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REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 1
VOLUME 1- EXECUTIVE SUMMARY AND SECTIONS 1-7 TEXT, TABLES AND FIGURES, OCTOBER 1993

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REPORT

REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 1

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

VOLUME 1
EXECUTIVE SUMMARY
SECTION 1-7
TEXT, TABLES, AND FIGURES

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U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE

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TABLE OF CONTENTS

	Page
List of Tables	xii
List of Figures	xix
List of Acronyms	xxv
Executive Summary	ES-1
1.0 Introduction	1-1
1.1 Description and History of the FEMP	1-3
1.1.1 Overview	1-3
1.1.2 Integration of the FEMP with the DOE System	1-4
1.1.3 Description of the FEMP Facility and Operations	1-4
1.1.3.1 Processing	1-5
1.1.3.2 Major Waste Types	1-6
1.1.4 Operating History of the FEMP	1-13
1.2 Description and History of Operable Unit 1	1-13
1.2.1 Description of Operable Unit 1	1-13
1.2.1.1 Waste Pit 1	1-14
1.2.1.2 Waste Pit 2	1-15
1.2.1.3 Waste Pit 3	1-16
1.2.1.4 Waste Pit 4	1-20
1.2.1.5 Waste Pit 5	1-21
1.2.1.6 Waste Pit 6	1-22
1.2.1.7 Clearwell	1-23
1.2.1.8 Burn Pit	1-24
1.2.2 History of Operable Unit 1	1-25
1.2.2.1 Waste Pit 1	1-27
1.2.2.2 Waste Pit 2	1-31
1.2.2.3 Waste Pit 3	1-31
1.2.2.4 Waste Pit 4	1-32
1.2.2.5 Waste Pit 5	1-33
1.2.2.6 Waste Pit 6	1-34
1.2.2.7 Clearwell	1-34
1.2.2.8 Burn Pit	1-34
1.2.2.9 Miscellaneous Facilities/Structures	1-35
1.3 Previous Studies on Operable Unit 1	1-35
1.3.1 Groundwater Pollution (1960)	1-36

E 4 3 3

TABLE OF CONTENTS
(Continued)

	Page
1.3.2 Aquifer Contamination Control Reports	1-36
1.4 Prior Environmental Investigations at the FEMP	1-37
1.4.1 Geologic Investigations	1-37
1.4.2 Surface Water and Sediment Investigations	1-37
1.4.3 Surface Soil Investigations	1-38
1.4.4 Hydrogeologic Investigations	1-38
1.4.5 Environmental Surveys	1-39
1.4.6 Vegetation and Wildlife Studies	1-40
1.5 Project Background	1-40
1.5.1 Regulatory Agency Agreements and the National Environmental Policy Act	1-40
1.5.2 Regulatory Agency Agreements and Applicable or Relevant and Appropriate Requirements	1-43
1.5.2.1 CERCLA and RCRA Integration	1-44
1.5.2.2 NEPA/CERCLA Integration Information	1-44
1.5.3 FEMP RI/FS	1-46
1.5.4 Operable Unit 1 Study Area Removal Actions	1-49
1.5.4.1 Removal Actions	1-49
1.5.4.2 Operable Unit 1 Study Area Runoff Control: Removal Action No. 2	1-49
1.5.4.3 Control of Exposed Material in Pit 6: Removal Action No. 6	1-50
1.5.4.4 Waste Pit 5 ETF: Removal Action No. 11	1-51
1.5.4.5 Control of Exposed Material in Waste Pit 5: Removal Action No. 18	1-51
1.5.4.6 Operable Unit 1 Study Area Contaminant Improvement: Removal Action No. 22	1-51
1.5.5 Waste Pit 4 Interim Closure	1-52
2.0 Study Area Investigations	2-1
2.1 Data Requirements Data Quality Objectives	2-1
2.1.1 Data Requirements	2-1
2.1.2 Data Quality Objectives	2-2
2.2 Surface Features	2-4
2.2.1 Aerial Photographic Interpretation	2-4
2.2.2 Photogrammetric Surveys	2-5
2.2.3 Geotechnical Evaluation of the Waste Pit Berms	2-6
2.3 Waste Pit Investigations	2-7
2.3.1 CIS Waste Pit Investigations	2-9

TABLE OF CONTENTS
(Continued)

		Page
	2.3.1.1 CIS Geophysical Surveys	2-9
	2.3.1.2 CIS Waste Pit Sampling	2-11
2.3.2	RI/FS Waste Pit Sampling Program	2-14
	2.3.2.1 1991 RI/FS Waste Pit Sampling	2-15
	2.3.2.2 1992 RI/FS Waste Pit Sampling	2-17
2.4	Meteorological Conditions	2-19
2.4.1	Wind Measurements	2-19
2.4.2	Meteorological Tower Temperature Measurements	2-20
2.5	Surface Water and Sediment	2-20
2.5.1	Surface Water	2-21
	2.5.1.1 FEMP Environmental Monitoring Program Paddy's Run Sampling	2-21
	2.5.1.2 Best Management Practices Plan Surface Water Sampling	2-22
	2.5.1.3 RI/FS Surface Water Sampling	2-23
2.5.2	Sediment	2-23
	2.5.2.1 1986 Paddy's Run Radiological Survey	2-24
	2.5.2.2 FEMP Environmental Monitoring Paddy's Run Sediment Sampling	2-25
	2.5.2.3 CIS Sediment Sampling	2-26
	2.5.2.4 RI/FS Paddys Run Sediment Sampling	2-27
2.6	Surface Soil	2-28
2.6.1	CIS Surface Soil Sampling	2-28
2.6.2	RI/FS Surface Soil Sampling	2-29
2.6.3	Waste Pit Area Storm Water Removal Action Surface Soil Sampling	2-30
2.6.4	FEMP Environmental Monitoring Surface Soil Sampling	2-31
2.6.5	CERCLA/RCRA Background Soil Sampling	2-31
2.7	Subsurface Soils	2-33
2.7.1	RI/FS Boring Program	2-33
2.8	Direct Radiation, Air, and Airborne Radon Monitoring	2-34
2.8.1	Direct Radiation	2-34
	2.8.1.1 CIS Direct Radiation Measurements	2-35
2.8.2	Air Monitoring	2-36
	2.8.2.1 FEMP Environmental Air Monitoring Program	2-36
2.8.3	Airborne Radon Measurements	2-37
	2.8.3.1 FEMP Environmental Monitoring Radon Emission Program	2-37
	2.8.3.2 Waste Pit Radon Flux Survey	2-37
2.9	Groundwater	2-39

004

4783

TABLE OF CONTENTS
(Continued)

	Page
2.9.1 1984 Groundwater Study	2-40
2.9.2 RCRA Groundwater Monitoring	2-41
2.9.3 RI/FS Groundwater Study	2-42
2.10 Ecological Sampling	2-44
2.10.1 Miami University Ecological Study	2-44
2.10.2 RI/FS Ecological Sampling	2-45
2.11 Quality Assurance Program Elements Used for Control and Verification of RI/FS Site Investigations	2-47
2.12 Data Validation	2-49
2.12.1 CIS Program Data Validation	2-53
2.12.1.1 CIS Chemical Data	2-54
2.12.1.2 CIS Radiological Data	2-54
2.12.2 RI/FS Program Data Validation	2-56
2.12.3 Validation Qualifiers	2-58
2.13 Data Quality Assessment	2-60
2.13.1 Regulatory Guidance Applicable to Data Quality Assessment	2-61
2.13.2 Data Evaluation	2-62
2.13.3 Summary	2-63
3.0 Physical Characteristics of the Study Area	3-1
3.1 Physical Characteristics of the Waste Pits	3-1
3.1.1 Waste Pit 1	3-1
3.1.2 Waste Pit 2	3-2
3.1.3 Waste Pit 3	3-2
3.1.4 Waste Pit 4	3-2
3.1.5 Waste Pit 5	3-3
3.1.6 Waste Pit 6	3-3
3.1.7 Burn Pit	3-3
3.1.8 Clearwell	3-3
3.1.9 Geotechnical Evaluation of the Waste Pit Berms	3-4
3.2 Meteorology and Air Quality	3-5
3.2.1 Wind	3-5
3.2.2 Precipitation	3-6
3.2.3 Temperature	3-6
3.2.4 Site-Wide Air Quality	3-6
3.2.5 Air Quality of Operable Unit 1	3-7

005

TABLE OF CONTENTS
(Continued)

			Page
	3.2.5.1	Radon Sampling	3-7
	3.2.5.2	Control of Exposed Material in Waste Pit 6 (Removal Action No. 6)	3-8
	3.2.5.3	Control of Exposed Material in Waste Pit 5 (Removal Action No. 18)	3-8
3.3	Topography and Surface Water Hydrology		3-8
3.3.1	Storm Sewer Outfall Ditch		3-9
3.3.2	Paddy's Run		3-10
3.3.3	Great Miami River		3-10
3.3.4	Topography and Surface Water Hydrology of Operable Unit 1		3-11
	3.3.4.1	Topography of Operable Unit 1	3-11
	3.3.4.2	Surface Water Hydrology of Operable Unit 1	3-11
3.4	Geology and Groundwater Hydrology		3-12
3.4.1	Geology		3-12
	3.4.1.1	Geologic History	3-12
	3.4.1.2	Bedrock Geology	3-15
	3.4.1.3	Seismology	3-15
	3.4.1.4	Glacial Outwash Deposits	3-15
	3.4.1.5	Geology of the Glacial Overburden	3-17
	3.4.1.6	Geology of Operable Unit 1 Area	3-18
	3.4.1.7	Soils	3-19
	3.4.1.8	Geochemistry and Mineralogy	3-22
3.4.2	Groundwater Hydrology		3-23
	3.4.2.1	Groundwater Hydrology of the Glacial Overburden	3-23
	3.4.2.2	Groundwater Hydrology of the Great Miami Aquifer	3-25
	3.4.2.3	Groundwater Flow in the Operable Unit 1 Study Area	3-26
3.5	Demographics and Land Use		3-28
3.5.1	Demographics		3-28
3.5.2	Land Use		3-30
3.6	Ecology		3-30
3.6.1	Regional Ecology		3-30
3.6.2	Floodplains and Wetlands		3-32
3.6.3	Threatened and Endangered Species		3-33
	3.6.3.1	Indiana Bat *(Myotis sodalis)*	3-33
	3.6.3.2	Cave Salamander *(Eurycea lucifuga)*	3-34

TABLE OF CONTENTS
(Continued)

		Page
	3.6.3.3 Other Species	3-34
4.0	Nature and Extent of Contamination	4-1
4.1	Background Data	4-2
4.1.1	Radioactive Decay Process	4-4
4.1.2	Process and Waste Summary	4-5
4.1.3	Statistics	4-5
4.1.4	Primary Data Sources	4-6
4.2	Sources	4-6
4.2.0	Source Characterization	4-6
4.2.0.1	Historical Evidence of Contaminants	4-7
4.2.0.2	Sample Physical Description	4-10
4.2.0.3	Geophysical Characterization	4-11
4.2.0.4	Radiological Characterization	4-12
4.2.0.5	Chemical Characterization	4-13
4.2.1	Waste Pit 1	4-16
4.2.1.1	Historical Characterization of Waste Pit 1	4-16
4.2.1.2	Sample Physical Characterization of Waste Pit 1	4-17
4.2.1.3	Geophysical Description of Waste Pit 1	4-17
4.2.1.4	Radiological Characterization of Waste Pit 1	4-18
4.2.1.5	Chemical Characterization of Waste Pit 1	4-19
4.2.1.6	Characterization Summary of Waste Pit 1	4-24
4.2.2	Waste Pit 2	4-25
4.2.2.1	Historical Characterization of Waste Pit 2	4-25
4.2.2.2	Sample Physical Characterization of Waste Pit 2	4-26
4.2.2.3	Geophysical Description of Waste Pit 2	4-27
4.2.2.4	Radiological Characterization of Waste Pit 2	4-27
4.2.2.5	Chemical Characterization of Waste Pit 2	4-29
4.2.2.6	Characterization Summary of Waste Pit 2	4-33
4.2.3	Waste Pit 3	4-35
4.2.3.1	Historical Characterization of Waste Pit 3	4-35
4.2.3.2	Sample Physical Characterization of Waste Pit 3	4-36
4.2.3.3	Geophysical Description of Waste Pit 3	4-37
4.2.3.4	Radiological Characterization of Waste Pit 3	4-37
4.2.3.5	Chemical Characterization of Waste Pit 3	4-39
4.2.3.6	Characterization Summary of Waste Pit 3	4-42

TABLE OF CONTENTS
(Continued)

		Page
4.2.4	Waste Pit 4	4-44
4.2.4.1	Historical Characterization of Waste Pit 4	4-44
4.2.4.2	Sample Physical Characterization of Waste Pit 4	4-45
4.2.4.3	Geophyiscal Description of Waste Pit 4	4-46
4.2.4.4	Radiological Characterization of Waste Pit 4	4-46
4.2.4.5	Chemical Characterization of Waste Pit 4	4-48
4.2.4.6	Characterization Summary of Waste Pit 4	4-51
4.2.5	Waste Pit 5	4-53
4.2.5.1	Historical Characterization of Waste Pit 5	4-53
4.2.5.2	Sample Physical Characterization	4-53
4.2.5.3	Geophysical Description	4-54
4.2.5.4	Radiological Characterization	4-54
4.2.5.5	Chemical Characterization of Waste Pit 5	4-55
4.2.5.6	Characterization Summary of Waste Pit 5	4-57
4.2.6	Waste Pit 6	4-58
4.2.6.1	Historical Characterization of Waste Pit 6	4-58
4.2.6.2	Sample Physical Characterization	4-58
4.2.6.3	Geophysical Description of Waste Pit 6	4-58
4.2.6.4	Radiological Characterization of Waste Pit 6	4-58
4.2.6.5	Chemical Characterization	4-60
4.2.6.6	Characterization Summary of Waste Pit 6	4-61
4.2.7	Burn Pit	4-62
4.2.7.1	Historical Characterization of the Burn Pit	4-62
4.2.7.2	Sample Physical Characterization of the Burn Pit	4-62
4.2.7.3	Geophysical Description of the Burn Pit	4-63
4.2.7.4	Radiological Characterization of the Burn Pit	4-63
4.2.7.5	Chemical Characterization of the Burn Pit	4-64
4.2.7.6	Characterization Summary of the Burn Pit	4-67
4.2.8	Clear Well	4-69
4.2.8.1	Historical Characterization of the Clearwell	4-69
4.2.8.2	Sample Physical Description of the Clearwell	4-70
4.2.8.3	Radiological Characterization of the Clearwell	4-70
4.2.8.4	Chemical Characterization of the Clearwell	4-70
4.2.8.5	Characterization Summary of the Clearwell	4-71
4.2.8.6	Characterization Summary of the Clearwell	4-73

4783

TABLE OF CONTENTS
(Continued)

		Page
4.3	Surface and Subsurface Soil	4-74
4.3.1	Surface Soil	4-74
4.3.1.1	CIS, FIDLER, and Geiger Mueller Beta-Gamma Dose Rate Measurements	4-75
4.3.1.2	Radiological Characterization	4-76
4.3.1.3	Chemical Characterization	4-79
4.3.2	Subsurface Soil	4-80
4.3.2.1	Radiological Characterization	4-80
4.3.2.2	Chemical Characterization	4-83
4.3.3	Soil Characterization Summary	4-83
4.4	Groundwater Characterization	4-84
4.4.1	Groundwater Within the Glacial Overburden	4-85
4.4.1.1	Radiological Characterization	4-87
4.4.1.2	Chemical Characterization	4-89
4.4.2	Groundwater Within the Great Miami Aquifer	4-92
4.4.2.1	2000-Series Well Data	4-93
4.4.2.2	3000-Series Well Data	4-97
4.4.2.3	4000-Series Well Data	4-100
4.4.3	Groundwater Summary	4-103
4.5	Surface Water and Sediment	4-107
4.5.1	Surface Water	4-108
4.5.1.1	Operable Unit 1 Runoff	4-108
4.5.1.2	Paddy's Run Stream Flow	4-111
4.5.2	Sediment	4-111
4.5.2.1	FEMP Environmental Monitoring Program	4-111
4.5.2.2	1986 Radiological Survey of Paddy's Run	4-111
4.5.2.3	CIS Program	4-112
4.5.2.4	RI/FS Program	4-112
4.5.3	Surface Water and Sediment Characterization Summary	4-113
4.6	Air and Direct Radiation	4-113
4.6.1	Airborne Radon	4-113
4.6.1.1	Waste Pit Radon-Flux Survey	4-114
4.6.1.2	FEMP Environmental Monitoring Program	4-115
4.6.2	Air Particulates	4-115
4.6.3	Direct Radiation	4-116

TABLE OF CONTENTS
(Continued)

		Page
4.7	Ecological Characterization	4-116
4.7.1	Background and Methods	4-117
4.7.2	Vegetation and Soil	4-118
4.7.3	Mammals	4-119
4.7.4	Fish	4-119
4.7.5	Macroinvertebrates	4-120
4.7.6	Ecological Characterization Summary	4-120
5.0	Contaminant Fate and Transport	5-1
5.1	Potential Migration Pathways	5-2
5.1.1	Surface Water Pathway	5-2
5.1.2	Groundwater Pathway	5-2
5.1.3	Air Pathway	5-3
5.2	Persistence of Contaminants	5-3
5.2.1	Radionuclides	5-3
5.2.2	Inorganics	5-4
5.2.3	Organics	5-5
5.3	Modeling of Potential Contaminant Migration	5-6
5.3.1	Surface Water Modeling	5-6
5.3.1.1	Conceptual Model	5-7
5.3.1.2	Technical Approach	5-7
5.3.1.3	Results of Surface Water Modeling	5-9
5.3.1.4	Uncertainties in the Model	5-10
5.3.1.5	Paddy's Run Loading to the Great Miami Aquifer	5-10
5.3.2	Groundwater Modeling and Transport Analysis	5-11
5.3.2.1	Conceptual Model	5-12
5.3.2.2	Source Term Development for Vadose Zone and Groundwater Models	5-14
5.3.2.3	Vadose Zone Modeling	5-19
5.3.2.4	Aquifer Modeling	5-21
5.3.2.5	Uncertainty in Modeling Results	5-23
5.3.3	Air Transport Modeling	5-25
5.3.3.1	Introduction	5-25
5.3.3.2	Emission Scenarios	5-26
5.3.3.3	Air Transport Contaminants	5-27
5.3.3.4	Contaminant Emission Rate Estimates	5-28

4783

TABLE OF CONTENTS
(Continued)

		Page
	5.3.3.5 Air Dispersion Modeling	5-30
	5.3.3.6 Air Dispersion Modeling Results	5-32
	5.3.3.7 Uncertainties in the Air Transport Analysis	5-33
	5.3.3.8 Comparison of Model Predictions to Ambient Air Monitoring Data	5-35
	5.4 Summary of Contaminant Fate and Transport	5-36
	5.4.1 Surface Water	5-36
	5.4.2 Groundwater	5-37
	5.4.3 Air	5-38
6.0	Baseline Risk Assessment	6-1
	6.1 Methods	6-2
	6.2 Constituents of Potential Concern (CPCs)	6-2
	6.3 Exposure Assessment	6-3
	6.4 Toxicity Assessment	6-6
	6.5 Risk Characterization Results	6-7
	6.5.1 Current Land Use With Access Controls - Current Source Term	6-7
	6.5.2 Current Land Use Without Access Controls - Current Source Term	6-7
	6.5.3 Current Land Use - Future Source Term	6-8
	6.5.4 Future Land Use - Future Source Term	6-9
	6.5.5 Background Risks	6-10
	6.6 Ecological Assessment	6-10
	6.7 Uncertainty Analysis	6-11
	6.7.1 Uncertainty in Selection of CPCs	6-11
	6.7.2 Uncertainties in Exposure Assessment	6-11
	6.7.3 Uncertainty in Toxicity Assessment	6-14
	6.7.4 Risk Characterization	6-16
	6.7.5 Summary of Uncertainties in Operable Unit 1 Baseline Risk Assessment	6-16
7.0	Summary and Conclusions	7-1
	7.1 Facility Description and History of Operations	7-1
	7.1.1 Waste Pit Construction	7-2
	7.1.2 Waste Pit Operation	7-2
	7.2 Contaminant Source Characterization	7-3
	7.2.1 Radiological Characteristics	7-3
	7.2.3 Chemical Characteristics	7-4

011

TABLE OF CONTENTS
(Continued)

		Page
7.3	Nature and Extent of Contamination	7-5
7.3.1	Surface and Vadose Zone Soil	7-5
7.3.2	Groundwater	7-6
7.3.3	Surface Water and Sediments	7-9
7.3.4	Air and Direct Radiation	7-9
7.3.5	Ecological Characterization	7-10
7.4	Summary of Contaminant Fate and Transport	7-11
7.4.1	Surface Water	7-11
7.4.2	Groundwater	7-12
7.4.3	Air	7-13
7.5	Baseline Risk Assessment	7-14
7.5.1	Exposure Scenarios	7-15
7.5.2	Constituents of Potential Concern	7-16
7.5.3	Risk Characterization Results	7-17
7.5.3.1	Current Land Use With Access Controls - Current Source Term	7-18
7.5.3.2	Current Land Use Without Access Controls - Current Source Term	7-18
7.5.3.3	Current Land Use - Future Source Term	7-19
7.5.3.4	Future Land Use - Future Source Term	7-19
7.6	Data Limitations	7-20
7.7	Recommended Remedial Action Objectives	7-21
7.7.1	Constituents of Potential Concern	7-22
7.7.2	Preliminary Remediation Goals	7-22
7.7.2.1	Risk-Based PRG Development	7-23
7.7.2.2	As Low As Reasonably Achievable	7-26
7.7.2.3	Preliminary Remediation Goals for Soils	7-27
7.7.2.4	Preliminary Remediation Goals for Groundwater	7-31
7.7.2.5	Surface Water	7-33
7.7.3	Development of Remedial Action Objectives	7-34
7.8	Findings and Conclusions	7-34

Appendix A - Non-QA/QC Pit Samples
Appendix B - Subsurface and Surface Media
Appendix C - Air Monitoring Data
Appendix D - Operable Unit 1 Fate and Transport Modeling
Appendix E - Operable Unit 1 Baseline Risk Assessment
Appendix F - Reference Materials
Appendix G - QA/QC Samples

LIST OF TABLES

Table	Title	Page
1-1	Deposition of Ash from On-Site Incinerators	1-12
1-2	Material Volume Calculation Results for Waste Pit 1	1-15
1-3	Material Volume Calculation Results for Waste Pit 2	1-16
1-4	Material Placed in Waste Pit 3 as Cover	1-18
1-5	Material Volume Calculation Results for Waste Pit 3	1-19
1-6	Material Volume Calculation Results for Waste Pit 4	1-21
1-7	Material Volume Calculation Results for Waste Pit 5	1-22
1-8	Material Volume Calculation Results for Waste Pit 6	1-23
1-9	Material Volume Calculation Results for the Clearwell	1-24
1-10	Material Volume Calculation Results for the Burn Pit	1-25
1-11	Summary of Operable Unit 1 Waste Pit Contents Based on Process Knowledge	1-28
1-12	Summary of Operable Unit 1 Waste Pit Constituents Based on Process Knowledge	1-29
2-1	Summary of Operable Unit 1 Environmental Studies	2-64
2-2	Operable Unit 1 Remedial Investigation Data Evaluation Matrix	2-65
2-3	Qualitative Data Quality Objectives	2-70
2-4	Quality Assurance Project Plan Data Quality Objectives for Precision, Accuracy, and Completeness	2-72
2-5	Sampling and Analysis Summary for Waste Pit 1	2-73
2-6	Sampling and Analysis Summary for Waste Pit 2	2-75
2-7	Sampling and Analysis Summary for Waste Pit 3	2-77
2-8	Sampling and Analysis Summary for Waste Pit 4	2-79
2-9	Sampling and Analysis Summary for Waste Pit 5	2-81
2-10	Sampling and Analysis Summary for Waste Pit 6	2-83
2-11	Sampling and Analysis Summary for the Burn Pit	2-85
2-12	Sampling and Analysis Summary for the Clearwell	2-87
2-13	Summary of Waste Pit Analytical Completeness	2-88
2-14	ASTM Standards	2-90
2-15	Summary of Surface Water and Sediment Analytical Completeness	2-91
2-16	Summary of Surface Soil Analytical Completeness	2-93
2-17	Summary of Subsurface Soil Analytical Completeness	2-94
2-18	Operable Unit 1 Monitoring Wells	2-95
2-19	Summary of Operable Unit 1 Groundwater Sampling Dates	2-98
2-20	Construction Summary of Monitoring Wells Outside Operable Unit 1	2-102
2-21	Summary of Groundwater Sampling Dates Outside Operable Unit 1	2-103
2-22	Summary of Groundwater Analytical Completeness	2-104

4783

LIST OF TABLES
(Continued)

Table	Title	Page
2-23	Summary of Data Validation Activities for Operable Unit 1	2-106
2-24	Criteria Used in Assignment of Qualifiers for Operable Unit 1 Data	2-107
2-25	Data Validation Criteria Revisions	2-111
2-26	Summary of Operable Unit 1 Analytical Laboratories	2-112
2-27	Operable Unit 1 CIS Pit Material Data Summary	2-113
2-28	Operable Unit 1 1991 RI/FS Pit Material Data Summary	2-115
2-29	Operable Unit 1 1991 RI/FS Pit Leachate Data Summary	2-116
2-30	Operable Unit 1 1992 RI/FS Pit Material Data Summary	2-117
3-1	Geotechnical Results for Waste Pits 1, 2, 3, 4, and Burn Pit	3-35
3-2	Ambient Air Temperature Measured by the FEMP Meteorological System	3-36
3-3	Soil Conservation Service Soils Drainage Classifications at the FEMP	3-37
3-4	Modal Percent for Minerals in Subsurface Soil Samples	3-38
3-5	Slug Test Results for Glacial Overburden	3-39
4-1.1.A	Radiological Profile of Pit 1	4-122
4-1.2.A	Radiological Profile of Pit 2	4-124
4-1.3.A	Radiological Profile of Pit 3	4-125
4-1.4.A	Radiological Profile of Pit 4	4-126
4-1.5.A	Radiological Profile of Pit 5	4-127
4-1.6.A	Radiological Profile of Pit 6	4-128
4-1.7.A	Radiological Profile of Burn Pit	4-129
4-1.8.A	Radiological Profile of the Clearwell	4-130
4-1.1.B	Metals Profile of Pit 1	4-131
4-1.2.B	Metals Profile in Pit 2	4-133
4-1.3.B	Metals Profile in Pit 3	4-134
4-1.4.B	Metals Profile in Pit 4	4-135
4-1.5.B	Metals Profile in Pit 5	4-136
4-1.6.B	Metals Profile in Pit 6	4-137
4-1.7.B	Metals Profile in the Burn Pit	4-138
4-1.8.B	Metals Profile in the Clearwell	4-139
4-1.1.C	Organic Profile of Pit 1	4-140
4-1.2.C	Organic Profile of Pit 2	4-144
4-1.3.C	Organic Profile of Pit 3	4-147
4-1.4.C	Organic Profile of Pit 4	4-150

LIST OF TABLES
(Continued)

4783

Table	Title	Page
4-1.5.C	Organic Profile of Pit 5	4-153
4-1.6.C	Organic Profile of Pit 6	4-156
4-1.7.C	Organic Profile of the Burn Pit	4-159
4-1.8.C	Organic Profile of the Clearwell	4-162
4-2	Background Concentrations for Soils and Groundwater	4-165
4-3	Operable Unit 1 - RI/FS Data Sources	4-168
4-4	Pit Material Statistical Summary - CIS Radiological Data	4-168
4-5	Pit Material Statistical Summary - RI/FS Radiological Data	4-172
4-6	Pit Leachate Statistical Summary - RI/FS Radiological Data	4-175
4-7	Pit Material Statistical Summary - CIS Inorganic Data	4-178
4-8	Pit Material Statistical Summary - RI/FS Inorganic Data	4-181
4-9	Pit Material Statistical Summary - CIS Organic Data	4-187
4-10	Pit Material Statistical Summary - RI/FS Organic Data	4-199
4-11	Pit Leachate RI/FS Statistical Summary for Inorganic Data	4-213
4-12	Pit Leachate Statistical Summary - RI/FS Organic Data	4-217
4-13	Pit Surface Water CIS Statistical Summary for Radiological Data	4-232
4-14	Pit Surface Water CIS Statistical Summary for Inorganic Data	4-235
4-15	Pit Surface Water CIS Statistical Summary for Organic Data	4-238
4-16	Surface Soil CIS Radiological Data	4-250
4-17	Surface Soil RI/FS Radiological Data	4-254
4-18	Surface Soil WPA Inorganic Data	4-255
4-19	Surface Soil WPA Organic Data	4-257
4-20	RI/FS Subsurface Soil Results Above Radiological Background Concentration (pCi/g)	4-258
4-21	RI/FS Groundwater 1000-Series Monitoring Wells - Radiological Summary	4-260
4-22	RCRA Groundwater 1000-Series Monitoring Wells - Radiological Summary	4-268
4-23	RI/FS Groundwater 1000-Series Monitoring Wells - Inorganic Summary	4-277
4-24	RCRA Groundwater 1000-Series Monitoring Wells - Inorganic Summary	4-295
4-25	RI/FS Groundwater 1000-Series Monitoring Well - Organic Results	4-311
4-26	RCRA Groundwater 1000-Series Monitoring Wells - Organic Summary	4-375
4-27	RI/FS Groundwater 2000- to 4000-Series Monitoring Wells - Radiological Summary	4-423

015

4783

LIST OF TABLES
(Continued)

Table	Title	Page
4-28	RCRA Groundwater 2000- to 4000-Series Monitoring Wells - Radiological Summary	4-431
4-29	RI/FS Groundwater 2000- to 4000-Series Monitoring Wells - Inorganic Summary	4-441
4-30	RCRA Groundwater 2000- to 4000-Series Monitoring Wells Inorganic Summary	4-457
4-31	RI/FS Groundwater 2000- to 4000-Series Monitoring Wells - Organic Summary	4-478
4-32	RCRA Groundwater 2000- to 4000-Series Monitoring Wells Organic Summary	4-542
4-33	Surface Water Analytical Results	4-608
4-34	Concentrations of Uranium in Surface Water Within Operable Unit 1	4-609
4-35	Summary of Surface Water Radiological Results, RI/FS Data	4-610
4-36	Summary of FEMP Environmental Monitoring Program Surface Water Sampling Results	4-611
4-37	Radioisotopes in Paddy's Run Sediments FEMP Environmental Monitoring Program	4-613
4-38	Summary of Sediment Radiological Results - CIS	4-615
4-39	Summary of Radon Flux Measurements	4-616
4-40	Indiana Control Area Radionuclide Concentrations in Garden Produce, Agricultural Crops, and Soil Samples	4-617
4-41	Radionuclide Concentrations in Garden Produce from Roadside Stand in the FEMP Vicinity	4-618
4-42	Radionuclide Concentrations in FEMP Vicinity Garden Produce, Agricultural Crops, and Soil Samples	4-619
4-43	Total Uranium Concentration Ratios in Garden Produce and Agricultural Crops for Selected Sites in the FEMP Vicinity	4-621
4-44	Radionuclide Concentrations in Wetland Plants and Soil Near Operable Unit 1 on the FEMP	4-623
4-45	Concentrations of Radiological Constituents in Soil and Terrestrial Vegetation Near Operable Unit 1	4-624
4-46	Chemical Concentrations in Vegetation and Wildlife Collected from the FEMP	4-625
4-47	Radionuclide Concentrations in Mammal Tissue Sampled Near Operable Unit 1 from the FEMP	4-626
4-48	Radionuclide Concentrations in Fish from Paddy's Run and Pond	4-627
4-49	Radionuclide Concentrations in Benthic Macroinvertebrates from Paddy's Run	4-628

016

LIST OF TABLES
(Continued)

Table	Title	Page
5-1	Available Potential Constituents of Concern Concentrations in Surface Soils at Operable Unit 1	5-41
5-2	Modeled Concentrations in Paddy's Run and the Great Miami River	5-43
5-3	Comparison of Modeled Results to Measured Surface Water Concentrations in Paddy's Run	5-45
5-4	Paddy's Run Loading - Screening for SWIFT	5-46
5-5	Vadose Zone Model Input Parameters - Operable Unit 1	5-48
5-6	Leachate A and Leachate B Compositions for Inorganic and Radionuclides in Operable Unit 1 - Pit 1	5-49
5-7	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - Pit 2	5-51
5-8	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - Pit 3	5-53
5-9	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - Pit 4	5-55
5-10	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - Pit 5	5-57
5-11	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - Pit 6	5-59
5-12	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - Burn Pit	5-61
5-13	Leachate A and Leachate B Compositions for Inorganics and Radionuclides in Operable Unit 1 - The Clearwell	5-63
5-14	Organic Leachate Concentrations in Operable Unit 1 - Pit 1	5-65
5-15	Organic Leachate Concentrations in Operable Unit 1 - Pit 2	5-67
5-16	Organic Leachate Concentrations in Operable Unit 1 - Pit 3	5-69
5-17	Organic Leachate Concentrations in Operable Unit 1 - Pit 4	5-71
5-18	Organic Leachate Concentrations in Operable Unit 1 - Pit 5	5-73
5-19	Organic Leachate Concentrations in Operable Unit 1 - Pit 6	5-75
5-20	Organic Leachate Concentrations in Operable Unit 1 - Burn Pit	5-77
5-21	Organic Leachate Concentrations in Operable Unit 1 - Clearwell	5-79
5-22	Screening Summary of Potential Constituents of Concern for Operable Unit 1	5-81
5-23	Constituents of Concern Summary List	5-85
5-24	Media Parameters for Vadose Zone Model - Operable Unit 1	5-87
5-25	Summary of Loading Times and Concentrations for Constituents of Concern	5-88
5-26	Summary of Constituents of Concern Predicted Maximum Concentrations in Groundwater	5-89

017

LIST OF TABLES
(Continued)

Table	Title	Page
5-27	Summary of Constituents of Concern Predicted Maximum Concentrations in Groundwater Surface Water Pathway	5-91
5-28	Emission Flux of Radon Gas from OU-1 Waste Pit Areas in the Current and Future Emission Scenarios	5-92
5-29	Activity Levels of Radionuclides in Surface Soil for the Current Scenario	5-93
5-30	Inorganic and Organic Concentration Data for the Current Scenario	5-94
5-31	Activity Level of Radionuclides for the Future Scenario at all OU-1 Waste Pit Areas	5-95
5-32	Inorganic and Organic Concentration Data for the Future Scenario at all OU1 Waste Pit Areas	5-96
5-33	Current Scenario, Maximum Annual Average On-Site Contaminant Concentrations, Annual Period: 1989, Radiological Contaminants	5-98
5-34	Current Scenario, Maximum Annual Average On-Site Contaminant Concentrations, Annual Period: 1989, Inorganic Contaminants	5-99
5-35	Maximum Annual Average On-Site Contaminant Concentrations, Annual Period: 1989, Other Contaminants	5-100
5-36	Current Scenario, Maximum Annual Average Off-Site Contaminant Concentrations, Annual Period: 1989, Radiological Contaminants	5-101
5-37	Current Scenario, Maximum Annual Average Off-Site Contaminant Concentrations, Annual Period: 1989, Inorganic Contaminants	5-102
5-38	Current Scenario, Maximum Annual Average Off-Site Contaminant Concentrations, Annual Period: 1989, Other Contaminants	5-103
5-39	Future Scenario, Maximum Annual Average On-Site Contaminant Concentrations, Annual Period: 1989, Radiological Contaminants	5-104
5-40	Future Scenario, Maximum Annual Average On-Site Contaminant Concentrations, Annual Period: 1989, Inorganic Contaminants	5-105
5-41	Future Scenario, Maximum Annual Average On-Site Contaminant Concentrations, Annual Period: 1989, Other Contaminants	5-106
5-42	Future Scenario, Maximum Annual Average Off-Site Contaminant Concentrations, Annual Period: 1989, Radiological Contaminants	5-107
5-43	Future Scenario, Maximum Annual Average Off-Site Contaminant Concentrations, Annual Period: 1989, Inorganic Contaminants	5-108
5-44	Future Scenario, Maximum Annual Average Off-Site Contaminant Concentrations, Annual Period: 1989, Other Contaminants	5-109
5-45	Current Scenario, Maximum Annual Average Contaminant Concentrations for Discrete Receptor Location, Radiological Contaminants	5-110
5-46	Current Scenario, Maximum Annual Average Contaminant Concentrations for Discrete Receptor Location, Inorganic Contaminants	5-111

LIST OF TABLES
(Continued)

Table	Title	Page
5-47	Current Scenario, Maximum Annual Average Contaminant Concentrations for Discrete Receptor Location, Other Contaminants	5-112
5-48	Future Scenario, Maximum Annual Average Contaminant Concentrations for Discrete Receptor Location, Radiological Contaminants	5-113
5-49	Future Scenario, Maximum Annual Average Contaminant Concentrations for Discrete Receptor Location, Inorganic Contaminants	5-114
5-50	Future Scenario, Maximum Annual Average Contaminant Concentrations for Discrete Receptor Location, Other Contaminants	5-115
6-1	Incremental Lifetime Cancer Risk Summary, Current Source Term	6-18
6-2	Hazard Index Summary, Current Source Term	6-19
6-3	Incremental Lifetime Cancer Risk Summary, Future Source Term	6-20
6-4	Hazard Index Summary, Future Source Term	6-22
6-5	Incremental Lifetime Cancer Risks for Soil Pathways, RME Resident Farmer, Natural Background Concentrations	6-23
6-6	Toxic Effects for Soil Pathways, RME Resident Farmer, Natural Background Concentrations	6-24
6-7	Uncertainties Associated with Estimated Risks from Operable Unit 1	6-25
7-1	Waste Unit Characteristics	7-38
7-2	Summary of Operable Unit 1 Waste Pit Contents Based on Process Knowledge	7-39
7-3	Waste Unit Constituent Inventory Based on Analytical Results	7-40
7-4	Comparison of Process Knowledge and RI/FS Sampling Estimate Waste Pit Inventories	7-42
7-5	Summary of Baseline Risk by Media and Receptor, Current Source Term	7-44
7-6	Summary of Baseline Risk by Media and Receptor, Future Source Term	7-46
7-7	Data Limitations and Recommended Actions	7-48
7-8	Radiological Constituents of Potential Concern, Operable Unit 1	7-54
7-9	Chemical Constituents of Potential Concern, Operable Unit 1	7-55
7-10	Development of Preliminary Remediation Goals, Operable Unit 1	7-58
7-11	Preliminary Remediation Goals - Soil	7-59
7-12	Preliminary Remediation Goals - Groundwater	7-63
7-13	Summary of MCLs, MCLGs, and Secondary MCLs	7-70
7-14	Preliminary Remediation Goals for Surface Water Based on Protection of Acquatic Species	7-73
7-15	Remedial Action Objectives Operable Unit 1	7-76

4783

LIST OF FIGURES

Figure	Title	Page
1-1	Southwest Ohio Map	1-53
1-2	FEMP Site Location Map	1-54
1-3	Location of Operable Unit 1 Within the FEMP	1-55
1-4	Operable Unit 1 Site Map	1-56
1-5	Feed Materials Relationship to AEC Production Systems	1-57
1-6	Schematic Diagram of the FMPC Process	1-58
1-7	Existing Production Area Layout	1-59
1-8	Liquid Waste Flow Diagram	1-60
1-9	Distribution of Ash to Waste Pits	1-61
1-10	Waste Pit Cross Section Plan	1-62
1-11	Waste Pit Area Cross Sections	1-63
1-12	Waste Pit 1 Physical Description	1-64
1-13	Waste Pit 2 Physical Description	1-65
1-14	Waste Pit 3 Physical Description	1-66
1-15	Waste Pit 4 Physical Description	1-67
1-16	Waste Pit 5 Physical Description	1-68
1-17	Waste Pit 6 Physical Description	1-69
1-18	Clearwell Physical Description	1-70
1-19	Burn Pit Physical Description	1-71
1-20	Historical Time Line of Pit Usage	1-72
1-21	Location Map of Miscellaneous Facilities, Structures, and Underground Piping in the CRU-1 Area	1-73
2-1	Operable Unit 1 Site Map	2-118
2-2	OU-1 Timeline of Regulatory Promulgations and Environmental Studies	2-119
2-3	Operable Unit 1 Topographic Map for Evaluation of Waste Pit Berms	2-120
2-4	Waste Pit Sampling Locations	2-121
2-5	Surface Water and Sediment Sampling Locations	2-122
2-6	FEMP Environmental Monitoring Surface Water Sampling Locations	2-123
2-7	1986 Radiological Survey of Paddys Run Creek	2-124
2-8	CIS Screening Sediment Sampling Locations	2-125
2-9	Surface Soil Sampling Locations	2-126
2-10	CIS Screening Surface Soil Sampling Location	2-127
2-11	CERCLA/RCRA Background Soil Study Sampling Locations	2-128
2-12	Subsurface Soil Sampling Locations	2-129

4789

LIST OF FIGURES
(Continued)

Figure	Title	Page
2-13	On-Site Radon/Air Monitoring Locations	2-130
2-14	Perched Water Sampling Locations (1000 Series Wells)	2-131
2-15	Groundwater Sampling Locations (2000 Series Wells)	2-132
2-16	Groundwater Sampling Locations (3000 Series Wells)	2-133
2-17	Groundwater Sampling Locations (4000 Series Wells)	2-134
2-18	Groundwater Monitoring Well Completion Depths	2-135
2-19	Summary of Specifications for Well Completion 1000/2000 Series Wells	2-136
2-20	Summary of Specifications for Well Completion 3000/4000 Series Wells	2-137
2-21	Ecological Sampling Location	2-138
2-22	Reporting Results: Qualifiers and Quantitation Limits	2-139
2-23	Decision Tree for Quantifying U-Qualified Data	2-140
2-24	Data Quality Assessment Process	2-141
3-1	Pit Cross Section Locations	3-40
3-2	Cross Section of Waste Pit 1 Contents	3-41
3-3	Cross Section of Waste Pit 2 Contents	3-42
3-4	Cross Section of Waste Pit 3 Contents	3-43
3-5	Cross Section of Waste Pit 4 Contents	3-44
3-6	Cross Section of Burn Pit Contents	3-45
3-7	Wind Rose for the FEMP Site Year 1992	3-46
3-8	USGS Topographic Map of the FEMP	3-47
3-9	1993 Topographic Map of the Operable Unit 1 Study Area	3-48
3-10	Surface Water Features and Drainage Patterns	3-49
3-11	Surface Water Bodies On and Adjacent to the FEMP	3-50
3-12	Storm Water Collection System for the FEMP	3-51
3-13	1951 Topographic Map of Operable Unit 1 Study Area	3-52
3-14	Storm Water Collection System for Operable Unit 1	3-53
3-15	Schematic Cross Section of the FEMP Area	3-54
3-16	Schematic Diagrams of the Deep Stage Drainage and the Present Drainage System	3-55
3-17	Conceptual Map of Surface Geology	3-56
3-18	Generalized Map of Pre-Site Construction Surface Geology	3-57
3-19	Generalized Stratigraphic Column of the FEMP Region	3-58
3-20	Bedrock Topography Map	3-59
3-21	Clay Interbed Topographic Surface	3-60
3-22	Clay Interbed Isopach	3-61

LIST OF FIGURES
(Continued)

Figure	Title	Page
3-23	Cross Sections Index Map for Operable Unit 1	3-62
3-24	Cross Section A-A′	3-63
3-25	Cross Section B-B′	3-64
3-26	Cross Section C-C′	3-65
3-27	Cross Section D-D′	3-66
3-28	Cross Section E-E′	3-67
3-29	Cross Section F-F′	3-68
3-30	Cross Section G-G′	3-69
3-31	Cross Section H-H′	3-70
3-32	Planar View of Lateral Extent of Waste Pits 4 and 6 Glacial Overburden Sand and Gravel Lenses	3-71
3-33	Soil Classifications and Prime Agricultural Land at the FEMP	3-72
3-34	Areas of Surface Water Infiltration to the Great Miami Aquifer Along Paddy's Run Creek and the Storm Sewer Outfall Ditch	3-73
3-35	Great Miami Aquifer Underlying the FEMP and Vicinity	3-74
3-36	Regional Groundwater Elevations, April 1986	3-75
3-37	Groundwater Elevations for 2000-Series Wells, January, 1992	3-76
3-38	Groundwater Elevations for 2000 Series Wells April, 1992	3-77
3-39	Groundwater Elevations for 2000 Series Wells July, 1992	3-78
3-40	Groundwater Elevations for 2000 Series Wells October, 1992	3-79
3-41	Hydrograph for Monitor Well 1011	3-80
3-42	Hydrograph for Monitor Well 1027	3-81
3-43	Hydrograph for Well Cluster 001	3-82
3-44	Hydrograph for Well Cluster 004	3-83
3-45	Hydrograph for Well Cluster 011	3-84
3-46	Hydrograph for Well 2027	3-85
3-47	Water Level Elevations in Waste Pits and Glacial Overburden, Autumn 1991	3-86
3-48	Water Level Elevations in Waste Pits and Glacial Overburden, May 1993	3-87
3-49	Land Use Adjacent to the FEMP	3-88
3-50	Sections of the Eastern Deciduous Forest Province in the Region of the FEMP	3-89
3-51	Habitat Types Present on the FEMP	3-90
3-52	Great Miami River and Paddy's Run (Creek) 100-Year Floodplain	3-91
3-53	Approximate Boundaries of Jurisdictional Wetlands at the FEMP	3-92
3-54	Indiana Bat Sampling Sites and Habitat Evaluation at the FEMP and Vicinity	3-93

022

LIST OF FIGURES
(Continued)

Figure	Title	Page
3-55	Population Locations and Potential Habitat for the Cave Salamander in the Vicinity of the FEMP	3-94
4-1	Principal Decay Scheme of the Uranium Series	4-629
4-2	Principal Decay Scheme of the Actinium Series	4-630
4-3	Principal Decay Scheme of the Thorium Series	4-631
4-4	CIS Borehole Sample Locations in the Waste Storage Area	4-632
4-5	RI/FS Waste Pit Material Boring/Leachate Monitoring Well Locations	4-633
4-6	1992 RI/FS Waste Pit Sampling Locations	4-634
4-7	Soil Boring/Groundwater Monitoring Well Locations	4-635
4-8	Pit Cross Section Locations	4-636
4-9	Conceptual Cross Section of Waste Pit 1 Contents	4-637
4-10	Geophysical Anomaly Map of Waste Pit One	4-638
4-11	Waste Pit Material - CIS Radiological Data	4-639
4-12	Waste Pit Material - RI/FS Radiological Data	4-640
4-13	Waste Pit Material - CIS Inorganic Data	4-641
4-14	Waste Pit Material - RI/FS Inorganic Data	4-642
4-15	Waste Pit Material - CIS Organic Data	4-643
4-16	Waste Pit Material - RI/FS Organic Data	4-644
4-17	Conceptual Cross Section of Waste Pit 2 Contents	4-645
4-18	Geophysical Anomaly Map of Waste Pit Two	4-646
4-19	Conceptual Cross Section of Waste Pit 3 Contents	4-647
4-20	Geophysical Anomaly Map of Waste Pit Three	4-648
4-21	Conceptual Cross Section of Waste Pit 4 Contents	4-649
4-22	Geophysical Anomaly Map of Waste Pit Four	4-650
4-23	Conceptual Cross Section of Burn Pit Contents	4-651
4-24	Geophysical Anomaly Map of Burn Pit	4-652
4-25	Isopleth of U-238 Activity Concentration in Surface Soils	4-653
4-26	FIDLER Measurement Contours Within Operable Unit 1 (Counts Per Minute)	4-654
4-27	Beta Gamma Dose Rate Contours Within Operable Unit 1 (mRAD/Hr)	4-655
4-28	Location of Surface Soil Containing Elevated Thorium-232	4-656
4-29	Uranium Concentration in Subsurface Soil (Zone 10-38)	4-657
4-30	Water Level Elevations in Waste Pits and Glacial Overburden, May 1993	4-658
4-31	Water Level Elevations in Waste Pits and Glacial Overburden, Autumn 1991	4-659
4-32	Average Total Uranium Concentrations in Perched Groundwater	4-660
4-33	Average Total Uranium Concentrations in the Upper Zone of the Great	

LIST OF FIGURES
(Continued)

Figure	Title	Page
	Miami Aquifer	4-661
4-34	Average Total Uranium Concentrations in the Middle Zone of the Great Miami Aquifer	4-662
4-35	Distribution of Uranium in Surface Water	4-663
4-36	Distribution of Uranium in Sediments	4-664
4-37	Radon-Flux Density for Waste Pits 1, 2, 3, and 4	4-665
4-38	Airborne Radon Concentration FEMP Environmental Monitoring	4-666
4-39	Airborne Uranium Concentration FEMP Air Monitoring Stations	4-667
4-40	Direct Radiation Dose Rates - CIS	4-668
4-41	Location of RI/FS Vegetation/Soils and Mammal Sampling Sites Near the Waste Storage Area and On Site	4-669
4-42	Location of Sampling Sites for Garden Produce and Agricultural Crops in the FEMP Vicinity	4-670
5-1	Principal Decay Scheme of the Uranium Series	5-116
5-2	Principal Decay Scheme of the Actinium Series	5-117
5-3	Principal Decay Scheme of the Thorium Series	5-118
5-4	Conceptual Model of Surface Water Runoff	5-119
5-5	Topography and Natural Drainage Scenario of OU-1 FEMP Site	5-120
5-6	Surface Water to Groundwater Pathway Transport Modeling Diagram	5-121
5-7	Conceptual Vadose Zone Model	5-122
5-8	Estimating Leachate for Radionuclides and Inorganics	5-123
5-9	Estimating Leachate for Organics	5-124
5-10	Potential Constituent of Concern Screening Diagram	5-125
5-11	Conceptual Model of Contaminant Transport by Groundwater at the FEMP	5-126
5-12	Projected Concentration of Total Uranium in Groundwater Beneath FEMP After 100 Years Due to Loading from Operable Unit 1 Waste Areas	5-127
5-13	Projected Maximum Concentration of Total Uranium in Groundwater Beneath FEMP Due to Loading from Operable Unit 1 Waste Areas After 630 Years	5-128
5-14	Projected Concentration of Total Uranium in Groundwater Beneath FEMP After 1000 Years Due to Loading From Operable Unit 1 Waste Areas	5-129
5-15	Operable Unit 1 Source Emission Areas, Fernald, Ohio	5-130
5-16	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Arsenic for the OU-1 Current Emissions Scenario Site-Wide, Fernald, Ohio	5-131
5-17	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Arsenic for the OU-1 Current Emissions Scenario Inset, Fernald, Ohio	5-132
5-18	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Radon for the OU-1	

LIST OF FIGURES
(Continued)

Figure	Title	Page
	Current Emissions Scenario Site-Wide, Fernald, Ohio	5-133
5-19	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Radon for the OU-1 Current Emissions Scenario Inset, Fernald, Ohio	5-134
5-20	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Uranium 238 for the OU-1 Current Emissions Scenario Site-Wide, Fernald, Ohio	5-135
5-21	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Uranium 238 for the OU-1 Current Emissions Scenario Inset, Fernald, Ohio	5-136
5-22	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Arsenic for the OU-1 Future Emissions Scenario Site-Wide, Fernald, Ohio	5-137
5-23	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Arsenic for the OU-1 Future Emissions Scenario Inset, Fernald, Ohio	5-138
5-24	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Radon for the OU-1 Future Emissions Scenario Site-Wide, Fernald, Ohio	5-139
5-25	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Radon for the OU-1 Future Emissions Scenario Inset, Fernald, Ohio	5-140
5-26	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Uranium 238 for the OU-1 Future Emissions Scenario Site-Wide, Fernald, Ohio	5-141
5-27	Isopleth of Ground Level Concentration ($\mu g/m^3$) of Uranium 238 for the OU-1 Future Emissions Scenario Inset, Fernald, Ohio	5-142
5-28	OU-1 Overall Fate and Transport Modeling Framework	5-143

LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ALARA	as low as reasonably acceptable
AMS	air monitoring stations
ARAR	applicable or relevant and appropriate requirement
ASI	Advanced Sciences, Inc.
ASL	Analytical Support Level
ASTM	American Society for Testing and Materials
AWQC	ambient water quality criteria
BMP	best management practice
BSL	biodenitrification surge lagoon
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CAA	Clean Air Act
CCV	continuing calibration verification (standard)
CDD	chlorinated dibenzo-p-dioxins
CDF	chlorinated dibenzofurans
CEDE	committed effective dose equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CIS	Characterization Investigation Study
CLP	Contract Laboratory Program (EPA)
cm/s	centimeter/second
COA	Certificate of Analysis
COC	chain of custody
COE	U.S. Army Corps of Engineers
CRQL	contract required quantitation limit
CR	concentration ratio
CRARE	Comprehensive Response Action Risk Evaluation
CRDL	contract required detection limits
CRP	community relations plan
CSF	cancer slope factor
CT	central tendency
CV	coefficient of variation
DCA	dichloroethane
DCE	dichloroethene
DCG	Derived Concentration Guide

4783

LIST OF ACRONYMS
(continued)

DCR	Document Change Request
DDT	dichlorodiphenyl-trichloroethane
DFO	Director's Findings and Orders
DMP	data management plan
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQO	data quality objective
EDL	economic discard level
EE/CA	engineering evaluation/cost analysis
EF	Engineering File
EIS	environmental impact statement
EM	electromagnetic
EMR	Environmental Monitoring Report
EP	extraction procedure
EPA	U.S. Environmental Protection Agency
EPDM	ethylene propylene diene monomer
ERDA	U.S. Energy Research and Development Administration
ERMC	environmental restoration management contractor
ETF	Experimental Treatment Facility
FEMA	Federal Emergency Management Agency
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Company
FFCA	Federal Facility Compliance Agreement
FIDLER	field instrument for detecting low-energy radiation
FMPC	Feed Materials Production Center
FONSI	finding of no significant impact (NEPA)
FR	Federal Register
FS	feasibility study
ft^2/day	square feet/day
ft^3/s	cubic feet/second
FY	fiscal year
GC	gas chromatography
GC/MS	gas chromatograph/mass spectrometry
GM	Geiger Mueller
GMP	groundwater monitoring plan
gpd	gallons per day

LIST OF ACRONYMS
(continued)

gpm	gallons per minute
GPR	ground penetrating radar
GSSI	Geophysical Survey Systems, Inc.
Hcl	hydrochloric acid
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
HSL	Hazardous Substance List
HSP	health and safety plan
HWMU	hazardous waste management unit (RCRA)
IARC	International Agency for Research on Cancer
ICV	initial calibration verification (standard)
ID	inside diameter
ILCR	incremental lifetime cancer risk
IP	implementation plan
IRIS	Integrated Risk Information System
IRP	Interim Processing Plant
ISCLT	industrial source complex–long term
IT	IT Corporation
keV	kiloelectron volt
kg	kilograms
LAACC	large area activated charcoal collectors
LLD	lower limit of detection
LRA	leading remedial alternative
µg/g	microgram/gram
µg/L	microgram/liter
µg/kg	microgram/kilogram
µmhos/cm	micromhos/centimeter
µR/hr	microroentgen per hour
MC&A	Material Control and Accountability
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCW	Mallinkrodt Chemical Works
MDL	minimum detection limit
MEK	methyl ethyl ketone
mg/kg	milligram/kilogram
mg/L	milligram/liter

028

4783

LIST OF ACRONYMS
(continued)

mph	miles per hour
mrad/hr	millirad/hour
mrem/year	millirem/year
MS	mass spectrometry
MSL	mean sea level
MT	metric ton
MTU	metric tons of uranium
MUSLE	Modified Universal Soil Loss Equation
MW	monitoring well
NAAQS	National Ambient Air Quality Standards
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
ND	nondetect
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEPA	National Environmental Policy Act
NLO	National Lead (Company) of Ohio
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NTS	Nevada Test Site
O&M	operations and maintenance
OD	outside diameter
ODH	Ohio Department of Health
OEPA	Ohio Environmental Protection Agency
ORAU	Oak Ridge Associated Universities
OSP	Ohio State Plane
OSWER	Office of Solid Waste and Emergency Response
OVA	organic vapor analyzer
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and completeness
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
pCi/g	picoCuries/gram
pCi/L	picoCuries/liter

LIST OF ACRONYMS
(continued)

$pCi/m^2/s$	picoCuries/square meter/second
PEIS	programmatic environmental impact statement
PIC	pressurized ionization chamber
PP	proposed plan
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PRG	preliminary remediation goals
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RA	risk assessment
RCRA	Resource Conservation and Recovery Act
RD	remedial design
R_f	retardation factor
R_fC	reference dose concentration
RFA	request for analysis
RfD	reference dose
RFI	RCRA Facility Investigation
RGTS	radon gas treatment system
RI	remedial investigation
RM	river mile
RME	reasonable maximum exposure
RMI	Reactive Metals, Inc.
ROD	record of decision
RPD	relative percent difference
RRF	relative response factor
RSC	relative source contribution
SACD	Stipulated Amendment to Consent Decree
SAP	sampling and analysis plan
SARA	Superfund Amendment and Reauthorization Act of 1986
SCQ	Site-Wide CERCLA Quality Assurance Project Plan
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SI	saturation index
SOP	standard operating procedure
SOW	Statement of Work

4783

LIST OF ACRONYMS
(continued)

SOWC	Southwestern Ohio Water Company
SPA	scintillation detector
SQL	sample quantitation limit
SSA	Stipulation and Settlement Agreement
SWCR	Site-Wide Characterization Report
SWIFT	Sandia Waste Isolation Flow and Transport (computer model)
SWOAPCA	Southwestern Ohio Air Pollution Control Agency
SWMU	solid waste management unit (RCRA)
TBC	to be considered
TCA	trichloroethane
TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TEF	toxicity equivalency factor
TLD	thermoluminescence dosimeters
TOC	total organic carbon
TOX	total organic halogens
TSP	total suspended particulate
UAP	uranyl ammonium phosphate
UBC	Uniform Building Code
UCL	upper confidence level
UF_4	uranium tetrafluoride
USCS	Unified Soils Classification System
USGS	U.S. Geological Survey
USLE	Universal Soil Loss Equation
UTL	upper tolerance limit
VOA	volatile organic analysis
VOC	volatile organic compound
WLM	working level month
WEMCO	Westinghouse Environmental Management Company of Ohio
WMCO	Westinghouse Materials Company of Ohio

EXECUTIVE SUMMARY

4783

The Remedial Investigation (RI) Report for Operable Unit 1 of the Fernald Environmental Management Project (FEMP) documents the site characterization phase of the Remedial Investigation/ Feasibility Study (RI/FS) being conducted at that site. The FEMP is a U.S. Department of Energy (DOE) facility near Fernald, Ohio, which operated from 1952 to 1989 providing high purity uranium metal products to support United States defense programs. Operable Unit 1 is located on the western portion of the site.

The FEMP is a 425 hectare (1050 acre) facility northwest of downtown Cincinnati (Figure 1-1) near Fernald, Ohio, a small farming community. The site lies on the boundary between Hamilton and Butler counties (Figure 1-2). The primary mission of the FEMP during its 37 years of operation was the processing of "feed" materials to produce high purity uranium metal. These high purity uranium metals were then shipped to other DOE or U.S. Department of Defense (DOD) facilities for use in the nation's weapons program.

In 1986 the U.S. Environmental Protection Agency (EPA) and DOE entered into a Federal Facility Compliance Agreement (FFCA) covering environmental impacts associated with the FEMP. In response to the FFCA, a site-wide RI/FS was initiated pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA). Production operations at the facility were suspended in 1989 and focus was shifted to environmental restoration and waste management activities. On June 29, 1990, a Consent Agreement (under Sections 120 and 106[a] of CERCLA) between the two agencies became effective; the purpose of this agreement was to achieve consistency between the operable unit concept and the commitments of the RI/FS program without modifying the underlying objectives.

The Consent Agreement was amended the following year to revise the schedules for completing the remediation of the five operable units and to provide for integration of the operable units to ensure compliance with the residual risk requirements of the National Hazardous Substances and Oil Contingency Plan (NCP). This Amended Consent Agreement was signed on September 20 and became effective on December 19, 1991.

The Ohio Environmental Protection Agency (OEPA) is participating in the FEMP CERCLA process through direct involvement in review meetings, public meetings, and technical review of project documentation.

The purpose of the RI phase is to develop a detailed understanding of the nature of the stored waste materials, their impacts on the surrounding environment, and the associated risks posed to human health and the environment. Following the RI report, a feasibility study (FS) report will be issued to

evaluate the range of available cleanup alternatives. The RI is prepared to support specific informational needs of FS alternative evaluation. Consistent with the Amended Consent Agreement and following consideration of comments received from the public and other interested parties, selection of the preferred cleanup alternative will be documented in a Record of Decision (ROD).

EPA approved the RI/FS Work Plan in May 1988. This plan provided the overall technical approach, identified investigative areas, developed objectives for each of the specified investigations, and established overall objectives for the evaluation of data collected during the RI activities. The work plan identified 27 units of the FEMP to be investigated in the RI/FS. Several modifications to the list eventually increased this total to 39 units. During the investigation it became apparent that, for technical and program management purposes, these 39 units should be categorized and grouped. The concept of grouping into operable units was introduced to allow completion of the remedial action process for the most well-defined units (and for those in eminent need of remediation) while data collection and analysis continues for other operable units.

The 39 units to be investigated were grouped to form five operable units:

- Operable Unit 1 – Waste Pit Area
- Operable Unit 2 – Other Solid Waste Units
- Operable Unit 3 – Former Production Area
- Operable Unit 4 – Silos 1 through 4
- Operable Unit 5 – Environmental Media

Consistent with DOE policy, the FEMP is integrating the requirements of the National Environmental Policy Act (NEPA) into the RI/FS. On May 15, 1990, a Notice of Intent was published in the Federal Register indicating that DOE planned to prepare an environmental impact statement (EIS) to evaluate the environmental impacts associated with planned cleanup activities at the site. As identified in the Notice of Intent, the feasibility study/proposed plan (FS/PP) for the lead operable unit, Operable Unit 4, will be issued as an FS/PP-EIS. The FS/PP-EIS will examine the environmental impacts associated with the Operable Unit 4 remedial activities and the cumulative environmental impacts associated with the implementation of remedial actions for all five of the FEMP operable units. Additionally, the SWCR supplements the Operable Unit 4 FS/PP-EIS evaluation of the no-action alternative by providing an assessment of cumulative environmental impacts associated with existing conditions at the FEMP on a site-wide basis.

The FS and PP for Operable Unit 1 will be written to tier off the Operable Unit 4 FS/PP-EIS to integrate the values of NEPA. The resultant Operable Unit 1 FS/PP-NEPA evaluation will examine the environmental impacts of implementing the Operable Unit 1 remedial action. In addition, if the Proposed Plan for Operable Unit 1 differs from the leading remedial alternative (LRA) for Operable Unit 1 used to prepare the Operable Unit 4 cumulative impact analysis, the cumulative impact analysis

provided in the Operable Unit 4 FS/PP-EIS will be updated and attached to the FS/PP-NEPA evaluation for Operable Unit 1.

This Operable Unit 1 RI Report will be incorporated in the Operable Unit 1 FS/PP-NEPA evaluation by reference. It contains characterization data for the waste pit area and will support the description of the affected environment for the Operable Unit 1 FS/PP-NEPA evaluations. This RI also will provide a baseline risk assessment that will support the Operable Unit 1-specific, no-action alternative by addressing risk issues as if Operable Unit 1 remained in its current condition.

DESCRIPTION OF OPERABLE UNIT 1

FEMP storage facilities were used for storing low-level radioactive wastes generated by the various chemical and metallurgical processes used at the facility since uranium production operations began in the early 1950s. The waste pit area (Operable Unit 1), the subject of this RI report, consists of Waste Pits 1, 2, 3, 4, 5, and 6; the Burn Pit (also used for the disposal and burning of waste); the Clearwell (primarily a settling basin for surface water runoff); miscellaneous structures and facilities such as berms, liners, concrete pads, underground piping, utilities, railroad tracks, fencing; and environmental media. Operable Unit 1 is located west of the former production area and covers approximately 9.4 hectares (37.7 acres). Paddy's Run, an intermittent tributary of the Great Miami River, runs along the west side of the FEMP property between Operable Unit 1 and the site boundary. Two types of disposal methods were generally used: a "wet" system for slurries where the wastes were pumped to the pit, and "dry" backfill type operations.

The majority of the hazardous constituents identified during the characterization of Operable Unit 1 were introduced to the plant in feed materials for the refining process. These materials were the raw feedstock from which uranium metal and thorium products were separated in plant operations. Feed materials included uranium-bearing ores and ore concentrates (which had been processed prior to receipt to remove certain radionuclides other than uranium), thorium-bearing ores, residues from other DOE facilities (which were found to have high uranium content), uranium from the nation's gaseous diffusion plants, and irradiated uranium-bearing materials from DOE facilities involved in the production of plutonium for weapons.

The production of uranium or thorium products was a multi-stage process involving chemical extraction or leaching, treatment, and manufacturing. Uranium-bearing feedstock was first dissolved in nitric acid to form a liquid from which the uranium content could be extracted from other impurities in the feedstock. These impurities include other radioactive members of the uranium decay series and potentially hazardous metals such as arsenic, chromium, nickel, and lead. This initial step produced a large portion of the waste which was disposed of in the Operable Unit 1 waste units, either as slurries or solids, referred to as raffinates. After this initial step, the separated uranium was further treated to improve its purity or prepare it for the manufacturing processes. These later treatment steps produced

additional wastes from filtering and settling operations (chemical precipitation wastes, filter cake and sump cake), drying operations (cold metal oxides or raffinates), chemical conversion (trailer cake, magnesium fluoride, and depleted slag), heat treatment (contaminated liquids), expended equipment (graphite and ceramics, pumps, piping, etc.), vessels, and containers contaminated with uranium and other hazardous constituents. Other wastes generated in the refinement process and site support activities include pollution control products (bag house residues), flyash from the heating plant, residues from the process water treatment plant (lime slurry), and construction debris.

Waste inventory records indicate that Waste Pit 1 contains 1075 metric tons (MT) of uranium; Waste Pit 2 contains 175 MT of uranium; Waste Pit 3 contains 846 MT of uranium and 97 MT of thorium; Waste Pit 4 contains 2203 MT of uranium and 74 MT of thorium; Waste Pit 5 contains 527 MT of uranium and 72 MT of thorium; and Waste Pit 6 contains 1432 MT of uranium. These inventories were supported by sampling during the RI. Waste inventory records do not contain information about the content of uranium and thorium in the Burn Pit and Clearwell.

Waste Pit 1 is considered a dry pit, since the waste slurries were filtered or calcined to remove water before they were placed in the pit. This waste pit received primarily neutralized waste filter cakes, vacuum-filtered sludges from production activities, magnesium fluoride slag, scrap graphite, and contaminated brick. It was, however, used as a settling basin for liquids removed from Waste Pit 2 in 1958 and 1959. Waste Pit 1 was closed and covered with clean fill in 1959. This waste pit is currently classified as a RCRA Solid Waste Management Unit.

Waste Pit 2 is also considered a dry pit and received primarily waste filter cakes, vacuum-filtered production sludge, magnesium fluoride slag, scrap graphite, contaminated brick, and concentrated raffinate residues. However, Waste Pit 2 was also used as a settling basin for neutralized, concentrated raffinate during 1958 and 1959, prior to completion of Waste Pit 3, because the drying equipment available at that time could not process all of the raffinate being produced by plant operations. Waste Pit 2 was closed and covered with clean fill in 1964. This waste pit is currently classified as a RCRA Solid Waste Management Unit.

Waste Pit 3 was the first waste pit built specifically for settling solids from liquid waste streams. Primarily, lime-neutralized raffinate slurries, as well as contaminated storm water, were pumped to Waste Pit 3. After Waste Pit 2 was filled, Waste Pit 3 received vacuum-filtered production sludge, neutralized liquid from process systems, neutralized refinery sludges, and cooling water from heat treatment operations. Starting in December 1958, lime sludge from the Water Treatment Plant was added to supplement the lime used for raffinate neutralization. Also, large quantities of neutralized residues from acid leaching of uranium-bearing magnesium fluoride slag were pumped to Waste Pit 3 during the late 1960s, prior to completion of Waste Pit 5. In 1973, fill material including filter cake, slag leach residue, lime sludge, and flyash was placed in Waste Pit 3 and construction activities were

initiated to cover this waste pit with soil. Waste Pit 3 covering activities were complete in 1977. This waste pit is currently classified as a RCRA Solid Waste Management Unit.

Waste Pit 4 received solid wastes that included process residues, scrap uranium metal, off-specification intermediate uranium products and residues, thorium metal and residues, and contaminated ceramics. The process residues included filter sludges, raffinates, graphite, magnesium fluoride slag, and pyrophoric uranium-bearing materials. Thorium metal and residues were hauled to the waste pits in drums and were placed in Waste Pit 4 when additional metal recovery was not economically feasible. At least 100 drums were deposited on the west side of this waste pit. Waste Pit 4 also received noncombustible trash including cans, concrete, asbestos, and construction rubble. Lime was occasionally added to standing water within Waste Pit 4 for uranium precipitation prior to the transfer of liquids to Waste Pit 5 for settling and discharge. Barium chloride was also disposed of in Waste Pit 4 from 1980 to 1983. Disposal activities in Waste Pit 4 were terminated in 1985. The waste pit was closed in 1986 and cover activities started. Waste Pit 4 is currently classified as a RCRA Hazardous Waste Management Unit and has undergone interim closure. Final closure of Waste Pit 4 will be completed in conjunction with remedial actions under CERCLA.

Waste Pit 5 served as a settling basin for slurries including neutralized raffinates, slurries from the acid leaching of uranium-bearing slags, and sump slurries which were generally filtered to remove solids. Lime sludge was added to this waste pit to supplement the lime used to neutralize the raffinate and heat treatment quench water were discharged directly to Waste Pit 5. Both the supernatant and sludges produced by the co-precipitation of thorium wastes with barium carbonate and aluminum sulfate, and the precipitation of uranium with calcium oxide were deposited in Waste Pit 5. The discharge of slurried waste materials into Waste Pit 5 was stopped in 1983 and use of this waste pit as a settling basin was discontinued in 1987. Waste Pit 5 is currently classified as a RCRA Hazardous Waste Management Unit.

Waste Pit 6 received only noncoarse, nonpyrophoric materials (this excludes uranium and thorium in metallic form), including magnesium fluoride slag, process residues, and filter cakes from vacuum filtering operations to protect the membrane liner. Extrusion residue and heat treatment quench water were also deposited in Waste Pit 6. Use of Waste Pit 6 ceased in 1985. Waste Pit 6, which is currently covered by water, is classified as a RCRA Solid Waste Management Unit.

The Burn Pit was used primarily as an isolated spot to burn contaminated combustibles such as laboratory chemicals; pyrophoric metals (e.g. uranium metal cuttings) and reactive chemicals; oils, contaminated combustible material; and cafeteria debris, cans, napkins, and skids. The Burn Pit was filled in 1968 during the construction of Waste Pit 5. The actual inventory of materials disposed of in the Burn Pit is not currently available. Investigations of that issue are ongoing and results will be provided in preliminary stages of the FS.

The Clearwell received surface water runoff from the waste pits and surface liquid from Waste Pits 3 and 5. It acted as a final settling basin prior to periodic pumping to the Great Miami River. The Clearwell is currently classified as a RCRA Solid Waste Management Unit.

STUDY AREA INVESTIGATIONS

Study area investigations for Operable Unit 1 included activities performed for DOE under the Characterization Investigation Study (CIS) performed for DOE in 1986-87, and the RI/FS program, performed in multiple stages between 1987 and 1992. In addition, results of environmental monitoring and other site programs provide a qualitative verification of the CIS and RI/FS studies and further define the nature of the waste pit area as a source of contamination to the surrounding environment. Characterization of the physical, chemical, and radiological profiles of each waste pit was completed through the investigations. The extent of contamination in the environment due to waste disposal practices in Operable Unit 1 was determined through the comparison of waste pit analytical results with sampling results generated from surface and subsurface soil, sediments, and storm water runoff from areas surrounding the waste pit boundaries and from groundwater monitoring wells located upgradient and downgradient from the general waste pit area.

Investigations performed as part of the RI to examine the nature and extent of contamination present in Operable Unit 1 included direct field measurements and the collection and laboratory analysis of samples from all media (i.e. soils, groundwater, etc.). Interviews with knowledgeable site personnel and literature searches related to processes at the FEMP have also been a part of these investigations. The expected contents and constituents in Operable Unit 1, based on process knowledge, have been compared with field observations and analytical results.

BASELINE RISK ASSESSMENT

As previously stated, one objective of the RI phase of the RI/FS is to evaluate the risks to human health and the environment associated with the existing conditions present at the waste site in absence of any cleanup actions. This evaluation is documented in the baseline risk assessment, Appendix E of the RI report. The results of the baseline risk assessment are compared against risk-based goals established by federal environmental regulation to determine if cleanup activities are warranted. Risk-based goals are established by EPA for both carcinogenic and noncarcinogenic constituents. However, the predominant constituents of potential concern (CPCs) associated with Operable Unit 1 are considered carcinogenic by nature.

Investigations conducted as part of the RI and other site programs successfully characterized the properties of the stored waste inventories and the nature and extent of contamination associated with Operable Unit 1. These investigations confirmed prior process knowledge about the chemical, physical, and radiological characteristics of the stored wastes. Above-background concentrations of

radionuclides and other contaminants were identified in surface and waste pit material, sediment, surface water, and groundwater within and adjacent to the Operable Unit 1 study area.

Statistical evidence indicates humans have about a one in three (33 percent) risk of acquiring cancer. Federal regulations designed to protect human health require that any excess risk from exposure to carcinogenic materials at a waste site not be greater than one in ten thousand. Accordingly, the baseline risk assessment in this document assesses the exposure to carcinogens as an incremental lifeline risk. That is the additional risk that humans might suffer, given a lifetime of exposure to such waste site materials.

To judge whether a waste site exceeds these risk goals, a formalized risk assessment process has been established through EPA guidance. To make this determination, risks are not only assessed for current contamination levels in the environment, but also for future conditions in the event that no mitigative cleanup actions are implemented at the waste site. To accomplish this objective, EPA has developed a concept called Reasonable Maximum Exposure. Within the baseline risk assessment, the maximum exposure that a human could reasonably be expected to receive from a waste site is evaluated. This evaluation typically examines the current land use of the waste site and assumes no active controls are applied to control constituent releases to the environment. The baseline risk assessment for Operable Unit 1 was assessed for both the current land use of the site as an industrial waste storage facility and a projected future use of the site as a family farm. For the current land use, risks were assessed with and without public access controls in place.

To assess the risks under these land-use scenarios, assumptions were made as to the exposure setting of potential human receptors and the mechanisms by which they are exposed to the site contaminants. For the current land-use scenario, which assumes the site remains an industrial facility, human receptors considered included a trespassing child, a visitor, an off-property farmer, an off-property user of meat and dairy products, and an off-property surface water user. For the future land-use scenario, which assumes the site reverts to a family farm, human receptors examined included an off-property farmer, an on-property resident child, an off-property farmer, and an off-property surface water user. To assist in evaluating the potential risks to each of these receptors, a number of mathematical models were employed to estimate the concentration of contaminants that will be transported through the environment. The models assist in predicting the effects that the physical process of nature will have on the movement of contaminants through the environment. Following application of these models, assumptions were made, based on EPA guidance, as to the quantity of contaminants to which the receptors were exposed through ingestion, inhalation, and direct contact.

For purposes of this Executive Summary, one land-use scenario (the future family farm) and one receptor (the on-property resident farmer) were selected to provide a relative indication of the baseline risks associated with Operable Unit 1. No such resident farmer currently exists at the facility, and the

calculated risks represent the maximum that the hypothetical receptor can reasonably be expected to receive during a lifetime. For purposes of this risk assessment, the on-property resident farmer was assumed to reside immediately adjacent to Operable Unit 1, grow his crops in the soils present in the Operable Unit 1 study area, and withdraw groundwater for agricultural and domestic use.

Incremental risk to an on-site resident farmer, assuming that land use in the future reverts to a family farm, is 1×10^{-1} (an additional 1 chance in 10 of acquiring cancer during a 70-year life).

SUMMARY AND CONCLUSIONS

The following is a summary of the findings and conclusions of the Operable Unit 1 RI Report:

Facility Operation

- The FEMP was operated from 1952 through 1989 as a uranium metals and thorium refining facility with associated waste processing and storage operations.

- Most hazardous substances found at FEMP were introduced as feed materials (i.e., uranium ore, uranium ore concentrates, thorium ore, irradiated uranium from plutonium production facilities) and their associated impurities to the refining process.

- Extensive process knowledge was utilized to assist in characterization of the waste pits and in determination of CPCs.

Contaminant Source

- Waste pits contain uranium isotopes and their decay products; thorium isotopes and their decay products; fission products such as technetium (Tc)-99; inorganic metals originating as impurities in the ores (or ore concentrates) used as feed to the uranium metal and thorium refining processes.

- Limited quantities of organic constituents are present; most notably 1,1,1-trichloroethane (TCA), polychlorinated biphenyls (PCBs), dioxins, and furans which likely originated in pesticides and herbicides used in the waste pit area, degreasers, flyash disposal and miscellaneous plant processes.

- Dioxins and furans found in Waste Pit 3 are thought to have originated from the processing for recovery of uranium of paper ash residue (from the site incinerator).

- Significant quantities of liquids are present within both covered and open waste pits, the Burn Pit, and the Clearwell which constitute a mobile contaminant source. Leachate depths in the waste pits range from a few feet to tens of feet.

- While many waste pits are lined with either native clay or synthetic membranes, the pit bottoms of some waste units extend to depths near the highly permeable sand and gravel aquifer.

- Adequate characterization of the waste materials was completed to meet the objectives of the RI and to support the FS as supplemented by treatability studies.

Surface Soils

- The entire lateral extent of surface soils in Operable Unit 1 have above-background concentrations of uranium and these materials may have been transported in the past to Paddy's Run via storm water overland flow and direct discharge.

- The surface soils covering and surrounding the waste pits contain elevated levels of uranium and lesser quantities of uranium daughter products, inorganic metals, and organic compounds such as polyaromatic hydrocarbons and PCBs.

- The likely sources of these contaminants are operational spills during disposal operation, overland transport by surface water, and airborne deposition from sources in the former production area or open waste pits.

- Soils in the vadose zone adjacent to the waste pits reveal constituent concentrations consistent with leachate movement from the waste units.

- Out of numerous 2000-series boring soil samples, contaminants were in one sample below the glacial overburden. However, no samples were collected directly beneath the waste pits.

- Adequate characterization of the surface soils was achieved to meet the objectives of the RI and support the development of a feasibility study.

- Little information on the nature and extent of contaminants in the soils directly beneath the waste pits is available. The informational needs of the Remedial Investigation/Risk Assessment were satisfied through the application of computer modeling to simulate the migration of contaminants from the waste pits to the underlying soils.

Groundwater

- Perched water zones are present in the glacial overburden with radiological and chemical characteristics similar to liquids within the waste pits, indicating lateral movement of waste constituents from several waste pits.

- Uranium and Tc-99 appear to be the most mobile radiocontaminants. Uranium is likely mobilized by tributyl phosphate which was used in the plant uranium extraction process.

- Tc-99 is an indicator of future flow patterns of less mobile contaminants.

- The upper portion of the Great Miami Aquifer has been impacted by waste disposal operations in Operable Unit 1.

- Uranium, Tc-99, cadmium, and chromium are the most significant constituents, with respect to concentration and potential hazard, present in the regional aquifer in the area of Operable Unit 1.

- Organic constituents (1,1,1-trichlorethane, 1,2-dichloroethylene, 1,1-dichloroethane, and toluene) are also present in the regional aquifer, with Waste Pits 1 and 4 and the Burn Pit as the most likely sources.

C40

- Adequate characterization of the nature of contaminants present in groundwater was achieved to meet the objectives of the RI. Although definition of the extent of the contamination in groundwater is not an objective of the Operable Unit 1 RI (this will be addressed in the Operable Unit 5 RI), sufficient information is available to identify Operable Unit 1 as the most likely source of contamination within perched and regional aquifers.

Surface Water and Sediment

- Operable Unit 1 CPCs were identified in surface waters flowing over and from the waste pit area.

- A removal action has been implemented to control surface water flow from the waste pit area to Paddy's Run. However, no action was taken to remove all areas of contaminated sediments in the drainways within Operable Unit 1.

Air and Direct Radiation

- Radon measurements performed on the closed waste pits revealed emissions below the National Emissions Standards for Hazardous Air Pollutants (NESHAP) limit of 20 picoCuries per square meter per second ($pCi/m^2/s$). However, some individual measurements were above this threshold.

- Airborne contaminant concentrations in the area of Operable Unit 1 appear to be associated with the pre-1990 uranium refining activities.

- Significant airborne releases of radiological and chemical contaminants were projected by transport models if the waste pits are not maintained but allowed to naturally degrade.

- Direct radiation measurements from Operable Unit 1 suggest significant potential risk to human receptors if the present system of access control were abandoned.

Ecological Characterization

- Although ecological receptors outside of the operable unit will be more fully addressed on a site-wide basis by Operable Unit 5, current data was evaluated in the SWCR to determine any impacts which would be directly attributable to Operable Unit 1. No such impacts were identified.

Baseline Risks

- Sufficient information was assembled during the course of the RI to permit the assessment of baseline risks to hypothetical receptors. Due to identified data limitations, certain assumptions were made to positively bias the potential risk (i.e., over-estimate risks to the reasonably maximum exposed receptor). However, the confidence level of the risk assessment is sufficient basis for risk-management decisions.

- Risk assessment for current land use and the current level of access control estimate the risk associated with the contaminants within Operable Unit 1 to a maximally exposed off-site farmer of up to 5×10^{-5} (5 chances in 100,000).

- The estimated risk to a hypothetical future farmer residing in the waste pit area and farming the adjacent area is up to 1×10^{-1} or one chance in ten of acquiring cancer over a 70-year residence.

Data Assessment

- The data as assembled in the RI is sufficient to meet the stated objectives of the RI by providing a detailed understanding of the nature of the stored wasted materials, their impact on the surrounding environment, and the associated risks posed to human health and the environment, both at present and for future postulated conditions.

- The RI is sufficient to meet the informational needs of the Operable Unit 1 Feasibility Study and support the detailed analysis of potential remediation actions.

- No additional site characterization activities are planned nor necessary to support decision-making and preparation of a ROD.

Based on the results of the Operable Unit 1 investigations, fate and transport modeling, and quantitative risk assessment, it is concluded that the risks to human health and the environment incurred from Operable Unit 1 exceed accepted regulatory thresholds, thereby requiring the implementation of a remedial action.

Viable remedial action alternatives will be evaluated in a Feasibility Study Report to be issued for Operable Unit 1.

1.0 INTRODUCTION

4703

This report documents the results of the Remedial Investigation (RI) phase of the remedial investigation/feasibility study (RI/FS) for Operable Unit 1 at the U.S. Department of Energy (DOE) Fernald Environmental Management Project (FEMP). This phase of the RI/FS process includes data collection and evaluation, fate and transport modeling, and a baseline risk assessment.

The FEMP was known as the Feed Materials Production Center (FMPC) until 1991. It is a contractor-operated government facility that provided high purity uranium metal products in support of United States defense programs from 1952 until production ceased in 1989. The facility was officially closed as a production facility in 1991.

The RI/FS process at the facility began in 1986, in accordance with a Federal Facility Compliance Agreement (FFCA) between DOE and the U.S. Environmental Protection Agency (EPA). The FFCA was intended to ensure that environmental impacts associated with activities at the facility would be thoroughly and adequately addressed. It details actions to be taken by DOE to ensure compliance with existing regulations, including the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). After the facility was placed on the National Priority List in 1989, the FFCA was amended by a Consent Agreement in 1990. This agreement revised the milestone dates for the RI/FS and provided for implementation of removal actions. The Consent Agreement was amended in 1991 to revise schedules for completing the RI/FS process.

The amended Consent Agreement provides for implementation of the operable unit concept. An operable unit is a term employed under RI/FS guidance to provide a logical, physical grouping of environmental and other concerns at a site. The FEMP has been partitioned into five operable units to promote a more structured and expeditious cleanup. Separate RI/FS documentation, including RI reports and FS reports, is being prepared for each of the five operable units.

As previously stated, this report documents the RI phase for Operable Unit 1. Operable Unit 1 consists of the following FEMP facilities and associated environmental media:

- Waste Pits 1 through 6
- Clearwell
- Burn Pit
- Miscellaneous structures and facilities such as berms, liners, concrete pads, underground piping, utilities, railroad tracks, fencing, and environmental media.

The objective of the RI process, as it applies to Operable Unit 1, is to develop a comprehensive understanding of the nature of the stored waste materials, the extent to which they have impacted the surrounding environment, and the potential threat that the materials and impacted media pose to human health and the environment. The FS for Operable Unit 1 will utilize the data provided in the RI Report to develop and screen alternatives for reducing risk to human health and the environment to an acceptable level.

The Site-Wide Characterization Report (SWCR) (DOE 1993c) contains detailed information concerning site ecological receptors and any potential impacts that the site may have had on these resources, based on data collected up to December 1, 1991. The SWCR contains a site-wide ecological risk assessment, which addresses impacts associated with operable unit contaminant sources. No additional ecological data are needed for Operable Unit 1, since ecological risk assessment in the SWCR sufficiently addresses the associated conditions and impacts.

Because the SWCR focuses on impacts related directly to operable unit sources, the EPA considered this ecological risk assessment to be deficient in terms of addressing the overall site-wide impacts to environmental media not specifically addressed in Operable Units 1, 2, 3, and 4. The EPA and DOE negotiated a resolution to the SWCR, which requires the Operable Unit 5 RI to perform a "second iteration" on the comprehensive site-wide ecological risk assessment and specifically focuses on the environmental media outside Operable Units 1, 2, 3, and 4. Therefore, ecological resources and any associated impacts are not addressed in this document.

This RI report consists of the following, in accordance with EPA guidance:

- Executive Summary, which provides a brief overview of the content and conclusions of the RI.

- Section 1.0 - Introduction, which summarizes the purpose and organization of the report; presents a description and history of the project; describes operations at both the FEMP and, more specifically, the facilities included in Operable Unit 1; provides a description of the contents of the waste pits and their constituents based on process knowledge; and outlines previous Operable Unit 1-related studies and relevant environmental investigations. Documentation on the disposition of the various waste streams in the waste pits is included in Appendix F.6.

- Section 2.0 - Study Area Investigations, which includes a description of the RI quality program and specific data objectives; the methodology employed for each data collection and analysis procedure; the data validation process as it relates to Operable Unit 1; and the usability of the data to support both the assessment of the nature and extent of contamination and the baseline risk assessment. The data discussed in Section 2.0 are included in Appendices A, B, and C.

- Section 3.0 - Physical Characteristics of the RI/FS study area, which describes the physical characteristics of the site and Operable Unit 1 study area; the structural aspects of the waste pits, Clearwell, and Burn Pit; and the physical characteristics of the stored wastes.

- Section 4.0 - Nature and Extent of Contamination, which presents the data gathered during the RI and relevant previous studies, discusses the nature and extent of contamination associated with Operable Unit 1, and compares the observed results with those expected from process knowledge.

- Section 5.0 - Contaminant Fate and Transport, which summarizes the physical and chemical characteristics of the contaminants originating from Operable Unit 1 and evaluates the probable fate and transport scenarios. A detailed discussion, including tables and figures, is attached as a stand-alone document in Appendix D.

- Section 6.0 - Baseline Risk Assessment, which presents a summary of the baseline risk assessment conducted for Operable Unit 1. The details of this assessment are included as a separate, stand-alone document, Appendix E.

- Section 7.0 - Summary and Conclusions.

- Appendix F contains general background information, including the periodic table, sample calculations, acronyms, and abbreviations, conversion factors, literature compendium, glossary, list of references, and process background. Appendix G contains tables of QA/QC sample results.

1.1 DESCRIPTION AND HISTORY OF THE FEMP

1.1.1 Overview

The FEMP is a 425 hectares (1050 acres), government-owned, contractor-operated facility located in southwestern Ohio approximately 29 kilometers (km) (17 miles) northwest of downtown Cincinnati (Figure 1-1). The facility is located just north of Fernald, Ohio, a small farming community, and lies on the boundary between Hamilton and Butler counties (Figure 1-2). Of the total site area, 345 hectares (850 acres) are in Morgan and Crosby townships of Hamilton County, and 80 hectares (200 acres) are in Ross Township of Butler County.

Production operations at the FEMP occurred in the fenced in, 55-hectare (136-acre) tract of land known as the former production area, located near the center of the site (Figure 1-3). Liquid and solid wastes were generated by the various operations at the FEMP during its production life of 1952 to 1989. Prior to 1984 solid and slurried wastes from FEMP processes were deposited in the on-site waste storage area. This area, located west of the production facilities, includes six low-level radioactive waste storage pits; two earthen-bermed concrete silos containing K-65 residues; one concrete silo containing metal oxides; one unused concrete silo; two lime sludge ponds; a burn pit; a clearwell; a solid waste landfill; and a biosurge area to treat wastewater. The waste storage pits, burn

pit, and clearwell portion of the waste storage area has been designated Operable Unit 1 (Figure 1-4). The remaining FEMP site consists of forest and pasture lands.

1.1.2 Integration of the FEMP with the DOE System

The primary mission of the FEMP during its 37 years of operation was the processing of "feed" materials to produce high purity uranium metal. These high purity uranium metals were then shipped to other DOE or U.S. Department of Defense (DOD) facilities for use in the nation's weapons program. A depiction of the FEMP's integration with other DOE facilities is presented in Figure 1-5.

Feed materials at the FEMP included pitchblende ores from mines in the former Belgian Congo and Australia; uranium concentrates (yellowcake) from uranium mills in Canada and other foreign countries as well as the United States; uranium trioxide (UO_3) from Port Hope, Canada; uranium tetrafluoride (green salts - UF_4) from excess inventory at the nation's gaseous diffusion plants; uranium hexafluoride (UF_6), also from the gaseous diffusion plants; as a slightly enriched recycled material from the Hanford and Savannah River plants; and recovered uranium-bearing residues from processing operations at the FEMP and elsewhere.

As described in Section 1.1.3, these feed materials were converted into high purity uranium metal, cast into various shapes, machined in some instances, and then transported to other DOE facilities. Depleted uranium metal derbies were transported to the Y-12 Plant in Oak Ridge, Tennessee. Some derbies and flat billets were shipped to the Rocky Flats Plant near Golden, Colorado. After 1962, uranium ingots were center drilled and then sent to Reactive Metals, Incorporated Titanium Company's Extrusion Plant (RMI), in Ashtabula, Ohio, for extrusion. The resulting extruded billets, which consisted of slightly enriched uranium metal, were then shipped to the Hanford Reactor Site near Richland, Washington. Extruded uranium tubes, consisting of depleted uranium metal, were returned to the FEMP for cutting and surface machining to produce target element cores. These depleted uranium metal target cores were shipped to the Savannah River Site near Augusta, Georgia. A description of the uranium metal products is provided in the next section.

1.1.3 Description of the FEMP Facility and Operations

Several chemical and metallurgical processes were used at the FEMP for the manufacture of uranium metal products (Figure 1-6). In general, these processes occurred in 7 of the FEMP's more than 50 production, storage, and support buildings. The physical layout of those buildings is shown in Figure 1-7. Much of the discussion of the refining process and handling of Operable Unit 1 wastes is excerpted from the following documents and will not be specifically referenced in all instances in the text:

- "Uranium Processing Technology" (Harrington and Ruehle 1959)
- "A Closer Look at Uranium Metal Production, A Technical Overview" (FMPC 1988)

1.1.3.1 Processing

Impure starting materials, or feed materials, were first introduced into the process through the sampling plant (Plant 1). Here the materials were sampled to determine the uranium concentration and the uranium enrichment status. Ore concentrates and impure feed materials from the recovery plant (Plant 8) were transferred to the refinery (Plant 2/3), where they were dissolved in nitric acid and the uranium was purified through solvent extraction to yield a solution of uranyl nitrate. Evaporation and denitrification converted the uranyl nitrate solution to UO_3 powder.

Beginning in 1962, residues were received from two DOE facilities, Hanford and Savannah River plants for reprocessing. Trace quantities of fission products and transuranics resided within these materials. These feed streams generally contained less than 3 parts per billion (ppb) of transuranics such as plutonium (Pu)-239 and less than 10 parts per million (ppm) of fission products such as technetium (Tc)-99. Beginning in 1965, the uranium values from the residues generated from processing this material at the FEMP were prepared in Plant 8, recovered in Plant 2/3 (refinery).

Uranium trioxide from Plant 2/3 was transported to the green salt plant (Plant 4), where it was reduced with hydrogen to form uranium dioxide (UO_2) and then converted to UF_4 by reacting with anhydrous hydrogen fluoride. The UF_4 was then transported to Plant 5 (a metals production plant) where it was blended with magnesium metal granules and placed in a closed refractory-lined steel pot. At approximately 650°C (1200°F), the UF_4 and the magnesium would initiate an exothermic reaction. The resulting product was a 135- to 165-kilogram (kg) (300 to 375 pound [lb]) piece of pure uranium metal and a by-product, magnesium fluoride slag. The resultant piece of uranium metal had the shape of a gentleman's top hat, or derby as it is called. Approximately 50 percent of the magnesium fluoride slag was then used to line the furnace pots.

Some of the derbies were shipped directly to other government sites, such as the plant in Oak Ridge, Tennessee, and the Rocky Flats Plant near Golden, Colorado. However, most remained in Plant 5 where they were remelted along with uranium scrap-metal from earlier machining operations and poured into graphite molds to form cylindrical or flat ingots. Flat ingots consisted of depleted uranium metal. These flat ingots were top-cropped, sampled, analyzed, and inspected in the metals fabrication plant (Plant 6), and then shipped to the Rocky Flats Plant.

The cylindrical ingots consisted of depleted, normal, or slightly enriched uranium. From plant startup until approximately 1962, the cylindrical ingots were top-cropped, sampled, and analyzed prior to being heat treated and rolled into rods. The rods were machined into fuel cores and shipped to nuclear reactors at various government sites, including Hanford and Savannah River. This process continued at a reduced level until 1970.

During the early 1960s, a process was added where these ingots were machined and cored in Plant 9, heat treated in Plant 6, and then sent to RMI in Ashtabula, Ohio. At RMI, depleted uranium ingots were extruded into tubes. The ingots, which consisted of slightly enriched uranium, were upset forged, machined, then shipped to the Hanford site. The extruded tubes consisting of depleted uranium were returned to Plant 6 at the FEMP. There, they were cut into sections, heat treated, machined to final dimensions, and inspected for final product quality. The completed target element cores were shipped to the DOE Savannah River site.

Small amounts of thorium were processed at the FEMP on several occasions from 1954 through 1975. Thorium operations were conducted in Plants 1, 4, 6, 8, 9, and the pilot plant. The FEMP served as the thorium repository for DOE and maintains storage facilities for a variety of thorium materials. Thorium materials are no longer being received at the FEMP for storage. Existing thorium inventories have now been declared waste and are being over-packed for shipment to DOE's Nevada Test Site (NTS) for disposal.

1.1.3.2 Major Wastes Types

In general, all of the wastes generated on site, as well as some wastes shipped from other DOE/DOD facilities, were disposed of on site. Therefore, a wide variety of materials were disposed of in the waste pits. However, the overwhelming percentage, both in mass and volume, is accounted for in three major waste streams: general sump sludge, neutralized raffinate, and magnesium fluoride. The following descriptions include these and other significant waste streams, their source, and the data used to determine their occurrence in the waste pits.

- General Sump Sludge: The general sump consisted of a series of batch tanks that received an average of 1.6 million gallons per month of filtrates from the various processing plants, as well as wastewater from the laboratory (0.3 to 0.9 million gallons per month) and general decontamination and cleanup water.

  Prior to discharging the filtrate to the general sump, the individual processing plants would neutralize the waste streams and filter them to remove the uranium values. The filtrates were then analyzed to ascertain that the uranium content was within allowable discard limits (generally <0.0004 pounds per gallon). If so, the filtrates were discharged to the general sump (Figure 1-8).

  Prior to discharge to the waste pits, the filtrate in the general sump was neutralized with calcium oxide, to obtain maximum precipitation of radioactive materials, and mixed. After 1984, the solids were settled and the supernatant pumped to the waste pits. The settled solids were transferred to Plant 8 for filtering and packaging for disposal. The filtrate from the Plant 8 filtering operation was returned to the general sump.

  As discussed in Appendix F.6.3, a combination of actual records and estimates was used to establish the amount of liquid and its uranium content pumped from the general sump to the waste pits. Operating records that show the flow and the uranium content were

available from fiscal year (FY) 67 through FY 84. For other years, where records were incomplete or nonexistent, a correlation based on production in Plant 5 was used.

An average solids content in the liquid pumped from the general sump to the waste pits of 3 percent was used. This amount is based on a reported range of 2 percent to 10 percent and measurements for a 3-month period in 1979 that indicate the solids content is at the lower end of the range.

Many substances would have precipitated with the lime neutralization in the general sump. Because the wastewater had been filtered in the individual processing plants, it has been assumed that 50 percent of the nonuranium solids deposited in the waste pits from the general sump was lime.

The majority of the flow from the general sump was discharged to Waste Pits 3 and 5. However, prior to the opening of Waste Pit 3 in December 1958, it is known that the general sump discharged to Waste Pit 2. It has been assumed that the general sump discharged to Waste Pit 1 prior to the opening of Waste Pit 2 in 1957.

Appendix F.6.3 details the estimates of the amount of sludge generated by the general sump and deposited in the waste pits.

- Neutralized Raffinate: In the refinery operation, uranium-bearing feed materials were digested in nitric acid to solubilize the uranium. The uranium was then extracted, leaving most of the nitric acid, impurities associated with the materials being processed, and small quantities of insoluble, nonextractable uranium in the resulting "raffinate" solution. Before 1960, these raffinates were calcined prior to disposal. If the raffinate resulted from the processing of ore concentrates with a high radium content (non-K-65 material - See Appendix F.6.4 for further discussion), it was called "hot raffinate," which was neutralized and pumped as a slurry to the silos. Otherwise, the raffinate was called "cold metal oxide" most of which was placed in Silo 3. As discussed further in Appendix F.6.4, it is likely that some "hot raffinates" were mixed with "cold metal oxides" and deposited in Waste Pits 2 and 3. After 1960, the process gradually progressed to neutralization of the raffinate slurry, resulting in "neutralized raffinates."

The amount and characteristics of the raffinate waste were dependent on the characteristics of the refinery feed material. During the first two decades of operation, refinery feeds included uranium ore concentrates from numerous mines and processors around the world. The range of composition of these concentrates is shown in Appendix F.6.2. An average composition of ore concentrates, based on more than 700 samples from 38 mines, was used to estimate the composition of raffinates generated from the processing of concentrates. With removal of the uranium from the ore concentrates, the impurities could be concentrated up to three times in the raffinate, depending on the original split between impurities and uranium. Therefore, significant concentrations of impurities such as arsenic (0.01 percent to 2.4 percent), chromium (0.1 percent to 0.12 percent), and thorium (0.003 percent to 3 percent) are expected in the waste pits associated with raffinates.

An estimated 2.74 metric tons (MT) of neutralized raffinate was generated for every MT of uranium produced from ore concentrates through the refinery. Approximately 70 percent of this amount was liquid, implying that 0.822 MT of solids was generated for every metric tons of uranium (MTU) of production from ore concentrates.

As discussed previously the neutralized raffinates generated from the recovery of uranium from process residues were different than that generated from processing ore concentrates. The residues were generated from other process operations and had a uranium content above the economical discard level (EDL). The residues were, therefore, reprocessed to recover the uranium. Because the residues had already been processed, the primary impurities were corrosion products from the process itself. An estimated 2.43 MT of neutralized raffinate was generated for every MT of uranium produced from residues through the refinery. At 70 percent moisture, this equates to 0.728 MT of solids generated for every MTU of production from residues.

The neutralized raffinates primarily contained the impurities from the ore concentrates and residues, nitrates, lime, and 0.5 percent total uranium (wet basis - 1.67 percent dry basis). The raffinates were pasty in consistency and ranged in color from yellow to blue, including brown, orange, and red. The color depended on the primary impurities included. The neutralized raffinates were deposited in slurry form to Waste Pits 3 and 5, with a small amount deposited in Waste Pit 2.

Appendix F.6.4 details the estimates of the amount of neutralized raffinate generated from the production of UO_3 in the refinery and deposited in the waste pits. Also included is an estimate of the contribution of the associated impurities to the composition of the waste pits, which will be discussed in more detail in Section 1.2.1.

- Magnesium Fluoride (MgF_2): The reduction of UF_4 (green salt) using magnesium metal to produce uranium metal generates MgF_2 slag. Theoretically, the production of 1 MTU generates 0.54 MT of slag. Appendix F.6.5 details the amount of MgF_2 generated in Plant 5 and deposited in the waste pits. This material was deposited in the waste pits in primarily three forms:

  - *Depleted Slag*: The reduction of depleted UF_4 in Plant 5 generated depleted MgF_2 slag. A small amount of C-oxide was deposited in Waste Pits 1 and 2 from 1955 to 1963. C-oxide was generated when dolomite was used to line the reduction pots, prior to magnesium fluoride being used for that purpose. The C-oxide contained (dry basis) approximately 5 percent uranium, a trace of magnesium metal, and 47.5 percent MgF_2 and 47.5 percent dolomite.

    The remainder of the depleted slag was deposited in Waste Pits 4 and 6. On a dry basis, the composition of the depleted slag (dry basis) is approximately 94.6 percent MgF_2, 5.4 percent uranium in various oxidation states, and trace amounts of elemental magnesium. The waste material was white to black in color, granular, and 0.03 to 1 inch in size.

  - *Trailer Cake*: Prior to 1965, MgF_2 slag from the reduction of normal and enriched UF_4 was transferred to Plant 8 to recover the uranium values. In Plant 8, the uranium was recovered by dissolving it in hydrochloric acid, followed by a series of precipitation steps. The insoluble materials remaining after the acid digestion were filtered out and the resulting trailer cake transported to Waste Pits 1, 2, 3, and 4.

    In addition to the trailer cake generated by the reduction of UF_4 produced on site, the facility received depleted C-oxide and interim reprocessing plant residues (IRP tailings) from Mallinckrodt Chemical Works (MCW) from 1959 to 1965. The names

050

are not significant except that the IRP tailings had already been processed to recover some of the uranium. Both of these materials were reprocessed to recover as much uranium as possible. The resultant residue (14,955 MT) was transported to Waste Pit 3 as trailer cake.

Trailer cake (dry basis) is approximately 96.5 percent MgF_2, 3 percent filter aid (diatomaceous earth), and 0.5 percent uranium, with some amount of nitrates. The trailer cake was white to gray in color and granular, with 100 percent less than 0.03 inches and 90 percent smaller than 50 microns.

- *Slag Leach Slurry*: After 1965, milled MgF_2 slag from the reduction of normal and enriched UF_4 was transferred to the refinery to recover the uranium values. The uranium was recovered by dissolving it in nitric acid, followed by extraction and denitration. The insoluble materials left over after the acid digestion were filtered out, reslurried, mixed with lime (calcium oxide) to a pH of around 11, and pumped to the waste pits. This material was deposited in Waste Pit 3 from 1965 until Waste Pit 5 was completed in October 1968, and in Waste Pit 5 thereafter.

  The composition of slag leach (dry basis) is approximately 96.5 percent MgF_2, 3 percent filter aid (diatomaceous earth), and 0.5 percent uranium, with some amount of calcium compounds from the neutralization step as well as nitrates. The material was white to gray in color and granular, with 100 percent less than 0.03 inch and 90 percent smaller than 50 microns.

- Other Waste Streams: Other waste known to have been deposited in the waste pits in significant quantities or whose presence may be of concern from an environmental standpoint include:

  - *Depleted Residues*: Various residues were generated from the processing of depleted materials. These residues included wastes from the packaging of depleted products in Plant 4, reduction and casting in Plant 5, and machining in Plant 6. A wide variety of material size, density, and uranium content are represented in these residues.

    The materials include the following (taken from actual records of discards):

    Contaminated rags, paper and polyethylene
    Contaminated asbestos material
    Dust collector bags
    Scrap salts (high in fluoride), including floor sweepings
    Off-spec UF_4 or thorium tetraflouride (ThF_4)
    Contaminated soil, rocks, sand, brick, and ceramics
    Furnace salt (solidified, nonchloride)
    Dust collector residues (high fluoride, pyrophoric)
    Dry crushed slag from furnace pot blowouts
    Partially oxidized metal (containing no metl-x fire retardant)
    Bad reductions (no derby)
    Unrecycled slag (ball mill product)
    Dirty prill (magnesium metal, high uranium content)
    Reject UO_3

Drum decontamination residues
Magnesium oxide and magnesium zirconate from crucible cleanout
Sludges (oily, high free metal)
Sludges (salt, soft, chloride)
Sludges (nonoily, low or high free metal)
Wet sump of filter cake (with and without oil)
Scrap uranium oxide U_3O_8
Chips and turnings
Solid metal (other than cores) U_3O_8
Contaminated asbestos materials

In total, these residues contain an average of approximately 47 percent uranium, with a range of 0 percent to nearly 95 percent. They range in density from 400 kg/cubic meters (m^3) (25 lb/cubic feet [ft^3]) to 8000 kg/m^3 (500 lb/ft^3), with an average of approximately 1440 kg/m^3 (90 lb/ft^3).

These residues were deposited in Waste Pits 1, 2, 4, and 6. Appendix F.6.7 details the amount of these residues generated and deposited in the waste pits.

- *Water Treatment Sludge*: Sludge from the softening of water for use in the production process was placed in the waste pits to further neutralize and solidify the contents. A total of approximately 300 tons per year of this material was placed in Waste Pits 3 and 5 for a 20-year period beginning in the mid-1960s. This material contains precipitated calcium and magnesium as well as excess lime. It is white to gray in color and pasty to granular.

  Appendix F.6.9 details the amount of this sludge that was generated and deposited in the waste pits.

- *Graphite and Ceramics*: Graphite was used in various places in the production process, including crucibles and ingot molds. This graphite was regularly replaced. The waste graphite from the processing of normal and enriched uranium was burned in the graphite burner to concentrate the uranium. Waste graphite from the processing of depleted uranium was deposited in Waste Pits 1, 2, and 4.

  Ceramic brick was used to line the reduction furnaces and ceramic refractory was used in the remelt furnaces in Plant 5. These ceramics were periodically replaced, with the old ones deposited in Waste Pits 1, 2, and 4.

  Appendix F.6.6 details the amount of graphite/ceramics generated and deposited in the waste pits.

- *Uranyl Ammonium Phosphate Filtrate*: Uranyl ammonium phosphate (UAP) filtrate was generated from 1953 through 1964 in the UAP process in Plant 8. This process was a method of recovering uranium from magnesium fluoride slag. The neutralized UAP filtrate was deposited in Waste Pits 1 and 2. Although not a major contributor to the contents of these waste pits, the filtrate did contain various impurities. Appendix F.6.8 details the amount of filtrate generated, its disposition in the waste pits, and its primary constituents.

- *Thorium Wastes*: Thorium wastes were generated at the site from two sources: an impurity in the ore concentrates and thorium processing. Total thorium in the concentrates ranged from 0.001 percent to 1.06 percent (Appendix F.6.2). The impurities in the ore concentrates were concentrated up to three times in the raffinate by virtue of removing the uranium. Therefore, depending on the ore concentrate and the associated impurities, significant concentrations of thorium may be expected in Waste Pits 2, 3, and 5 associated with the raffinate.

  The production of thorium metal generated residues for disposal. In the early 1950s, these residues were stored and later transported to Maxey Flats in Moorehead, Kentucky, and Mallinckrodt in Weldon Springs, Missouri. Some of these residues, however, were deposited in the waste pits as raffinates (Waste Pits 1, 3, and 5), solids (Waste Pit 4), and liquid wastes (Waste Pits 2, 3, and 5 through the general sump).

  Appendix F.6.10 details the amount of thorium residues disposed of in the waste pits.

- *Ash*: As illustrated in Table 1-1 and Figure 1-9, all contaminated combustibles, such as wooden pallets, paper, general trash, graphite, oils, etc. were burned or incinerated on site. The purpose of this activity was to reduce the volume to be ultimately disposed and to concentrate any recoverable uranium. The incinerators included the Sewage Treatment Plant incinerator, the security incinerator, and the Trane incinerator. The burners included the graphite Burner, the Oil Burner, and the Burn Pit.

  The ash from these burning activities was collected and sampled for uranium content and isotopic level. If these levels were above the Economic Discard Limit (EDL), the ash was processed to recover the uranium. In this case, the ash would have become part of the raffinate, and been deposited in Waste Pits 2, 3, or 5. If the uranium content was below the EDL, the ash would have been deposited directly in Waste Pits 1, 2, or 4.

  Records indicate that approximately 25 MT of incinerator ash was received from the K-25 Plant at Oak Ridge, Tennessee from FY 70 through FY 82. This ash had uranium contents of 2 percent to 85 percent and contained 0.8 percent to 10 percent uranium (U)-235. Because of the uranium content, this material was processed to recover the uranium, with the residue becoming part of the neutralized raffinate and discarded in Waste Pit 5.

  Flyash: Flyash was generated from the on-site, coal-fired boiler. This material generally was deposited in one of two ash storage piles. However, as discussed in Section 1.2.1.3, some of the flyash was used as cover material for Waste Pit 3. In addition, records indicate that some of this flyash was deposited in the Burn Pit prior to 1959.

Table 1-1 summarizes the combustion equipment and disposition of the ash generated and Figure 1-9 shows the distribution of the various ashes to the waste pits.

TABLE 1-1
DISPOSITION OF ASH FROM ON-SITE INCINERATORS

Combustion Device	Materials Burned	Uranium Level	Disposition of Ash
Incinerator at Sewage Treatment Plant	Paper, rags, wood, etc.	Above Economic Discard Limit (EDL): 0.2 - 0.42% uranium	Ash was reprocessed to recover uranium at refinery (Plant 8). Ash (and associated contaminants) entered raffinate waste stream. During 1954-1959, raffinate was heat dried (calcined) and disposed of in Waste Pit 2. After that, raffinate slurry was pumped to Waste Pits 3 and 5.
Security Incinerator	Classified documents (paper)		
Trane Incinerator	Miscellaneous contaminated combustibles		
Graphite Burner	Graphite molds (normal and enriched contamination)		
Oil Burner	Miscellaneous waste oils	Below EDL	Disposed in Waste Pit 1, 2, or 4.
Coal Fired Boilers	Coal	Testing undocumented.	Disposed of in flyash piles (majority), Waste Pit 3, and the Burn Pit.
Burn Pit	Waste oils, laboratory waste, railroad ties, pyrophorics, etc.	Above EDL	Reprocessed to recover uranium (see disposition of reprocessed ash above).
		Below EDL	Remained in Burn Pit or disposed of in Waste Pit 1, 2, or 4.

1.1.4 Operating History of the FEMP

The Atomic Energy Commission (AEC), predecessor to the U.S. Energy Research and Development Administration (ERDA) and then DOE, established the FMPC in conformance with AEC orders in the early 1950s. In 1951, National Lead Company of Ohio, Inc., (now NLO) entered into a contract with the AEC as the Management and Operations Contractor for the facility. This contractual relationship lasted until January 1, 1986. Westinghouse Materials Company of Ohio (WMCO), a wholly owned subsidiary of Westinghouse Electric Corporation, then assumed management responsibilities for the site operations and facilities. In 1991, Westinghouse renamed this subsidiary the Westinghouse Environmental Management Company of Ohio (WEMCO). During that same year, DOE renamed the site the Fernald Environmental Management Project (FEMP) to reflect the site's revised mission. On December 1, 1992, Fernald Environmental Restoration Management Company (FERMCO) assumed responsibility for the site as the first Environmental Restoration Management Contractor (ERMC) for DOE.

The FEMP began operations in 1952 upon completion of the Pilot Plant, the site's first operational facility. Plant 1, Plant 2/3, Plant 4, Plant 5, and Plant 8 began operations in 1953. Plant 6 began operations in 1952. Plant 7 (where UF_6 was processed) and Plant 9 became operational in 1954.

Production peaked in 1960 at approximately 12,000 MTU per year. A product decline began in 1964 and reached a low in 1975 of about 1230 MTU. During the 1970s, consideration was given to closing the FEMP. Thus, capital improvements and staffing were minimized. The staffing level, which peaked at 2891 personnel in 1956, slowly declined to 538 personnel in 1979. In 1981, the FEMP began planning to accommodate increased production requirements. Production levels significantly increased and there was a rapid staff buildup for several years. The renewed need for uranium metal resulted in the implementation of a major facilities restoration program. Production ceased in July 1989, and plant resources were focused on environmental cleanup activities. In June 1991, the site was officially closed as a federal production facility.

1.2 DESCRIPTION AND HISTORY OF OPERABLE UNIT 1

This section provides a brief physical description of each of the waste units that comprise Operable Unit 1 and a summary of the operational history pertinent to these facilities. The operational history focuses primarily on the operational activities conducted prior to the initiation of the site-wide RI/FS in 1986.

1.2.1 Description of Operable Unit 1

Operable Unit 1 contains six waste pits, the Burn Pit, and the Clearwell. Operable Unit 1 (Figure 1-4) is located west of the former production area and includes approximately 37.7 acres. The area is relatively flat with gentle slopes resulting from the emplacement of soil covers over buried wastes and topographical modifications to control surface runoff. Paddy's Run, an intermittent tributary of the

Great Miami River, runs along the west side of the FEMP property between the waste storage area and the site boundary. The geographic area constituting Operable Unit 1 is bounded by the Ohio State Planar Coordinates shown in Figure 1-4. Figure 1-10 shows a cross section profile of the waste pit area; Figure 1-11 shows cross sections of each waste pit.

The following is a summary of information pertaining to waste pit construction and closure.

1.2.1.1 Waste Pit 1

Waste Pit 1 was constructed in 1952 by excavating into an existing clay lens, and then lining the waste pit with clay excavated from an area to the northeast of the waste pit, which later became the Burn Pit. The waste pit surface area is oval-shaped; the dimensions at the bottom are approximately 165 feet wide by 347 feet long. The waste pit is an average 29.5 feet deep, including approximately 18 feet of wastes, 11 feet of lining, and a 6-inch cover. The bottom of Waste Pit 1 slopes approximately 1 foot from east to west. Four feet of excavated clay was placed in the southeast corner of Waste Pit 1 and a berm was constructed on the west side of the waste pit. This berm is elevated approximately 20 feet above the ground surface. The sides of Waste Pit 1 were constructed with 3:1 slopes and then seeded. Figure 1-12 presents a physical description of Waste Pit 1.

A trench, 11 to 12 feet wide and 10 feet deep, was excavated around the bottom of Waste Pit 1 and backfilled with low permeability material (clay). A sump area, lined with approximately 6 feet of low permeability material (clay), was also constructed in the southwest corner. The trench fed rainwater and other liquids to the sump, where they could be removed as necessary.

A 2-inch asphalt dumping pad was constructed over a 6-inch macadam base on the east side of Waste Pit 1. A concrete apron was extended from the pad toward the bottom of the waste pit to facilitate sliding wastes into the waste pit. A fire hydrant was located near the center of the dumping pad to wash materials down into the waste pit.

Water drained from Waste Pit 1 through a series of three pipes located in the west dike. Eight-inch decant lines were constructed through the west berm of Waste Pit 1 but were rarely used. Rainwater from the pipe trench in the K-65 area was pumped into the south end of Waste Pit 1 through an existing pump.

In 1954, the dumping pad on the east side of the waste pit was enlarged and a curb constructed of reinforced concrete was added. Materials used in constructing the pad included a 6-inch asphalt macadam base course and a 2-inch surface treatment.

In 1957, additional storage space was created when excavated material from the construction of Waste Pit 2 was used to increase the berm height by 5 feet on the west side of the waste pit. Because of this increase in height, the slope of the dike near the top edge is approximately 1.5:1 (Figure 1-11).

In 1959, a channel at least 5 feet wide was excavated between the residues and the outer berm to facilitate the proper flow of rainwater to the sump.

Waste Pit 1 was closed and covered with clean fill soil in mid-1959. A portion of this cover was removed in 1972 as a source of cover material for Waste Pit 3. Also, a gravel roadway is constructed on top of the existing cover in the southern portion of the waste pit. The roadway leads to the clearwell pumphouse.

The waste pit is classified as a solid waste management unit (SWMU) under the RCRA.

The results of material volume calculations are presented in Table 1-2:

TABLE 1-2
MATERIAL VOLUME CALCULATION RESULTS FOR WASTE PIT 1

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	0.5	1700	
Waste	18 (maximum)	48,500	37,083
Low Permeability Material	11 (maximum)	18,200	
TOTAL	29.5 (maximum)	68,400	

1.2.1.2 Waste Pit 2

In 1957, Waste Pit 2 was constructed northeast of Waste Pit 1. An existing spring-fed pond (water level elevation 574±1 feet) existed on what became the southern portion of the waste pit. The waste pit was constructed by draining the pond and excavating into the existing native clay. Trees, stumps, and roots had to be removed from the north end. The bottom and side slopes were then lined with 4.5 feet of additional clay from an area immediately northeast of the waste pit, which later became the Burn Pit.

The surface area boundary of the waste pit resembles a six-sided polygon with dimensions at the top of approximately 190 feet wide by 270 feet long. The waste pit is approximately 23.5 feet deep, including 15 feet of wastes, 4.5 feet of lining, and 1 to 4 feet of cover. Logs from Borings Nos. 1768 and 1769 conducted during the RI/FS activities indicate that the top of the low permeability material for Waste Pit 2 is encountered at an elevation of 561 feet. There are two 8-inch cast iron decant pipes

installed through the northwest berm of the waste pit. Like Waste Pit 1, the decant lines were rarely used. Figure 1-13 presents a physical description of Waste Pit 2.

A road was built only 4 feet from the east edge of the waste pit. With roadway improvements over the years, the current road could lie over a portion of Waste Pit 2.

Waste Pit 2 was closed and covered with clean fill in mid-1964. A portion of this cover was removed in 1972 as a source of cover material for Waste Pit 3. The cover material varies from approximately 1 to 4 feet in thickness over the waste pit. In 1975, a test area for the above-grade storage of raffinate filter cake was constructed on Waste Pit 2. The test area was 60 feet by 60 feet and was constructed of earth and coal cinders. The height of the test area is unknown. An unloading area, about 20 feet in diameter, was constructed inside the test pit and roadfill gravel and sand were placed on the edge of the area. Raffinate cake from Plant 8 was dumped by truck into the unloading area, and the cake was moved into the southern half of the waste storage area with the use of a crane. From May 22 to June 9, 1975, 29 truckloads (275 tons) of filter cake were placed in the waste storage area. The filter cake was generated by the filtration of a lime neutralized raffinate stream and had a moisture content of about 70 percent. The filter cake was allowed to dry in the sun to remove some of the moisture for volume reduction. The experiment was deemed unsuccessful and material from the test was deposited into Waste Pit 3.

Waste Pit 2 is classified as a SWMU under RCRA.

The results of material volume calculations are presented in Table 1-3:

TABLE 1-3
MATERIAL VOLUME CALCULATION RESULTS FOR WASTE PIT 2

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	1 to 4	4200	
Waste	15.1 (maximum)	24,200	18,503
Low Permeability Material	4.5 (approx.)	9000	
TOTAL	23.5 (maximum)	37,400	

1.2.1.3 Waste Pit 3

Waste Pit 3 was placed in service in December 1958 and was constructed by excavating into the underlying naturally occurring clay lens. To construct Waste Pit 3 and the Clearwell, a small creek that ran along the west embankment of Waste Pit 2 was relocated north of the Burn Pit and parallel to the railroad tracks. The surface area boundary of the waste pit is oval-shaped and has dimensions of approximately 450 feet wide by 720 feet long. The waste pit is approximately 42 feet deep, including 27 feet of wastes, 1 foot of liner, and 14 feet of cover.

A natural layer of low permeability clay forms the bottom of the waste pit, so the placement of additional clay material was not necessary. The bottom of Waste Pit 3 has an elevation of approximately 548 feet.

The sides of Waste Pit 3 were constructed with a 1.5:1 slope and lined with 12 inches of clay. The west berm of Waste Pit 3 was constructed approximately 20 feet above the 1958 ground level. Some of the soil excavated from the waste pit itself was used to form the west wall. No berm was constructed on the north side of Waste Pit 3.

The east side of Waste Pit 3 was formed from the west sides of Waste Pits 1 and 2. An effluent line from the general sump was constructed through the north dike of Waste Pit 3. Spoil areas used during the construction of Waste Pit 3 were located due north and west of the waste pit. The spoil area due north of the waste pit was subsequently graded to an elevation of approximately 575 feet. Top soil was placed further north of the waste pit. Figure 1-14 presents a physical description of Waste Pit 3.

A 4-foot wide walkway of crushed stone was constructed on top of the berm between Waste Pit 3 and the Clearwell. In the middle of the berm, a 20-foot-long by 19-foot-wide reinforced concrete weir was constructed. The weir allowed water to decant from Waste Pit 3 to the Clearwell. The height of the weir was adjusted using 10-foot-long two-by-fours and two-by-sixes, which were laminated to achieve the appropriate thickness. In the early 1970s, the weir was removed and the area was filled with soil to create a wider berm between Waste Pit 3 and the Clearwell.

In 1965, the capacity of Waste Pit 3 was increased by adding 2 feet of additional material onto the berms. In the late 1960s, an area in the north end of Waste Pit 3 was excavated and wooden pallets were placed in this area and crushed with a bulldozer.

In 1970, when the waste pit could no longer be used as a settling basin, solid materials were placed in the waste pit starting from the northeast corner. A bulldozer was used to initially push flyash into the waste pit.

Prior to June 1, 1971, approximately 5000 cubic yards of dry materials consisting of broken concrete and soil excavated from nearby areas were dumped into Waste Pit 3. Because of the hazards involved in placing these materials on the unstable sludge, it was decided to limit operations to the east side of the waste pit, which was believed to be more stable. In November 1972, a considerable amount of soil was pushed from Waste Pits 1 and 2 into Waste Pit 3. From June 1971 through December 1972, the engineering department kept records of how many truckloads of cinders from the south pit, silo cinders, dirt from the field, and coal fines from the coal storage area were placed in Waste Pit 3. The engineering department assumed that each truckload was equivalent to 10 cubic yards. Table 1-4 shows the amount of each material placed into Waste Pit 3 per month.

TABLE 1-4

MATERIAL PLACED IN WASTE PIT 3 AS COVER

Month	Cover Materials (m^3)[a]			Totals
	Flyash	Coal Fines	Dirt	
Prior to Jun-71	---	---	---	3,823
Jun-71	283	0	1,254	1,537
Jul & Aug-71	749	0	6,087	6,836
Sep-71	2,019	0	3,127	5,146
Oct-71	505	0	5,735	6,240
Nov-71	566	0	5,796	6,362
Dec-71	2,485	0	0	2,485
Jan-72	1,537	596	0	2,133
Feb-72	2,187	84	329	2,600
Mar-72	2,982	0	153	3,135
Apr-72	2,309	0	765	3,074
May-72	1,002	0	1,713	2,715
Jun-72	436	0	3,257	3,693
Jul-72	390	0	2,072	2,462
Aug-72	390	0	5,368	5,758
Sep-72	---	---	---	2,133
Oct-72	2,133	0	0	2,133
Nov-72	688	0	0	688
Dec-72	535	0	0	535
Totals	21,196	680	35,656	63,488

a The volume does not include unknown volumes of slag leach, filter cakes, flyash, lime sludges, or soil from the cover of Waste Pits 1 and 2, all of which are known to have been deposited in Waste Pit 3 after 1974.

060

From 1975 to 1977, slag leach residue, filter cakes, flyash, soil, and lime sludges were deposited into the waste pit. From 1975 until 1984, some of the filter cakes from Plant 8 sludges accumulated in the general sump tanks, and recycled slurries from Waste Pit 5 were classified as dry waste and deposited into Waste Pit 3. A road between Waste Pits 2 and 4 was used to bring material to the waste pit by truck. The waste would then be placed into the waste pit using a bulldozer with a 15-foot extension.

In 1975, when Waste Pit 3 was partially covered, the drainage patterns were changed to channel surface water from Waste Pits 1, 2, and 3 to the Clearwell and Waste Pit 4. The surface water from Waste Pit 4 was pumped into Waste Pit 5 to settle suspended solids.

In 1975, a field demonstration was held on top of Waste Pit 3 to test the use of a drag scraper for dispersing raffinate and Waste Pit 5 sludge filter cake into the waste pit from a truck dumping point. The test proved this method was feasible, and the drag scraper was further used to prepare Waste Pit 3 for more filter cake dumping.

In 1975, filter cake was placed into Waste Pit 3 by using a transfer truck to dump the filter cake into a prepared depression on the edge of the waste pit. The solids were in a slurry form when first dumped but quickly came to rest. When the depression filled, a clamshell bucket shoveled the solids and piled them further into the waste pit. Often the solids would form a conical pile.

In 1975, Waste Pit 5 was almost full so several hundred thousand gallons of sludge were removed, combined with other waste streams, and pressed into filter cake. The resulting filter cakes were primarily discarded into Waste Pit 3. None of the materials deposited in Waste Pit 3 as part of the activities to construct the cover are accounted for as wastes in the waste pit. However, it is known that many of these materials became mixed into the wastes.

In 1977, Waste Pit 3 was closed for disposal purposes and completely covered with clean fill.

Waste Pit 3 is classified as a SWMU under RCRA.

The results of material volume calculations are presented in Table 1-5:

TABLE 1-5
MATERIAL VOLUME CALCULATION RESULTS FOR WASTE PIT 3

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	14 (maximum)	93,700	
Waste	27 (maximum)	204,100	156,055
Low Permeability Material	1	9700	
TOTAL	42 (maximum)	307,500	

1.2.1.4 Waste Pit 4

Waste Pit 4 was constructed in 1960. The waste pit sides and bottom are lined with 1 to 2 feet of low permeability clay. The surface area boundary of the waste pit is trapezoidal in shape and has maximum dimensions of approximately 380 feet wide by 310 feet long. The waste pit is approximately 32 feet deep, including 25 feet of waste, 1 to 2 feet of liner, and 6 feet of cover. The waste pit was constructed with side slopes of 2:1. The top of the waste pit has an elevation of 584 feet above mean sea level (MSL) with the existing ground elevation at 584 feet to 588 feet above MSL.

There is a concrete pad on the northeast edge of Waste Pit 4, which served as a temporary storage area for drummed material to be emptied into the waste pit. There was a fire hydrant located at the pad to wash contamination from vehicles and materials from the pad into the waste pit.

Disposal activities in Waste Pit 4 were terminated in 1985, and it was closed in May 1986. Figure 1-15 presents a physical description of Waste Pit 4.

Waste Pit 4 was classified as a Hazardous Waste Management Unit (HWMU) under RCRA in 1984. Interim RCRA closure, as certified by the OEPA, was completed in August 1989. Final closure of Waste Pit 4 has been deferred to the CERCLA program. At the time of the waste pit's closure, the surface of the waste pit was a shallow dome of soil surrounded by an earthen berm. To facilitate drainage, the cover was designed to extend a minimum of 3 feet, and an average 9.8 feet beyond the center line of the earthen berm. A ditch was excavated around the perimeter of the waste pit to collect runoff. Fill material was placed on the waste pit between the crown of the surface soil dome and the earthen berm.

Approximately 5000 cubic yards of fill material were required to provide sufficient slope to allow rain water to flow from the top of the dome outward in all directions. Soil and organic material excavated for the perimeter ditch were added to the fill material. Clay was combined with bentonite to achieve the required low permeability. Approximately 1000 cubic yards of clay was required to cover the waste pit to a depth of 2 feet while maintaining the necessary slope.

Because heavy earth moving equipment was expected to generate dust and cause surface contaminants to become airborne, the construction contractor was prohibited from performing any excavation or regrading on the waste pit surface. The cap was designed to place 0 to 3 feet of fill material over certain sections of the waste pit to minimize the addition of material while achieving the required slope.

Following installation of the fill and clay cover, a Hypalon cover was placed onto the waste pit in sheets that varied from 47.9 to 51.8 feet in length. Each sheet was thermally bonded to the adjacent

sheets to provide an impermeable cover. An anchor system was designed to increase the cover's stability during high winds. At every other seam, one sheet's edge was placed into a trench that was excavated 1 foot into the clay. The trench was backfilled with clay and compacted. The adjoining sheet was then welded with adhesive to the exposed surface of the buried sheet. On the perimeter of the waste pit, the cover was secured in a trench excavated to 4 feet below the frost line. Pillows made of Hypalon and filled with sand were welded to the cover surface at 50-foot intervals to act as weights.

A vent was installed through the Hypalon and clay to allow gas to escape. Rock channel protection was placed in the perimeter drainage ditch and the exposed soil was seeded to prevent erosion.

The results of material volume calculations are presented Table 1-6:

TABLE 1-6
MATERIAL VOLUME CALCULATION RESULTS FOR WASTE PIT 4

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	6	14,600	
Waste	25	55,100	42,130
Low Permeability Material	1	1000	
TOTAL	32 (maximum)	72,800	

1.2.1.5 Waste Pit 5

Waste Pit 5 was constructed and placed into service in 1968. The Waste Pit 5 surface area boundary is rectangular in shape and is approximately 820 feet long by 240 feet wide. The waste pit is approximately 29 feet deep, including 28 to 29 feet of wastes, and a membrane liner. Waste Pit 5 was constructed with side slopes of 2.5:1. The waste pit berm extends about 10 feet above grade on the south side and 14 to 20 feet above grade on the north side. Excavated material was used to build the waste pit dike. The waste pit was lined with a 60-mil thick Royal-Seal ethylene propylene diene monomer (EPDM) elastomeric membrane. Figure 1-16 presents a physical description of Waste Pit 5.

Water percolation from porous native material was encountered during the original excavation of the waste pit. The porous seams were overexcavated and filled with compacted clay prior to installation of the liner. Perched water was encountered during excavation activities, but the majority of water originated from surface runoff into the waste pit. The waste pit bottom was sloped from east to west to allow for drainage. The perched water and runoff were pumped from the west end of the waste pit.

All liquid waste entered Waste Pit 5 through a 6-inch pipe in the eastern end. Supernatant overflowed through an effluent tower in the southwest corner of the waste pit. The tower included an adjustable overflow connected to a 12-inch transit pipe that routed the overflow to the Clearwell.

4783

Two minor liner joint repairs were completed in December 1970. One failure was identified between the waste pit lining and effluent tower. The second failure was at a membrane field splice near the feed end of the waste pit. Because the failures were below the normal liquid operating level, some liquid release probably occurred. Waste Pit 5 stopped receiving slurried materials in 1983 and was discontinued for use as a settling basin in 1987. Waste Pit 5 is classified as an HWMU under RCRA and a water cover is maintained.

Removal Action No. 11, Waste Pit 5 Experimental Treatment Facility (ETF), began on December 13, 1991, and was completed on March 22, 1992. Approximately 350 cubic yards of waste material and contaminated media were removed following completion of the testing. This action served as an interim RCRA closure/response action. Removal Action No. 18, Control of Exposed Material in Waste Pit 5, resulted in the dredging of exposed material to restore the water cover to the entire waste pit. These actions are further discussed in Section 1.5.4.4.

Waste Pit 5 is classified as an HWMU under RCRA.

The results of material volume calculations are presented in Table 1-7:

TABLE 1-7
MATERIAL VOLUME CALCULATION RESULTS FOR WASTE PIT 5

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	N/A	N/A	
Waste	28±1	97,900	74,854
Low Permeability	N/A	N/A	
TOTAL	29 (maximum)	97,900	

1.2.1.6 Waste Pit 6

Waste Pit 6 was constructed from September 1978 to June 1979. It is square shaped, measuring approximately 210 feet on both sides. The waste pit is approximately 24 feet deep, measured from the top of the berm to the liner, but the depth of the wastes in the waste pit is only 20 feet.

Waste Pit 6 was constructed in the same manner as Waste Pit 5 and lined with a 60-mil EPDM elastomeric liner. There is a berm around all sides except for the west side, which is adjacent to Waste Pit 4. The berm varies in height from approximately 4 to 8 feet above grade. Figure 1-17 presents a physical description of Waste Pit 6.

164

A concrete dumping pad was constructed on the west side of Waste Pit 6. Material was moved from the concrete pad into the waste pit with a crane or flushed in with water. Later, a concrete dumping pad was constructed on the east side of the waste pit.

Water percolation was encountered during excavation activities. Numerous pockets of perched groundwater were encountered during the construction of Waste Pit 6.

Preventing water from entering the waste pit during construction was difficult. The liner continued floating on water entering the waste pit, so holes were cut in the liner. A pump was inserted under the liner and the perched groundwater was removed. Before cutting holes in the liner, pieces of plastic reinforcement were fixed to the liner in those locations so that the liner would not tear extensively when the holes were cut. Once the water was removed, patches were welded over the holes to complete the integrity of the impervious liner. Sand bags were also placed on the liner to keep it from floating. Because of the small size, the waste pit bottom was not sloped during construction. Waste Pit 6 is currently water covered.

The use of Waste Pit 6 ceased on March 11, 1985. Removal Action No. 6, Control of Exposed Material in Waste Pit 6, was completed in December 1990. This action involved the redistribution of exposed material in the waste pit so that it would be completely covered with water. The water cover continues to be maintained.

Waste Pit 6 is classified as a SWMU under RCRA.

The results of material volume calculations are presented in Table 1-8:

TABLE 1-8
MATERIAL VOLUME CALCULATION RESULTS FOR WASTE PIT 6

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	N/A	N/A	
Waste	20	9600	7340
Low Permeability Material	N/A	N/A	
TOTAL	24 (maximum)[a]	9600	

[a]Distance from top of berm to liner.

1.2.1.7 Clearwell

The Clearwell was constructed in 1959 during Waste Pit 3 construction activities. To allow for construction of Waste Pit 3 and the Clearwell, a small creek that ran along the west embankment of Waste Pit 2 was relocated north of the existing Burn Pit and parallel to the railroad tracks. The

Clearwell was excavated into existing low permeability material to an elevation of 548±1 feet above MSL. The Clearwell is approximately 200 feet long by 180 feet wide, with a maximum depth of 27 feet. The east, west, and south sides of the Clearwell were constructed with a 1.5:1 slope and lined with 12 inches of clay. The north side was constructed with a 2:1 slope and also lined with 12 inches of clay. The west berm of the Clearwell was constructed approximately 20 feet above grade in 1958. The north side is adjacent to the south side of Waste Pit 3. The east side was formed from the west side of Waste Pit 1. A natural layer of low permeability material forms the bottom of the Clearwell, and additional clay material was not placed in the bottom. The bottom of the Clearwell is at elevation of 548±1 feet above MSL. Figure 1-18 presents a physical description of the Clearwell.

Spoil areas for the construction of the Clearwell were due north of Waste Pit 3 and west of Waste Pit 3. Top soil was placed farther north of Waste Pit 3. The spoil area due north of Waste Pit 3 was subsequently graded.

A series of three 8-inch pipes are located in the berm between Waste Pit 1 and the Clearwell, but these decant lines were rarely used. Also, a weir was constructed on the north side of the Clearwell to drain Waste Pit 3. Finally, the 12-inch line from the overflow of Waste Pit 5 extends through the east berm of the Clearwell.

The Clearwell is classified as a SWMU under RCRA.

The results of material volume calculations are presented in Table 1-9:

TABLE 1-9
MATERIAL VOLUME CALCULATION RESULTS FOR THE CLEARWELL

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	N/A	N/A	
Waste	11	3700	2829
Low Permeability Material	1	600	
TOTAL	27 (maximum)[a]	4300	

[a]Distance from top of berm to bottom of Clearwell.

1.2.1.8 Burn Pit

Clay to line Waste Pits 1 and 2 during their construction was obtained from an area immediately northeast of Waste Pit 2, which at that time was called the clay pit. A gravel dumping pad was eventually built up on the north end of the resulting excavation so that trucks could back into the deepest part of the waste pit to dump combustible wastes. Thus, the waste pit became known as the Burn Pit. Although records were not kept on all of the materials or amounts deposited, it is known

that the Burn Pit was used primarily to burn combustible materials such as laboratory chemicals; pyrophoric and reactive chemicals; oils; low-level contaminated combustible material, such as pallets and skids; and cafeteria debris. In addition, several materials were deposited directly into the Burn Pit, including cans, bottles, general refuse, and laboratory glassware.

The Burn Pit was filled with cinders, concrete, ash, gravel, and soil in 1968, during the construction of Waste Pit 5. Figure 1-11 shows a cross section of the Burn Pit. Figure 1-19 presents a physical description of the Burn Pit.

The results of material volume calculations are presented in Table 1-10:

TABLE 1-10
MATERIAL VOLUME CALCULATION RESULTS FOR THE BURN PIT

Material	Depth (ft)	Volume (yd^3)	Volume (m^3)
Cover	N/A	N/A	
Waste	26	30,300	23,167
Low Permeability Material	N/A	N/A	
TOTAL	26 (maximum)	30,300	

1.2.2 History of Operable Unit 1

With few exceptions, FEMP storage facilities were used for storing all wastes generated at the facility since the beginning of uranium production operations in 1951. The waste pits were constructed to store waste material generated at the site as well as some materials imported from other facilities. Section 1.1.3.2 describes how these materials were generated. The following paragraphs describe how the wastes were transferred to the waste pits and, based upon knowledge of the operations, the characteristics of the various waste pits.

The FEMP refinery processed two basic classes of materials: (1) pitchblende ores as they were mined and shipped to the FEMP, and (2) other uranium concentrates that had already been refined to some degree. This second class of materials included uranium concentrates that had already undergone a preliminary refining process at an off-site mill and residues recovered at various stages of FEMP operations.

Uranium-bearing ores, as they are mined, contain not only uranium, but also equilibrium concentrations of uranium progeny (i.e., the isotopes of other elements formed through the sequential radioactive decay chains that begin with U-235 and U-238). the concepts of radioactive decay chains and progeny products are discussed in detail in Section 4.0. These progeny, which include radium, are removed in either a preliminary milling process or in the refining process (if the ores are not

preprocessed through a mill). Thus, when the FEMP refinery processed pitchblende ores (non-K-65 material), the refinery wastes were known as "hot" raffinates. The term "hot" was used to indicate that the material contained a high concentration of the gamma-emitting radionuclide radium (Ra)-226 and progeny that result in a significant direct penetrating radiation exposure rate. When the FEMP processed uranium concentrates that had been preprocessed through a uranium mill, a significant portion of the Ra-226 and the gamma-emitting progeny had already been removed. The thorium progeny of uranium (i.e., thorium [Th]-230, etc.) remained with the uranium concentrates due to the inefficiency of the mill in removing this metal, and were thus termed "cold" metal oxides.

The six waste pits are numbered based on the chronology of their construction. They are further identified as dry or wet pits on the basis of the physical characteristics of the waste materials intended to be placed in them. Waste Pits 3 and 5 were classified as wet pits and received pumped slurries. Waste Pits 1, 2, 4, and 6 were generally identified as dry pits because they received primarily dry solids, but they may have received liquid waste streams as well.

In general, the process plant and type of residue dictated the type of container, mode of transportation, and method of depositing the materials in the waste pits (NLO 1977):

- With four exceptions, liquid residues were normally neutralized in the general sump and pumped to the waste pits. The exceptions were Zimlo slurry, heat-treat quench water, UAP neutralized filtrate, and slag leach slurry, which were routed directly to the waste pits. The volume of the Zimlo slurry and heat-treat quench water was minor and contributed insignificant amounts to the solids in the waste pits. The piping system for the pumped wastes is described in Section 1.2.2.9. Also, feed sump residues from the water treatment and boiler plants and cooling water from the heat treating operation were hauled directly to the waste pits in tank trucks.

- Drummed materials were transported on semi-flatbed trailers and, in the case of pyrophoric metals, by four-wheeled flatbed trailers pulled by a tow tractor. With few exceptions, as discussed below, the drums were unloaded and the contents dumped onto the edge of the respective waste pit with a fork truck equipped with a drum rotator.

- Metal dumpsters and hoppers were transported to the waste pits and the residues emptied directly onto the edge of the respective waste pit.

- Bulk materials were hauled by dump trucks and dump trailers, which also deposited materials onto the edge of the respective waste pit.

Material deposited on the edges of the waste pits was pushed into the waste pits by either a bulldozer or a drag line scraper. Loose contamination was washed from the bulldozers, drag line, scraper, vehicles, dumpsters, and fork trucks at one of two hydrants. One of these hydrants was located near the center of the concrete pad for Waste Pit 1 and the second at the southeast corner of the concrete

pad for Waste Pit 4. Empty drums were transported to Plant 8 and cleaned in the drum washing facility, and (as necessary) containers and equipment were cleaned at the decontamination facility.

The following section describes the operating history of each of the structures in Operable Unit 1, including the types of materials deposited in each and the expected constituents. Figure 1-20 presents a time line showing the period of operation for each of the waste pits. Table 1-11 shows the distribution of the waste streams in the waste pits and Table 1-12 summarizes the major constituents in each waste pit.

1.2.2.1 Waste Pit 1

Waste Pit 1 was in operation from 1952 to mid-1959. For most of this period, there was no need for a settling lagoon because waste slurries, other than effluent from the general sump, were filtered or calcined to remove water. Therefore, Waste Pit 1 has been considered a dry pit. It was, however, used as a clearwell for Waste Pit 2 in 1958 and 1959 (NLO 1985).

Waste Pit 1 is divided into four sections: depleted materials; filter (trailer) cakes from Plant 8; graphite from Plant 5 along with bricks, stones, and miscellaneous solids; and chemical trap material and other miscellaneous drummed materials (Carvitti 1959). The first three sections are approximately equal in size and arranged, respectively, from south to north. The fourth section is located in the southwest corner of the waste pit.

A pad was located on the east side of Waste Pit 1. Waste materials were dumped on the pad and either pushed into the waste pit by a bulldozer or washed into the waste pit using the fire hydrant on the pad.

Approximately 28,100 m^3 of wastes have been accounted for in Waste Pit 1, compared to 37,086 m^3 (76 percent accounted for) based on survey data and boring logs (Parsons 1993). As indicated in Table 1-11, the most significant portion of the volume accounted for is trailer cake (46 percent), with less significant amounts of general sump sludge (27 percent), and depleted materials (slag and residues - 22 percent). The average density of the materials accounted for in the waste pit is 1400 kg/m^3 (90 lb/ft^3), with a range from 400 kg/m^3 (25 lb/ft^3) to 8000 kg/m^3 (500 lb/ft^3) associated with the depleted residues.

Waste Pit 1 contains an estimated total of 1075 MTU. The most significant sources of the uranium are depleted slag (59 percent) and depleted residues (32 percent). The uranium content of the waste pit is expected to range from 0 percent to nearly 95 percent, both associated with depleted residues.

Waste Pit 1 contains significant amounts (12,000 MT each) of dolomite and MgF_2, (both associated with C-liner and trailer cake), and calcium (3800 MT, associated with the general sump sludge).

TABLE 1-11

SUMMARY OF OPERABLE UNIT 1 WASTE PIT CONTENTS BASED ON PROCESS KNOWLEDGE

Source	Solids to Waste Pits[d]																	
	Waste Pit 1			Waste Pit 2			Waste Pit 3			Waste Pit 4			Waste Pit 5			Waste Pit 6		
	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)
General Sump Sludge[a]	2	10,764	7,500	1	6,578	4,600	12	41,720	29,000				20	53,493	37,100			
Raffinate[b]				7	433	500	633	39,754	41,400				501	30,070	31,300			
Magnesium Flouride																		
Depleted Slag[c]	636	6,783	4,700	59	634	400				329	7,845	5,300				332	8,082	5,500
Trailer Cake[d]	92	18,401	13,000	71	14,208	9,900	150	30,072	20,900	55	11,137	7,700						
Slag Leach[d]							63	12,605	8,700				26	5,239	3,600			
UAP Filtrate[e]	3	1,712	1,200	8	3,763	2,600												
Depleted Residues[f]	339	2,163	1,500	32	202	100				1,818	3,590	2,500				1,100	1,853	1,200
Graphite/Ceramics[f]	3	150	60	0	13	5				1	450	230						
Water Treatment Sludge[g]							0	2,669	1,900				0	3,857	2,700			
Thorium Wastes[h]		80	100		0	0		89	100		1,093	800		1,007	1,000		0	0
Totals	1,075	40,054	28,060	178	25,832	18,105	858	126,909	102,000	2,203	24,115	16,530	547	93,666	75,700	1,432	9,935	6,700

Notes: a) See Appendix F.6.3.
b) See Appendix F.6.4.
c) See Appendix F.6.7.
d) See Appendix F.6.5.
e) See Appendix F.6.8.
f) See Appendix F.6.6.
g) See Appendix F.6.9.
h) See Appendix F.6.10. Note that the thorium values are not included in the uranium column totals and do not include thorium deposited in the waste pits through the general sump.
i) See Appendix F.6.11.

010

4783

TABLE 1-12

SUMMARY OF OPERABLE UNIT 1 WASTE PIT CONSTITUENTS BASED ON PROCESS KNOWLEDGE

Constituent	Solids to Waste Pits (MT)[a]					
	Waste Pit 1	Waste Pit 2	Waste Pit 3	Waste Pit 4	Waste Pit 5	Waste Pit 6
Uranium (U)	1,075	178	858	2203	547	1432
Aluminum (Al)	52	120	710	0	420	0
Antimony (Sb)	0	0	1	0	0	0
Arsenic (As)	0	1	64	0	41	0
Barium (Ba)	5	12	75	0	45	0
Boron (B)	0	0	1	0	0	0
Bismuth (Bi)	0	0	0	0	0	0
Cadmium (Cd)	0	0	4	0	3	0
Calcium (Ca)	3,776	2,524	31,585	0	36,800	0
Chloride (Cl)	316	695	39	0	25	0
Chromium (Cr)	0	0	4	0	2	0
Cobalt (Co)	0	0	1	0	1	0
Copper (Cu)	2	4	22	0	13	0
Dysprosium (Dy)	0	0	2	0	1	0
Erbrium (Er)	0	0	0	0	0	0
Europium (Eu)	0	0	0	0	0	0
Flouride (F)	18	39	81	0	38	0
Gadolinium (Gd)	0	0	1	0	1	0
Holmium (Ho)	0	0	0	0	0	0
Iron (Fe)	18	49	812	0	513	0
Lead (Pb)	0	0	4	0	3	0
Lutetium (Lu)	0	0	0	0	0	0
Magnesium (Mg)	10	30	673	0	430	0
Manganese (Mn)	4	9	26	0	14	0
Molybdenum (Mo)	0	1	54	0	35	0
Nickel (Ni)	0	0	1	0	0	0
Samarium (Sm)	0	0	0	0	0	0
Sodium (Na)	485	1,078	960	0	624	0

TABLE 1-12
(Continued)

Constituent	Solids to Waste Pits (MT)[a]					
	Waste Pit 1	Waste Pit 2	Waste Pit 3	Waste Pit 4	Waste Pit 5	Waste Pit 6
Terbium (Tb)	0	0	0	0	0	0
Thorium (Th)	1	2	97	74	72	0
Thulium (Tm)	0	0	0	0	0	0
Tin (Sn)	1	2	7	0	4	0
Vanadium (V)	0	5	395	0	257	0
Yttrium (Y0)	0	0	3	0	2	0
Ytterbium (Yb)	0	0	0	0	0	0
Zinc (Zn)	0	0	9	0	6	0
NH3	0	1	50	0	32	0
CO3	0	3	238	0	155	0
MgF2	11,952	10,694	41,183	18,263	5,056	7,750
PO4	592	1,338	6,491	0	3,516	0
P2O5	0	8	623	0	405	0
SiO2	757	889	3,092	334	1,169	0
SO4	0	36	2,915	0	1,896	0
V2O5	0	4	310	0	202	0
NO3	0	66	7,529	0	4,475	0
Dolomite	11,953	3,592	0	0	0	0
Unaccounted	9,037	4,452	27,959	3,241	36,860	753
		0				
Totals	40,054	25,832	126,909	24,115	93,666	9,935

Notes: a) See Appendix F.6.10 for further details.

072

1.2.2.2 Waste Pit 2

Waste Pit 2 was used from 1957 through mid-1964. Waste Pit 2 was used briefly as a settling waste pit for neutralized raffinate during 1958 and 1959, prior to completion of Waste Pit 3 (NLO 1985). It was used as a settling waste pit because the drying equipment available at that time could not process all of the raffinate.

Approximately 18,100 m^3 of waste have been accounted for in Waste Pit 2, compared to 18,505 m^3 (98 percent accounted for) based on survey data and boring logs (Parsons 1993). As indicated in Table 1-11, the most significant portions of the accounted volume for are trailer cake (55 percent) and general sump sludge (25 percent), with a less significant amount of UAP filtrate (14 percent). The average density of the materials accounted for in the waste pit is 1400 kg/m^3 (90 lb/ft^3), with a range from 400 kg/m^3 (25 lb/ft^3) to 8000 kg/m^3 (500 lb/ft^3) associated with the depleted residues.

Waste Pit 2 contains an estimated total of 178 MTU. The most significant sources of the uranium are trailer cake (40 percent), depleted slag (33 percent), and depleted residues (18 percent). The uranium content of the waste pit is expected to range from 0 percent to nearly 95 percent, both associated with depleted residues.

More than 40 percent of the estimated mass in Waste Pit 2 is MgF_2 (14,842 MT) from both C-liner and trailer cake. Waste Pit 2 contains significant amounts of dolomite (3600 MT) and calcium (2500 MT), associated with general sump sludge and neutralized raffinate. The relatively small amount of neutralized raffinate in Waste Pit 2 contributes small amounts of impurities associated with raffinates.

1.2.2.3 Waste Pit 3

Waste Pit 3 was the first waste pit built specifically for settling solids from liquid waste streams. It was used as such from December 1958 through October 1968. Liquid wastes, including contaminated storm water from the Burn Pit, were pumped to Waste Pit 3 (Carvitti 1959). Waste Pit 3 also received dry residues after Waste Pit 2 was filled. The liquid wastes were pumped to the north end of the waste pit and solid materials settled as the liquid flowed toward the overflow weir at the south end.

Beginning in the late 1960s, solid materials were placed in the waste pit in an attempt to stabilize it. These efforts included the deposition of approximately 5000 cubic yards of broken concrete and excavated earth prior to June 1, 1971 (Nelson 1972), as well as placement of wooden pallets in the north end (Parsons 1993) and a considerable amount of soil from Waste Pits 1 and 2 into the waste pit in November 1972 (Engineering File [EF] 1958). Finally, filter cake, slag leach residue, lime sludge, and flyash were used to complete the filling of the waste pit from 1975 to 1977 (NLO 1985a). Also in 1975, several hundred thousand gallons of sludge were removed from Waste Pit 5, filtered, and most of the sludge deposited in Waste Pit 3. All of these residues have been accounted for as cover material and not as part of the waste inventory.

Approximately 102,000 m^3 of waste have been accounted for in Waste Pit 3 compared to 156,066 m^3 (65 percent accounted for) based on survey data and boring logs (Parsons 1993). Part of this difference is associated with the estimated bulk densities of the residues in the waste pit; unaccounted for materials that were deposited in the waste pit as part of the cover; and compounds, such as lime, sodium hydroxide, potassium hydroxide, magnesium oxide, filter aid, and soda ash that were associated with neutralization of the materials deposited in the waste pit but not accounted for separately. As indicated in Table 1-11, the most significant portions of the accounted for volume are neutralized raffinate (40 percent), general sump sludge (28 percent) and trailer cake (20 percent). The average density of the materials accounted for in the waste pit is approximately 1200 kg/m^3 (75 lb/ft^3). Because most of the residues in Waste Pit 3 were slurries, the density is not expected to vary significantly from this average.

Waste Pit 3 contains an estimated total of 858 MTU. The most significant source of the uranium is the neutralized raffinate (74 percent), with trailer cake also contributing a significant amount (17 percent). The uranium content of the waste pit is expected to range from 0 percent in the water treatment sludge to 0.5 percent (wet basis) in the neutralized raffinate.

More than 32 percent of the estimated mass in Waste Pit 3 is MgF_2 (41,183 MT) from trailer cake and slag leach, which also contributed nearly 25 percent of the mass as calcium. Waste Pit 3 contains significant amounts of arsenic and barium, associated with the neutralized raffinate, as well as thorium, (97 MT - Table 1-12) associated with general sump sludge.

1.2.2.4 Waste Pit 4

Solid wastes were deposited in Waste Pit 4 from August 1960 until May 1986. The solid wastes were dumped onto a concrete pad on the northeast edge and pushed into the waste pit with a bulldozer.

In some cases, these wastes were hauled to the waste pits in drums. These drums were generally emptied into the waste pit and the drums returned to Plant 8 for cleaning prior to reuse. At least 100 of the drums, however, were deposited on the west side of the waste pit (Diehl 1980). These drums probably contained spent heat treatment salts that had solidified in the drums, although definitive records in this regard are not available.

In 1975, some of the filter cake from the dredging of Waste Pit 5 was placed in Waste Pit 4 (Pennak et al. 1976). Barium chloride was reportedly deposited in Waste Pit 4 (WMCO 1986). The 1986 report indicates that 23,500 pounds of low-level radioactive waste containing barium chloride heat treatment salt were deposited in the waste pit from May 1981 and April 1983. Review of records during the RI phase indicates that the material deposited in the waste pit was contaminated with barium chloride (floor sweepings, etc.) and that the salts were stored in the RCRA warehouse.

Only 16,500 m^3 of waste have been accounted for in Waste Pit 4, compared to 42,133 m^3 (39 percent accounted for) based on survey data and boring logs (Parsons 1993). The remainder of the material in the waste pit is assumed to be trash from the site that could be deposited without documentation. These materials included cans, laboratory glass and plastic, concrete, asbestos, construction rubble, and general trash (Parsons 1993). The general trash included nonrecoverable metal refuse, glass, plastic, wood, and noncombustible cafeteria waste (prior to 1974 when the sanitary landfill was opened). The Burn Pit may include similar general trash. Lime was occasionally added to Waste Pit 4 to maintain a pH suitable for uranium precipitation (NLO 1977).

As indicated in Table 1-11, the most significant portions of the accounted for volume are trailer cake (47 percent) and depleted materials (slag and residues - 47 percent). The average density of the materials accounted for in the waste pit is approximately 1500 kg/m^3 (90 lb/ft^3), with a range from 400 kg/m^3 (25 lb/ft^3) to 8000 kg/m^3 (500 lb/ft^3) associated with the depleted residues.

Waste Pit 4 contains an estimated total of 2203 MT of uranium. The most significant source of the uranium is the depleted residues (83 percent), with depleted slag also contributing a significant amount (15 percent). The uranium content of the waste pit is expected to range from 0 percent to nearly 95 percent, both associated with depleted residues.

More than 75 percent of the estimated mass in Waste Pit 4 is MgF_2 (18,263 MT) from depleted slag. Aside from the uranium and MgF_2, Waste Pit 4 contains approximately 1093 MT of wastes from thorium processing, 74 MT of which is thorium (Table 1-12).

1.2.2.5 Waste Pit 5

Waste Pit 5 served as a settling basin for thin slurries pumped from the refinery (Plant 8) and the general sump from October 1968 through August 1983, as well as supernatant from Waste Pits 4 and 6. The waste pit also received supernatant from the general sump from August 1983 into 1987.

In 1975, several hundred thousand gallons of sludge were removed from Waste Pit 5 (because it was filling up) and filtered; the majority of the sludge was deposited in Waste Pit 3, with some going to Waste Pit 4.

Approximately 75,700 m^3 of wastes have been accounted for in Waste Pit 5 compared to 74,860 m^3 (100 percent accounted for) based on survey data and boring logs (Parsons 1993). As indicated in Table 1-11, the most significant portions of the accounted for volume are general sump sludge (49 percent) and neutralized raffinate (41 percent). The average density of the materials accounted for in the waste pit is approximately 1200 kg/m^3 (75 lb/ft^3). Because all of the residues in Waste Pit 5 were slurries, the density is not expected to vary significantly from this average.

Waste Pit 5 contains an estimated total of 547 MTU. The most significant source of the uranium is the neutralized raffinate (92 percent). The uranium content of the waste pit is expected to range from 0 percent in the water treatment sludge to 0.5 percent (wet basis) in the neutralized raffinate. Waste Pit 5 also contains approximately 72 MT of thorium (Table 1-12) from the periods when thorium was processed.

Over 39 percent of the estimated mass in Waste Pit 5 is calcium associated with the general sump sludge and the neutralized raffinate. It also contains 5056 MT of MgF_2 from slag leach. Waste Pit 5 contains significant amounts of arsenic and barium, associated with the neutralized raffinate.

1.2.2.6 Waste Pit 6

Waste Pit 6 received wastes from June 1979 through March 1985. Generally, to protect the membrane liner, the waste pit received only noncoarse, nonpyrophoric materials.

Approximately 6700 m^3 of waste have been accounted for in Waste Pit 6, compared to 7341 cubic meters (91 percent accounted for) based on survey data and boring logs (Parsons 1993). As indicated in Table 1-11, the only wastes that Waste Pit 6 received were depleted slag (82 percent by volume) and depleted residues (18 percent by volume). The average density of the materials accounted for in the waste pit is approximately 1500 kg/m^3 (90 lb/ft^3), with a range from 400 kg/m^3 (25 lb/ft^3) to 6480 kg/m^3 (400 lb/ft^3) associated with the depleted residues.

Waste Pit 6 contains an estimated total of 1432 MT of uranium. The depleted residues account for 77 percent of this amount. The uranium content of the waste pit is expected to range from 0 percent to nearly 95 percent, both associated with depleted residues.

Nearly 80 percent of the estimated mass in Waste Pit 6 is MgF_2 (7750 MT) from the depleted slag.

1.2.2.7 Clearwell

The Clearwell received surface water runoff from the waste pits and supernatant from Waste Pits 3 and 5. It acted as a final settling basin prior to periodic pumping to the Great Miami River. The Clearwell was dredged in the late 1960s or early 1970s, but has never been emptied or dredged again. Measurements indicate the presence of approximately 11 feet of sludge in the bottom of the Clearwell.

1.2.2.8 Burn Pit

The Burn Pit was used from before 1957 to 1968 to burn materials such as laboratory chemicals; pyrophoric and reactive chemicals; oils; low-level contaminated combustible material, such as pallets and skids; cafeteria debris; and general refuse, such as cans, bottles, and laboratory glassware.

The actual inventory of materials disposed of in the Burn Pit is unknown. Boring logs 1776 and 1777 indicate debris such as glass, ceramics, metal, wood, etc., down to an elevation of 558±1 feet. This information is consistent with its known use. Because of its use, the Burn Pit is expected to contain a wide variety of unburned materials as well as products of complete and incomplete combustion.

1.2.2.9 Miscellaneous Facilities/Structures

Figure 1-21 shows the miscellaneous aboveground and underground facilities and structures associated with Operable Unit 1. The most significant of these features is the piping systems described below. As indicated previously, liquid wastes were pumped to the waste pits, which was accomplished using two 6-inch-diameter pipes between the general sump and the waste pits. These pipes exited the former production area on the west side, enclosed in a concrete trench that was covered with slabs of concrete. The trench extended to the fence of the K-65 silos. At this point, the pipes were routed north and buried underground. The two pipes then branched, one running north between Waste Pits 2, 3, and 4 to Waste Pit 5, and one running west to the Clearwell.

The pipe at Waste Pit 5 connected to three berm valves. With these valves, the liquid could be directed from the general sump to Waste Pits 4 or 5, from either waste pit to the other, or from either waste pit back to the general sump or to Manhole 175, which discharged to the Great Miami River.

The pipe between the general sump and the Clearwell was used to transport effluent from the Clearwell back to the general sump, or to Manhole 175, which discharged to the Great Miami River.

An additional pipe originated in the tower at the west end of Waste Pit 5 and extended, buried in the dike of Waste Pit 3, to the Clearwell. This pipe transported supernatant from Waste Pit 5 to the Clearwell.

Plant operating personnel have periodically excavated portions of all of these lines in conjunction with other construction activities. There are no indications that any have ever failed.

1.3 PREVIOUS STUDIES ON OPERABLE UNIT 1

In addition to information collected from the processing operations, several previous studies have been conducted that provide data for the waste pit area of Operable Unit 1. These investigations include activities completed under the RI/FS, the Characterization Investigation Study (CIS), the environmental monitoring program, and other site programs (such as Radon flux measurements) undertaken to characterize the physical, chemical, and radiological properties of the waste pits, their contents, and the surrounding environment. Detailed information on objectives, methods, and analyses for these studies that directly supported the RI are provided in Section 2.0, Study Area Investigations.

Historic reports that provide information on the waste pit area specifically are discussed below. A summary of the objectives and findings is provided for each report.

1.3.1 Groundwater Pollution (1960)

In 1960, a study was conducted for the purpose of evaluating the groundwater pollution potential at the FEMP. The report defined the geology and groundwater occurrence at the site and identified sources of groundwater pollution, pollutants of primary concern, and probable results of pollution of the groundwater. The study found that with respect to the waste pit area:

- Two aquifers existed at the site—one sand and gravel layer, approximately 50 feet in thickness about 80 to 90 feet below ground surface; and a second sand and gravel formation 70 feet in thickness about 140 feet below ground surface.

- The waste pits presented the most serious potential source of groundwater contamination at the FEMP—at the time it was believed that some of the waste pits extended below the impervious surface layers; in some of the waste pit excavations, lenses or deposits of pure sand and gravel were encountered. At the time of the study, Waste Pits 1, 2, and 3 were in existence.

- Primary constituents of potential concern (CPC) included uranium and thorium products (and their accompanying radioactivity) and chlorides, nitrates, and fluorides.

Field studies were also conducted to evaluate the groundwater pollution potential. The studies included sampling of production and test wells, visual inspections, and a field survey and sampling of Paddy's Run. Conclusions of the field studies included:

- The two aquifers were interconnected and the chemical content of each was the same; indicating that contamination reaching the shallow groundwater could be migrating into the deep aquifer.

- There was evidence of leakage from Waste Pit 3 into a test well, as well as a small amount of seepage from Waste Pit 3 to Paddy's Run.

- The wet and dry pits form the greatest potential hazard from a groundwater pollution standpoint and also with respect to potential pollution of Paddy's Run.

1.3.2 Aquifer Contamination Control Reports

Aquifer Contamination Control Reports were used to report monitoring results for potential groundwater contamination. These reports were prepared by NLO quarterly from 1965 to 1975 and annually from 1976 to 1985. The Aquifer Contamination Control Reports provided information on measures taken to avoid groundwater contamination. They included:

- Analysis of test and production well sampling to determine groundwater contamination, if any

- Monitoring storm sewer system for uranium losses
- Refining operation of the general sump and waste pit area to minimize amount of liquids released to ground
- Monitoring flow of Great Miami River and analytical results from plant effluent

Additional investigations that contribute substantial information to historic knowledge of the FEMP and Operable Unit 1 are summarized in Section 1.4, Prior Environmental Investigations at the FEMP. The investigations include information on geology, surface water, hydrogeology, contamination releases, environmental surveys, and ecology.

1.4 PRIOR ENVIRONMENTAL INVESTIGATIONS AT THE FEMP

Numerous environmental investigations have been conducted in and around the FEMP site by DOE and other organizations. The following paragraphs describe the most pertinent of these studies that were used in scoping the RI/FS in the preparation of the RI/FS work plan, and as background in the appropriate sections of this report.

1.4.1 Geologic Investigations

Geologic investigations of the area that surrounds and includes the FEMP have contributed substantial information to the RI/FS investigation. Fenneman (1916) performed an extensive survey of the geology in the Cincinnati area. This report describes in detail the interbedded limestone and shale bedrock and its mantle of glaciofluvial and alluvial sediments that constitute the buried-channel aquifers in southwestern Ohio. Later investigators such as Durrell (1961) supported Fenneman's observations. The shape of the buried-channel aquifer was further refined by Watkins and Spieker (1971) via geophysical surveys of the area around Fernald. More recent information includes various maps of the geology of Hamilton and Butler counties, Ohio, as well as individual quadrangle maps of areas located in those counties (Leow 1985; Vormelker 1985; Ford 1974; Swinford in preparation). Maps showing the extent and age of glacial till in the Operable Unit 1 study area have also been produced (Brockman 1988). The Soil Conservation Service (USDA 1980, 1982) has performed detailed soil surveys of Butler and Hamilton counties, Ohio including the environs of the site.

1.4.2 Surface Water and Sediment Investigations

The Miami Conservancy District has kept precipitation and runoff records for the Miami River Valley since the early 1900s (Houck 1921). Precipitation records have also been kept at the Cincinnati/ Northern Kentucky International Airport. Flood information for the Great Miami River and Paddy's Run is available from the Federal Emergency Management Agency (FEMA 1982). Additional information on most Ohio streams, including the Great Miami River and Paddy's Run, has been well documented with respect to flow duration and water quality (Cross and Hedges 1959; OEPA 1982).

Flow from the drainage basin is monitored by the U.S. Geological Survey (USGS) using a gaging station on the Great Miami River at Hamilton, Ohio. Flow regulation on the Great Miami River has been studied by Spieker (1968a); Paddy's Run data have been compiled by Dames and Moore (1985a). Realignments and other modifications of Paddy's Run and its tributaries on the FEMP have been documented by Dove (1961) and WMCO (1987). Surface water quality data have been collected for the FEMP area for the period 1979 through the present as part of the site environmental monitoring program. The Ohio Environmental Protection Agency (OEPA) collected water quality data during the period of 1977 through 1983.

In 1986, the FEMP performed a comprehensive radiological survey of the sediment in Paddy's Run (Dames & Moore 1986). The survey included a walkover scan, with hand-held radiation detection instrumentation, of the bed of the creek from north of the facility to the confluence of the creek with the Great Miami River. Sediment samples were collected and analyzed at points in the creek bed displaying elevated radiological readings and at locations in the bed adjacent to the K-65 silos. The results of the study were used to support the description of the nature and extent of contamination presented in Section 4.0.

In 1988, under the terms of a Director's Findings and Orders issued by the State of Ohio, sampling was performed by the FEMP from a series of drainage ditches and storm water manholes on the FEMP property. Three of these ditches were in the vicinity of Operable Unit 1. Data were used from this study to support the description of the nature and extent of contamination described in Section 4.0.

1.4.3 Surface Soil Investigations

During 1986 and 1987, a comprehensive environmental investigation (Weston 1987) was performed at the FEMP entitled the CIS. The CIS involved the investigation of the FEMP waste storage areas including the Operable Unit 1 study area and the area surrounding the flyash piles. During the CIS, samples were collected from the waste units themselves and the surrounding surface soils and drainages leading to Paddy's Run. These surface soil sample results from the samples collected during the CIS (in and around the Operable Unit 1 study area) have been used to support the description of the nature and extent of contamination associated with Operable Unit 1, which is presented in Section 4.0.

1.4.4 Hydrogeologic Investigations

Dove (1961) and Spieker (1968a) have extensively described the hydrology and hydrogeology of the Great Miami Aquifer in the lower Great Miami River Valley. These studies document recharge rates, permeabilities of various lithologies, and other aquifer characteristics. Both studies also discuss groundwater/surface water interactions, specifically for the Great Miami River and Paddy's Run. Other studies of the regional valley-fill aquifer in the vicinity of the FEMP include a study by the Miami Conservancy District (1985), several studies by the Ohio Department of Natural Resources

(Walker 1986; Walton and Schaefer 1956), and various contracted studies (GeoTrans 1985; Dames and Moore 1985a; ATEC Associates, Inc. 1982). Two other studies by Spieker (1968b, c) discuss the potential effects of increased pumping of the groundwater and future development of the groundwater resources, respectively.

1.4.5 Environmental Surveys

An environmental monitoring program has been conducted at the FEMP since the late 1950s. The program has undergone significant change and expansion over the years in response to the changing needs of the facility and evolving federal regulation and DOE administrative orders. The program entails a broad range of activities related to environmental monitoring and sampling, waste management, and overall site remediation.

The primary objectives of the ongoing environmental monitoring program are to:

- Ensure that the FEMP can detect any release of materials as quickly as possible, so that corrective actions can be implemented as appropriate.
- Estimate the radiation dose that area residents may be exposed to as a result of any release of materials.
- Measure progress of correcting problems from past operations and in implementing improved environmental management practices.

Additionally, the environmental monitoring program collects and analyzes samples of surface water and sediment from Paddy's Run, along the western boundary of Operable Unit 1. The results of the environmental monitoring program are reported in the annual environmental report.

For more than 10 years, the environment in and around the FEMP has been closely monitored by DOE (Battelle et al. 1977; DOE 1985a, 1987), Oak Ridge Associated Universities (ORAU 1985), various FEMP-related committees (WMCO 1986, 1987; Fleming and Ross 1984), and various contracted agencies (IT 1986; Weston 1986a; Battelle 1981). The DOE and ORAU documents include environmental impact assessments, RI/FS documents, and environmental surveys. Internal reports of studies by NLO and WMCO include the annual Environmental Monitoring Reports and the Aquifer Contamination Control Reports (NLO 1965-1985), which are available through DOE. A continuous sampling and analysis program to comply with the requirements of the RCRA is also ongoing at FEMP.

The contracted studies represent additional comprehensive environmental sampling and analysis programs and document the analytical results of a large number of perched water, groundwater, surface water, sediment, surface soil, subsurface soil, and air samples. The analytical constituents include radionuclides, organic compounds, metals, and general water quality parameters.

From January 1985 to 1988, the Ohio Department of Health (ODH) (through a cooperative agreement with DOE) conducted a special environmental monitoring program on and around the FEMP (ODH 1988). The program included the collection of more than 300 water samples from area wells, cisterns, and surface waters including ponds; 34 soil samples; the measurement of direct radiation levels at 40 locations; measurement of environmental radon at 16 locations on the FEMP and 25 off-site locations; and monthly collection and analysis of milk samples from cattle in the vicinity of the site.

1.4.6 Vegetation and Wildlife Studies

Vegetation and wildlife in the FEMP study area have been studied and characterized by WEMCO, NLO, and OEPA. WEMCO performed two studies on the fish that are indigenous to Paddy's Run and the Great Miami River in the vicinity of the FEMP (WMCO 1986, 1987). The OEPA study (1982) was a more comprehensive study of the aquatic environment in the Great Miami River. A recent study by Facemire et al. (1990), under contract to the site operator, described the general terrestrial and aquatic environments of the FEMP and surrounding areas. The database compiled in this study is the most complete characterization of the ecological resources available.

1.5 PROJECT BACKGROUND

This section of the report describes the regulatory history of the site and describes numerous prior investigations of the FEMP environment and operations. This description sets the stage for the presentation of a conceptual model of contaminant transport for the Operable Unit 1 study area, which will also assist the reader in understanding the logic used to identify overall data needs that drove the RI site investigation.

1.5.1 Regulatory Agency Agreements and the National Environmental Policy Act

On March 9, 1985, the EPA issued a Notice of Noncompliance to DOE identifying EPA's concerns over potential environmental impacts associated with the FEMP's past and present operations. Between April 1985 and July 1986, conferences were held between DOE and EPA representatives to discuss the issues and to identify the steps DOE proposed to achieve and maintain environmental compliance.

On July 18, 1986, an FFCA detailing actions to be taken by DOE to assess environmental impacts associated with the FEMP was signed by DOE and EPA. The FFCA was entered into pursuant to Executive Order 12088 (43 FR 47707) to ensure compliance with existing environmental statutes and implementing regulations such as the Clean Air Act, RCRA, and CERCLA. In particular, the FFCA was intended to ensure that environmental impacts associated with past and present activities at the FEMP be thoroughly and adequately investigated so that appropriate remedial response actions can be formulated, evaluated, and implemented. As required by the FFCA, a site-wide RI/FS was initiated in July 1986 pursuant to CERCLA.

082

In November 1989, the FEMP was placed on the National Priorities List (NPL) for investigation and remediation under CERCLA. This placement, in addition to progressive findings in the RI/FS program, necessitated the amendment of the existing agreement between DOE and EPA. The 1986 FFCA was amended by a Consent Agreement under Sections 120 and 106(a) of CERCLA (Consent Agreement) providing for the implementation of the operable unit concept for the FEMP RI/FS and revising the milestone commitments for the RI/FS program without modifying the underlying objectives in the FFCA. The Consent Agreement was signed on April 9, 1990, and became effective on June 29, 1990, following a period of public comment. The Consent Agreement also provided for the implementation of removal actions.

OEPA and DOE entered into the Director's Findings and Orders (DFO) on June 26, 1987. The DFO identified regulatory requirements including proper storm water management, biodenitrification surge lagoon (BSL) liner replacement and operation, restrictions for placement of waste in Waste Pit 5 and the Clearwell, best management practices (BMP) Plan, and implementation for the control of industrial wastes and other wastes to be managed and potentially discharged from the FEMP, in addition to a study of environmental impact associated with discharged waste off site.

On March 11, 1986, OEPA filed a complaint against the DOE citing various RCRA violations. As a result of the complaint, the OEPA and DOE entered into the Consent Decree (CD) without the admission or adjudication of any issue of fact or law (CD, December 1988). The CD included requirements for proper waste characterization, control of wastewater and runoff in the waste pit area, characterization of Waste Pit 5, hazardous waste management, and groundwater assessment.

On April 5, 1990, OEPA filed contempt of court charges against DOE and WEMCO for violation of the CD. As a result of these charges, DOE and WEMCO entered into negotiations and the CD was revised. The revised CD, the "Stipulated Amendment to Consent Decree (SACD)," was signed on January 22, 1993. The SACD includes specific schedules for hazardous waste evaluations, Plant 1 pad management requirements, revisions to the Part A and Part B Permit Applications, and additional hazardous waste requirements.

The Consent Agreement was amended in 1991 to revise the schedules for completing the RI/FS for the five identified operable units. This Amended Consent Agreement was signed on September 20, 1991 and became effective on December 19, 1991, following a period of public review. The State of Ohio is not a party to the Consent Agreement, although state representatives were present during the discussions that led to the agreements and are active participants in the RI/FS process.

DOE's policy for remedial action sites is to integrate values of National Environmental Policy Act (NEPA) into the procedural and documented requirements of CERCLA, wherever practicable. In accordance with this policy, the RI/FS documents prepared under CERCLA to support cleanup

decisions for each operable unit at the FEMP will be written to reflect these values. The NEPA/CERCLA integration approach was outlined in a Notice of Intent (NOI) that was published in the Federal Register (FR) on May 15, 1990.

The Federal Facilities Agreement (FFA) was signed by EPA and DOE on November 19, 1991. The FFA was focused to ensure the control and abatement of radon-222 emissions at the FEMP. The FFA identified requirements for the K-65 silos, Silo 3, radon flux measurements, other emission sources, and consistency with the Consent Agreement and its amendments.

The RI reports for each operable unit will contain characterization data for the specific operable unit and surrounding site and will function as the NEPA Description of the Affected Environment discussion. The Site-Wide Characterization Report (SWCR 1992) includes detailed technical appendices reporting site-specific studies of wetlands, threatened and endangered species, cultural resources, etc., as well as a site-wide baseline risk assessment. The SWCR will also support the Description of the Affected Environment discussion and will function as the NEPA impact analysis of the no-action alternative. The FS documents prepared for each operable unit will also incorporate the appropriate level of NEPA documentation, in that each will contain the operable unit-specific impact analysis discussion. The PP for each operable unit will present the preferred alternative component.

The resultant integrated process and document package will be termed FS/PP-NEPA documents. The SWCR and operable unit-specific RI information will be incorporated into the FS/PP-NEPA documents by reference. The Operable Unit 4 FS/PP-EIS will function as the lead CERCLA/NEPA document from which the NEPA documentation for other operable units will be tiered.

In accordance with both CERCLA and NEPA processes, these documents are also made available for public comment. Public involvement is an important factor in the decision-making process for site remediation. Public comments will be used to develop the decision for the current remedial action, which will be presented in a ROD. Applying the integrated approach for NEPA and CERCLA, Operable Unit 1 will issue either a ROD or FONSI, depending on the selected level of NEPA documentation. The contents of the documents prepared for the remedial actions at the FEMP are not intended to represent a statement on the legal applicability of NEPA to remedial actions conducted under CERCLA.

The DOE issued a second NOI on October 22, 1990 to prepare a Programmatic EIS (PEIS) on DOE's nationwide integrated Environmental Restoration and Waste Management Program. The purpose of DOE's proposed program is to provide a broad, systematic approach to addressing cleanup activities and waste management practices at DOE facilities nationwide. The Draft ROD for Operable Unit 1 is scheduled to be submitted to EPA on December 6, 1994, which may precede the completion of the PEIS scheduled for late 1994. Consequently, prior to the completion of the PEIS, decisions will be

made on other FEMP issues such as containment; stabilization; and treatment, storage, and disposal of the wastes. These actions are appropriate interim actions because they are justified independently of the program, would be accompanied by adequate NEPA documentation, and do not prejudice the ultimate decision of the program by determining subsequent development or limiting alternatives. It is therefore assumed that remedial alternatives evaluated for Operable Unit 1 will be consistent with the approaches developed in the programmatic environmental impact statement (PEIS).

1.5.2 Regulatory Agency Agreements and Applicable or Relevant and Appropriate Requirements

CERCLA Section 121(d), as amended by the Superfund Amendments and Reauthorization Act (SARA), requires that remedial actions attain a standard of cleanup that is protective of human health and the environment, is cost effective, and uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, the cleanup standards that must be met for the hazardous substances, pollutants, or contaminants must be at least as stringent as any applicable or relevant and appropriate requirement (ARAR), criteria, or limitation under federal and/or state law.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

To-be-considered (TBC) materials are nonpromulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. However, TBCs will be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of health or the environment.

When hazardous substances remain on a site at the conclusion of a remedial action, CERCLA requires that the cleanup action ensure a level or standard of control that attains federal or state environmental or public health ARARs.

Identification of ARARs essentially begins prior to and during the remedial investigation. ARARs are identified in increments of increasing certainty as more information regarding the site is developed.

Potential ARARs for Operable Unit 1 are being identified. As the RI/FS remedial design/remedial action (RD/RA) process continues, identification of ARARs will be refined. The list of potential ARARs for Operable Unit 1 will be included in the Operable Unit 1 FS. During development of remedial alternatives, ARARs will be used to identify cleanup goals and requirements.

1.5.2.1 CERCLA and RCRA Integration

Section VIII of the Amended Consent Agreement requires DOE to integrate CERCLA response and RCRA corrective action obligations. In addition, the Part B Permit Application requires the DOE to investigate releases from SWMUs as part of the RI/FS required for each operable unit identified under the CERCLA program. The permit further states that if corrective action is required for SWMUs and HWMUs, the corrective action will be part of the CERCLA program.

The objective of a RCRA corrective action program is to evaluate the nature and extent of the release of hazardous waste or constituents; to evaluate facility characteristics; and to identify, develop, and implement the appropriate corrective measure or measures adequate to protect human health and the environment. Requirements for evaluating nature and extent of releases under RCRA Facility Investigation (RFI) are substantially met in this RI report. Similarly, the FS under CERCLA parallels the Corrective Measures Study requirements under RCRA corrective action.

1.5.2.2 NEPA/CERCLA Integration Information

Consistent with DOE Order 5400.4, the FEMP is integrating the values of the NEPA into the documentation being prepared to support the RI/FS process. On May 15, 1990, an NOI was published in the FR indicating that DOE planned to prepare an Environmental Impact Statement (EIS) to evaluate the environmental impacts associated with planned cleanup activities at the site. As identified in the NOI, the FS for the lead FEMP operable unit, in this case Operable Unit 4, will be issued as a Feasibility Study/Proposed Plan - Environmental Impact Statement (FS/PP-EIS) and has been written to incorporate NEPA values at the level of an EIS. The Operable Unit 4 RI report and SWCR support the description of the affected environment and the impact analysis of implementing the site-wide no-action alternative. The Operable Unit 4 RI and SWCR are incorporated into the Operable Unit 4 FS/PP-EIS by reference. Furthermore, the RI/FS documents for the remaining operable units will also be written to include NEPA values and will tier from the Operable Unit 4 FS/PP-EIS.

This strategy is also outlined in the Implementation Plan (IP) for the RI/FS-EIS Process for Remedial Activities at Operable Unit 4, Silos 1 through 4, which was conditionally approved by EH-1 on January 19, 1993. The purpose of the IP are to record the results of the scoping process and to provide guidance to DOE for the preparation of the FS/PP-EIS for Operable Unit 4. Two scoping meetings were held in the potentially affected communities located near the FEMP on June 12 and 13, 1990.

The RI reports for Operable Unit 1 and the remaining operable units will contain characterization data for the specific operable unit and nearby environmental media, and will support the description of the affected environment for NEPA purposes. In addition, the RI report will contain a baseline risk assessment addressing the impact on human health that will support the no-action alternative for the specific operable unit. Since the SWCR, additional human health risk information has been obtained and is in the baseline risk assessment included in the RI report. The ecological risk assessment in the SWCR addresses the entire FEMP and is based on data collected in each operable unit before December 1991. Since then, no new ecological data have been collected for Operable Unit 1. Environmental media not directly related to Operable Units 1, 2, 3, or 4 will be addressed in a "second iteration" of the site-wide ecological risk assessment and will be, by definition, included in the Operable Unit 5 RI.

The FS documents prepared for Operable Unit 1 and the remaining operable units will also be written to incorporate NEPA values. The NEPA evaluation for the specific operable units will contain the impact analysis of each alternative for the specific operable unit. The FS documents evaluate alternatives for the remediation of the various operable units. The evaluation of environmental impacts in the Operable Unit 1 FS/PP-NEPA evaluation will include: a discussion of the impacts to biotic resources, cultural resources, etc.; a floodplain/wetland assessment pursuant to the requirements of Title 10 Part 1022 of the Code of Federal Regulations (10 CFR 1022) as appropriate; and a qualitative evaluation of ecological risks associated with Operable Unit 1 residual contaminants. The NEPA impact analysis of each alternative will be integrated into the Detailed Analysis of Alternatives discussion in the Operable Unit 1 FS and will likewise occur in the FS documents for the remaining operable units. In addition, the Operable Unit 4 FS/PP-EIS has been supplemented to incorporate evaluation of the environmental consequences, consistent with NEPA, of implementing the Operable Unit 4 preferred alternative with the leading remedial candidates for each of the other FEMP operable units. This discussion of the NEPA impact analysis related to potential remedial actions for the five operable units will be updated in each operable unit-specific FS/PP-NEPA document, as appropriate in sequence as each operable unit progresses through the RI/FS process.

The PP for each operable unit will summarize key information from the RI, baseline risk assessment, and Comprehensive Response Action Risk Evaluation (CRARE) and will identify the preferred comprehensive alternative for the remedial action. In addition, the PP will provide a summary of the environmental impacts from the preferred alternative.

In accordance with both CERCLA and NEPA processes, these documents are made available to the public for comment. Public involvement is an important factor in the decision-making process for site remediation. Public comments will be considered in remedy selection for each operable unit. Applying the integrated approach for CERCLA and NEPA, DOE plans to prepare and issue a single ROD to be signed by both DOE and EPA for the Operable Unit 4 FS/PP-EIS. The remaining

operable units would issue either a ROD or a finding of no significant impact (FONSI), depending on the selected level of NEPA documentation. DOE's CERCLA/NEPA integration policy is not intended to represent a statement on the legal applicability of NEPA to remedial actions under CERCLA.

The DOE is currently preparing a programmatic EIS for environmental restoration and waste management. The document is expected to be issued as a draft for public comment. The proposed remedial action at the FEMP is considered to qualify as interim action for the programmatic EIS under the conditions established in 40 CFR 1506.1(c). Presently, the action proposed is considered an interim action because it is: (1) justified independently of the program, (2) accompanied by an adequate EIS, and (3) not prejudice the ultimate decision on the program by determining subsequent development or limiting alternatives. However, before issuing the ROD pursuant to the FS/PP-EIS for Operable Unit 4 at the FEMP, DOE will further review these conditions to ensure that they are met at that time.

1.5.3 FEMP RI/FS

As previously discussed, the FEMP site-wide RI/FS was initiated in July 1986 pursuant to the terms of the FFCA. Consistent with the terms of agreement, DOE prepared and submitted a RI/FS work plan in December 1986. Following review by EPA and OEPA, a series of technical discussions were held between involved organizations, which led to the modification of the original work plan. The RI/FS work plan received EPA approval in May 1988.

The RI/FS work plan provides the overall technical approach, identifies a number of investigative areas, develops objectives for each of the specified investigations, and establishes overall objectives for the evaluation of data collected during the RI activities. The work plan includes the following detailed plans that establish specific procedures for the completion of the RI/FS for the FEMP:

- Sampling and analysis plan (SAP)
- Health and safety plan (HSP)
- Community relations plan (CRP)
- Data management plan (DMP)
- Quality assurance project plan (QAPP)

The SAP contains objectives, sampling locations, and sampling procedures for the following:

- Radiation measurements
- Surface soils
- Groundwater
- Subsurface soils
- Surface water and sediment
- Biological resources
- Air quality

The SAP has been amended on a number of occasions through the Document Change Request (DCR) procedure of the QAPP. Several of these addenda are specific to Operable Unit 1 and are discussed in Section 2.0.

Sampling activities associated with the Operable Unit 1 RI have been completed. The field investigation for Operable Unit 1 was conducted pursuant to the approved sampling plans. Although not technically a part of Operable Unit 1, information collected as part of investigations for other operable units will be presented in this RI report, as appropriate, in an effort to determine the potential impact of Operable Unit 1 sources on the environment.

The RI/FS work plan, (ASI/IT 1988) identified 27 units of the FEMP to be investigated in the RI/FS. Several modifications to the list eventually increased this total to 39 units. In the course of the investigation, it became apparent that, for technical and program management purposes, these 39 units needed to be categorized and grouped accordingly. The concept of operable units was introduced into the program to allow the remedial action process to proceed to completion for the most well-defined units, while data collection and analysis continued for other operable units. The operable unit concept was formalized in the 1990 Consent Agreement and later refined by the 1991 Amended Consent Agreement.

The five FEMP operable units are broadly defined as:

- Operable Unit 1 - Waste Pit Area
- Operable Unit 2 - Other Waste Units
- Operable Unit 3 - Former Production Area
- Operable Unit 4 - Silos 1 through 4
- Operable Unit 5 - Environmental Media

In an effort to supplement available guidance and promote consistency among the operable units, the 1991 Amended Consent Agreement added a number of work elements to the ongoing RI/FS. Those elements pertinent to Operable Unit 1 included the issuance of a Risk Assessment Work Plan Addendum, the issuance of a SWCR, and the formulation of a comprehensive site-wide operable unit.

The Risk Assessment Work Plan Addendum (DOE 1992a) details the approach, methods, models, and input parameters to be employed in the completion of the operable unit RI and FS risk assessments, including Operable Unit 1. It was conditionally approved by EPA on June 12, 1992. The Risk Assessment Work Plan Addendum represents the vehicle by which the final geographical boundaries of the individual source operable units (i.e., Operable Units 1, 2, and 4) are defined. Consistent with the Work Plan Addendum, the quantitative baseline risk assessment for Operable Unit 1 will be limited to within the geographical boundaries identified in the addendum. Discussions or presentations

of data to define the nature and extent of contamination associated with the operable unit will not be limited by the pre-established geographical boundaries.

The 1991 Amended Consent Agreement also provided for a SWCR. This report was prepared to compile site-wide data available as of December 1991 and to complete a preliminary site-wide baseline risk assessment. The preliminary baseline risk assessment quantitatively evaluates risk from the FEMP site as a whole for the existing, preremedial action conditions. The SWCR was conditionally approved by EPA in January 1993. The SWCR summarizes data available from the RI/FS as of December 1991. A preliminary site-wide baseline risk assessment is presented in the SWCR based on the data available at that time. The SWCR was prepared to satisfy the following specific objectives:

- Identify and characterize any sources of potential radiological and chemical contamination.
- Summarize the current knowledge of the nature and extent of any radiological and chemical substances found in soils, sediment, surface water, and groundwater.
- Identify the migration pathways and mechanisms for transport of radiological and chemical substances found in soils, sediment, surface water, and groundwater.
- Characterize the occurrence of chemical or radiological substances in aquatic and terrestrial organisms both on and adjacent to the FEMP.
- Support the Description of the Affected Environment and Functions as the NEPA Impact Analysis for the no-action alternative.
- Develop, validate, and apply various site models to augment the current understanding of the site environment.
- Provide the data necessary to perform the screening and detailed analysis of remedial alternatives during the FS.

The SWCR also contains the NEPA impact analysis of the no-action alternative. The site-wide data required for analysis of potential impacts of site-wide remedial action are contained in the SWCR.

The Amended Consent Agreement added a Comprehensive Site-Wide Operable Unit that will evaluate the remedies selected for the five operable units on a site-wide basis. This addition was done to ensure that the combined remedial actions taken for the five operable units are protective of human health and the environment on a site-wide basis as required by the National Oil and Hazardous Substance Pollution Contingency Plan (NCP).

In October 1990, DOE received EPA approval of the Operable Unit 1 Initial Screening of Alternatives (ISA) Report, which presented the following alternatives:

- Alternative 0 - No action
- Alternative 1 - Nonremoval, slurry wall, and cap
- Alternative 2 - Nonremoval, physical stabilization, slurry wall, and cap
- Alternative 3 - Nonremoval, in situ vitrification, and cap
- Alternative 4 - Removal, waste treatment, and on-property disposal
- Alternative 5 - Removal, waste treatment, and off-site disposal
- Alternative 6 - Waste removal, treatment, on-property disposal, and cap
- Alternative 7 - Waste removal, treatment, on-property disposal, soil treatment, and cap

Because the comprehensive base of information contained in this RI report was not available at the time the ISA report was completed, it is possible that the FS screening process will produce different results. If this is the case, the basis of such differences will be explained in detail with the FS.

The RI/FS Treatability Study Report for Operable Unit 1 is scheduled to be completed by October 1993. The treatability report will describe and evaluate waste treatment technologies studied for remediation of the waste pit area. The goal of the report is to evaluate each waste treatment technology to determine the feasibility, effectiveness, and reliability of each technology. Technologies covered in the report include vitrification, solidification/stabilization, physical/thermal processing, chemical processing, and supporting technologies. The information presented in the report will be used to support the preparation of the FS and ROD.

1.5.4 Operable Unit 1 Study Area Removal Actions

1.5.4.1 Removal Actions

Removal actions, as described in 40 CFR Part 300.415, are primarily intended to abate, minimize, stabilize, mitigate, or eliminate a release or threat of release of hazardous substances, pollutants, or contaminants before a final remedial action, if there is a threat to public health and welfare or the environment. These actions are initiated to accelerate cleanup activities to address releases or potential releases of hazardous substances. Five removal actions have been conducted within Operable Unit 1:

- Removal Action No. 2: Waste Pit Area Runoff Control
- Removal Action No. 6: Control of Exposed Material in Pit 6
- Removal Action No. 11: Waste Pit 5 Experimental Treatment Facility
- Removal Action No. 18: Control of Exposed Material in Pit 5
- Removal Action No. 22: Waste Pit Area Containment Improvement (Operable Unit 1).

1.5.4.2 Waste Pit Area Runoff Control: Removal Action No. 2

This removal action can be broadly defined as management of radioactively contaminated storm water runoff from Operable Unit 1. Waste storage units within Operable Unit 1 included in this removal action are the six waste pits, the Burn Pit, and the Clearwell. Runoff from the concrete storage silos

in Operable Unit 4 also was included in this removal action. Implementation of the removal action entailed a site evaluation, work plan preparation, and the execution of the recommended measures. The eight-phase removal action was completed June 15, 1992 (DOE 1992c).

This project included installing concrete drainage ditches, dikes, and culverts, which, along with existing topographic features, collect the waste pit area storm water runoff. A concrete collection sump was installed south of the Clearwell to collect contaminated storm water runoff and pump it to the BSL. The storm water runoff from uncontaminated portions of the waste pit area is routed from the perimeter drainage areas to Paddy's Run.

This removal action continues to provide runoff control and collection. The potentially-contaminated storm water runoff is collected and pumped to the BSL and the effluent treatment system before discharge to the Great Miami River. Thus, the potential for release of contaminants to the environment has been reduced.

1.5.4.3 Control of Exposed Material in Pit 6: Removal Action No. 6

This removal action involved redistributing the exposed material such that all solids were below the water level in Waste Pit 6 to reduce particulate emissions to the environment. Field activities for the removal action began on December 17, 1990 and were completed on December 19, 1990.

Approximately 125 cubic yards of the waste pit contents were exposed above the water cover of the 29,000-square-foot Waste Pit 6 surface area. This exposed waste pit material was subject to wind erosion and was estimated to be a contributor to the airborne dose received by the maximally exposed off-site individual from all sources of radiation at the FEMP. The removal action entailed using a crane with a clamshell attachment to remove the exposed material and redistribute the material to deeper portions of the waste pit.

Air sampling equipment was set up and air monitoring was initiated during late November 1990, approximately 3 weeks prior to any waste pit material movement. The air was sampled to provide quantitative measurements before, during, and after the waste pit material relocation.

A procedure was jointly agreed to by DOE and EPA to ensure that none of the material will be exposed. This procedure provides that the water level on the waste pit will be maintained (i.e., lowered after heavy rainfall or increased to compensate for losses, such as those due to evaporation). As a result of this removal action, Waste Pit 6 is no longer a significant source of particulate emissions.

1.5.4.4 Waste Pit 5 ETF: Removal Action No. 11

This removal action involved dismantling the ETF, removing the surrounding soils to prevent any potential spread of contamination beyond the immediate area, and packaging the waste materials generated during the removal action for storage pending final disposition.

The ETF was built in 1984 to test the feasibility of thermally drying sludge material from Waste Pit 5. This facility included a sand and gravel filter bed installed over a plastic liner. Six-foot wooden walls surrounded the filter bed and the structure was covered with a "greenhouse-type" enclosure. The drying experiment entailed spreading the wet material on the filter bed to facilitate drainage and evaporation; however, in February 1988, high winds removed the plastic roof from the facility and some of the sludge material was deposited on nearby surrounding soil. As an interim measure, water was applied to the remaining residues and a tarpaulin was placed over the filter bed to prevent further escape of material.

Field activities for this removal action began in December 1991 and was completed in March 1992. All of the potentially contaminated material was packaged and temporarily stored pending final disposition. The demolished site has been backfilled and capped with clay. Decontamination and rinsate waters from this removal action are being stored on site pending final disposition. Completion of this activity has resulted in the elimination of one of the particulate sources in Operable Unit 1.

1.5.4.5 Control of Exposed Material in Pit 5: Removal Action No. 18

This removal action involved dredging the exposed material below the waterline. Waste Pit 5 was removed from service in 1983. From 1983 to 1987, it received only decant water from the general sump, filtrate from the recovery plant, and nonradioactive slurries from the boiler plant and water treatment plant. Solids built up in the east end of the waste pit to the point that they were exposed and became a concern in regard to airborne contaminants.

Prior to starting the field activities in September 1992, the exposed materials were sprayed with water to soften them. Following this activity, a dredge was used to move the exposed materials to the west end of the waste pit.

Ambient air monitoring was conducted prior to this action, during the action, and after its completion in December 1992. The results indicate that the concentration of particulates in the ambient air in the vicinity of the FEMP were significantly reduced.

1.5.4.6 Waste Pit Area Containment Improvement (Operable Unit 1): Removal Action No. 22

This removal action involved minimizing the potential for wind and water erosion of contaminated materials from access roads and exposed surfaces in the Operable Unit 1 study area. A work plan was submitted to the EPA on August 31, 1992. Prior to work plan approval, exposed or stressed areas

were seeded with grass. EPA and OEPA were notified of this, and in September and October 1992 seeding commenced to ensure that the schedule for completion of the removal action can be maintained (Craig 1992). Field activities for the remainder of this removal action were completed on June 30, 1993.

1.5.5 Waste Pit 4 Interim Closure

Waste Pit 4 underwent interim RCRA closure, as certified by the OEPA in 1989, with final closure deferred to the CERCLA program. Interim closure activities included covering the waste pit with soil and rocks overlaid with 2 feet of clay compacted to 1 x 10^{-7} cm/s permeability and covered with a 45 mil reinforced Hypalon liner.

During this interim closure period, Waste Pit 4 is monitored with groundwater wells and weekly inspections. There is a maintenance plan to repair deficiencies noted during inspections.

In accordance with Attachment A, No. 11 of the Stipulation and Settlement Agreement (SSA) of December 1988, a final closure plan for Waste Pit 4 must be submitted within 90 days after receipt of the ROD for Operable Unit 1.

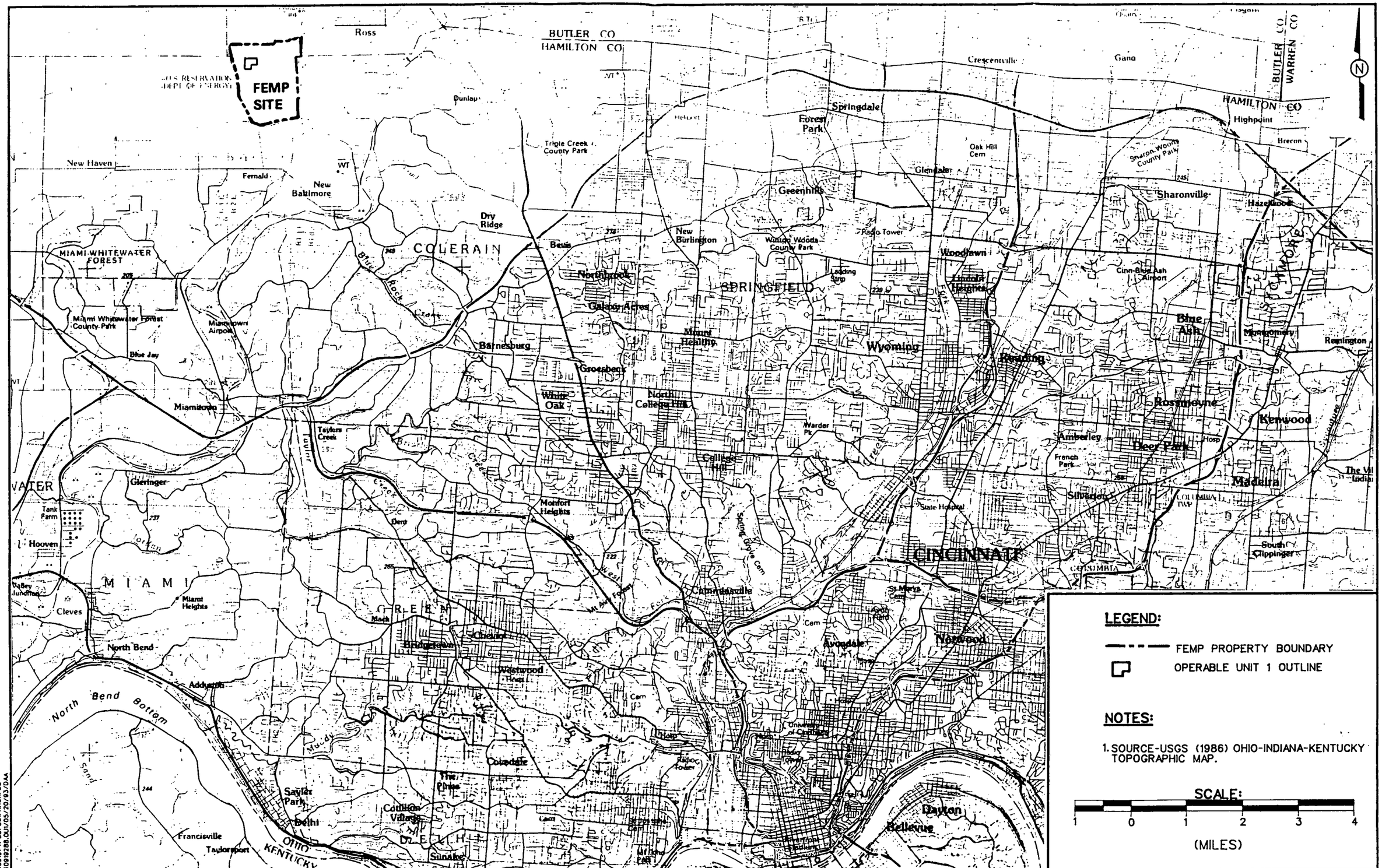


FIGURE 1-1. SOUTHWEST OHIO MAP

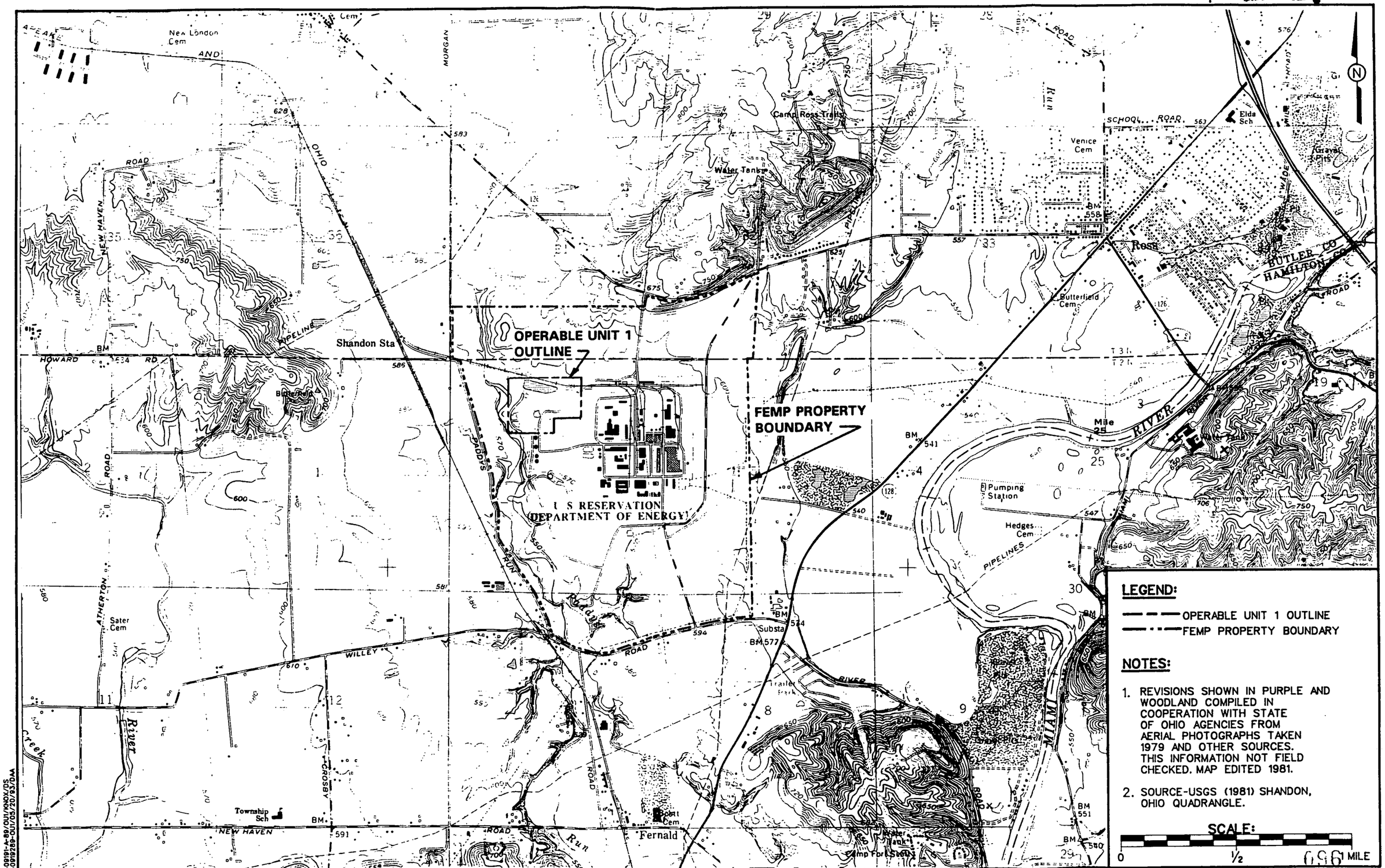
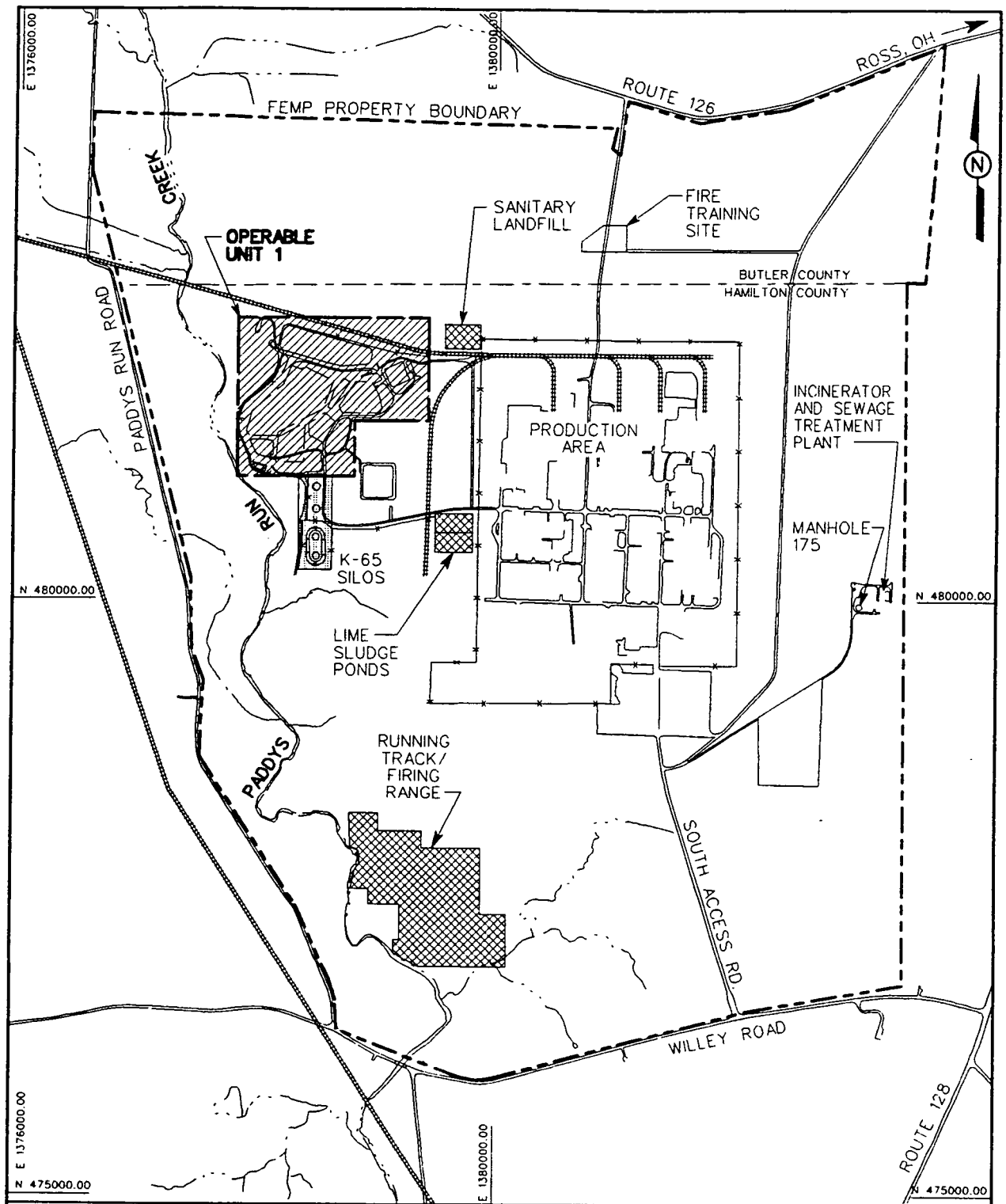


FIGURE 1-2. FEMP SITE LOCATION MAP



NOTE:

1. OPERABLE UNIT 3 INCLUDES ALL BUILDINGS, PIPELINES, AND ABOVEGROUND STRUCTURES IN THE PRODUCTION AREA. OPERABLE UNIT 5 INCLUDES GROUNDWATER, SURFACE WATER, SOILS, FLORA AND FAUNA, IN THE REGIONAL AREA AS WELL AS THE PRODUCTION AREA.

LEGEND:

—x—x— FENCE LINE
—·····— DRAINAGE WAY
CSX RAIL LINE
— — — OPERABLE UNIT 1 OUTLINE
— — — FEMP PROPERTY BOUNDARY

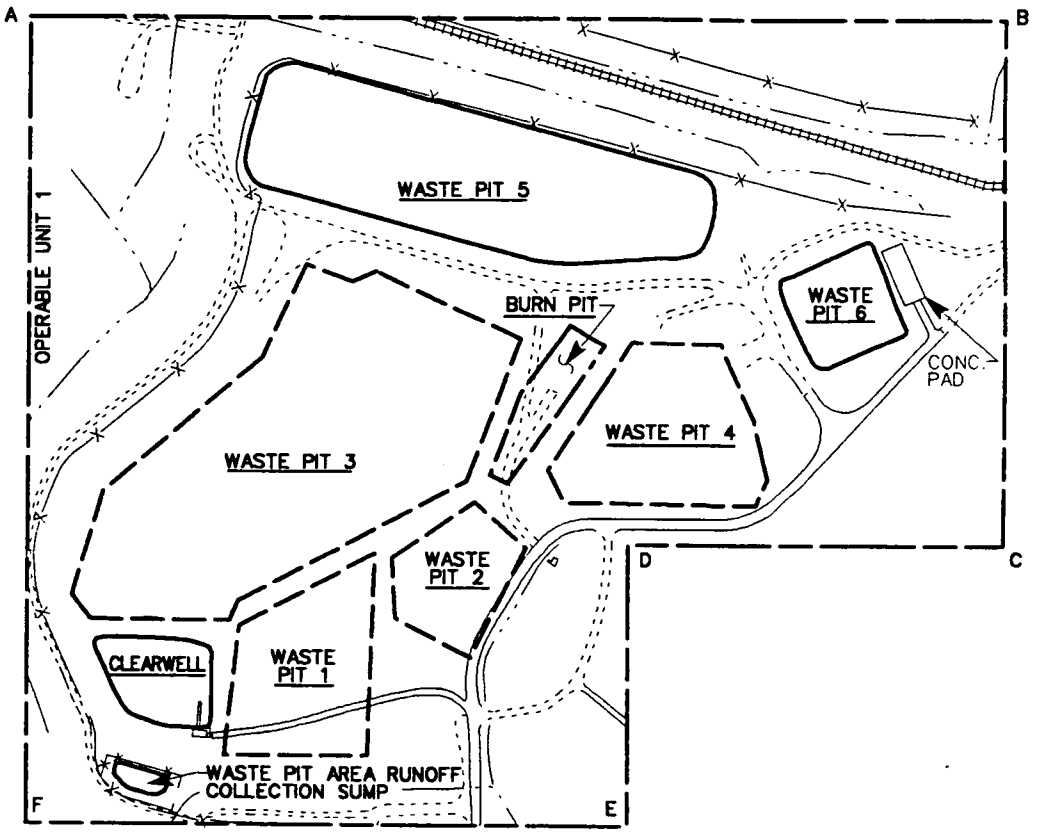
OPERABLE UNIT 1
OPERABLE UNIT 2
OPERABLE UNIT 4

SCALE:
0 1200 FEET

409191-A-388 /OU1 /NNOX /DS
40918368.OU1 09/01/93 GP

FIGURE 1-3. LOCATION OF OPERABLE UNIT 1 WITHIN THE FEMP

697



NOTES:

1. PITS 1, 2, 3 AND THE BURN PIT ARE COVERED WITH SOIL CAPS AND VEGETATED.
2. PIT 4 HAS AN INTERIM CAP.
3. PITS 5, 6 AND CLEARWELL ARE WATER COVERED
4. COORDINATES SHOWN ARE OHIO STATE PLANAR COORDINATES, ADJUSTED PER THE NORTH AMERICAN DATUM (NAD) OF 1983.
5. OPERABLE UNITS (OU) ARE IDENTIFIED. OU 5 INCLUDES GROUNDWATER, SURFACE WATER, SOILS, FLORA & FAUNA IN THE AREA OTHERWISE IDENTIFIED.

OU1 STATE PLANAR COORDINATES		
POINT	NORTHING	EASTING
A	482364	1377824
B	482364	1379432
C	481499	1379432
D	481499	1378812
E	481033	1378812
F	481033	1377824

LEGEND:

- —X—X— FENCE LINE
- DRAINAGE WAY
- CSX RAIL LINE
- PAVED ROADWAY
- GRAVEL ROADWAY
- OPERABLE UNIT 1 OUTLINE
- COVERED PIT OUTLINE
- OPEN PIT OUTLINE

SCALE: 0 300 FEET

409191-A-1D / OU1 KNOX/ DS
409191D.OU1 09/20/93 GP

FIGURE 1-4. OPERABLE UNIT 1 SITE MAP

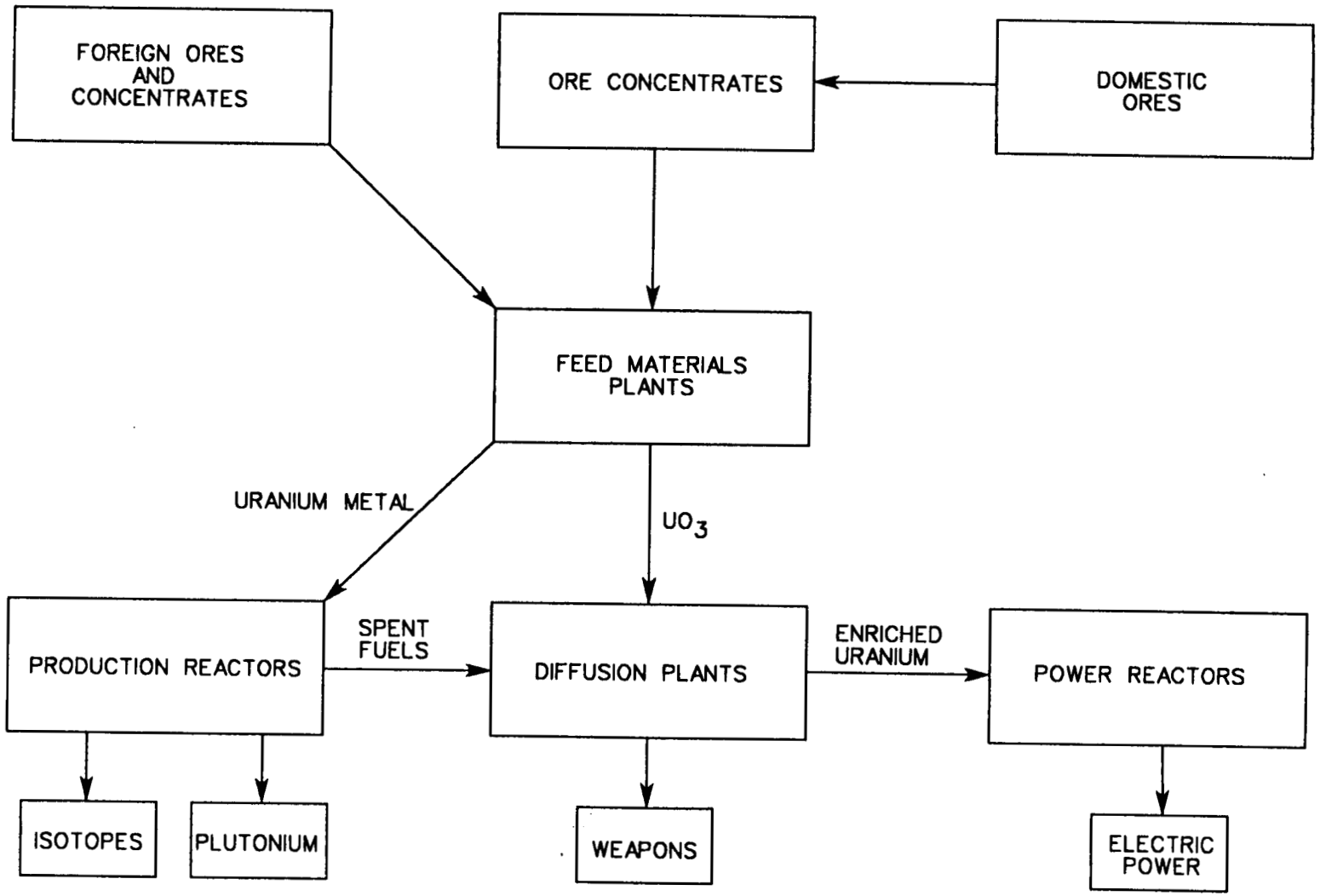


FIGURE 1-5. FEED MATERIALS RELATIONSHIP TO AEC PRODUCTION SYSTEMS

4783

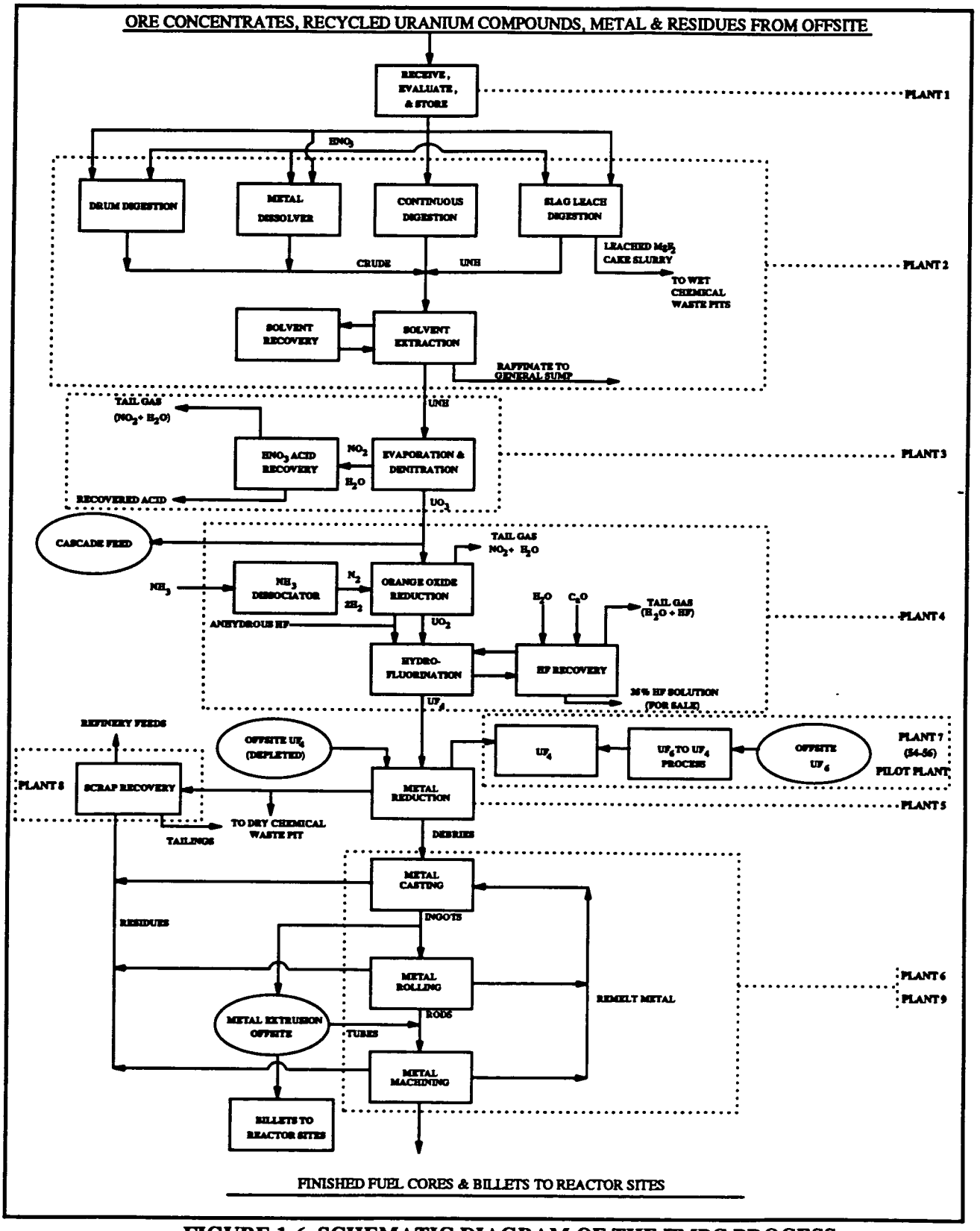
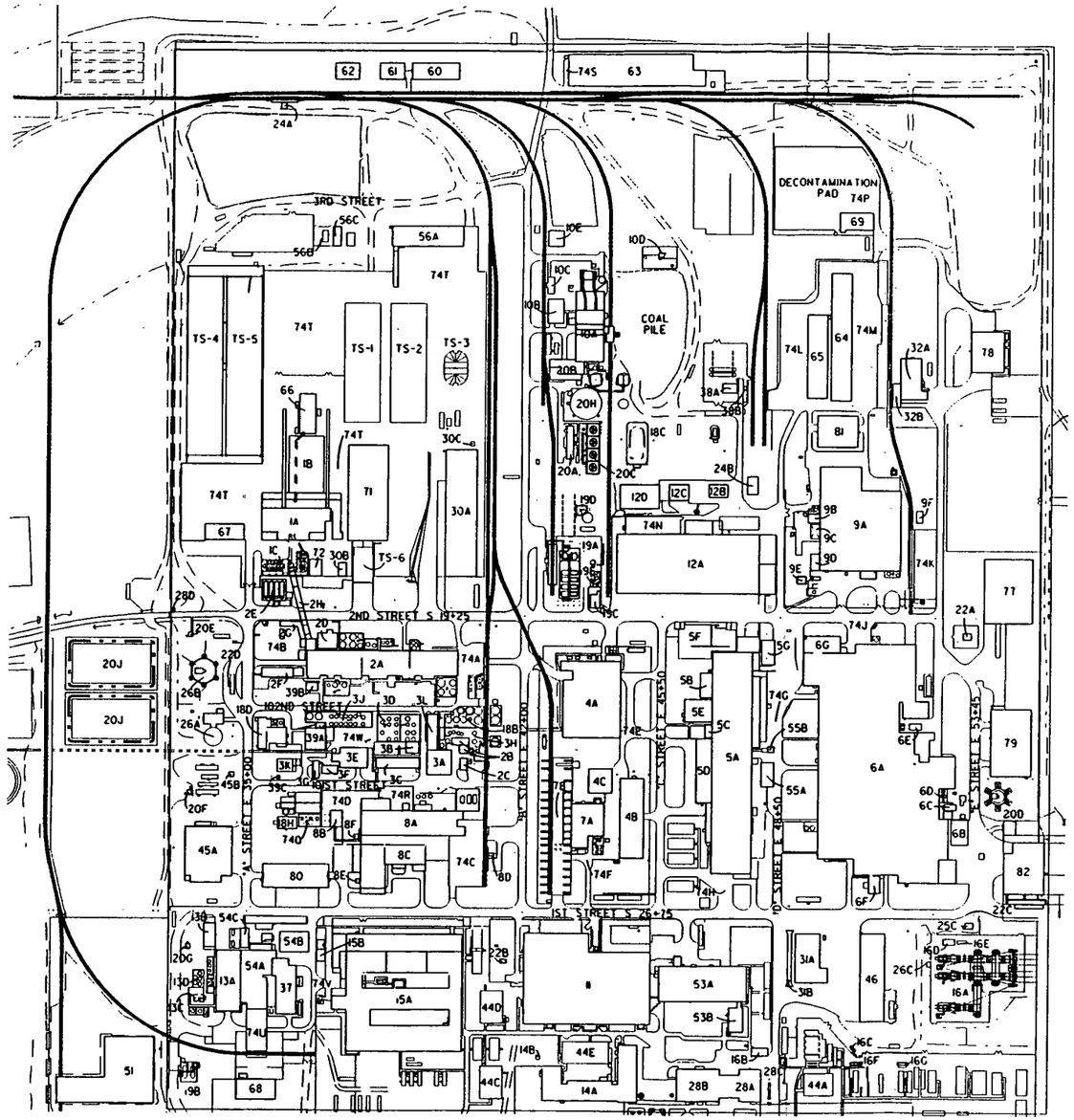


FIGURE 1-6 SCHEMATIC DIAGRAM OF THE FMPC PROCESS



PRODUCTION AREA

FEMP SITE INDEX

TS-1	TENSION SUPPORT STRUCTURE #1
TS-2	TENSION SUPPORT STRUCTURE #2
TS-3	TENSION SUPPORT STRUCTURE #3
TS-4	TENSION SUPPORT STRUCTURE #4
TS-5	TENSION SUPPORT STRUCTURE #5
TS-6	TENSION SUPPORT STRUCTURE #6
1A	PREPARATION PLANT
1B	PLANT 1 STORAGE BLDG.
1C	PLANT 1 ORE SILOS
2A	ORE REFINERY PLANT
2B	GENERAL/REFINERY SUMP CONTROL BLDG.
2C	BULK LIME HANDLING BLDG.
2D	METAL DISSOLVER BLDG.
2E	NFS STORAGE & PUMP HOUSE
2F	COLD SIDE ORE CONVEYOR
2G	HOT SIDE ORE CONVEYOR
2H	CONVEYOR TUNNEL (FROM PLANT 1)
3A	MAINTENANCE BLDG.
3B	OZONE BLDG.
3C	NAR CONTROL HOUSE
3D	NAR TOWERS
3E	HOT RAFFINATE BLDG.
3F	HARSHAW SYSTEM
3G	REFRIGERATION BLDG.
3H	REFINERY SUMP
3J	COMBINED RAFFINATE TANKS
3K	OLD COOLING WATER TOWER
3L	ELECTRICAL POWER CENTER BLDG.
4A	GREEN SALT PLANT
4B	PLANT 4 WAREHOUSE
4C	PLANT 4 MAINTENANCE BLDG.
5A	METALS PRODUCTION PLANT
5B	PLANT 5 INGOT PICKLING
5C	PLANT 5 ELECTRICAL SUBSTATION
5D	WEST DERBY BREAKOUT/SLAG MILLING
5E	PLANT 5 FILTER BLDG.
5F	PLANT 5 COVERED STORAGE PAD
5G	PLANT 5 INGOT STORAGE SHELTER
6A	METALS FABRICATION PLANT
6B	PLANT 6 COVERED STORAGE AREA
6C	PLANT 6 ELECTROSTATIC PRECIPITATOR (SOUTH)
6D	PLANT 6 ELECTROSTATIC PRECIPITATOR (CENTRAL)
6E	PLANT 6 ELECTROSTATIC PRECIPITATOR (NORTH)
6F	PLANT 6 SALT OIL HEAT TREAT BLDG.
6G	PLANT 6 SUMP BLDG.
7A	PLANT 7
7B	PLANT 7 OVERHEAD CRANE
8A	RECOVERY PLANT
8B	PLANT 8 MAINTENANCE BLDG.
8C	ROTARY KILN/DRUM RECONDITIONING
8D	PLANT 8 RAILROAD FILTER BLDG.
8E	DRUM CONVEYOR SHELTER
8F	PLANT 8 OLD DRUM WASHER
9A	SPECIAL PRODUCTS PLANT
9B	PLANT 9 SUMP TREATMENT FACILITY
9C	PLANT 9 DUST COLLECTOR
9D	PLANT 9 SUBSTATION
9E	PLANT 9 CYLINDER SHED
9F	PLANT 9 ELECTROSTATIC PRECIPITATOR
10A	BOILER PLANT
10B	BOILER PLANT MAINTENANCE BLDG.
10C	WET SALT STORAGE BIN
10D	CONTAMINATED OIL/GRAPHITE BURN PAD
10E	UTILITIES HEAVY EQUIP. BLDG. (PROPOSED)
11	SERVICE BLDG.
12A	MAIN MAINTENANCE BLDG.
12B	CYLINDER STORAGE BLDG.
12C	LUMBER STORAGE BLDG.
12D	MAINTENANCE BLDG. WAREHOUSE (PROPOSED)
13A	PILOT PLANT WET SIDE
13B	PILOT PLANT MAINTENANCE BLDG.
13C	SUMP PUMP HOUSE
13D	PILOT PLANT THORIUM TANK FARM
14A	ADMINISTRATION BLDG.
14B	BLDG. 14 EOC GENERATOR SET
15A	LABORATORY
15B	LABORATORY CHEMICAL STORAGE BLDG.
16A	MAIN ELECTRICAL STATION
16B	ELECTRICAL SUBSTATION
16C	ELECTRICAL PANELS & TRANSFORMER
16D	MAIN ELECTRICAL SWITCH HOUSE
16E	MAIN ELECTRICAL TRANSFORMERS
16F	TRAILER SUBSTATION #1
16G	TRAILER SUBSTATION #2
16H	10 PLEXS NORTH SUBSTATION
16J	10 PLEXS SOUTH SUBSTATION
18A	BDN SURGE LAGOON
18B	GENERAL SUMP
18C	COAL PILE RUNOFF BASIN
18D	BIODENITRIFICATION TOWERS
18E	STORM WATER RETENTION BASINS
18F	PIT #5 SLUICE GATE
18G	CLEARWELL PUMP HOUSE
18H	BDN EFFLUENT TREATMENT FACILITY
18J	METHANOL TANK
18K	LOW NITRATE TANK
18L	HIGH NITRATE TANK
18M	HIGH-NITRATE STORAGE TANK
18N	WASTE PIT AREA STORM WATER RUNOFF CONTROL
18P	DISSOLVED OXYGEN BLDG.
18Q	IAWWT VALVE HOUSE
19A	MAIN TANK FARM
19B	PILOT PLANT AMMONIA TANK FARM
19C	TANK FARM CONTROL HOUSE
19D	OLD NORTH TANK FARM
19E	TANK FARM LIME SLITTER BLDG.
20A	PUMP STATION & POWER CENTER
20B	WATER PLANT
20C	COOLING TOWERS
20D	ELEVATED POTABLE STORAGE TANK
20E	WELL HOUSE #1
20F	WELL HOUSE #2
20G	WELL HOUSE #3
20H	PROCESS WATER STORAGE TANK
20J	LIME SLURRY PITS
22A	GAS METER BLDG.
22B	STORM SEWER LIFT STATION
22C	TRUCK SCALE
22D	SCALE HOUSE & WEIGH SCALE
22E	UTILITY TRENCH TO PIT AREA
23	METEOROLOGICAL TOWER
24A	RAILROAD SCALE HOUSE
24B	RAILROAD ENGINE HOUSE
25A	CHLORINATION BLDG.
25B	M.H. #175/EFF. LINE/SAMPLING BLDG.
25C	SEWAGE LIFT STATION BLDG.
25D	U.V. DISINFECTION BLDG.
25E	DIGESTER & CONTROL BLDG.
25F	SLUDGE DRYING BEDS
25G	PRIMARY SETTLING BASINS
25H	TRICKLING FILTERS
25J	10 PLEXS SEWAGE LIFT STATION
26A	PUMP HOUSE-HP FIRE PROTECTION
26B	ELEVATED WATER STORAGE TANK
26C	MAIN ELECTRICAL STRAINER HOUSE
28A	SECURITY BLDG.
28B	HUMAN RESOURCES BLDG.
28C	GUARD POST ON SOUTH END OF "D" STR.
28D	GUARD POST ON WEST END OF "2ND" STR.
30A	CHEMICAL WAREHOUSE
30B	DRUM STORAGE WAREHOUSE
30C	OLD TEN TON SCALE
31A	ENGINE HOUSE/GARAGE
31B	OLD TRUCK SCALE
32A	MAGNESIUM STORAGE BLDG.
32B	BLDG. 32 COVERED LOADING DOCK
34A	K-65 STORAGE TANK (NORTH)
34B	K-65 STORAGE TANK (SOUTH)
34C	RTS BLDG.
35A	METAL OXIDE STORAGE TANK (NORTH)
35B	METAL OXIDE STORAGE TANK (SOUTH)
37	PILOT PLANT ANNEX
38A	PROPANE STORAGE
38B	CYLINDER FILLING STATION
39A	INCINERATOR BLDG.
39B	WASTE OIL DECANT SHELTER
39C	INCINERATOR SPRINKLER RISER HOUSE
39D	SEWAGE TREATMENT PLANT INCINERATOR
44A	TRAILER COMPLEX (6-PLEX)
44C	TRAILER COMPLEX (7-PLEX S.)
44D	TRAILER COMPLEX (7-PLEX N.)
44E	TRAILER COMPLEX (10 PLEX)
45A	RUST ENGINEERING BLDG.
45B	UTILITY SHED EAST OF RUST TRAILERS
46	HEAVY EQUIPMENT BLDG.
51	SIX TO FOUR REDUCTION FACILITY #2
53A	HEALTH & SAFETY BLDG.
53B	IN-VIVO BLDG.
54A	SIX TO FOUR REDUCTION FACILITY #1
54B	PILOT PLANT SHELTER
54C	PILOT PLANT DISSOCIATOR SHELTER
55A	SLAG RECYCLING BLDG.
55B	SLAG RECYCLING PIT/ELEVATOR
56A	CP STORAGE WAREHOUSE
56B	STORAGE SHED (WEST)
56C	STORAGE SHED (EAST)
60	QUONSET HUT #1
61	QUONSET HUT #2
62	QUONSET HUT #3
63	KC-2 WAREHOUSE
64	THORIUM WAREHOUSE
65	(OLD) PLANT 5 WAREHOUSE
66	DRUM RECONDITIONING BLDG.
67	PLANT 1 THORIUM WAREHOUSE
68	PILOT PLANT WAREHOUSE
69	DECONTAMINATION BLDG.
71	GENERAL IN-PROCESS WAREHOUSE
72	DRUM STORAGE BUILDING
73A	FIRE BRIGADE TRAINING CENTER BLDG.
73B	FIRE TRAINING POND
73C	FIRE TRAINING TANK
73D	FIRE TRAINING BURN TROUGH
73E	CONFINED SPACE BURN TANK
74A	PLANT 2 EAST PAD
74B	PLANT 2 WEST PAD
74C	PLANT 8 EAST PAD
74D	PLANT 8 WEST PAD
74E	PLANT 4 PAD
74F	PLANT 7 PAD
74G	PLANT 5 EAST PAD
74H	PLANT 5 SOUTH PAD
74J	PLANT 6 PADS
74K	PLANT 9 PAD
74L	BUILDING 65 WEST PAD
74M	BUILDING 64 EAST PAD & R.R. DOCK
74N	BUILDING 12 NORTH PAD
74P	DECONTAMINATION PAD
74Q	PLANT 8 OLD METAL DISSOLVER PAD
74R	PLANT 8 NORTH PAD
74S	BUILDING 63 WEST PAD
74T	PLANT 1 STORAGE PAD
74U	PILOT PLANT PAD
74V	LABORATORY PAD
74W	INCINERATOR BLDG. PAD
77	FINISHED PRODUCTS WAREHOUSE (4A)
78	D & D BUILDING
79	PLANT 6 WAREHOUSE
80	PLANT 8 WAREHOUSE
81	PLANT 9 WAREHOUSE
82	RECEIVING/INCOMING MAT'LS. INSP.
88	CLEARWELL LINE
89	PARKING LOTS
T76	INTERIM OFFICE SPACE
T77	INTERIM OFFICE SPACE
T80	INTERIM OFFICE SPACE
T81	INTERIM OFFICE SPACE

LEGEND:

- ROADWAY
- FENCE LINES
- BUILDING OUTLINES
- CSX RAIL LINES
- INDICATES PROPOSED LOCATIONS OF STRUCTURES.

SCALE:

100 0 100 200 300 FEET

NOTE:

1. SOURCE - FEMP CADD SITELIST.DGN MAR. 12, 1993.

/server/model/base/floor/map/fig1-6.dgn

FIGURE 1-7. EXISTING PRODUCTION AREA LAYOUT

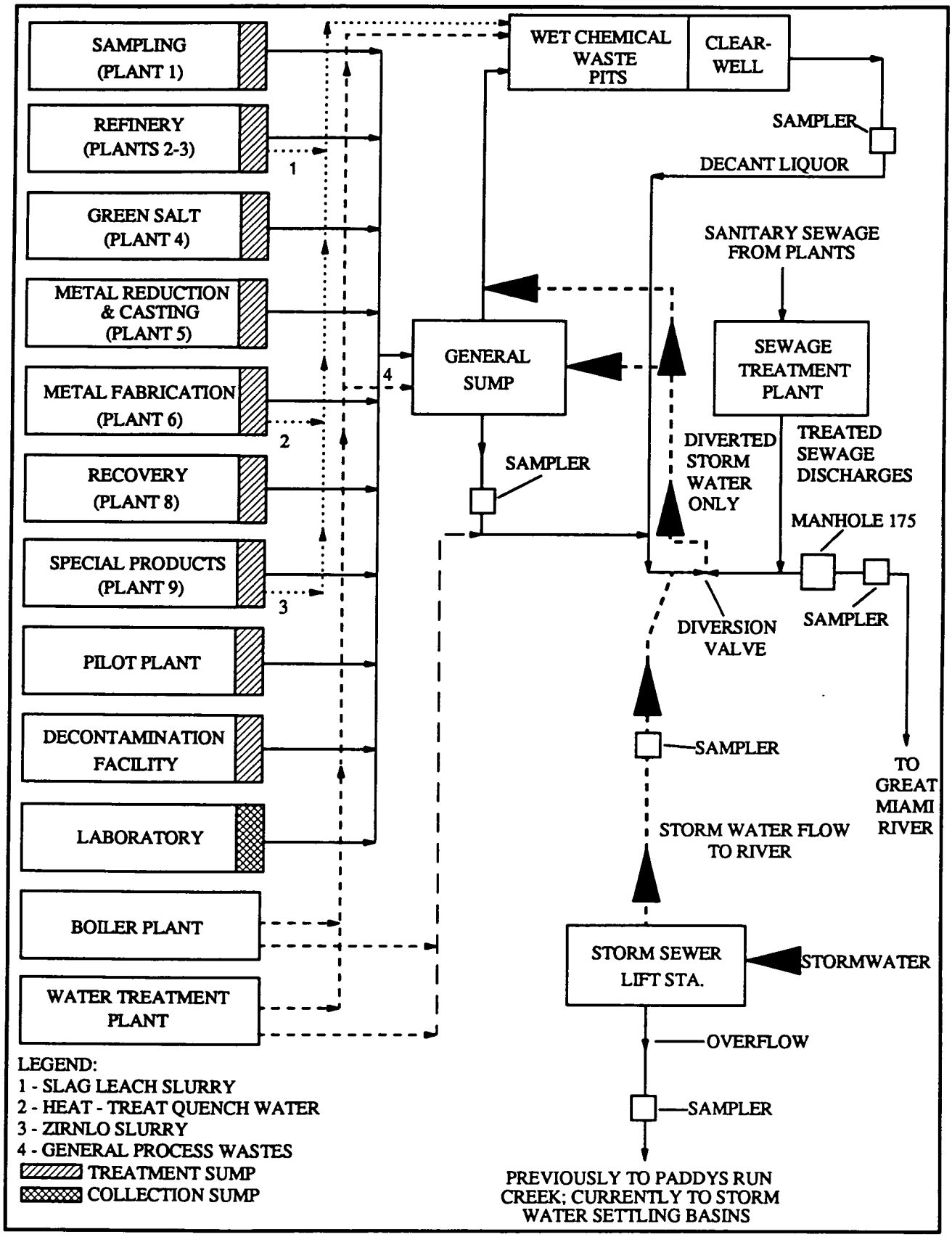
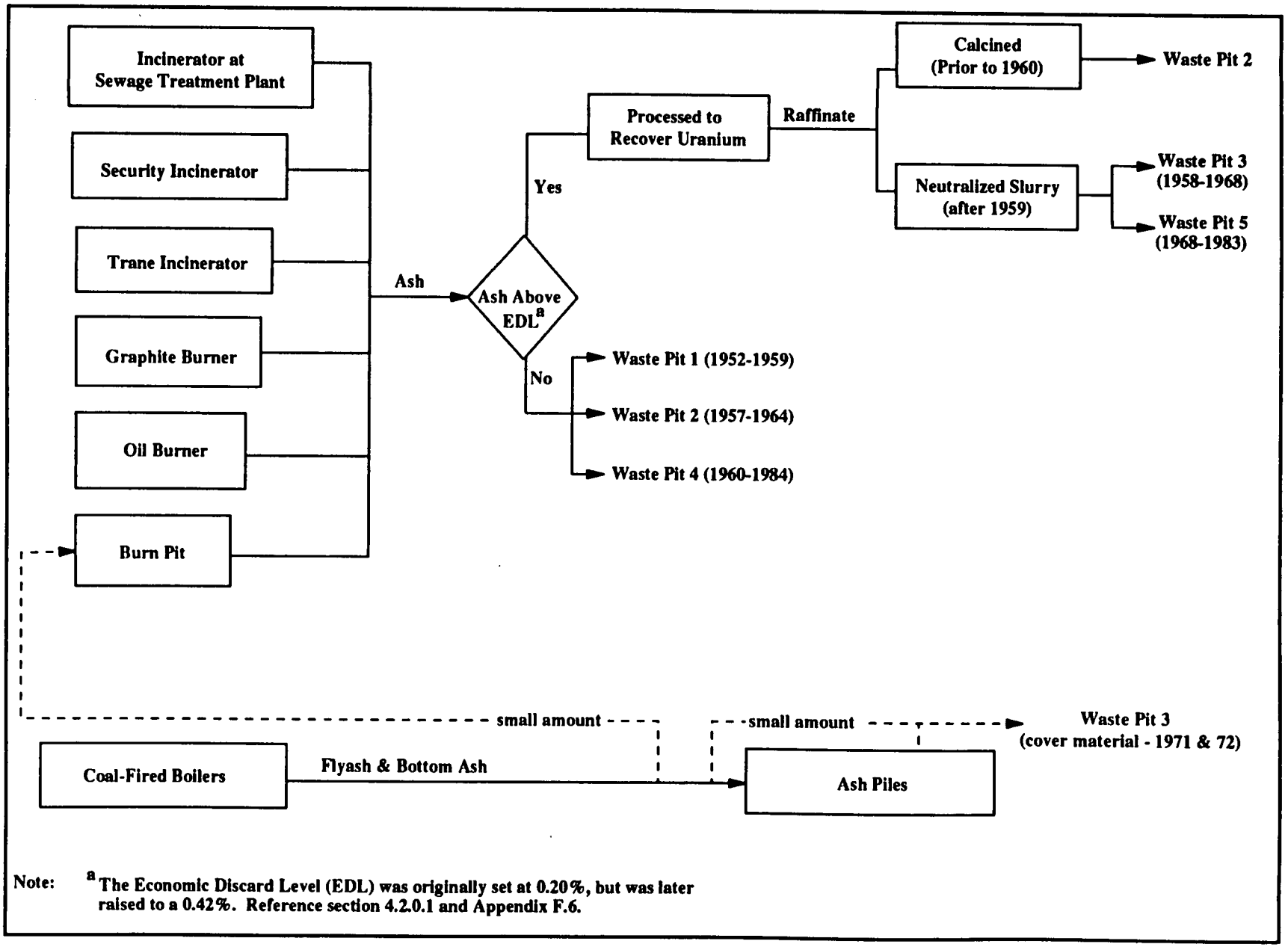


FIGURE 1-8 LIQUID WASTE FLOW DIAGRAM

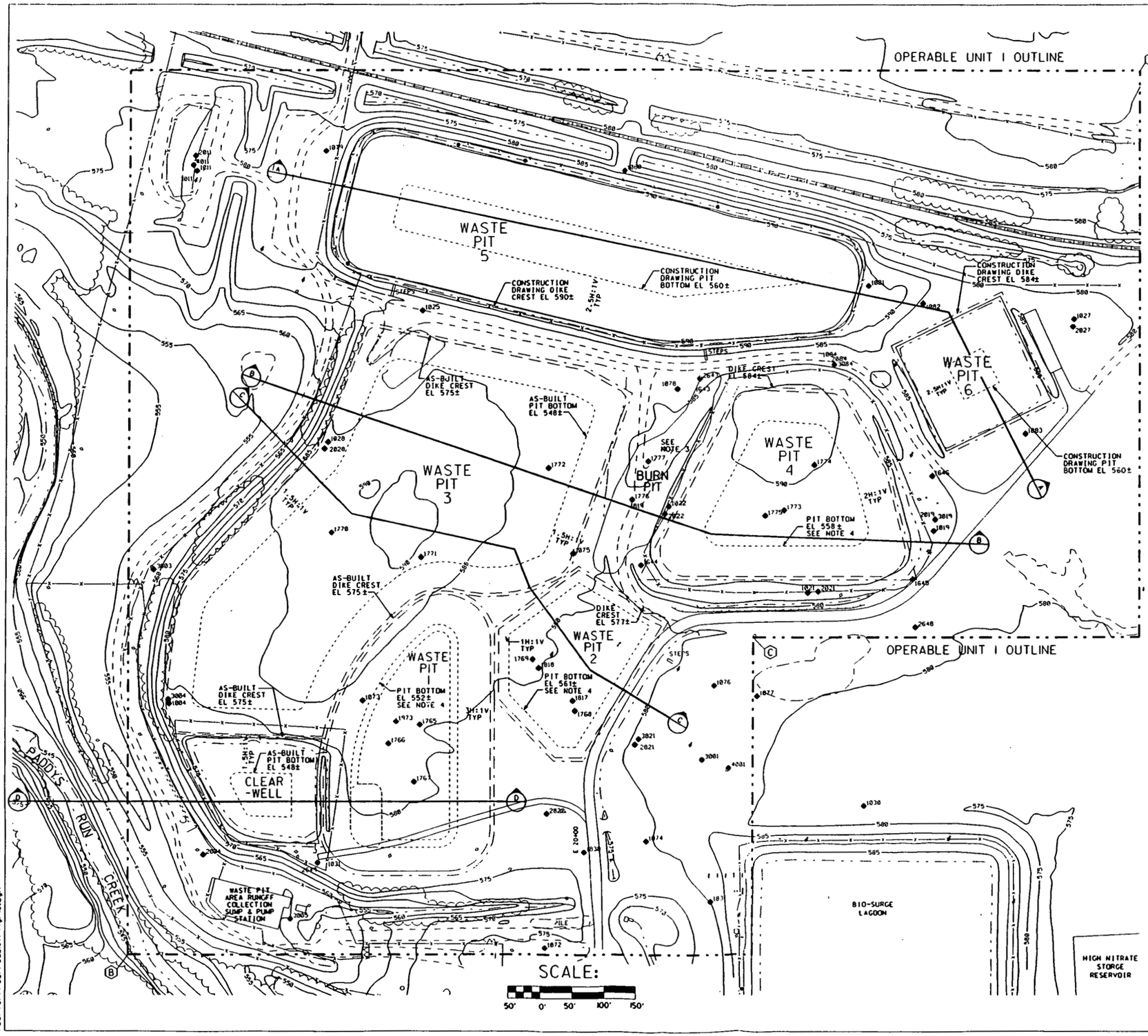


Note: [a] The Economic Discard Level (EDL) was originally set at 0.20%, but was later raised to a 0.42%. Reference section 4.2.0.1 and Appendix F.6.

FIGURE 1-9. DISTRIBUTION OF ASH TO WASTE PITS

FER/OU1 RI/UK FIG.1-9/10-01-93

4783



LEGEND:

- OPERABLE UNIT I OUTLINE
- COVERED WASTE PIT OUTLINE
- OPEN WASTE PIT OUTLINE
- WASTE PIT OUTLINE BOTTOM
- MAJOR CONTOUR
- FENCE
- RAIL LINE
- PAVED ROAD
- GRAVEL ROAD
- FIRE HYDRANT (FH)
- MONITORING WELL
- POWER POLE

NOTES:

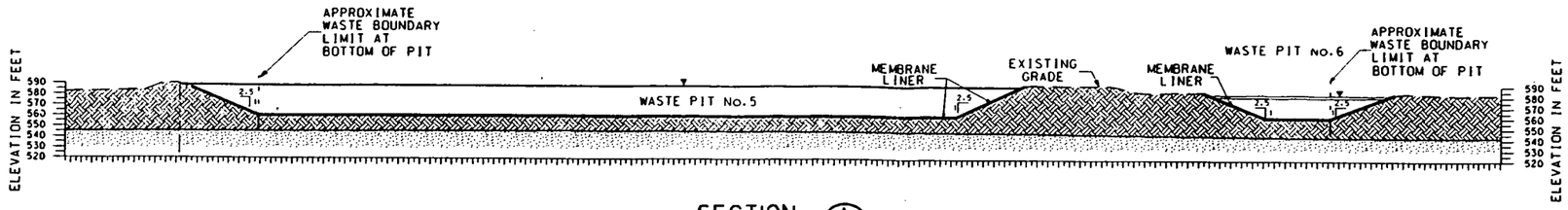
1. EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM FEMP SITE PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW.
   AERIAL TOPOGRAPHY, 1992
   FEMP CADD GRID/UTILITY DRAWINGS
   FEMP CONTRACTOR PROJECT DESIGN DOCUMENTS
2. THE GEOMETRIC CONFIGURATIONS, THE LINER THICKNESSES, AND THE BOTTOM ELEVATIONS OF THE WASTE PITS WERE DETERMINED FROM THE BEST AVAILABLE DATA AT THIS TIME. THIS DATA WAS GATHERED FROM CONSTRUCTION, AS-BUILT, SURVEY, AND FEASIBILITY STUDY DRAWINGS (1/31/92, REV 1), AND FROM THE EXISTING PLANT ENGINEERING FILES.
   THE DIKE CREST SHOWN AROUND THE WASTE PITS REPRESENTS THOSE BUILT AT THE TIME OF CONSTRUCTION. MOST OF THE DIKES HAVE BEEN BURIED WITH COVER MATERIAL OF DIFFERENT THICKNESSES.
3. THE GEOMETRIC CONFIGURATION OF THE BURN PIT HAS BEEN DETERMINED FROM THE SITE AS-BUILT SURVEY OF THE BURN PIT DIKE. DEPTH AND SLOPES OF THE BURN PIT ARE NOT KNOWN.
4. SOURCE - FERMCO DRAWING 21A-5500-G-00248
   FERMCO CADD DRAWING NO. CRUIAB003.DGN

CRU-1 COORDINATES POINTS

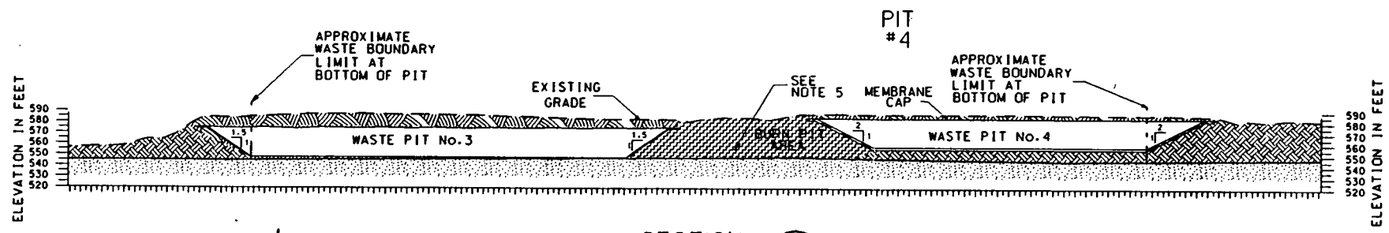
	FEMP EAST	FEMP SOUTH	STATE PLANAR (NAD 1983) EASTING	STATE PLANAR (NAD 1983) NORTHING
(A)	E 28+63.88	S 3+42.45	1379432.00	482364.00
(B)	E 12+92.90	S 17+16.95	137782400	481033.00
(C)	E 22+67.78	S 12+24.09	1378812.00	481499.00

/server/res/rea2187/11gi-10.dgn

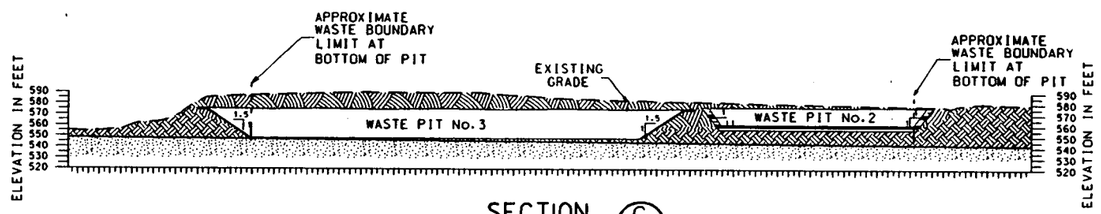
FIGURE 1-10. WASTE PIT CROSS SECTION PLAN



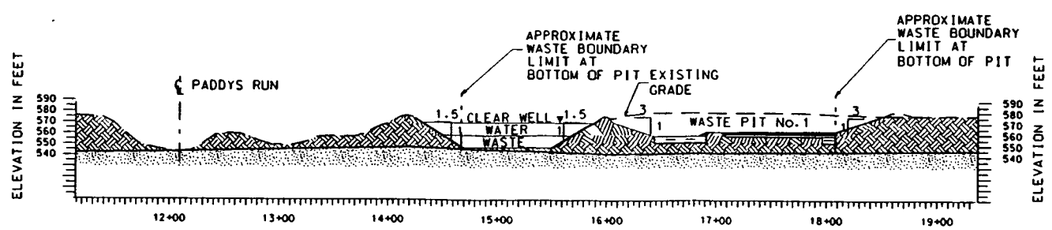
SECTION A/A
SCALE: 1"=60'



SECTION B/B
SCALE: 1"=60'



SECTION C/C
SCALE: 1"=60'



SECTION D/D
SCALE: 1"=60'

LEGEND:

- GLACIAL OVERBURDEN
- CLAY LINER
- FILL SOIL
- SAND AND/OR GRAVEL
- SOIL MIXED WITH WASTE
- WASTE

NOTES:

1. EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM FEMP SITE PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW.

   EXISTING SITE DATA SOURCE (IN PLANT FILES)
   AERIAL TOPOGRAPHY, 1992
   FEMP CADD GRID/UTILITY DRAWINGS
   FEMP CONTRACTOR PROJECT DESIGN DOCUMENTS

2. 2H:1V IS MINIMUM SLOPE PERMISSIBLE FOR SAFE EXCAVATION OVER AN EXTENDED TIME PERIOD. ACTUAL SLOPE WILL VARY DEPENDENT ON SLOPE CONDITIONS ENCOUNTERED (TYPICAL TO ALL PITS).

3. THE GEOMETRIC CONFIGURATIONS, THE LINER THICKNESSES, AND THE BOTTOM ELEVATIONS OF THE WASTE PITS WERE DETERMINED FROM THE BEST AVAILABLE DATA AT THIS TIME. THIS DATA WAS GATHERED FROM CONSTRUCTION, AS-BUILT, SURVEY, AND FEASIBILITY STUDY DRAWINGS (REV 1), ALONG WITH ENGINEERING FILES AND THE 1992 AERIAL TOPOGRAPHY.

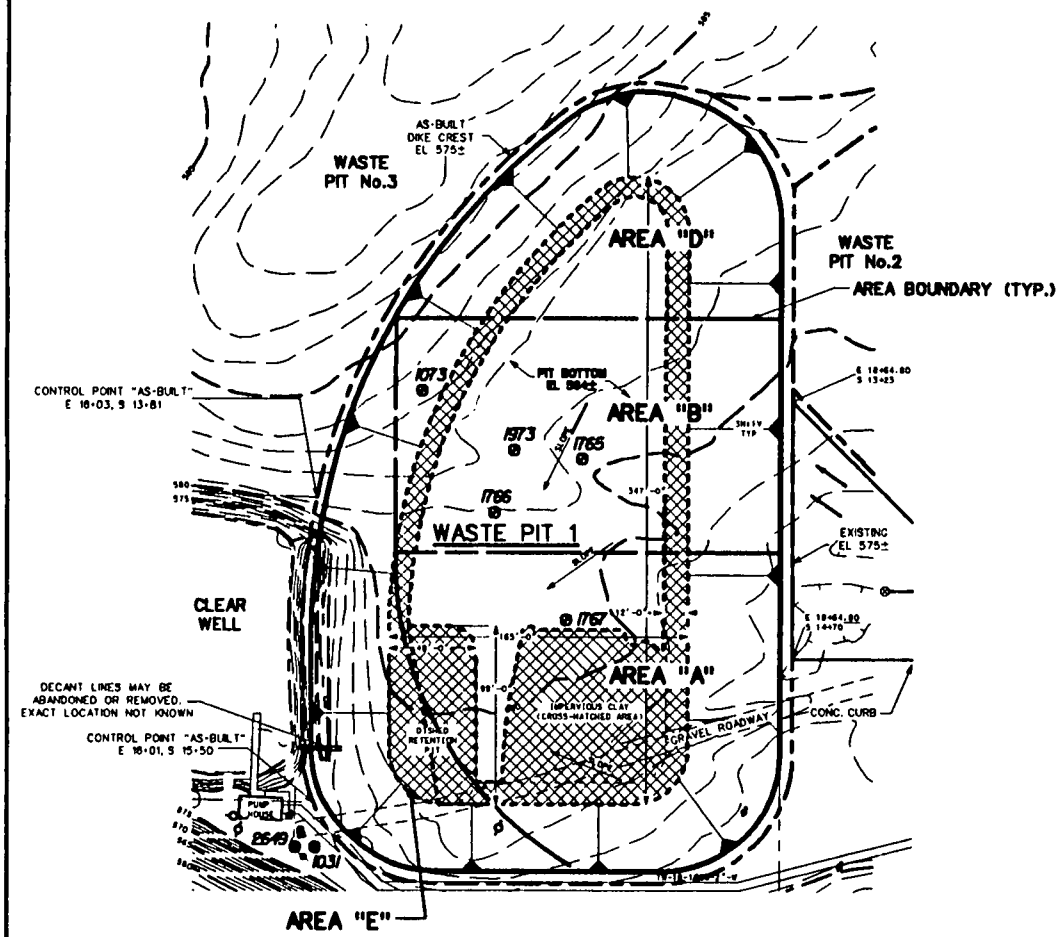
4. THE BORING LOGS SHOWN ON PARSONS SKETCH SK-G-01221 PROVIDED THE SUBSURFACE PROFILES.

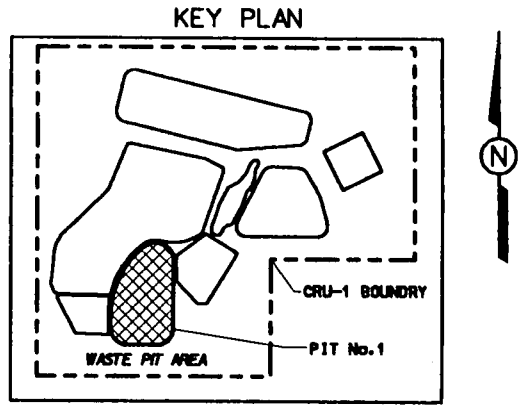
5. BECAUSE OF INADEQUATE INFORMATION, THE BURN PIT AREA LOCATED BETWEEN WASTE PITS 3 AND 4 IS SHOWN AS SOIL MIXED WITH WASTE.

1. SOURCE - FERMCO DRAWING 21A-5500-G-00249 105
FERMCO CADD DRAWING NO. CRUIXS004.DGN

/server/model/base/floor/map/fig1-11dgn

FIGURE 1-11.
WASTE PIT AREA CROSS SECTIONS





SCALE: NOT TO SCALE

LEGEND:

- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

AREAS:

A. ALL DEPLETED MATERIALS.

B. FILTER CAKES FROM PLANT 8 (RECOVERY)-NORMAL.

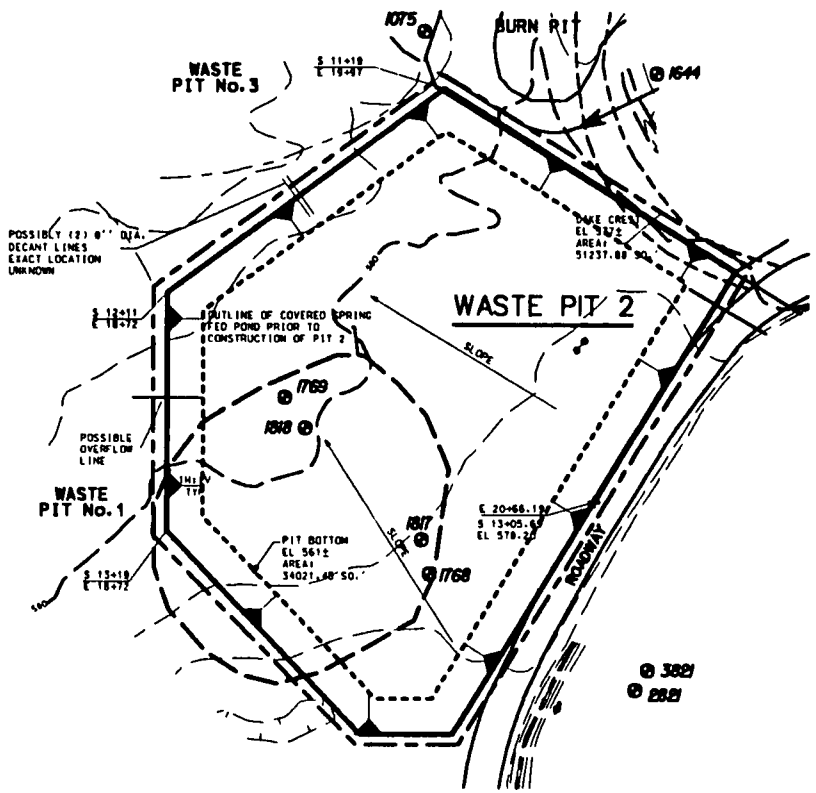
D. SCRAP GRAPHITE, BRICK, AND MISC. SOLIDS-NORMAL.

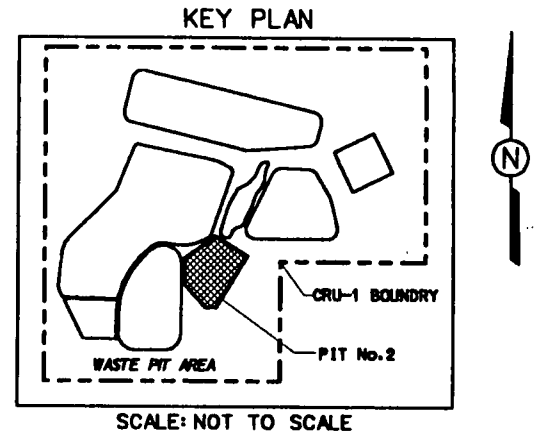
E. CHEMICAL TRAPS.

OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH*	APPROX. SURFACE AREA
1952 - 1959	COVERED	48,500 CY	68,400 CY	30 FEET	2.11 ACRES

* DEPTH INCLUDES MAXIMUM DEPTH OF PIT COVER, WASTE, AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-12. WASTE PIT 1 PHYSICAL DESCRIPTION





SCALE: NOT TO SCALE

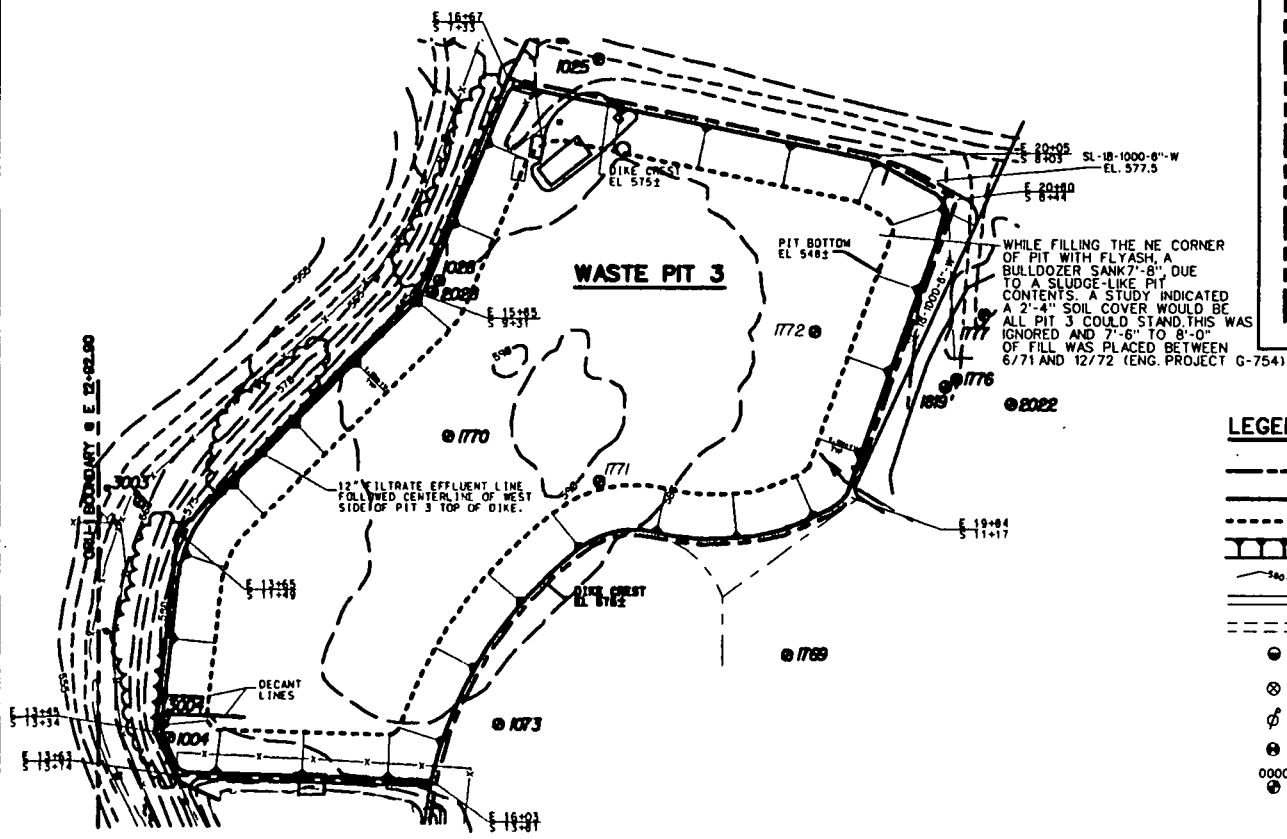
LEGEND:

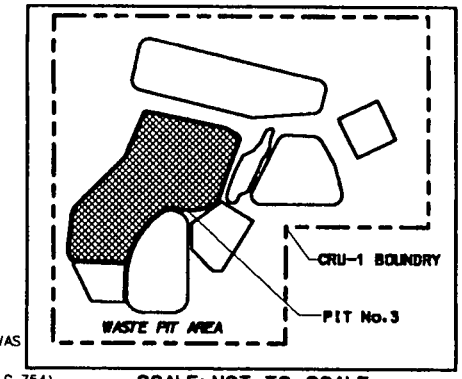
- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH *	APPROX. SURFACE AREA
1957 - 1964	COVERED	24,200 CY	37,400 CY	25 FEET	0.90 ACRES

* DEPTH INCLUDES MAXIMUM DEPTH OF PIT COVER, WASTE, AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-13. WASTE PIT 2 PHYSICAL DESCRIPTION





SCALE: NOT TO SCALE

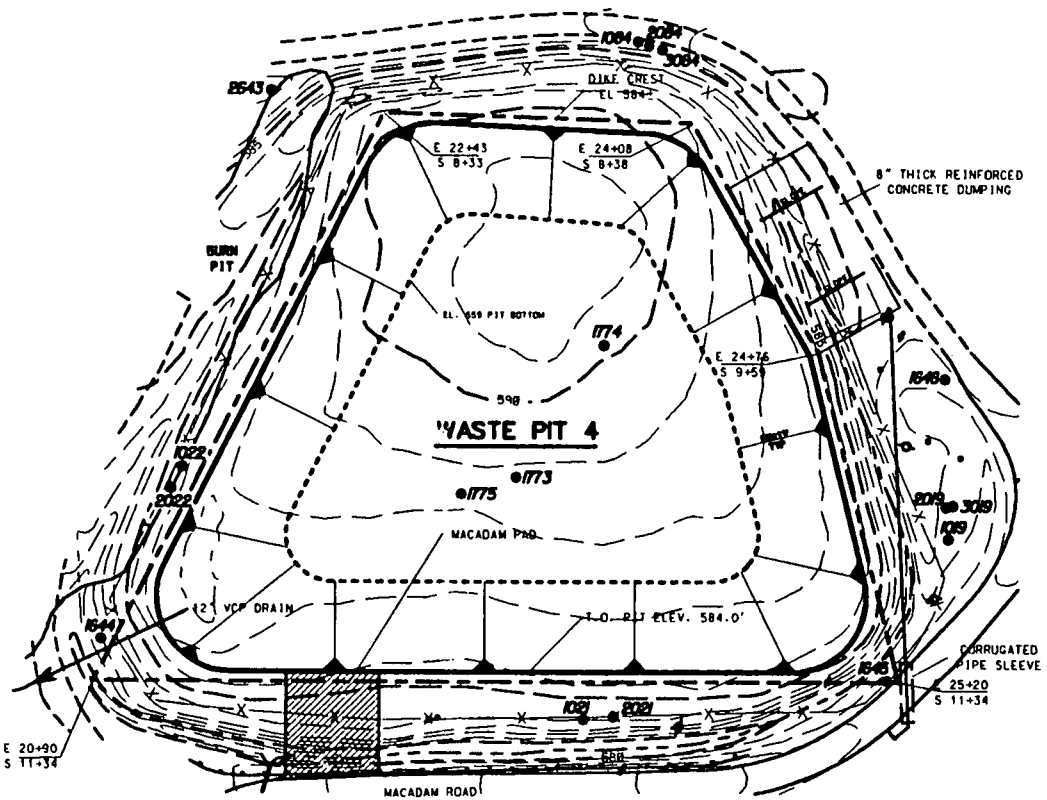
LEGEND:

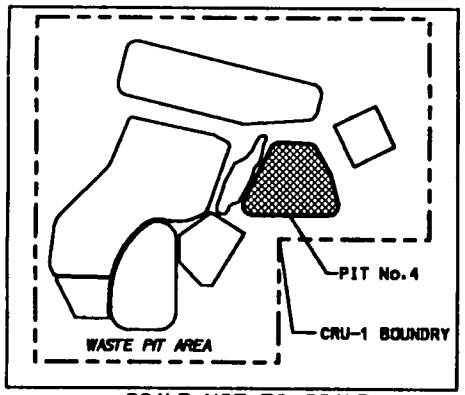
- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH*	APPROX. SURFACE AREA
1958 - 1977	COVERED	204,100 CY	307,500 CY	42 FEET	5.00 ACRES

* DEPTH INCLUDES MAXIMUM DEPTH OF PIT COVER, WASTE, AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-14. WASTE PIT 3 PHYSICAL DESCRIPTION





SCALE: NOT TO SCALE

LEGEND:

- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH *	APPROX. SURFACE AREA
1980 - 1986	ITERM RCRA CAP	55,100 CY	72,800 CY	32 FEET	1.50 ACRES

* DEPTH INCLUDES DEPTH OF PIT COVER, WASTE, AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-15. WASTE PIT 4 PHYSICAL DESCRIPTION

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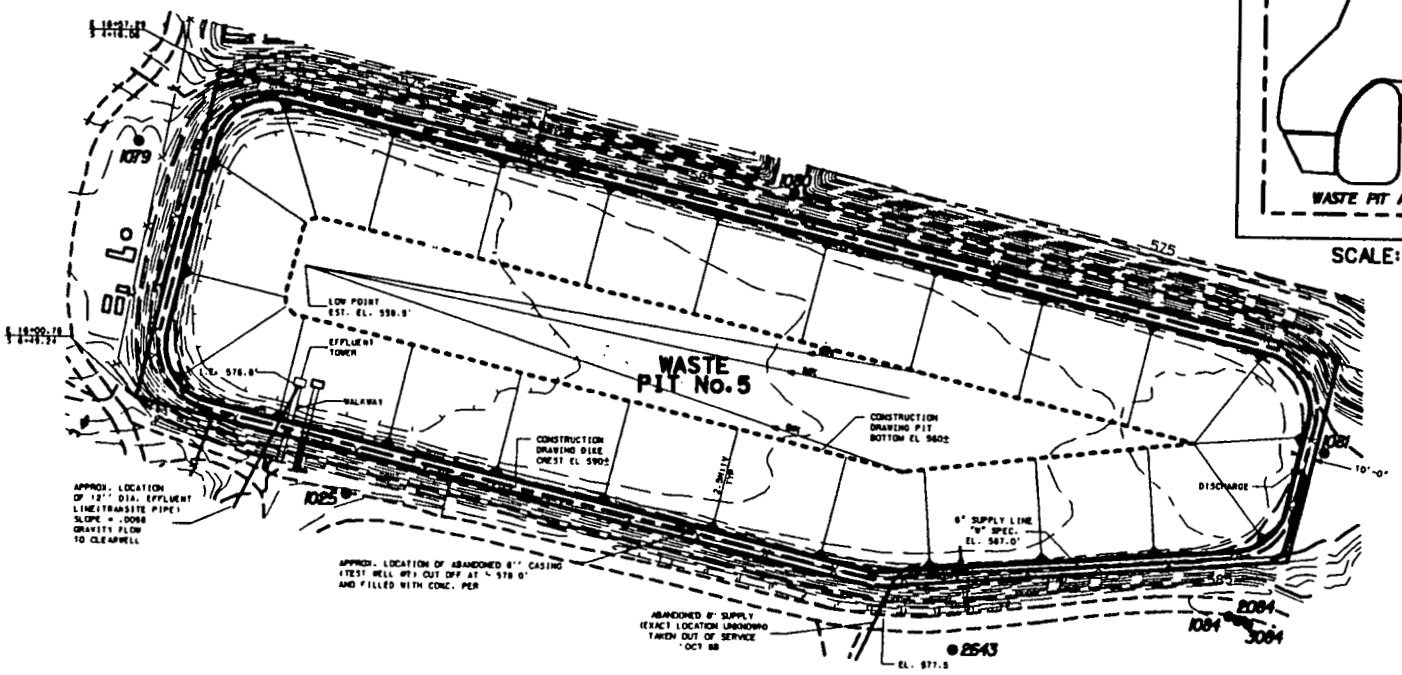
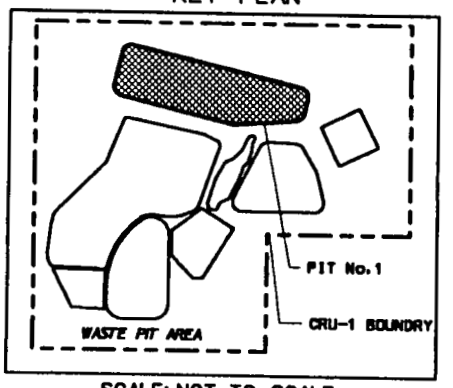
409191-A-355 \OUT \0001X \DS



KEY PLAN



SCALE: NOT TO SCALE

N

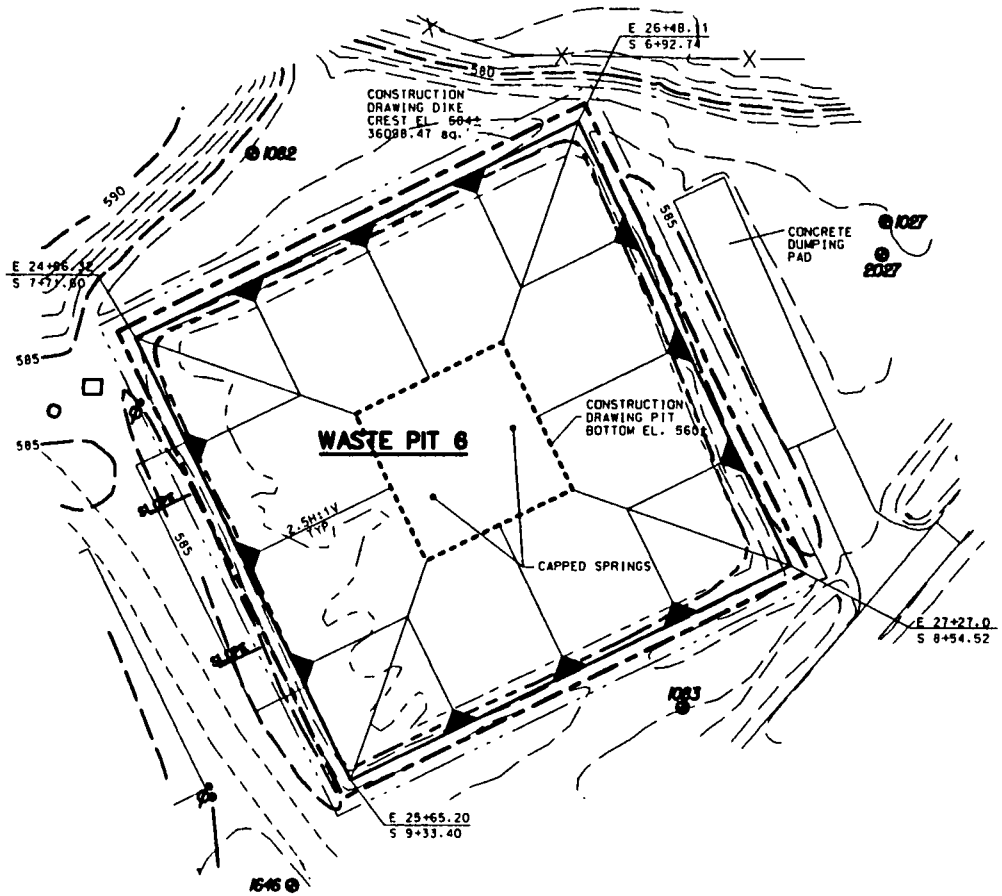
LEGEND:

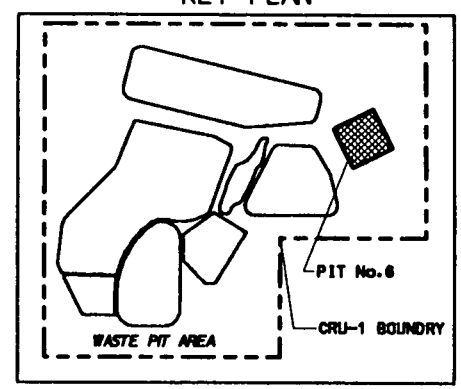
- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH *	APPROX. SURFACE AREA
1988 - 1983	UNCOVERED	97,900 CY	97,900 CY	28 FEET	3.74 ACRES

* DEPTH INCLUDES WASTE AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-16. WASTE PIT 5 PHYSICAL DESCRIPTION





SCALE: NOT TO SCALE

LEGEND:

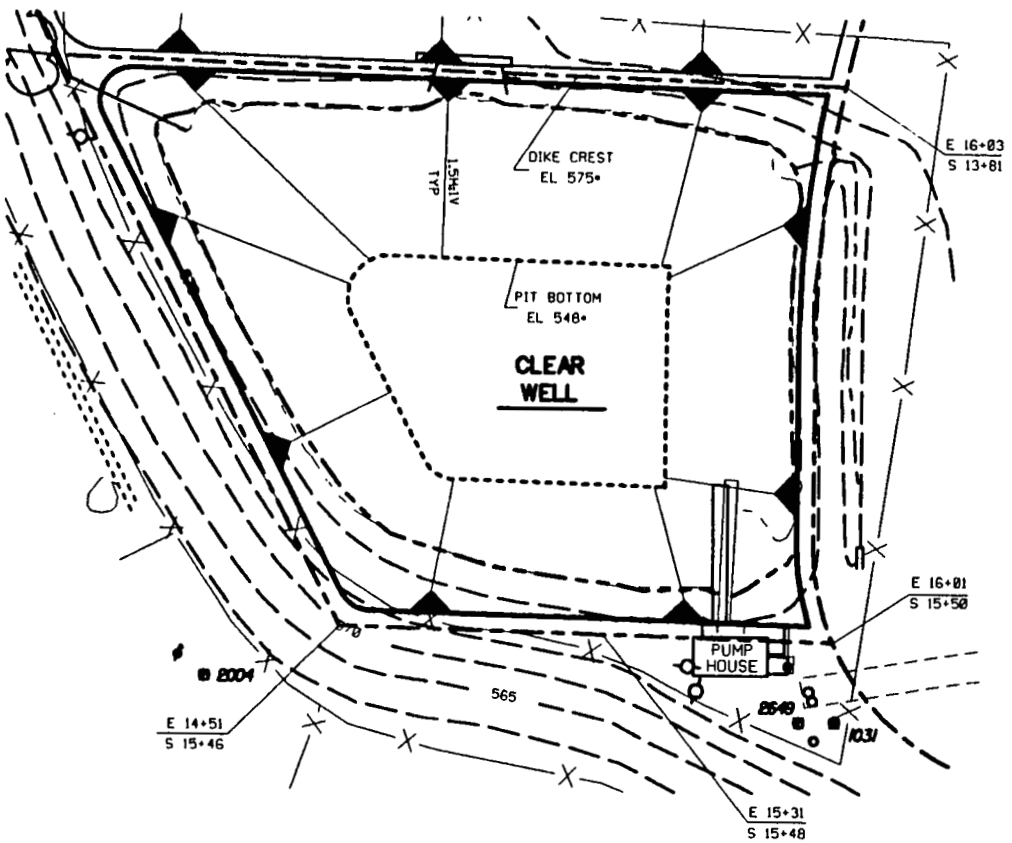
- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

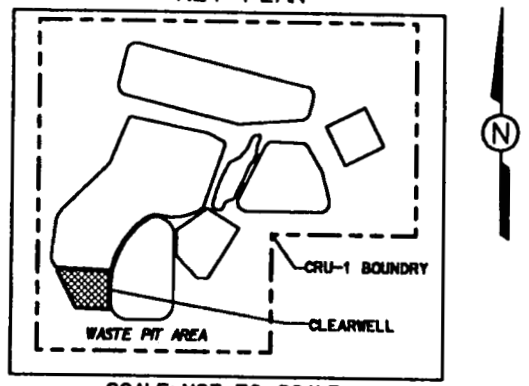
OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH *	APPROX. SURFACE AREA
1979 - 1985	UNCOVERED	9,600 CY	9,600 CY	20 FEET	0.74 ACRES

* DEPTH INCLUDES WASTE AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-17. WASTE PIT 6 PHYSICAL DESCRIPTION

4783





SCALE: NOT TO SCALE

LEGEND:

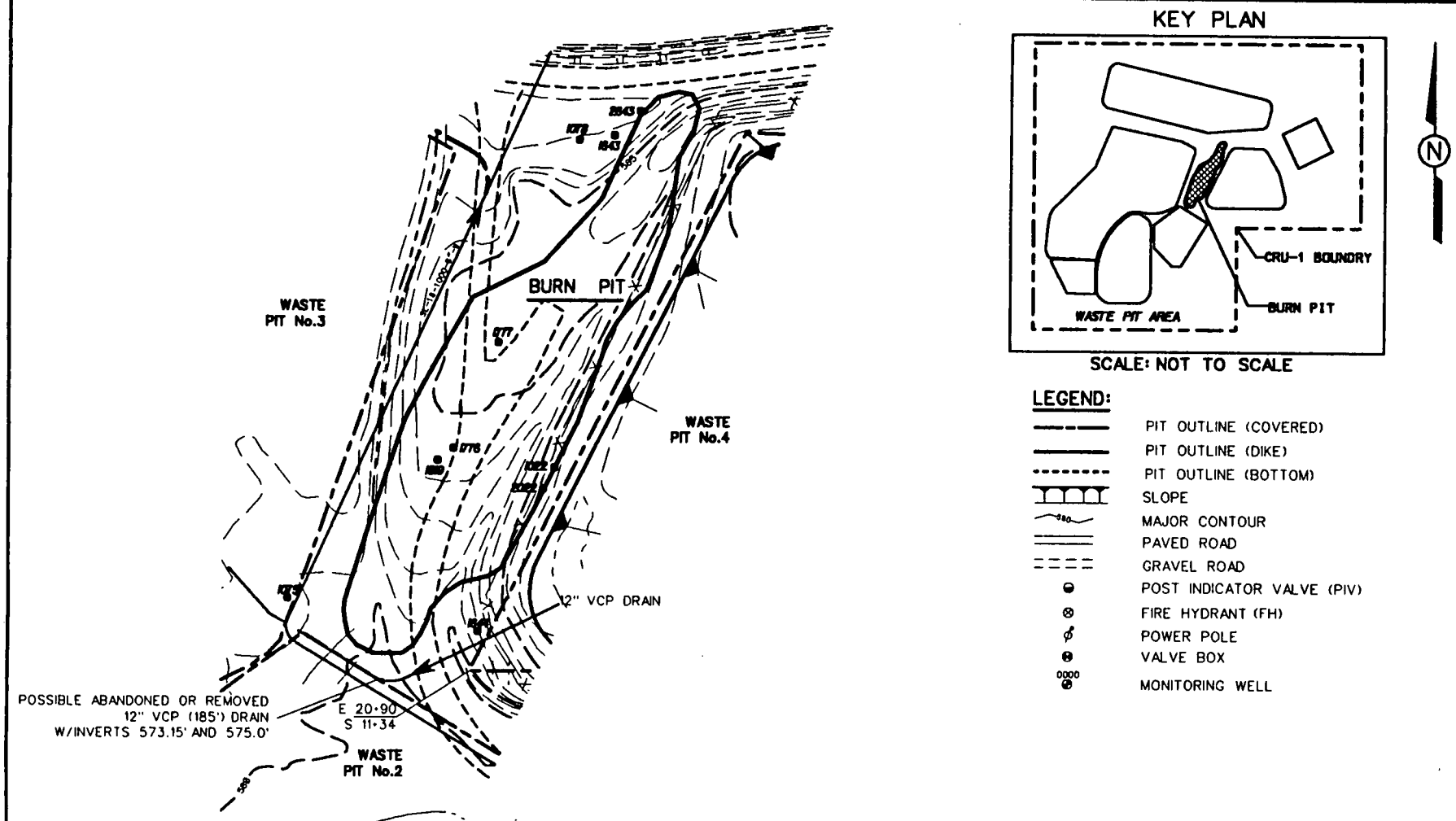
- PIT OUTLINE (COVERED)
- PIT OUTLINE (DIKE)
- PIT OUTLINE (BOTTOM)
- SLOPE
- MAJOR CONTOUR
- PAVED ROAD
- GRAVEL ROAD
- POST INDICATOR VALVE (PIV)
- FIRE HYDRANT (FH)
- POWER POLE
- VALVE BOX
- MONITORING WELL

OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH *	APPROX. SURFACE AREA
1959 - 1987	UNCOVERED	3,700 CY	4,300 CY	12 FEET	0.65 ACRES

* DEPTH INCLUDES WASTE AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-18. CLEARWELL PHYSICAL DESCRIPTION

4789



OPERATION PERIOD	CURRENT STATUS	EST. WASTE VOLUME	EST. TOTAL VOLUME	APPROX. DEPTH ※	APPROX. SURFACE AREA
1957 - 1968	BACKFILLED	30,300 CY †	30,300 CY †	28 FEET †	0.50 ACRES †

† BOUNDARIES OF THE BURN PIT ARE NOT CLEARLY IDENTIFIED. QUANTITIES ARE ASSUMED TO BE WITHIN +/- 30% ACCURACY.
※ DEPTH INCLUDES APPROXIMATE DEPTH OF PIT COVER, WASTE, AND LOW PERMEABILITY BOTTOM LAYERS.

FIGURE 1-19. BURN PIT PHYSICAL DESCRIPTION

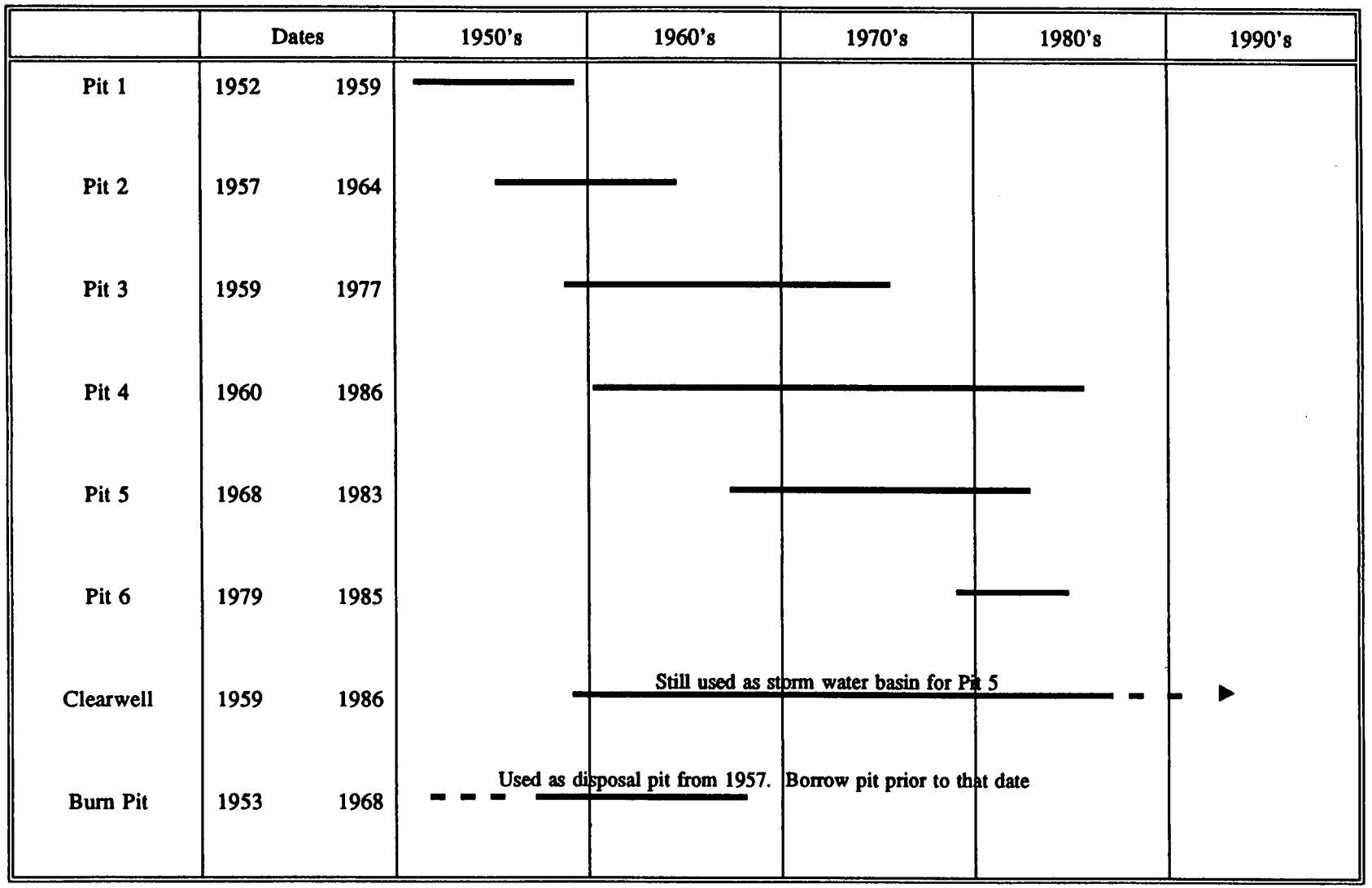


FIGURE 1-20. HISTORICAL TIMELINE OF PIT USAGE

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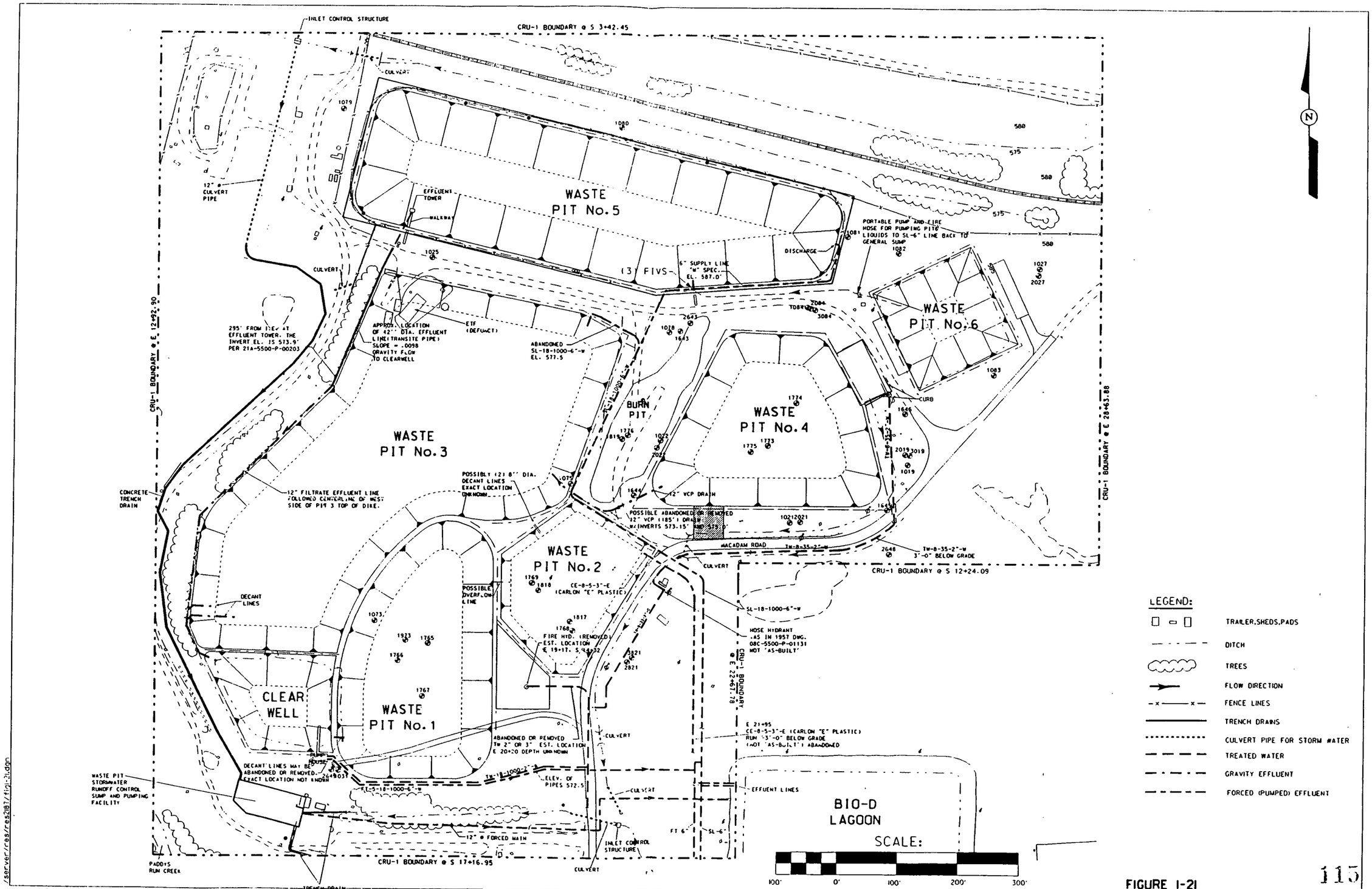

115

FIGURE 1-21

LOCATION MAP OF MISC. FACILITIES, STRUCTURES AND UNDERGROUND PIPING IN THE CRU-1 AREA

2.0 STUDY AREA INVESTIGATIONS

Section 2 provides a detailed review of the objectives, methodology, and available data from individual characterization studies conducted at the FEMP, which were associated with the Operable Unit 1 study area. Data useability and limitations are discussed at the end of the section. Activities included investigations completed under the Remedial Investigation/Feasibility Study (RI/FS), the Characterization and Investigation Study (CIS), the FEMP Environmental Monitoring Program, the Resource Conservation and Recovery Act (RCRA) Groundwater Study, and other special site programs undertaken to characterize the physical, chemical, and radiological properties of the site. Table 2-1 summarizes the investigative activities evaluated in the Operable Unit 1 RI.

This section also discusses how various data sets are combined to satisfy the Remedial Investigation (RI) Data Quality Objectives (DQO), which in turn provide a foundation for discussions of nature and extent of contamination, fate and transport modeling of CPC, and the baseline risk assessment, which are presented in Sections 4, 5, and 6, respectively. Evaluation of results from various Operable Unit 1 characterization studies are presented in these later sections and are not included in Section 2.

Section 2.1 outlines RI data requirements and Operable Unit 1 Rag. Sections 2.2 through 2.10 contain information on the objective, methodology, and analyses used for each investigative activity. Quality Assurance Program elements and data validation are discussed in Sections 2.11 and 2.12, respectively. Section 2.13 focuses on the assessment of data quality.

2.1 DATA REQUIREMENTS AND DATA QUALITY OBJECTIVES

Data requirements for the RI were driven by the Consent Agreement between EPA and DOE; DOE and EPA guidance policy; and the CERCLA, RCRA and NEPA regulations. The following section presents RI/FS data requirements and data quality objectives.

2.1.1 Data Requirements

The Consent Agreement between DOE and EPA provided the framework for the performance of the Operable Unit 1 RI/FS. One of the specific purposes of the Consent Agreement was to establish requirements for the performance of a RI/FS to fully determine the nature and extent of the threat to the public health or welfare or the environment caused by the release and threatened release of hazardous substances, pollutants, contaminants, or hazardous constituents at the FEMP. In addition, the Consent Agreement allowed work performed and data generated prior to the effective date of the Consent Agreement to be retained and utilized as elements of the RI/FS to the maximum extent feasible as long as it did not violate applicable or relevant and appropriate laws, regulations, or guidelines and without risking significant technical errors.

Operable Unit 1 was redefined in the Amended Consent Agreement (ACA) to include Waste Pits 1 through 6, the Burn Pit, and the Clearwell, as illustrated in Figure 2-1. The Ohio State Planar coordinates shown on Figure 2-1 define the horizontal boundaries of Operable Unit 1. The vertical boundaries are defined as including all material within the horizontal boundaries from the soil surface to the top of the Great Miami Aquifer. Perched water encountered during remediation is also included in Operable Unit 1.

Outside the boundary of Operable Unit 1, local and regional impacts associated with Operable Unit 1 source contaminants were evaluated by extending the data evaluation to include the Operable Unit 1 study area and the regional environment.

The Operable Unit 1 study area concentrated on the area most likely to be affected by contamination originating from Operable Unit 1. This area encompasses Operable Unit 1 and its surrounding environs, including portions of the Great Miami Aquifer and perched groundwater.

The regional environment is defined as that region outside the Operable Unit 1 study area. Its boundaries extend to all areas necessary to evaluate data and to assess the impacts from Operable Unit 1. This RI report addresses four issues by employing a regional perspective:

- Regional environmental resources that could be impacted (e.g., ambient air, groundwater, or wetlands)
- Risk to off-site receptors
- Long-term migration potential for materials released from the waste pits
- Direct radiation exposure

The regional environment applies to all five operable units. This RI report addresses each of the above elements as they apply to Operable Unit 1. Table 2-2 summarizes the data evaluation approach applied including the following: (1) the informational needs of the RI, (2) the data available from sources other than the RI/FS to meet those needs, and (3) site characterization activities specifically conducted to satisfy identified data deficiencies. The table also identifies the ultimate use of the individual data sets in the RI and the section of the report in which the data set is introduced.

2.1.2 Data Quality Objectives

EPA has published guidance for determining Risk Assessment Guidance (RAG) (EPA 1987). Some of the environmental studies used in the RI prior to 1987 had not developed formal RAG as later guidance recommended; however, data from these studies was used in the RI in accordance with the terms of the Consent Agreement and current regulatory guidance. To put the regulatory and

investigative activities into perspective, Figure 2-2 shows a timeline of FEMP environmental studies and regulatory promulgations which affected the FEMP.

As defined by EPA guidance documents, RAG are quantitative and qualitative statements that specify the quality of data required to support decisions made during remedial response activities. The result of the DQO process are project specific quality assurance (QA) objectives for precision, accuracy, representativeness, comparability, and completeness (PARCC).

Precision is a measure of the mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Various measures of precision exist depending on what is defined as "similar conditions." Precision is best expressed in terms of the standard deviation with comparison of replicate values expressed as the relative percent difference (RPD).

Accuracy is a measure of the bias in a system and is defined as the degree of agreement of a measurement (X) with an accepted reference or true value (T). It can be reported as a ratio (X/T), the difference between two values (X-T), or the difference as a percentage of the true value (100(X-T)/T).

Representativeness is a measure of the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental concern. By definition, if precision and accuracy objectives are achieved, the resulting degree of representativeness may also be high.

Comparability expresses the confidence with which one data set can be compared to another. Typically, the analytical methods used must have common analytical parameters, such as the same units of measure in reporting, similar detection limits, and equivalent sampling techniques.

Completeness is a measure of the amount of useable data resulting from a data collection program, given the sample design and analysis, and is usually expressed in percent, as the number of accepted data points divided by the total number of data points generated.

These data quality indicators are significant to the DQO process because they define the quality objectives. They are used as measures of performance and used in discussions of data quality and data limitations in Section 2.13.2, where the results obtained are compared to the study objectives.

The FEMP elected to break out the RI RAG into two components. Qualitative RAG, the first component, were set as part of the RI/FS media-specific sampling plans. Table 2-3 shows the RAG by sampling plan. These qualitative objectives were established based on discussions between data users in accordance with EPA guidance. It should also be noted that EPA approved the RI/FS work plans, including the Sampling Plan and the Quality Assurance Project Plan (QAPP).

The second component of the RAG was the quantitative component and was set by the QAPP. The QAPP is a project-specific document which serves as the governing QA document for the RI/FS. Project QA procedures are documented to satisfy the following objectives:

- To ensure that scientific data is of sufficient or greater quality to meet scientific and legal scrutiny
- To gather or develop data in accordance with procedures appropriate for the intended use of the data
- To ensure that data is of known or acceptable precision, accuracy, representativeness, comparability, and completeness

Quantitative RAG were presented in detail by analyte in Section 4 of the QAPP and briefly summarized in Table 2-4. These objectives applied to both analytical laboratories and field procedures. There are no specific RAG for representativeness or comparability in the QAPP; however, these parameters were considered in the data validation and data evaluation process. Results of duplicate samples, where available, were compared with original samples during data validation as a measure of precision. Representativeness is discussed as part of the data limitations discussion in Section 2.13 and Section 7.6.

This logical and simplified DQO format prevents excessive repetition of the RI/FS RAG. For example, instead of having specific precision, accuracy, representativeness, comparability, and completion (PARCC) objectives for each sampling objective, FEMP's format allows PARCC objectives to be dictated by the site-wide QAPP.

2.2 SURFACE FEATURES

Investigation activities documenting changes in the surface features of the Operable Unit 1 study area included the evaluation of historical aerial photographs and the performance of photogrammetric surveys. An evaluation of the integrity of the earthen berm surrounding Waste Pits 3, 5, and the Clearwell also is presented in this section. Section 3.3.4 further details the Operable Unit 1 study area surface features.

2.2.1 Aerial Photographic Interpretation

Aerial photographs of the FEMP were taken periodically between 1950, before groundbreaking, until 1988, when production ceased. These photographs chronicled the FEMP facility development and associated surface feature changes. Specific information on these photographs can be obtained from the report, Site Analysis: Feed Materials Production Center, Fernald, Ohio, (1988) prepared by the U.S. Environmental Protection Agency Environmental Photographic Interpretation Center in Warrenton, Virginia.

Objectives

Aerial photographs were used to document surface conditions in existence prior to the construction of the facility and the general chronology of waste pit development, usage, and closure.

Methodology

Government and commercial sources were searched for quality aerial photographs of the FEMP. Selected photographs were analyzed by stereoscopic viewing of backlit transparencies to create a three-dimensional effect that allowed discernment of different physical features and environmental conditions. Photographs from the years 1950, 1954, 1957, 1962, 1964, 1968, 1976, 1983, and 1988 provided a historical overview of FEMP activities, particularly those within the Operable Unit 1 study area.

2.2.2 Photogrammetric Surveys

No comprehensive topographic or planimetric maps of the FEMP existed before the initiation of RI activities. Photogrammetric surveys, which are used to prepare accurate maps by combining aerial photographs and surveying techniques, were conducted in 1988 and 1992 to correct this deficiency.

Objectives

The primary objective of the photogrammetric survey was to provide a reference coordinate system for all site activities. Specific objectives of the photogrammetric surveys included:

- Completion of a high resolution map of the Operable Unit 1 study area capable of supporting data management, fate and transport modeling, graphical presentations, and Feasibility Study (FS) activities

- Creation of appropriate ground control and permanent benchmarks to establish vertical and horizontal coordinates of sampling and well locations and planimetric features.

Methodology

Aerial photographs, on a scale of approximately 1 inch equals 300 feet, were taken in 1988 and 1992. The 1992 flyover was performed to supplement existing photographs and to provide a map of current conditions at the facility. Ground control surveys were performed to establish aerial targets at horizontal and vertical control locations. Employing photogrammetric methods, planimetric mapping with 1-foot topographic contours meeting National Map Accuracy Standards (on a scale of 1 inch equals 50 feet) was completed for an area of approximately 4800 acres inclusive of the FEMP. Permanent survey benchmarks were established on the FEMP site to facilitate ground surveys required for field sampling operations. The resulting map and ground control were based on the Ohio State Plane (OSP) Coordinate System of 1983. Horizontal control was tied to the North American Datum of the 1983 OSP Coordinate System with vertical control tied to the North American Vertical Datum of 1929. A digital database was created of the planimetric map in both Intergraph and AutoCad formats. Topographic features of the FEMP are discussed in Section 3.3.

2.2.3 Geotechnical Evaluation of the Waste Pit Berms

An evaluation of the structural integrity of the waste storage area dikes located around Waste Pits 3, 5, and the Clearwell was conducted. As illustrated in Figure 2-3, these three pits were contained by berms which had the highest degree of slope, and thus were inherently the most unstable. The scope of work was divided into three separate activities. The first activity consisted of a field investigation of the subsurface soil and groundwater conditions in and around the dikes. The second activity involved geotechnical laboratory testing of soil samples obtained during the field investigation. In the final activity, field investigation data and laboratory results were utilized in a computer model to evaluate the potential for slope failure. Results of this evaluation can be found in Waste Pits 3 and 5 and Clearwell Dikes Stability Analysis Report (Parsons 1992). The report was the basis for development of the Waste Pits 3 and 5 and Clearwell Dikes Removal Site Evaluation (Parsons 1992).

Objective

The objective of the structural stability analyses of the earthen dikes bordering Waste Pits 3, 5, and the Clearwell was to evaluate the potential for slope failure. These pits were closest to Paddy's Run, an intermittent tributary of the Great Miami River, a determining factor for pits to be included in the evaluation. Two causes of instability were of particular concern: high groundwater levels resulting from a 100-year storm event and loading and accelerations caused by a 500-year earthquake.

Methodology

The field investigation phase involved soil sampling and piezometer installation. Details and specifications for field activities and analytical methodologies can be found in Soil Investigation Plan for Dike Stability Analysis of Waste Pits 3 and 5 and the Clearwell (Parsons 1991).

Subsurface soil samples beneath, inside, and adjacent to the waste pit dikes were obtained by soil test borings. Recovery of undisturbed soil samples used the Standard Method for Penetration Resistance and Split-Barrel Sampling (American Society for Testing and Materials [ASTM] 1586). Following visual classification, these soil samples were retained for laboratory index property testing. Additionally, relatively undisturbed Shelby tube samples (ASTM 1587) were obtained for laboratory testing of physical properties.

Temporary piezometers were installed in borings where groundwater was encountered during the field investigation. The piezometers measured groundwater elevations within the dike.

Analyses

The geotechnical laboratory testing was directed toward determining the classifications of the in situ soils and their engineering properties. Laboratory index tests were performed on split-barrel and Shelby tube soil samples. Index classification tests performed included natural moisture content (ASTM 2216), Atterberg Limits (ASTM D 4318) and grain size tests (ASTM D 422). Classification

of soils by these tests provided a systematic method for categorizing soils according to their probable engineering behavior. In addition, grain size analyses provided a means to evaluate zones of potential seepage. Physical property testing on Shelby tube soil samples consisted of consolidated-undrained triaxial compression tests, including pore pressure measurements (ASTM D 4767), consolidation tests (ASTM D 2435), and triaxial permeability tests (COE-EM-1110-2-1906).

Computerized slope stability analyses were conducted to investigate potential failure surfaces for eight idealized cross sections. These cross sections were developed from the field and geotechnical laboratory data. With input from the geotechnical testing, the computer program XSTABL analyzed three general cases for each of the eight cross sections: Case 1, Low Groundwater Table; Case 2, High Groundwater Table; and Case 3, Low Groundwater Table with Earthquake Loading. Results of the computer analysis are discussed in Section 3.1.9.

2.3 WASTE PIT INVESTIGATIONS

The CIS and RI/FS programs included investigations into the contents of each of the eight waste pits. During the CIS sampling effort, which took place from 1986 to 1987, three types of geophysical surveys and a pit media sampling program were conducted on both the earthen and liquid covered pits. In 1990 to 1991, the RI/FS sampling program supplemented this data with waste media and leachate samples from the earthen covered pits -- Waste Pits 1, 2, 3, 4, and the Burn Pit. Waste Pits 5, 6, and the Clearwell, the three pits that have standing liquid covers, were sampled under the RI/FS program in 1992. Unlike the CIS waste pit study, which placed boreholes randomly after geophysical anomalies had been avoided, the 1991 RI/FS Waste Pit Study attempted to place boreholes near the deepest portions of each pit sampled. This was done because, although waste disposed of in Waste Pits 1, 2 and 4 was dry at the time of disposal, the waste became saturated upon disposal due to the "bathtub" effect on each pit. Since a primary goal of the 1991 RI/FS Waste Pit Study was to collect leachate samples representative of contaminants potentially leaking into the Great Miami Aquifer, the deepest portions of these pits, which were nearest the top of the underlying sand and gravel unit, were selected. Figure 2-4 indicates the locations of the waste pit samples from the CIS and RI/FS programs. Tables 2-5 through 2-12 list distinctive sample numbers and analyses groups for each validated waste pit sample set. Table 2-13 summarizes analytical completeness by comparing the number of analyses planned to that which represents acceptable data.

The following summarizes the number of analyses performed on waste pit material, not including leachate, surface water, or QA/QC samples. Within Waste Pit 1 there were 20 samples analyzed for inorganic parameters, 16 samples analyzed for pesticides/PCBs, 21 samples analyzed for volatiles and semivolatiles, 12 samples analyzed for herbicides, 11 samples analyzed for organo-phosphate pesticides, 9 samples analyzed for dioxins/furans, and 15 samples which were analyzed for radiological parameters. In addition, 6 samples were analyzed after the toxicity characteristic leaching procedure (TCLP) was performed.

Within Waste Pit 2 there were 13 samples analyzed for inorganic parameters, 10 samples analyzed for pesticides/PCBs, 15 samples analyzed semivolatiles, 18 samples analyzed for volatiles, 7 samples analyzed for herbicides and organophosphate pesticides, 6 samples analyzed for dioxins/furans, and 11 samples which were analyzed for radiological parameters. In addition, 4 samples were extracted by TCLP prior to analyses.

Waste Pit 3 included 19 samples which were analyzed for inorganic parameters, 16 samples analyzed for pesticides/PCBs, 18 samples analyzed semivolatile and volatiles, 7 samples analyzed for herbicides and organophosphate pesticides, 9 samples analyzed for dioxins/furans, and 16 samples which were analyzed for radiological parameters. Six samples were also extracted by TCLP prior to analyses.

Seventeen samples were analyzed for inorganics in Waste Pit 4. This pit also included 13 samples analyzed for pesticides/PCBs, 23 samples analyzed semivolatiles, 20 samples analyzed for volatiles, 14 samples analyzed for herbicides, 15 samples analyzed for organophosphate pesticides, 13 samples analyzed for dioxins/furans, and 17 samples which were analyzed for radiological parameters. In addition, 4 samples were extracted by TCLP prior to analyses.

Waste Pit 5 included 17 samples which were analyzed for inorganic parameters, 17 samples analyzed for pesticides/PCBs, 18 samples analyzed semivolatiles, 17 samples analyzed for volatiles, and 17 samples which were analyzed for radiological parameters. Ten samples were also extracted by TCLP before analyses.

Within Waste Pit 6 were 17 samples which were analyzed for inorganic parameters, 17 samples analyzed for pesticides/PCBs, 17 samples analyzed semivolatiles and volatiles, and 17 samples which were analyzed for radiological parameters. In addition, 9 samples were extracted by TCLP prior to analyses.

Thirteen samples in the Burn Pit were analyzed for inorganic parameters. This pit also included 13 samples which were analyzed for pesticides/PCBs, 18 samples analyzed for semivolatiles, 14 samples analyzed for volatiles, 5 samples analyzed for herbicides, 6 samples analyzed for organophosphate pesticides, 5 samples analyzed for dioxins/furans, and 12 samples which were analyzed for radiological parameters. In addition, 3 samples were extracted by TCLP before analyses.

The Clearwell included 12 samples which were analyzed for inorganic parameters, 10 samples analyzed for pesticides/PCBs, and 12 samples which were analyzed for semivolatiles, volatiles, and radiological parameters. In addition, 7 samples were extracted by TCLP prior to analyses.

2.3.1 CIS Waste Pit Investigations

Roy F. Weston, Inc. (Weston) was retained to characterize the existing environmental condition of the waste storage area, including the Operable Unit 1 waste pits. Weston conducted geophysical surveys, drilled boreholes, and collected samples which were submitted for analysis of chemical and radiological parameters. This work was performed prior to the 1990 Consent Agreement but was incorporated into the RI under the provisions of the Consent Agreement.

2.3.1.1 CIS Geophysical Surveys

Three types of geophysical surveys were performed on Waste Pits 1 through 4 and the Burn Pit within Operable Unit 1: magnetic, electromagnetic terrain conductivity, and ground penetrating radar. Results were reported in CIS Volume 1: Geophysical Survey (Weston 1987). In general, these surveys were intended to provide qualitative information on shallow stratigraphy within the waste pits and potentially hazardous drilling locations caused by buried metal objects. The specific objective and methodology of each geophysical survey are outlined below. Resulting data are discussed by pit in Section 4.2.

Magnetic Survey

Objective

The magnetic survey was performed to identify areas containing relatively large concentrations of buried ferrous metal.

Methodology

Magnetic measurements were taken with a battery-powered portable magnetometer, EG&G Geometrics Model G-856. Base station readings were taken throughout each day to account for diurnal variations of the earth's magnetic field. The survey was conducted at 25-foot intervals with the sensor at a height of eight feet above ground surface. Corrections for the diurnal variation of the earth's magnetic field were made to all field data utilizing the base station measurements. Magnetic contour and control point posting maps were then prepared from the reduced data. These maps were interpreted first for magnetic anomalies originating from cultural features present (i.e., railroad tracks, and chain link fences) at the surface. The remaining anomalies were interpreted as resulting from buried ferromagnetic materials. Buried drums were assumed to be a component of these identified areas, an assumption supported by historical process knowledge.

Electromagnetic Survey

Objective

The objective of the electromagnetic survey was to locate areas of anomalous electrical conductivity in FEMP waste storage areas, including the waste pits. Possible sources of anomalous conductivities in

these areas included wastewater containing high total dissolved solids, buried metallic debris, nonmetallic conductive debris (i.e., flyash), and groundwater contaminant plumes.

Methodology

Two instruments, Geonics, Ltd. EM 31 and EM 34-3, were employed in the electromagnetic survey. Both instruments were battery powered and operated by creating an alternating primary magnetic field at the transmitting coil. The EM 31 was used continuously along north-south profiles. Measurements were recorded at each grid node and between grid nodes when anomalous readings occurred. Two modes of operation yielded effective depths of 9 and 18 feet. The EM 34-3 has deeper effective depths; two modes of operation with this model resulted in effective depths of 25 and 50 feet. Measurements with the EM 34-3 were recorded at grid nodes only.

Apparent conductivity data postings and contour maps were prepared from the raw field data. These maps were interpreted initially for cultural features on the surface, buried pipelines, and other buried metal objects. After data points were identified as resulting from surface or buried metal, they were edited from the data to target anomalies resulting from other sources such as groundwater contamination.

Contour maps were prepared from the edited conductivity data set. However, it should be noted that conductivity readings influenced by relatively large masses of buried metal objects were still present in the data. The resulting contour maps were interpreted with regard to pore water saturation, total dissolved solids concentration, glacial till thickness, and the presence of buried metal.

Ground Penetrating Radar

Objective

The objective of performing a ground penetrating radar survey in the waste pit area was threefold: to locate the boundaries of the pits; to identify the depth and bottom configuration of each pit; and to verify indications of buried ferrous metal debris from the magnetic survey.

Methodology

The ground penetrating radar (GPR) unit used was a Geophysical Survey Systems, Inc. (GSSI) SIR System 8 powered by a 12-volt battery in the field vehicle. The system was calibrated for an approximate effective depth of 28 feet, the approximate average depth of the waste pits. GPR profiling was conducted both north to south and east to west. All horizontal profiles were electronically marked on the paper scrolls used to record data by the operator at 25-foot or 50-foot intervals.

Individual ground penetrating radar horizontal profiles were removed from the paper rolls collected on site and then indexed by the roll number and order on a given roll. Final base maps were constructed

from the local coordinates posted on profiles and from a field base map showing the location of ground penetrating radar subsurface coverage for each area covered at the FEMP. The ground penetrating radar data were interpreted primarily for locating buried objects and possible pit boundary signatures.

The GPR surveys confirmed and accurately located specific burial zones within the pits. However, because of the relatively high soil conductivity within the waste storage area, transmitted GPR signals were attenuated at depths less than the depths of the pits. Therefore, the depths and configurations of the pit floors could not be determined. Signal scattering and attenuation also prevented the detection of the lateral boundaries of the pits, which were effectively delineated by the electromagnetic surveys by sensing the conductivity contrast between the pit contents and the surrounding terrain.

2.3.1.2 CIS Waste Pit Sampling

All waste pits were sampled under the CIS program to characterize the chemical and radiological constituents of the pit material, an investigation which had not been previously conducted. Details of sampling methods can be found in Site Characterization of the waste storage areas (Weston) Part 2, Volumes 1 and 2, and support documentation. The results of this investigative phase are reported in CIS Volume 2: Chemical and Radiological Analyses of the Waste Storage Pits (Weston 1987). Section 4.2 discusses sampling results and nature and extent of contamination. Appendix A presents CIS analytical data grouped by waste pit. Section 2.1.3.2 evaluates the quality and usability of this data set.

Objectives

There were four main objectives for sampling the waste pits during the CIS program:

- To confirm process knowledge regarding the type of waste materials present and their radiological characteristics
- To characterize the radiological and chemical composition of the waste
- To determine range of physical and geotechnical properties of the waste materials within the pits
- To characterize the radiological and chemical composition of the water cover in Waste Pits 4, 5, 6, and the Clearwell.

Methodology - Dry Pits

Pits designated as dry during sampling included Waste Pits 1, 2, 3, 4, and the Burn Pit. This designation was made based on the present condition of the waste pits rather than the historical designation of the physical condition of the waste stream placed in the pits. Borehole locations within each pit were selected randomly throughout the pit after areas of high geophysical anomaly had been eliminated. Each of these waste pits was sampled using the hollow-stem auger sampling technique.

Diedrich Drilling's D-50 rig mounted on an all-terrain log skidder was used. Samples were obtained continuously using a 3-inch outside diameter, 24-inch long split-spoon sampler. The sampling of these pits was performed using ASTM Method D 1586-84, "Penetration Tests and Split Barrel Sampling of Soils," by determining blow counts at 6-inch intervals. Sampling continued until reaching a depth at which a geologist identified the residue or waste/natural clay interface but did not exceed a predetermined depth thought to be near the bottom of each pit. CIS lithological logs are presented in Appendix A.

When a split-spoon sampler was removed from the borehole, it was placed on a clean plastic sheet and opened immediately. The length of the contents was then measured and recorded. A portable organic vapor analyzer (OVA), calibrated daily, was used to collect readings directly from the surface of the samples. This was done at a minimum of four locations. Readings of 0 to 5 ppm above background were considered positive detections. Using a stainless steel spatula, the sample was then cut into two equal portions and numbered. One portion was then sliced again into two halves. From the inner face of each half, the spatula tip was used to collect aliquots of waste along the sample length and transfer this material to a 40 ml volatile organic compound (VOC) vial which was then sealed. All VOC vials were cooled in an ice chest for preservation. The bottled samples were later composited in the laboratory to form one sample per borehole. Both halves of the sliced portion were then placed in a large metal bowl and hand composited with each sample from the borehole. Resulting composite material was transferred into appropriate vials for hazardous substance list (HSL) and isotopic radiological analysis at an off-site laboratory.

Remaining composite material was placed into plastic containers for geotechnical and physical parameter analysis in the on-site soils laboratory. The other half of the Shelby tube sample was placed into a wide-mouth plastic jar and sent to the on-site laboratory for gamma spectral analysis to determine relative activity of the samples shipped off site for analysis. All boreholes were then grouted with nonshrink bentonite cement as the augers were withdrawn from the hole.

For each sample location, technicians labeled every sample container and recorded the date, sample number, technician's name, grid location, depth of sample interval, chain-of-custody number, laboratory location, and the analytical parameters in the subsurface field logbook. Radiological composite samples were then sent to the TMA/Eberline laboratory in Albuquerque for radiochemical analysis; chemical composite samples were sent to Weston Analytics.

The sample preparation method had the potential to remove volatile constituents from the sampled media. Low bias in the results was identified but not quantitated.

Methodology - Wet Pits

The wet pits, as determined during the CIS, included Waste Pits 5, 6, and the Clearwell. The Clearwell sediment was sampled using a stainless steel Ponar dredge. The residues from Waste Pits 5 and 6 were sampled from a floating sampling platform using a three-inch diameter stainless steel piston-type sampler. This sampler consisted of a stainless steel rod spaced with stainless steel piston rings at three 20-inch intervals. The rod/piston assembly was inserted into a stainless steel tube sleeve and lowered to the desired depth. As the sleeve was raised, pit residue flowed around the rod and piston. The sleeve was then lowered around the rod/piston assembly, sealing the three samples. This device was used to obtain 20-inch incremental samples for the entire depth of the pit residue or until the sampler met resistance. At that time, a decision was made to either abandon the boring or stop at that depth and use the samples.

When the piston sampler was brought to the sample preparation table located on the pit berm, the outer sleeve was retracted very slowly to allow the residue in each sample interval to flow into separate stainless steel bowls. Immediately, a portion of the residue was placed into a VOC bottle and sealed. The VOC bottles from each sample interval in a single boring were sent to Weston Analytics laboratory for compositing and for analysis of volatile organic chemicals. A portion of the sample interval was placed into a 477 ml Nalgene radiological jar for analysis in the on-site gamma spectroscopy laboratory. The remainder of the sample interval was covered in the bowl and set aside for compositing.

This same procedure was followed for each sample interval from the pit boring. Remaining residue was composited. Portions of the composited sample were placed into the appropriate containers for nonvolatile chemical analyses. A portion of the composite boring was placed into a 477 ml Nalgene container for radiological analysis in the on-site laboratory and for shipment to TMA/Eberline. The rest of the composite was placed into plastic containers for geotechnical and physical parameter analyses.

Methodology - Water Samples

The water covers on top of Waste Pits 5, 6, and the Clearwell were sampled using either a portable grab sampler or a Kemmerer sampler. Surface leachate from the southern half of Waste Pit 4 was also sampled in this manner prior to the pit being covered by a soil/synthetic liner cap. These devices were designed to sample water from beneath the water surface at specific depths. A pontoon boat was used in Waste Pits 5, 6, and the Clearwell for those samples collected at locations away from the banks.

Upon taking the water samples, several field measurements were performed. These included pH, temperature, specific conductivity, and dissolved oxygen. From the total number of samples taken from Waste Pits 4, 5, 6, and the Clearwell, one sample from each pit was filtered so that an assessment of both soluble chemical species and suspended matter could be made. Technicians labeled the

sample bottles and recorded the sample number, date, time, depth of sampling, temperature, pH, specific conductivity, and the dissolved oxygen in the surface water sample logbook. All samples were shipped off site. Samples requiring chemical constituent analyses were sent to Weston Analytics laboratory; samples requiring radiochemical analyses were sent to the TMA/Eberline laboratory.

Analyses

Samples were analyzed for chemical and radiological parameters. Tables 2-5 through 2-12 illustrate the analyses performed for each CIS waste pit sample. Waste pit analytical data completeness is presented in Table 2-13. Radiological analytes included the following:

- Cesium-137 (Cs)
- Neptunium-237 (Np-237)
- Plutonium-238 (Pu-238)
- Pu-239/240
- Radium-226 (Ra-226)
- Ra-228
- Ruthenium-106 (Ru-106)
- Strontium-90 (Sr-90)
- Technetium-99 (Tc-99)
- Thorium-228 (Th-228)
- Th-230
- Th-232
- Uranium-234 (U-234)
- U-235
- U-238

Chemical analytes included Hazardous Substance List (HSL) organics and inorganics plus cyanide. Four samples in Pit 4 were analyzed for herbicides and organophosphorus pesticides. The majority of samples in the waste pits were also analyzed for RCRA hazardous characteristics, including corrosivity, ignitability, reactivity, and Extraction Procedure (EP) toxicity. A comparison of CIS analysis versus analyte lists from other waste pit studies in presented in Appendix F.

2.3.2 RI/FS WASTE PIT SAMPLING PROGRAM

A detailed review of the Operable Unit 1 CIS data was undertaken during the DQO development process to determine if additional sampling of the waste pits would be required to support the RI, fate and transport, baseline risk assessment, and the FS. Areas of concern included the following:

- Availability of data to evaluate treatment methods for reducing the mobility of waste pit constituents
- Quality of information to characterize the source term for migration from the lower portions of the waste pits
- Availability of information to characterize the leaching potential of the waste materials.

As a result of identified data gaps, two additional sampling programs were performed under the RI/FS. The first program conducted in July, August, and September of 1991 and referred to as the 1991 RI/FS in this report, addressed the capped pits (Waste Pits 1, 2, 3, 4, and the Burn Pit). The second waste pit sampling program, herein referred to as the 1992 RI/FS, was conducted on the wet pits

(Waste Pits 5, 6, and the Clearwell) from February to April 1992. Appendix A presents the RI/FS analytical data grouped by waste pit.

2.3.2.1 1991 RI/FS WASTE PIT SAMPLING

Objective

The RI/FS sampling program for the waste pit material was developed to meet the objectives as stated in Section 2.3.2 plus the following:

- Provide samples to assess the geochemical properties of the waste materials which may have affected the leaching characteristics of the waste and therefore, the mobility of leachate constituents
- Provide samples for geotechnical and other engineering treatability testing in support of the treatability
- Provide data for future sampling and testing to be conducted during the remedial design phase.

Methodology

To facilitate the collection of relatively undisturbed samples, an auger drilling rig and Shelby tubes were used for advancing boreholes and geotechnical sample collection in the waste pits.

Because some of the waste pits were believed to be lined with clay soils of low permeability, drilling was conducted in a cautious manner to prevent damage or penetration of the pit liner. Drilling used 10-inch nominal outside diameter by 6.25-inch nominal inside diameter hollow-stem augers. A split-spoon (ASTM D1586-84) sampler was continuously driven in advance of the auger to permit collection of samples and to allow identification of the bottom of the pit except in the instances where a thin-walled 3-inch-diameter, 30-inch-long Shelby tube (ASTM D1587-83) was used to collect geotechnical/physical samples. Shelby tube samples were collected based on the estimated waste depth at one-third, one-half, and two-thirds depths of the waste zone. The field geologist ensured the split-spoon sampler was then advanced in 6 inch intervals near the bottom of each pit to allow borehole termination immediately after identification of the waste pit liner. This method of identifying the pit bottoms was considered to be cautious based on process knowledge of the liner and till thickness.

The depths of Waste Pits 3 and 4 were known from design drawings. Based on this information, it was possible to prescribe the sample depths and total depth of penetration within the boreholes proposed for these pits. This prediction was not possible for Waste Pits 1, 2, and the Burn Pit because design drawings for Waste Pits 1 and 2 were referenced to a lost bench mark, and no construction records were available for the Burn Pit. Therefore, by advancing a split-spoon sampler in short increments, the borings were terminated prior to the penetration of the clay liner. If the pit bottom

was partially penetrated by the split spoon sampler, a bentonite plug was placed at the bottom of the borehole to reduce the possibility of leakage from the pit through the liner in this location.

All borings installed under the 1991 RI/FS Waste Pit Sampling were converted to monitoring wells screened within the pits except reborings 1817, 1818, and 1819. These reborings were installed because of missed sample holding times in boring/well numbers 1768, 1769, and 1776, respectively. The boring logs for 1991 RI/FS wells are included in Appendix A. Figure 2-3 shows the location of each borehole. Boring locations were selected to fall within the deepest portion of each pit as estimated from design drawings or CIS data.

Materials collected during the installation of the boreholes were used for several purposes. All samples were collected discretely using a Shelby tube and in some cases later composited. Samples sent for radiological analysis were composited into the upper, middle, and lower thirds of each borehole (referred to as Zones A, B, and C). Each sampling interval yielded one composite sample per zone. The compositing was completed on site because of laboratory license restrictions limiting quantities of waste pit materials allowed in the off-site laboratory. Samples sent for VOC analysis were not composited but collected discretely. Additional specific information regarding field methodology is presented in Section 4.5 of the RI/FS Work Plan, Vol V (ASI/IT 1988).

When composite samples were collected, the split-spoon sample was divided lengthwise into two equal portions after it was field screened for radioactivity and VOC. One-half of each split-spoon core was used for compositing which allowed for specific interval analysis of the remaining uncomposited material. When a VOC analysis of the sample was required, the necessary volume was collected immediately after halving the sample. Nonmixable materials such as concrete, wood chips, paper, plastic, glass, and rock fragments were removed from the sample halves prior to compositing. Although the removal of these potential sorbents could have reduced the concentrations of radiological and chemical analytes in the samples, this method of sample preparation was more cost effective. The compositing was completed within a disposable glove bag. Samples were placed in the bag after they were split and not removed until they were composited. They were then placed in appropriate containers. One composite was prepared per bag. Mixing of the sample was accomplished either by hand; with mixing tools composed of Pyrex® glass, stainless steel, or Teflon®; or with a mechanical mixer utilizing stainless steel mixing blades.

A sample was considered composited when uniform color and texture was observed throughout the sample. When uniformity was achieved the composite was spread evenly in the mixing bowl and quartered. Equal portions were taken from each quarter to provide the necessary volume for the specified analyses. These portions were placed in the appropriate labeled containers for shipment to the laboratory. Excess composite was containerized and archived. Compositing equipment was decontaminated before and between each composite.

Quality Assurance/Quality Control (QA/QC) samples were collected as outlined in the RI/FS Work Plan, Volume V, Section 6.6, pages 26 and 27 (ASI/IT 1988).

Analyses

Geotechnical analyses were performed on one Shelby tube sample from Zones A, B, and C from each borehole where material was recovered. The general geological and descriptive geotechnical parameters were established to determine the expected soils behavior during implementation of remedial alternatives. All sample analytical testing was conducted as specified under the appropriate ASTM standards and laboratory procedures using qualified geotechnical technicians and properly calibrated apparatus that met the requirements of ASTM D3740-80. Table 2-14 lists the analyses and ASTM standards that were used. Documentation for the testing conformed to the standards set forth in the RI/FS QAPP.

Tables 2-5 through 2-12 illustrate the analyses performed for each 1991 RI/FS waste pit sample. Waste pit analytical data completeness if presented in Table 2-13. A comparison of 1991 RI/FS analytes versus analyte lists from other studies is presented in Appendix F. Analytical parameters for pit material samples included the following:

- Full radiological parameters
- Full HSL (organic and inorganic)
- Dioxins and furans
- General chemistry parameters
- Appendix IX (includes full HSL plus herbicides and organophosphorus pesticides).

Certain radionuclides (such as Po-210, Pa-231, and Ae-227) were assumed to be in equilibrium with their parent radionuclides, as verified through earlier studies, and thus were not analyzed for. Pit leachate and groundwater samples were analyzed for the same parameters. Groundwater samples were collected after the installation and purging of the monitoring wells.

2.3.2.2 1992 RI/FS Waste Pit Sampling

The primary intent of this sampling effort was to collect bulk material from Waste Pits 5, 6, and the Clearwell to be used in treatability studies on the waste material. Due to the sampling methodologies used, there was consideration given only to supplementing characterization data collected during the CIS, and not to specifically use this data in the baseline risk assessment. However, after validation and subsequent evaluation, a portion of this data was determined to be of sufficient quality to reduce uncertainty in the baseline risk assessment.

Objectives

The objectives of this sampling effort were to:

- Obtain sufficient sample quantities for cement stabilization, vitrification, physical separation (soil washing), and chemical separation treatability studies on materials in Waste Pits 5, 6, and the Clearwell

- Collect additional data from Waste Pit 5 and the Clearwell as required by the RCRA compliance program.

Details of the methodology are provided in the Sampling Plan for Obtaining Pits 5, 6, and Clearwell Samples for Operable Unit 1 Treatability Studies, Revision 2 (August 1991).

Methodology

Five methods were proposed for collecting samples from the water covered Waste Pits 5, 6, and the Clearwell because of the differences in form and consistency of the waste materials. The methods proposed were slurry pump, backhoe, bailer, Vibra-core System, and a clamshell crane. Before the collection of samples from the waste pits, trial runs were performed under simulated conditions where the actual samples were to be collected. The clamshell crane was selected to be the most effective method to conduct this sampling effort.

The crane was located on level ground away from the waste pit because of the weight of the equipment. A marker was placed on the crane cable to identify the maximum depth the clamshell bucket could be lowered into the waste pits without causing damage to the liner. The clamshell was slowly lowered into the waste pit to collect the saturated waste material, and the material captured in the clamshell bucket was transferred into 55-gallon drums.

Closeup pictures were taken to document the sampling activities, sampling locations, and appearance of materials removed. The drums were left at the sampling location for 24-hours to allow excess water in the material to separate. The water in the drums was then decanted and returned to the pit. The 55-gallon drums were then sealed, decontaminated, labeled and sent to Building 71 to await sampling. Grab samples from the top of each sampled drum were collected between May and June for Waste Pits 5 and 6, and in August for Clearwell samples.

Analyses

Laboratory analysis was conducted by Ecotek LSI in Atlanta, Georgia, from June 1992 through March 1993. Samples that were collected in support of this effort were analyzed for full Hazardous Substance List (HSL) parameters, Appendix IX parameters, full radiological parameters, and general chemistry. In addition, samples were extracted by TCLP and analyzed for full HSL parameters. Holding times for samples submitted for organics analyses exceeded EPA CLP holding times and preservation requirements, thus all organics results were rejected during the data validation process, and thus were not used in the baseline risk assessment. The effect of missed holding times is assessed in Section 7.6.

Tables 2-10, 2-11, and 2-12 illustrate the analyses performed for each 1992 RI/FS waste pit sample. Waste pit analytical data completeness is presented in Table 2-13. A comparison of 1992 RI/FS analytes versus analyte lists from other studies is presented in Appendix F.

2.4 METEOROLOGICAL CONDITIONS

Under the FEMP Environmental Monitoring Program and the FEMP Emergency Preparedness Program, variations in temperature, wind speed, and wind direction were recorded at the FEMP. This information was used in defining the air transport mechanism of site emissions and fugitive dust from exposed ground surfaces. Furthermore, meteorological data (i.e. prevailing wind) supported the selection of focus areas for additional environmental monitoring activities (i.e. surface soil and ecological sampling) by predicting the areas most potentially affected by possible airborne CPC. Site meteorology is discussed in Section 3.2.

2.4.1 Wind Measurements

Objective

Site-specific wind speed and wind direction data were collected at FEMP to support the FEMP Environmental Monitoring Program and the FEMP Emergency Preparedness Program. The data were used as input into the atmospheric dispersion models which were in turn used for the fate and transport modeling of airborne CPC from Operable Unit 1.

Methodology

Data was collected at the site meteorological tower. Measurements were made at both the 10 m (33 foot) height and the 60 m (200 foot) height. Wind speeds were measured using wind speed sensors designed to provide low starting thresholds, wide dynamic responses, and high accuracy over a wide range of wind speeds and a variety of environmental conditions. The wind speed sensor had a vinyl anemometer cup set attached to a shaft and 30-hole photochopper assembly. The photochopper interrupted a solid state source to a phototransistor, thereby producing a frequency output proportional to the ambient wind speed.

Wind directions were measured using wind direction sensors designed to provide low starting thresholds, fast dynamic response, and high rate of accuracy under adverse environmental conditions. The wind direction sensor had a counterbalanced, lightweight vane attached to a shaft that was coupled to a precision low torque potentiometer. Wind direction via vane position was converted to a proportional direct current voltage by the potentiometer.

Wind speed and wind direction data were automatically recorded by a computer-based data collection system consisting of a remote (located at the meteorological tower) data logging computer, located at the meteorological tower, connected to a central microcomputer. The data logging computer scanned

the analog inputs from wind speed and wind direction sensors for instantaneous values and then scaled, averaged, and stored these values. The central computer polled the remote data logging computer for the stored data values and reported the wind speed and wind direction data as hourly averages.

Routine calibrations were conducted semiannually on the entire meteorological data collection system. Routine preventive maintenance was conducted quarterly.

2.4.2 Meteorological Tower Temperature Measurements

Objective

Ambient air temperature data was collected at the FEMP to support the FEMP Environmental Monitoring Program. The collected data was used for the stability class calculations utilized in the atmospheric dispersion models for fate and transport modeling of airborne CPC from Operable Unit 1.

Methodology

Ambient air temperature measurements were made using temperature sensors located at both the 10-m and 60-m heights of the meteorological tower. The temperature sensor was made up of composited epoxy-coated thermistors protected by a probe casing.

Ambient air temperature data were automatically recorded by a computer-based data collection system consisting of a remote data logging computer, located at the meteorological tower, connected to a central microcomputer. The data logging computer scanned the analog inputs from the temperature sensors for instantaneous values and then scaled, averaged, and stored these values. The central computer polled the remote data logging computer for the stored data values and reported the temperature data as hourly averages. Delta temperature measurements, the difference in temperature between the 10-m height and the 60-m height, were calculated automatically by the computer system.

Routine calibrations were conducted semiannually on the entire meteorological data collection system. Routine preventive maintenance was conducted quarterly.

2.5 SURFACE WATER AND SEDIMENT

Surface water and sediment investigations were performed under several studies including the CIS, the RI/FS, and the FEMP Environmental Monitoring Program, as illustrated in Figure 2-5. In addition, a 1986 radiological survey of Paddy's Run, a small creek immediately west of the waste pit area, was performed. Studies of surface water and sediment were conducted to determine the impact of site effluent discharges and stormwater runoff on channel flow and sediments of nearby water bodies. Because the four radioactive waste storage silos, now part of Operable Unit 4, were also located

adjacent to Paddy's Run but downstream of the Operable Unit 1 study area, it should be noted that Operable Unit 4 was a potential source of contamination attributed to Operable Unit 1 in this report.

2.5.1 Surface Water

A number of sampling programs were completed at the FEMP that contained surface water sampling components relevant to Operable Unit 1. These programs included the FEMP Environmental Monitoring Program, the Best Management Practices Plan (BMP), and the RI/FS. From these programs, the following numbers of samples were evaluated in the Operable Unit 1 RI: twelve CIS samples, thirteen 1984 Groundwater Study samples, 549 FEMP Environmental Monitoring Program samples (which were only analyzed for total uranium), and three samples from the Best Management Practices study. Table 2-15 presents a summary of parameters for each study which were analyzed. This information is used in the RI to describe the nature and extent of surface water contamination associated with the Operable Unit 1 study area. Section 4.5.1 discusses the results of these studies and the nature and extent of surface water contamination.

2.5.1.1 FEMP Environmental Monitoring Program Paddy's Run Sampling

Objective

As part of the FEMP Environmental Monitoring Program, surface water samples were routinely collected from Paddy's Run and analyzed for radiological parameters. The sampling objective was to monitor the impact of FEMP operations on the regional environment.

Methodology

Grab samples have been collected weekly from six locations along Paddy's Run as shown in Figure 2-6. These locations included points upstream of the FEMP (W-5), upstream of the Operable Unit 1 study area (W-9), and downstream of the Operable Unit 1 and Operable Unit 4 study areas (W-10, W-11, W-7, and W-8). At each sampling location a precleaned bucket was used to fill prelabeled sample bottles. Appropriate chain-of-custody, QC sampling, and field documentation procedures were employed to ensure the quality of the collected results. Occasionally, locations W-10, W-11, and W-7 were dry, and no samples were collected. Due to the volume of data available, only data collected from January 1991 to December 1992 was evaluated in Section 4.0, Nature and Extent. This data is presented in Appendix B.3.1.

Analysis

Weekly samples were submitted to the FEMP on-site analytical laboratory for total uranium analysis. Additionally, two-month composite samples from location W-5 and monthly composite samples from location W-7 were submitted for isotopic radium analysis. If an insufficient sample was available from location W-7, a monthly composite from W-8 was substituted. Yearly results were reported in the Annual Site Environmental Report.

2.5.1.2 Best Management Practices Plan Surface Water Sampling

Consistent with the terms of the Ohio Environmental Protection Agency (OEPA) Director's Findings and Orders, the analyses of surface water samples collected from a series of drainage locations on the FEMP property was completed in 1988. This sampling was conducted as part of an overall plan established to evaluate liquid discharges from the FEMP.

Objectives

The specific objectives of surface water sampling for the BMP pertinent to the Operable Unit 1 RI/FS program included:

- A characterization of the chemical and radiological constituents in surface water entering Paddy's Run through site drainages
- Support of the identification of potential pathways for contaminant release and the delineation of the nature and extent of contamination from the Operable Unit 1 study area.

Methodology

One-time grab samples were collected from two locations in a drainage ditch within the Operable Unit 1 study area on July 20 and 21, 1988. The sampling locations are shown on Figure 2-5. Sampling procedures were conducted consistent with the OEPA approved "Sampling Plan for the Characterization of Storm Water Runoff at the FMPC" (October 1987). Stormwater samples from the drainage ditches were collected using a dipper or by immersion of precleaned sample bottles depending on sample location. Sample locations were staked with horizontal coordinates utilizing survey benchmarks. Flow in the drainage ditches was estimated by timing a float to obtain current velocity and then multiplying by the measured cross-sectional area of flow in the drainage.

Analyses

Collected samples were analyzed for inorganics, radiological, and water quality parameters as listed below:

- Aluminum
- pH
- Barium
- Isotopic Radium (one sample)
- Calcium
- Sodium
- Copper
- Sulfate
- Chloride
- Temperature
- Chromium
- Isotopic Thorium (one sample)
- Conductivity
- Total Organic Carbon (TOC)
- Fluoride
- Total Dissolved Solids (TDS)
- Iron
- Toxicity
- Lead
- Total Suspended Solids (TSS)
- Magnesium
- Isotopic Uranium
- Nitrate
- Zinc
- Oil and Grease

2.5.1.3 RI/FS Surface Water Sampling

Surface water sampling was conducted as part of the RI to supplement existing data from the FEMP Environmental Monitoring Program.

Objectives

The objectives of the RI/FS surface water sampling included characterizing the nature of the radiological and chemical contaminants and determining the extent of contaminant distribution in surface water at points along drainage pathways from the site towards the Great Miami River.

Methodology

RI/FS surface water sampling pertinent to the Operable Unit 1 RI involved the collection of samples from the six established FEMP Environmental Monitoring Program sampling locations (W-5, W-7, W-8, W-9, W-10, and W-11) in Paddy's Run, and 11 locations in drainage swales within the waste pit area. Sampling locations are shown in Figure 2-5 and Figure 2-6. Samples were collected quarterly for one year while the particular stream or drainage swale was flowing. Samples were collected by hand using a pond or dip sampler or immersion of the sample jar directly into the water.

Analyses

Surface water samples were subjected to the following field analyses:

- pH
- Temperature
- Conductivity
- Dissolved oxygen

Selected water samples were analyzed at an off-site laboratory for radiological and chemical analysis. Some samples were submitted for full HSL analysis consistent with EPA CLP as listed in Appendix F. Surface water analytical data completeness is presented in Table 2-15.

2.5.2 Sediment

Sediment samples were routinely collected as part of the FEMP Environmental Monitoring Program. In 1986, a special study of Paddy's Run was conducted. Additionally, samples were collected in Paddy's Run and from site drainage channels as part of the CIS and the RI/FS. This information was used to support characterization of the nature and extent of potential releases from the Operable Unit 1 study area. From these studies, 3 RI/FS samples, 20 CIS samples, 66 FEMP Environmental Monitoring Program samples, and 28 samples from the 1986 Radiological Survey of Paddy's Run were evaluated in the Operable Unit 1 RI. This analytical data is evaluated in Section 4.5.2.

4783

It should be noted that each of these sediment sampling events was conducted prior to construction of the stormwater runoff control removal weir, Removal Action No. 2, completed in July 1992. The purpose of this removal action was to control water and sediment transport from the waste pit area.

2.5.2.1 1986 Paddy's Run Radiological Survey

In 1986, Dames and Moore performed a two-part study of Paddy's Run. Initially, a radiological survey of the creek's sediments was conducted at regular intervals along the course of the creek. This survey data was supplemented by sediment sampling along a 1200-foot stretch of Paddy's Run. Figure 2-7 shows the reach of Paddy's Run surveyed in this study. Results of this survey were published in Dames and Moore's draft report Radiological Analysis of Soil Samples - Paddy's Run (December 1986).

Objectives

The objectives of the survey included:

- Identification of radiological CPC in Paddy's Run sediments in attempt to define the extent of contamination in this drainage area resulting from FEMP operations
- Identification of sediments outside of the FEMP that may be acting as an intermediate or secondary source of radiological CPC for eventual transport into the regional ground-water aquifer.

Methodology

Measurements of gamma radiation levels were made along Paddy's Run from the railroad bridge northwest of the waste pits downstream to the confluence with the Great Miami River. At 5-foot intervals along the centerline, four gamma radiation measurements were made approximately 5 and 10 feet from the center on each side of the creek. Readings were taken with a large volume sodium iodide (NaI) scintillation detector. To mitigate the effects of gamma radiation originating from the K-65 silos located south of the Operable Unit 1 perimeter, shielded survey measurements were made at slightly greater grid spacing along approximately 2400 feet of Paddy's Run parallel to this area. Shielding consisted of two lead blankets and one 3/8-inch thick plywood-sheathed lead plate. Because of elevated readings related to shielding inefficiency in the point of the creek closest to the K-65 silos, a sediment sampling program for 1200 feet of this zone was developed. This region of Paddy's Run was slightly downstream (south) from the portion of the creek adjacent to the Operable Unit 1 waste pits.

Sediment samples were taken from the east and west banks of Paddy's Run at approximately 25-foot intervals. Samples were composited so that analysis was performed on one composite sample representing each 100-foot section of creek bank. In the field, sampling was biased to allow for the collection of the finer grained fraction of stream bank sediments. A trowel was used to collect the sample and was washed with demineralized water and dried between samples. Approximately two

133

kilograms of soil were drawn from an area of four inches in diameter down to four inches in depth. Samples were allowed to air dry for approximately two weeks. Dried samples were composited on an equal weight basis, labeled, and sent to a laboratory for radiological analysis.

In addition, there were two locations within Paddy's Run where gamma activity exceeded 25 µR/hr and could not be attributed to the effects of the K-65 silos. A sample was collected at each of these two locations. For control, two other samples were taken at locations where gamma activity was similar to background levels.

Analyses

In total, 28 sediment samples were submitted for radiological analysis. These samples were analyzed for gross alpha, isotopic uranium, isotopic thorium, and Ra-225. This data is presented in Appendix B.3.2.1.

2.5.2.2 FEMP Environmental Monitoring Paddy's Run Sediment Sampling

Objective

As part of the FEMP Environmental Monitoring Program, sediment samples were routinely collected to provide information on sediments in Paddy's Run.

Methodology

The frequency and location of sediment sampling varied to some degree over the 30-year FEMP Environmental Monitoring Program. From 1986 through 1990, sediment samples were collected annually from 25 locations in Paddy's Run upstream of the confluence of Paddy's Run with the storm sewer outfall ditch at 100-m intervals north of the outfall and from 18 locations at 200-m intervals in Paddy's Run south of the same confluence. During this time frame, three 500-gram sediment samples were collected at each sampling location with a trowel. These samples were collected across the cross-section of the creek at each location, one on each bank and one at mid-stream.

In 1991 and 1992, sediment samples were collected annually from 24 locations in Paddy's Run both above and below the confluence of the creek with the storm sewer outfall ditch. Additionally, a sample was collected at the northwestern FEMP property line where Paddy's Run intersected State Route 126. During this period, one sample was collected at each selected location in Paddy's Run. Locations were selected based on observation by the sampling technician of the points in the creek with recent visual deposition of sediments.

All samples were placed in prelabeled sample bags which were then sealed with custody tape. FEMP Environmental Monitoring Standard Operating Procedures guided sampling activities, including field methods, documentation, labeling, packaging, chain of custody, and decontamination.

Analyses

Sediment samples collected from 1986 through 1990 were submitted to either the FEMP on-site laboratory or an off-site laboratory for analysis, depending on availability of the FEMP laboratory. Collected samples were analyzed for:

- Isotopic uranium
- Isotopic thorium
- Isotopic radium
- Isotopic plutonium
- Tc-99

Samples collected after 1990 were analyzed either in the FEMP laboratory or at an off-site laboratory for total uranium, isotopic radium, and isotopic thorium. This analytical data is presented in Appendix B.3.2.1.

2.5.2.3 CIS Sediment Sampling

Sediments were sampled during the CIS investigations of surface soils within the waste storage area and associated drainage ditches.

Objectives

The objective of the CIS surface soil sampling was to establish the nature and distribution of radionuclides present in the FEMP waste storage area surface soils, including sediments that had accumulated in drainage ditches.

Methodology

Sediment samples were collected along several drainage ditches within the Operable Unit 1 study area during the radiological characterization of the waste storage area surface soils. Sampling procedures for the CIS followed the techniques outlined in the DOE report "Procedures for Sampling Radium-Contaminated Soils" (1985b). Techniques included the use of ring samplers and stainless steel trowels to obtain surface samples to a depth of six inches. Technicians used trowels and post-hole samplers to sample intervals below six inches. Screening sample locations are shown in Figure 2-8. Before samples were collected, a gamma ray measurement was made of the surface with a Field Instrument for Detection of Low-Energy Radiation (FIDLER). If the FIDLER indicated elevated radioactivity, a 0- to 2-inch sample was taken followed by a 2- to 6-inch sample. The upper sample was collected to develop the correlation between U-238 activity concentration and FIDLER count rates because the Th-234 63 kilo electronvolt (keV) photon was attenuated below two inches. Activity concentration results from the two intervals were mathematically composited to give a 0- to 6-inch sample interval for reporting.

After the samples were collected to a depth of six inches, a probe was placed in the cavity, and another measurement was made. An intermediate-depth sample was collected between six and twelve inches if the resulting radiation level was higher than expected because of the change in detector-soil geometry. Care was taken to prevent cross-contamination between sampling intervals. The hole was enlarged before continuing to the next sampling interval. This process was repeated as needed to a depth of eighteen inches. In some cases a sample was collected from the eighteen to twenty-four inch interval. Because of the diameter of the FIDLER housing (nine inches), too much time was required to enlarge the hole for successive depth readings. A smaller NaI large volume scintillation detector (two and a half inches) was used.

Individual samples were placed in plastic bags and homogenized. An aliquot from the bag was placed in a 477-milliliter plastic jar and sealed with custody tape. The sample container was labeled, and the sample number, location, date, time, depth, technician name, chain of custody laboratory location, and significant comments were recorded in the field logbook.

Analyses

The collected samples were analyzed in an on-site gamma spectrometry laboratory as a screening mechanism for elevated radionuclide concentrations. Analyzed parameters included Uranium-238, Cs-137, Ra-226, Ru-106, and Th-232. Twenty samples were sent to an off-site laboratory for full radiological analysis. CIS sediment data is presented in Appendix B.3.2.1. Sediment analytical data completeness is presented in Table 2-15.

2.5.2.4 RI/FS Paddy's Run Sediment Sampling

Additional sampling of Paddy's Run sediments was performed as part of the RI/FS in order to supplement existing data from earlier programs.

Objectives

This sampling effort was designed to provide information on the distribution and extent of radiological constituents in sediment from Paddy's Run and site drainage systems leading into Paddy's Run.

Methodology

Sediment samples were collected quarterly for three quarters from two locations on Paddy's Run. The samples were obtained from locations W-10 and W-11 shown in Figure 2-5. Station W-5 was included in the sediment sampling program to provide a background comparison. Additionally, samples were collected from three locations in drainage ditches within the Operable Unit 1 study area. Samples were collected by compositing scoop samples collected from quarter points in the channel at the designated sample locations. Detailed information on the sampling methodologies can be found in the RI/FS Work Plan, Sampling and Analysis Plan, and the Quality Assurance Project Plan (ASI/IT 1988).

Analyses

One sample each from stations W-5, W-11, and W-10 were analyzed for total uranium, Ra-226, Ra-228, and gross alpha/beta.

2.6 SURFACE SOIL

Surface soil samples were collected at the FEMP during several different investigative activities. These programs included the following: CIS, RI/FS, Waste Pit Area Stormwater Runoff Control Removal Action (WPASWRCRA), FEMP Environmental Monitoring Program, and the CERCLA/RCRA Background Soil Study. In addition, samples collected from well borings from 0 to 24 inches deep were evaluated, along with surface soil samples collected from sampling events discussed in this section. Figure 2-9 reflects the addition of this well boring data. However, sampling procedures for well boring samples are discussed in Section 2.7. From these studies 60 CIS samples, 14 RI/FS samples, 17 WPASWRCRA samples, and 36 FEMP Environmental Monitoring Program samples were evaluated in the Operable Unit 1 RI.

In general surface soil sampling activities focused near heavily traveled roadways on the western perimeter of the waste pit area. Because of dust movement from traffic during plant production, and because of prevailing winds from the west, this area was suspected to contain higher contaminant concentration. Results from the Background Soil Study are discussed in Section 4.1. Nature and extent of contamination in surface soils is presented in Section 4.3.1. Table 2-16 summarized surface soil data completeness.

2.6.1 CIS Surface Soil Sampling

Objectives

The objective of CIS surface soil sampling was to identify the radionuclides contributing to above-background levels in surface soils in the waste storage areas.

Methodology

The waste storage areas were the primary target of the CIS surface soil sampling program; Operable Unit 1 was not defined at the time. Consequently, the sampling locations were not randomly distributed throughout the Operable Unit 1 study area. Figure 2-9 illustrates the CIS surface soil sampling locations.

CIS surface soil samples followed the same methodology as did CIS sediment samples. This sampling methodology was discussed in Section 2.5.2.3 and will not be repeated here. Figure 2-10 shows the screening surface soil sampling locations.

Analyses

Samples collected from the Operable Unit 1 study area were analyzed in an on-site gamma spectrometry laboratory. Each sample was subjected to a 10 minute count in the gamma spectrometry instrument. Results were reported for U-238, Cs-137, Ra-226, Ru-106, and Th-232. Additional detail on the gamma spectrometry analyses can be found in the CIS, Volume 3 (Weston 1987a). CIS on-site surface soil results are presented in Appendix B.1.1.1.

2.6.2 RI/FS Surface Soil Sampling

Additional investigations were conducted under the RI/FS program to supplement previous data collection efforts. The site investigations were intended to determine the lateral and vertical extent of on-site surface soil contamination by radionuclides and hazardous substances. The RI/FS surface soil sampling program was completed in 1988 with the collection of more than 1000 samples site wide. Of those samples, 34 surface soil samples (as defined by depth) were collected from within Operable Unit 1 because much of this area had been sampled during the CIS program.

Objectives

The objectives of the RI/FS surface soil sampling program were to:

- Determine the nature and extent of contamination by radioactive substances in surface soils
- Confirm areas of surface radiological contamination identified in the radiation measurements survey and quantify the types and concentrations of radionuclides found
- Characterize the source term for radionuclides which have the potential to contribute to off-site environmental impacts.

Methodology

Surface soil sampling procedures followed the techniques presented in the DOE report Procedures for Sampling Radium-Contaminated Soils, which were adopted in the EPA-approved RI/FS Work Plan. This sampling methodology was outlined in Section 2.5.2.3. Sample locations are shown in Figure 2-9.

Analyses

Soil samples collected within the site boundaries were analyzed for parameters that were representative of the analytes historically found in materials utilized at the FEMP. The following is a list of radiological parameters included in analytical testing:

Gamma Spectral Analysis	Tc-99
Isotopic Uranium	Cs-137
Isotopic Thorium	Ru-106
Isotopic Plutonium	Np-237
Isotopic Radium	

Total Uranium
Sr-90

Analytical data is presented in Appendix B.1.1.2. RI/FS surface soil analytical data completeness is presented in Table 2-16.

2.6.3 Waste Pit Area Storm Water Removal Action Surface Soil Sampling

Surface soils were sampled in support of the implementation of the Waste Pit Area Storm Water Run-off Control Removal Action. Surface soil samples were collected from areas within the FEMP waste storage area potentially affected by re-grading and excavation activities to be performed under the removal action.

Objectives

The objectives of the surface soil sampling conducted as part of the removal action included:

- Determining the chemical constituents present in the surface soil in areas potentially affected by the removal action
- Assessing the potential impacts to worker public health and safety because of the disturbance of surface soils as a result of the removal action
- Assessing viable storage and disposal options under RCRA for excess soils generated during the removal action.

Methodology

Samples were collected prior to removal action activities under two separate sampling efforts. Sample locations are shown in Figure 2-9. The first sampling activity involved the collection of surface soil samples to a depth of 6 inches using a stainless steel hand auger. These samples were used to assist in establishing health and safety requirements for the removal action and to aid in identifying the need and location of additional sampling.

The second sampling activity involved the collection of surface soil samples to a depth of 24 inches using a stainless steel hand auger. Sampling locations were randomly selected within areas potentially affected by the removal action. Sampling locations and collection methodology were consistent with the EPA-approved Waste Pit Area Storm Water Runoff Control Removal Action Work Plan. Nine of these hand augered samples were obtained in or adjacent to the Operable Unit 1 study area.

Analyses

Discrete samples were collected from each of the thirteen 6-inch surface soil sampling locations and submitted to the on-site laboratory for screening level analysis for isotopic uranium, thorium, and radium. Results were used to establish health and safety requirements for the removal action.

Nine discrete samples from the 0- to 6-inch interval were submitted to an off-site laboratory for HSL inorganic and pesticide/PCB analysis. Eight samples from the 18- to 24-inch interval were submitted to the off-site laboratory for HSL volatile and semivolatile organics analysis. Analytical data is presented in Appendix B.1.1.4. The Waste Pit Area Storm Water Runoff Control Removal surface soil analytical data completeness is presented in Table 2-16.

2.6.4 FEMP Environmental Monitoring Surface Soil Sampling

The FEMP collected surface soil samples along with other samples for different environmental media as part of the Environmental Monitoring Program for the site. These soil samples were usually collected once a year. The sampling points were located at the air monitoring stations. Due to the volume of data available, only data from 1986 through 1992 has been evaluated in the Operable Unit 1 RI.

Objective

The objective for collecting the surface soil samples was to monitor the potential impacts of FEMP operations on the site surface soils.

Methodology

Soil samples were collected from two depths, 0- to 2- and 2- to 4-inches. All surface soil samples taken after 1986 were collected by a stainless steel hand trowel, scoop, or hand auger in accordance with the RI/FS QAPP, (WEMCO 1988) or the Site-Wide CERCLA Quality Assurance Project Plan (SCQ), (WEMCO 1992).

Decontamination of all sampling equipment was performed at a designated central staging area. All sampling equipment was decontaminated between each sample collection by cleaning with a non-phosphate detergent and a bottle brush, rinsing with tap water, methanol, and two separate deionized water rinses.

Analyses

The collected soil samples were analyzed for total uranium. Additional analyses were added to specific samples as requested to collect data outside of the scope of the FEMP Environmental Monitoring Program. This analytical data is presented in Appendix B.1.1.2.

2.6.5 CERCLA/RCRA Background Soil Sampling

Objectives

The objectives for the background soil study were to:

- Collect surface and subsurface soil samples from an area with geology representative of the FEMP and analyze them for inorganic and radionuclide CPCs

- Perform statistical tests to establish the nature of variability of background concentrations with respect to depth of sample and soil type

- Prepare a report to serve as a reference for future investigations requiring background values of surface and subsurface soil.

The procedures for sampling, analyses, and statistical calculations were provided in the CERCLA/RCRA Background Soil Study Sampling and Analyses Plan (DOE 1992d). The results of the study were presented in the CERCLA/RCRA Background Soil Study (IT 1992).

Methodology

The basis of the background study was to sample and analyze soils with similar characteristics to FEMP soils. To minimize the possibility that samples were collected from areas where air emissions from the FEMP would bias the study, all samples were collected from an area near Shandon, Ohio, more than 3 miles northwest of the site. Figure 2-11 illustrates the sampling locations.

Thirty hand-auger borings were drilled to collect samples. Samples were collected at 30 locations, from three depths: 0 to 6 inches, 36 to 42 inches, and 48 to 54 inches. The set of surface soil samples represents loess and the most severely weathered soil horizon. The 36 to 42 inch sample set represented till and glaciofluvial sediment, which were at the approximate maximum depth of significant weathering. The deepest sample set represented till and glaciofluvial sediment and was collected from below the maximum depth of significant weathering. Samples were collected from 0 to 6 inches and 36 to 42 inches at all 30 locations and from 48 to 54 inches at 21 of the 30 locations. QC samples included blind duplicates, equipment rinsates, bottle blanks, and preservation reagent blanks.

Analyses

Samples were analyzed per EPA CLP and FEMP RI/FS radiological analytical methods as defined in the RI/FS QAPP. All analyses were conducted by routine analytical procedures. Counting times for radiological analyses were set to achieve lower-than-usual instrument detection limits.

All soil samples and QC blanks were analyzed for the following parameters:

- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Cadmium
- Calcium
- Chromium
- Cobalt
- Ac-227
- Cs-137
- Pb-210
- Potassium-40
- Pa-231
- Ru-106
- Sr-90
- Tc-99
- Isotopic radium
- Isotopic thorium

- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- Nickel
- Potassium
- Isotopic uranium
- Selenium
- Silicon
- Silver
- Sodium
- Thallium
- Vanadium
- Zinc

Statistical calculations are discussed in Appendix E.2.2.2.

2.7 SUBSURFACE SOILS

Subsurface sampling was conducted during the RI/FS program for Operable Unit 1, for which 107 samples were collected. Nature and extent of contamination in subsurface soil is discussed in Section 4.3.2. Table 2-17 summarizes subsurface soil analytical completeness.

2.7.1 RI/FS Boring Program

The subsurface soil sampling program was an integral part of the RI/FS groundwater monitoring well installation program; boreholes for collecting subsurface soil samples were used as sites for monitoring wells, as illustrated in Figure 2-12.

Objectives

The main objective of the subsurface soil investigations was to provide data on subsurface conditions within the FEMP facility that might define or influence contaminant migration pathways. To accomplish this, an evaluation of the chemical, radiological and geotechnical properties of the subsurface soils was performed.

Methodology

The subsurface soil sampling program was addressed separately from the surface soils program because of the difference in objectives and the specificity of methods and equipment.

During the borehole drilling program, standard penetration tests were conducted and subsurface soil samples were collected using an 18-inch split-spoon sampler in accordance with ASTM Method D1586-84. The soils were continually sampled in the glacial overburden. Samples were taken at 5-foot intervals in the Great Miami Aquifer to the total depth of the borehole. The USCS was used in soils classification. Logs for soil borings within the Operable Unit 1 study area are included in Appendix A.

Analyses

Immediately upon opening each split-spoon, the samples were screened for VOCs using an HNu photoionization detector. If volatiles were detected at above-background levels, a sample of the soil core was collected for full HSL analysis. This same approach was applied to soils exhibiting unusual odors or what might have been visible evidence of contamination. The field screening procedure for radionuclides utilized a large volume scintillation detector (SPA-3). For each boring location, the sample with the highest reading within each geologic horizon was selected for radiological laboratory analysis. All samples sent to the laboratory were tested for radionuclides that were historically used, stored, or produced at the FEMP. It should be noted that this sampling methodology may have conservatively biased the results since suspected and not random samples were submitted for analysis. This analytical data is presented in Appendix B.1.2.3. RI/FS subsurface soil analytical data completeness is presented in Table 2-17.

2.8 DIRECT RADIATION, AIR, AND AIRBORNE RADON MONITORING

Monitoring for direct radiation, air particulates, and airborne radon gas was and continues to be conducted in and around FEMP property. The aim of the monitoring program was to gather data to quantify radiation exposure rates for local residents, site workers, and the environment from sources originating at the FEMP. The pathways discussed in this section concern Operable Unit 1 because the waste pits emit radiation, generate fugitive dust, and release radon gas. Figure 2-13 depicts the approximate locations of air and radon monitoring stations along the FEMP fenceline. Section 4.6 discusses the results and nature and extent of contamination from direct radiation, air, and airborne radon.

2.8.1 Direct Radiation

The direct radiation pathway differed from other pathways in that gamma rays emitted from radionuclides on site might have been directly intercepted by local populations; the dose was not received by inhalation or ingestion but from gamma rays emitted from a radiation source. The FEMP Environmental Monitoring Program measured direct radiation within FEMP boundaries and at locations near the site using both pressurized ionization chambers (PICs) for periodic measurements and thermoluminescence dosimeters (TLDs) for long-term measurements. The PICs and TLDs were located at permanent monitoring stations within FEMP boundaries and at locations near the site. Because none of these permanent monitoring stations were located within the boundaries of Operable Unit 1, FEMP Environmental Monitoring Program direct radiation monitoring information was not included in this section. Discussions of direct radiation doses as determined from this monitoring program can be found in the FEMP Annual Site Environmental Reports. However, direct radiation measurements were taken within Operable Unit 1 during the CIS program.

2.8.1.1 CIS Direct Radiation Measurements

Direct radiation measurements within Operable Unit 1 were taken with a variety of instruments during the CIS program. Measurements were classified into three categories: exposure rate measurements, FIDLER measurements, and beta-gamma dose rate measurements. Detailed written measurement procedures were found in Site Characterization of the waste storage areas, Part 2, Vols. 1 and 2, Support Documentation (Weston 1986). A full report of these direct radiation measurements was made in CIS Report Volume 3: Radiological Survey of Surface Soils (Weston 1987c).

Objectives

The purpose of acquiring exposure rate, FIDLER, and beta-gamma dose rate measurements was to obtain measurements over a wide range of radioactivity energy levels. These measurements guided the selection of surface soil sampling locations; areas with elevated radioactivity concentrations were selected. In addition, FIDLER measurements were made to provide a correlation between FIDLER count rates and the measured concentrations of U-238 governed by site-specific conditions and other variables. This correlation was intended to serve only as an indicator for the need to further sample and analyze the local surface soils. Beta-gamma measurements were to provide supplemental radiation data to verify the presence of anomalous radiation as determined by the FIDLER measurements.

Methodology - Exposure Rate Measurements

The primary instrument used to measure exposure rates around the Operable Unit 1 waste pits and other areas of the FEMP was a Reuter Stokes Model RS-111 PIC. This instrument had a response proportional to exposure in Roentgens (R) over a wide energy range. The PIC was used to field calibrate a portable scintillation detector, an Eberline SPA-3. Count rates from the SPA-3 were correlated to exposure rates determined from those locations where PIC measurements were taken. This correlation was applied to the remainder of the SPA-3 measurements. In locations with readings above 100 microR/hr, exposure rate measurements also were taken with an Eberline Model HP-270 energy compensated Geiger Muller (GM) probe to corroborate PIC measurements. The energy response of the HP-270 measurement system is similar to that of the PIC. Measurements taken across the waste pit area were based on an approximate 100- to 200-foot grid spacing. Measurement locations excluded the liquid covered pits -- Waste Pits 5, and 6, and the Clearwell.

Methodology - FIDLER Measurements

The FIDLER was used during the CIS to take systematic standing measurements on the ground surface at 50-foot grid intersections. The FIDLER probe and appurtenances were set to detect the 63 keV photons from Th-234, an isotope of the U-238 decay chain. Following these measurements, each 50 foot by 50 foot grid block was subdivided into four quarters, each 25 foot by 25 foot. These subdivided blocks were scanned for anomalous radioactivity concentrations with the FIDLER device. When subgrid blocks with anomalous readings were found, standing measurements were taken on the ground surface at 6.25-foot intervals.

Methodology - Beta-Gamma Dose Rate Measurements

The beta-gamma dose rate measurements were made with an Eberline Model HP-210T probe that housed a pancake-type thin window GM detector. For protection of the fragile GM window and to reduce the detector's sensitivity to alpha particles, a double layer of aluminized mylar was placed between the GM tube and the protective wire grid that covered the probe's window. Measurements were taken systematically at each 50-foot grid node by placing the probe on the ground surface and counting emitted radiation for one-minute. Measurements were qualitative in that no correlation was made with U-238 activity concentrations, although the count rate was converted to absorbed dose rate (mrad/hr) using a correction factor supplied by TMA/Eberline.

2.8.2 Air Monitoring

In addition to site point sources such as stack emissions, the waste pit area within Operable Unit 1 was a potential source of airborne radionuclide particulates. Known as fugitive dust, these airborne particulates were of concern because of the potential exposure to site workers and local communities. The FEMP Environmental Monitoring Program continually monitored air in the FEMP vicinity for concentrations of airborne uranium.

2.8.2.1 FEMP Environmental Air Monitoring Program

Air monitoring stations were a means of measuring the transport of particulates via the air pathway. This information was used in conjunction with surface soil, grass, produce, and milk sampling results to estimate doses to local residents and estimate environmental exposure.

Objective

Air monitoring was performed under the site environmental monitoring program in order to obtain accurate information about the airborne quantities of uranium and other radionuclides.

Methodology

Sixteen high volume air monitoring stations (AMS) including nine within the FEMP fenceline, five in the local community, and two background locations were used to determine airborne radionuclide emissions from the FEMP. At each AMS, air was drawn through an 8-inch by 10-inch filter at a rate of 45 cu. ft./min. Charts continuously recorded flow data, thus allowing changes in flow rate to be taken into account.

Analyses

Filters from air monitoring stations were collected and analyzed weekly. The filters were stored for at least three days at the laboratory to allow naturally-occurring, short-lived radionuclides to decay. After this holding period, the filters were heated to 550°C to remove organic matter. Filters were then dissolved in acid, and the resulting solutions were analyzed for uranium. A portion of each solution

was retained each week to prepare a yearly composite sample which was analyzed for trace concentrations of radionuclides such as isotopes of radium, neptunium, plutonium, and thorium.

2.8.3 Airborne Radon Measurements

Airborne radon measurements were collected both on and off the FEMP property in support of the ongoing FEMP Environmental Monitoring Program. An additional radon study was performed on Waste Pits 1, 2, and 3 in November 1991 and on Waste Pit 4 in November 1992 by Chem-Nuclear Geotech, Inc., to support the description of the concentrations of radon in the atmosphere in the Operable Unit 1 study area.

2.8.3.1 FEMP Environmental Monitoring Radon Emission Program

Airborne radon was measured on and off the site property in support of the FEMP Environmental Monitoring Program. The findings were published annually in the FEMP Annual Site Environmental Report. Radon gas was measured as a separate component from air particulates in the air pathway.

Objective

Airborne radon measurements were collected to assess radon exposure to site workers and populations bordering the FEMP. The collected data were used to support the determination of the nature and extent of contamination associated with the Operable Unit 1 study area.

Methodology

Radon measurements were collected at 49 locations both on and off FEMP property. Figure 2-13 shows the on-site radon sampling locations. Measurements were taken using laboratory-supplied track etch radon cups. Four sampling points were located at monitoring sites representing background locations unaffected by FEMP operations. Typically two types of cups, type "F" and "M", were placed at each measurement location. Type "F" cups employed a filter that was permeable to radon gas but not to radium progeny or particulates. Type "M" cups employed filters that were permeable to radon and thoron gas but not to their progeny or particulates. Radon cups were changed quarterly and returned to the manufacturer's laboratory for analysis. Field blank radon cups were used to establish radon measurements incidental to the cup collection process.

2.8.3.2 Waste Pit Radon Flux Survey

The Federal Facility Agreement (FFA) for the control and abatement of Radon-222 emissions required the FEMP to measure radon flux from all waste pits known to contain radium. These measurements were taken for Waste Pits 1, 2, and 3 in November 1991. Subsequently, DOE petitioned EPA to exempt Waste Pit 4 from the FFA requirement because it was covered with a clay cap and liner which inhibited emissions. EPA agreed, provided DOE could verify that the radon emissions were below the standard of 20 pCi/m^2s. DOE verified this in January 1993. It was also agreed that because of the water level in Waste Pit 5, 6, and the Clearwell, radon flux measurements were not required if the

exposed material above the water line were submerged. After completion of Removal Action No. 18, Control Exposed Material in Waste Pit 5, and Removal Action No. 6, Control Exposed Material in Waste Pit 6, exposed material was submerged and radon flux measurements for these pits were not required.

Objective

Radon flux measurements were taken on Waste Pits 1, 2, and 3 during November 1991 and on Waste Pit 4 during November 1992 by Chem-Nuclear Geotech, Inc. These measurements were taken to (1) provide an estimate of the long-term average radon emissions from these waste pits, (2) to verify that the average radon emission was below the National Emission Standards for Hazardous Air Pollutants (NESHAP) limit of 20 pCi/m^{2}s, and (3) to correlate to surface concentrations of Ra-226. This information is discussed in Section 4 to support the description of radon emissions from the waste pits.

Methodology

The sampling and analysis methodology of Standard Method 115 (40 CFR 261, Appendix B) was adopted for the collection of radon flux data from the waste pits. This methodology uses Large Area Activated Charcoal Collectors (LAACCs) to absorb radon emissions from the surface of the waste pit. Following exposure, the charcoal is analyzed using gamma spectroscopy to determine the amount of radon absorbed; from this measurement, the radon flux density is calculated.

The QAPP for this study was prepared based on the requirements set forth in EPA Interim Guidelines and Specifications for Preparing QAPPs, QAMS/005/80 dated December 29, 1980. This plan was specific to the radon flux monitoring being performed by Chem-Nuclear Geotech at the FEMP. Its purpose was to promote the detailed and specific procedures and practices that delineated how data of known and acceptable quality was to be produced for the tasks specified in Geotech's Sample and Analysis Plan For The Fernald Radon Flux Measurement Survey, Phase I.

It had been anticipated that elevated atmospheric radon levels, because of the presence of the K-65 Silos (located adjacent to the waste pits), would adversely affect the measurement results obtained from the LAACCs. The waste residue in the storage silos located in Operable Unit 4, not yet covered with a bentonite sealant layer, possibly added radon emissions to the atmosphere. To address this possibility during the sampling of Waste Pits 1, 2, and 3, an attempt was made to determine an empirical correction factor that could be applied to the results from the LAACCs in the event that measurements would be conducted in high atmospheric radon concentration conditions. However, because of the resulting high spatial radon flux variability observed in the waste pits, the comparison between standard and control LAACC measurements did not yield a meaningful correction factor. Since normal outdoor ambient radon concentrations were observed during the sampling event, a correction factor was not needed, nor was it recommended during future sampling events under similar condition. The results from the LAACC measurements were reported as determined, with no

correction applied. Two real-time monitors measuring the ambient atmospheric radon concentration verified that a correction factor was not needed for Waste Pit 4 LAACC results.

Radon emissions from the vent pipe located in Waste Pit 4 were monitored as well. The monitoring methodology employed was comparable to that contained in Method 115. Monitoring the radon concentration inside the vent pipe and air flow permitted calculation of the radon flux emitted. The combined results from the vent pipe and from the LAACC measurements were used to calculate the total average radon emission from Waste Pit 4.

Using 40 CFR, Part 61, Appendix B, Method 115 as guidance, sampling locations were determined by developing a uniform rectangular grid of 100 sampling locations for Waste Pits 2 and 3 and a grid of 102 locations for Waste Pit 1. Sample spacing for Pit 1 equaled 28 feet (8.5 m); Pit 2, 21 feet (6.4 m); and Pit 3, 49 feet (14.9 m). For Waste Pit 4 a uniform rectangular grid of 119 possible sampling points was used. Of these 119 locations, 25 were randomly selected as sample points.

The actual number of samples used to measure radon flux in the waste pit area:

- Pit 1 -- 99 LAACC samples
- Pit 2 -- 98 LAACC samples
- Pit 3 -- 100 LAACC samples
- Pit 4 -- 25 LAACC samples, combined with 160 hours of continuous vent pipe monitoring.

2.9 GROUNDWATER

Several groundwater monitoring programs have evolved throughout the history of the FEMP. The three production wells that supplied drinking water to the plant were among the first drilled during the construction of the site in 1951. From 1959 to 1965, approximately 11 monitoring wells were installed in the waste pit area to see if pit operations were affecting the groundwater. Three of these monitoring wells were deepened and three others were capped as more waste pits were built. All wells, including the three production wells, were a focal point for the FEMP Environmental Monitoring Program through 1989.

In 1984, the FEMP performed the first comprehensive groundwater study to determine the sources of off-site groundwater contamination. Since the RI/FS program was begun in 1987, the groundwater monitoring program has rapidly expanded. By 1990, more than 200 on-site monitoring and production wells, off-site monitoring wells, and privately-owned wells were tested as part of a comprehensive sampling program.

Groundwater as defined in Section 2.9 includes perched water in the 1000-series wells outside of the waste pits and 2000-, 3000-, and 4000-series wells that monitor various depths of the Great Miami

Aquifer. Locations of 1000-, 2000-, 3000-, and 4000-series wells are shown in Figures 2-14, 2-15, 2-16, and 2-17, respectively. From these wells, approximately 650 samples were evaluated in the determination of nature and extent of contamination. Information describing wells within Operable Unit 1 is listed in Table 2-18. Table 2-19 summarizes sampling dates for wells within Operable Unit 1.

Wells outside of Operable Unit 1 were selected to help define the nature and extent of contaminants originating from the waste pit area (Table 2-20). These wells were selected based on (1) proximity to Operable Unit 1 (both upgradient and downgradient wells were selected), (2) proximity to other probable contamination sources, and (3) availability of sufficient data from wells chosen. Table 2-21 summarizes sampling dates for wells chosen outside of Operable Unit 1. The selection of sampling locations, frequency of sampling, and parameters to be tested in each monitoring well are determined by RCRA and CERCLA regulations and DOE guidelines.

An illustration of monitoring well depth with respect to groundwater is provided in Figure 2-15. Groundwater hydrology for both the regional environment and the Operable Unit study area is discussed in Section 3.4.2. Table 2-22 summarizes groundwater analytical completeness.

2.9.1 1984 Groundwater Study

Objectives

The first task of a comprehensive groundwater study at the FEMP was completed on June 15, 1984 by Dames & Moore with the submission of the Task A Draft Report (Dames and Moore 1985a). The objective of the study was to identify the source of above-background uranium concentrations in three off-site wells.

Methodology

Monitoring wells were installed within the waste storage area in order to confirm the suspected potential sources. Following the installation of the monitoring wells, groundwater samples were taken from the new and existing wells. Samples were collected according to the methods outlined by EPA at that time.

In order to minimize the possibility of cross contamination, groundwater samples were collected beginning at the well least likely to contain above background concentrations of uranium (upgradient well) and ending at the well most likely to contain the highest level of above background concentrations of uranium. Sampling order was chosen based on the analytical results available from past sampling by NLO, the proximity of the cluster to the nearest suspected uranium source, and the geologic conditions present at the site.

After purging the wells, field measurements of pH, conductivity, and temperature were taken. Samples were then collected and proper chain of custody forms completed for each sample. Samples were placed in coolers and shipped to the laboratory for analysis. Field blanks consisting of distilled, deionized water were collected between selected wells to assure the effectiveness of the cleaning and sample handling procedures. In addition, trip blanks from the lab accompanied the samples to ensure proper sample bottle preparation and handling techniques were employed and to evaluate the potential for atmospheric contamination of sampling equipment.

Analyses

Collected samples were analyzed for isotopic uranium and total uranium. The isotopic results in pCi/L were used to calculate total uranium on a weight basis. This was accomplished by calculating the mass of each isotope from alpha spectrometric data (pCi/L) and then summing the mass of U-238, U-234, and U-235 per liter. Analytical data are presented in Appendix B.2.2 and B.2.3.

2.9.2 RCRA Groundwater Monitoring

A RCRA detection monitoring program was initiated in August 1985 due to the designation of Pit No. 4 as a hazardous waste management unit (HWMU) as defined under RCRA. This designation was due to the report of barium salts having been disposed in Pit 4 from 1980 to 1983. The RCRA detection monitoring system triggered an assessment monitoring program in December 1987, due to changes in water quality in downgradient wells. The RCRA assessment monitoring program continued through December 1991, when a new groundwater monitoring plan (GMP) was developed to provide monitoring for eight additional regulated HWMUs identified in the June 1991 RCRA Part A Permit Application.

The RCRA GMP includes monitoring for site specific parameters at the boundary of defined Waste Management Areas (WMAs) and at the facility boundary. The objectives of an Assessment Monitoring Program (OAC 3745-65-93[D][7][a]/40 CFR 265.93[d][7][i]) are addressed through implementation of the RCRA GMP. The RCRA GMP provides: 1) monitoring on a quarterly basis for a list of site specific constituents; 2) data evaluation, including trend analysis to evaluate changes in water quality over time; 3) comparison of data to RCRA GMP action levels, developed from CERCLA Preliminary Remediation Goals (PRGs), applicable Maximum Contaminant Levels (MCLs) and background Upper Tolerance Limits (UTLs); and 4) the determination as to rate and extent of contaminant migration for the facility for contaminants that pose a health risk, if the concentrations are above the RCRA GMP action levels, consistent with OAC 3745-65-93(A) and 40 CFR 2654.93(a).

The RCRA Part A Permit Application identified nine RCRA regulated HWMUs, three of which are located within the boundaries of Operable Unit 1; these being Pit 4, Pit 5, and the Clearwell. As previously noted, Pit 4 contains approximately 23,500 pounds of low level radioactive waste containing barium chloride salt (RCRA Listed Hazardous Waste D005), designating it as a HWMU.

From 1983 to 1987, wastewater from the production area potentially containing spent 111-TCA (RCRA Listed Hazardous Waste F001/F002) flowed across Pit 5 to the Clearwell to discharge to the Great Miami River, thus designating each of these pits as HWMUs.

Because of the volume of data available through the ongoing RCRA compliance program, only data collected after January 1, 1990 will be presented and assessed.

Methodology

The current program, the RCRA Groundwater Assessment Program, quarterly monitored water quality in 43 wells located within the FEMP boundaries. Standard Operating Procedures (SOP) guided sampling activities, including field methods, documentation, labeling, packaging, chain of custody, and decontamination.

Analyses

Under the RCRA Groundwater Assessment Program, analytical parameters included drinking water standards as well as additional RCRA parameters. Testing was conducted for 24 metals, 36 volatile organic compounds, and 14 water quality parameters. In-depth information on sampling methods and analytical procedures can be found in the RCRA annual reports. Analytical data collected after January 1, 1990 is presented in Appendix B.2.2 and B.2.3.

2.9.3 RI/FS Groundwater Study

The RI/FS Groundwater Study is defined here as the installation and sampling of groundwater and perched water monitoring wells outside the waste pits. The study included sampling wells which were not originally installed under the RI/FS program.

Objectives

The objectives in conducting RI/FS groundwater investigations relevant to the Operable Unit 1 RI included:

- Determining whether groundwater in the Great Miami Aquifer beneath the Operable Unit 1 study area contained above background concentrations of CPCs
- Determining the concentrations of CPC in the groundwater beneath the waste pits and supporting the modeling of the potential migration of these constituents
- Determining the rate and direction of groundwater flow within the Great Miami Aquifer sufficient to support the baseline risk assessment and FS evaluation of alternatives.

Methodology

Monitoring wells installed in the Operable Unit 1 study area allowed the sampling of four successively deeper water-bearing zones. Well numbering was determined by the aquifer zone monitored, as

depicted in Figure 2-18. The 1000-series wells monitor perched water zones in the glacial overburden. Note that the 1700-series wells were located within the pits and were not screened in the perched zone; thus, they were not considered in this section. The 2000-series wells monitored the upper portion of the Great Miami Aquifer. The 3000-series wells monitored the lower portions of the Great Miami Aquifer, and the 4000-series wells monitored the lower portions of the Great Miami Aquifer near bedrock.

In total, 50 groundwater monitoring wells within the Operable Unit 1 study area were sampled during the RI/FS program excluding the 1700-series wells which were located inside the waste pits. Of the 50 wells sampled, 27 were 1000-series wells, 13 were 2000-series wells, 8 were 3000-series wells, and 2 were 4000-series wells.

Thirty-nine of the 50 groundwater monitoring wells were installed under the RI/FS program. Using cable tool and hollow-stem auger drilling methods, cuttings were removed from the borehole and stored on-site in 55-gallon drums. The cuttings were stored until RCRA determinations were completed, at which time drum cuttings could be managed. Well casings were 316 stainless steel with flush-thread joints. Inside diameter was 4 inches. Screen slot opening sizes of 0.01 and 0.02 inches were used in lengths of 5, 10, or 15 feet. Figures 2-18 and 2-19 show generalized well construction diagrams for 1000/2000 and 3000/4000-series wells, respectively. Specific construction details for each well are contained in Appendix B.2.1.

Upon completion, monitoring wells were developed by purging and allowed to recover. Static water levels were measured monthly beginning in January 1988 and ending September 1991, for those wells installed as of that date.

Prior to withdrawing groundwater samples, at least three well volumes of water were purged from the well using a stainless steal submersible pump or a teflon bailer. Samples were obtained after well recovery, again using a submersible pump or teflon bailer. Wells and bailers were decontaminated prior to reuse.

Analyses

Groundwater samples were analyzed for radiological and drinking water quality parameters. Extended HSL parameter testing was conducted once to augment and confirm the findings of the ongoing RCRA monitoring program. In doing so, selected wells were sampled for HSL volatile and semivolatile organics, HSL inorganics (including cyanide), HSL pesticides/PCBs, primary drinking water standards, and organophosphorus pesticides. Wells 1072 and 1077 were dry during sampling events; thus no samples were retrieved. Samples tested for volatile organic compounds, pH, specific conductance, and temperature were collected first. Parameters not affected by volatilization or pH variation were

sampled last. Samples for both dissolved metals and radionuclides were filtered in the field through 0.45-micron filtering apparatus.

Analytical data is presented in Appendix B.2.2 and B.2.3. Data completeness in presented in Table 2-22.

2.10 ECOLOGICAL SAMPLING

This section presents the ecological investigations performed at the FEMP and included in the Operable Unit 1 RI. It identifies the objectives, methodologies, and analyses used during the ecological studies. Two studies are cited in this section: the ecological characterization study conducted by researchers from Miami University in Oxford, Ohio, and the ecological study performed as a component of RI/FS sampling efforts. Each study examined potential ecological contaminant receptors in the FEMP environment. Additional ecological assessment data, including a thorough ecological characterization of the FEMP and vicinity, were presented in the Site-Wide Characterization Report (DOE 1992) and the FEMP annual site environmental reports. As discussed in Section 1, the ecological risk assessment in the SWCR sufficiently addresses Operable Unit 1 ecological conditions and impacts. A "second iteration" of the comprehensive sitewide ecological risk assessment contained in the SWCR will be performed under the Operable Unit 5 RI and will focus on environmental media outside Operable Units 1, 2, 3, and 4.

2.10.1 Miami University Ecological Study

In 1986-1987, researchers at Miami University in Oxford, Ohio, performed an ecological characterization study of the FEMP site. The results of this study, as documented in the report Ecological and Biological Characterization of the FMPC (Facemire, et al. 1990), were used to support a description of the site ecology presented in Section 3.6. This study was the primary source of habitat descriptions and data on potential ecological receptors at the FEMP and is referenced extensively in the ecological risk assessment being conducted under Operable Unit 5.

Objectives

The objectives of the study were as follows:

- Plan and lay out transects to be used in gathering biological and ecological data
- Identify aquatic and terrestrial life forms within the environs of the FEMP
- Prepare a catalog documenting the location and associated habitat of all species found
- Determine species' distributions and abundance

- Determine the possibility of stress-induced differences between on-property and off-property plant and animal populations using electrophoretic techniques

- Interpret the results of the study.

Methodology

Permanent transects were established in six major terrestrial habitats within FEMP boundaries, excluding the former production area: riparian; deciduous woodlots; pine plantations; the "reclaimed flyash pile" which overlapped the South Field and part of the inactive flyash pile; and grazed and ungrazed pastures. The researchers also established eight on-property sampling stations along Paddy's Run for examination of fish and benthic communities. These transects and stations were sampled in 1986 and 1987 to provide species lists and estimates of species' abundances and diversity. Details of sampling techniques were provided in the report (Facemire, et al. 1990).

In addition, the researchers sampled a number of flora and fauna species for genetic analysis using starch gel electrophoresis of protein extracts. They also examined reproductive success in American robins (*Turdus migratorious*) and mourning doves (*Zenaida macroura*) by examining clutch size, morphological measurements of fledglings, and fledgling survival. Details of methods and loci examined in genetic studies were provided in the report.

Analyses

Analyses included identifying collected and encountered species as well as providing estimates of species abundances and diversities.

2.10.2 RI/FS Ecological Sampling

The RI/FS inquiry into ecological resources at the FEMP included a study of radionuclide uptake by plants and animals on site, surveys for threatened or endangered species, toxicity testing of FEMP effluent and soils, macroinvertebrate surveys of Paddy's Run and the Great Miami River, and wetlands delineation. Because contaminant uptake by benthic macroinvertebrates, plants (flora), and animals (fauna) specifically pertained to the Operable Unit 1 study area, the methodologies associated with these efforts are discussed below; however, not all of the ecological sampling points were located in the Operable Unit 1 study area. Results of this study are described and analyzed in Section 4 and used to assess contaminant migration pathways in Section 6.

Objectives

The objectives of RI/FS ecological sampling included the following:

- Determine if any radiological or hazardous substance releases to the FEMP environs resulted in significant uptake, assimilation, and transfer to ecological habitat receptors including surface water, sediments, and adjacent wetlands

- Determine if any radiological or hazardous substance releases to FEMP environs resulted in significant uptake and assimilation in agricultural products and crops
- Determine if the above factors represented significant pathways to human receptors
- Determine if federal and state threatened or endangered species existed within the FEMP environs and the potential risk which was posed to their existence or welfare through CPC release from the FEMP

In addition, benthic macroinvertebrate populations in Paddy's Run and the Great Miami River were surveyed to analyze the composition of the communities present.

Methodology - Benthic Macroinvertebrates

Macroinvertebrates were relatively short-lived and their abundance reflected the relatively recent status of the water body. They were less transient than fish, forming permanent communities, such that variation in the community could indicate water quality variations over short distances. In addition, they were easier to quantify than microorganisms and frequently occurred in numbers sufficient to calculate a statistical comparison of closely spaced sampling locations. Samples were collected over a two-year period from October 1988 to August 1990. Sampling locations are shown in Figure 2-21. A variety of methods were used in data analysis and evaluation.

Water quality was concurrently monitored with macroinvertebrate sample collection during each sampling period. In situ water quality variables and current velocities were measured at midstream Paddy's Run locations adjacent to Hester-Dendy artificial substrate samples at the time of sampler deployment and retrieval.

Hester-Dendy artificial substrate samplers and Surber stream bottom samplers were employed in the study to sample the macroinvertebrate communities. Samples were removed from the samplers and properly handled for shipment to a laboratory for preservation and analysis. In the case of the Hester-Dendy sampler, the samplers were separated and placed in individual heavy-gauge plastic bags. The bags were sealed and placed in coolers with ice and shipped to the laboratory where the samplers were disassembled for preservation and analysis.

Methodology - Flora Sampling

On- and off-site plant samples included garden produce, agricultural crops, grasses, shrubs, pine needles, mosses, and algae along with representative soil samples. Produce and crops were collected from various sites, including reference sites located upwind from the FEMP in Brookville, Indiana, and in the FEMP vicinity. Sample locations for random sampling of general flora were selected using the OSP coordinate system. Sampling was also conducted in habitats such as wetlands, which may have served as a receptor for CPC. Other sites were chosen because of their locations relative to anticipated

depositional patterns from FEMP stack emissions; areas north and east of the FEMP were anticipated to be downwind while areas south and west were anticipated to be upwind.

Shears, shovels, and trowels were used to collect the samples. Flora samples were collected by cutting shoots at the ground level with shears and placing the material on aluminum foil, and wrapping and placing the sample in a zipper-seal bag. Garden produce samples were collected under the grower's supervision; samples included fruits, leafy vegetables, grains, root crops, and a representative soil sample. Samples were wrapped in aluminum foil and placed in zipper-seal bags. Chain of custody forms were completed and samples were stored in ice coolers and shipped to the laboratory for analysis. More specific procedures for selecting sample locations and collecting samples were discussed in the Biological Sampling and Analysis Report (ASI/IT 1990).

Methodology - Fauna Sampling

Samples of mammals and fish were collected both on and off site. Small mammal samples included deer mice, shrews, and cotton tail rabbits. Muscle tissue from two opossum was also analyzed as well as the kidney and liver of a white tail deer that was killed by a vehicle. Fish samples were collected along Paddy's Run and the Great Miami River and from a small drainage pond north of the former production area. A combination of techniques was used to capture fish for laboratory analyses. The small pond was sampled using a hand-held seine. Fauna samples were placed in coolers and chain of custody forms were completed for shipment to the laboratory.

2.11 QUALITY ASSURANCE PROGRAM ELEMENTS USED FOR CONTROL AND VERIFICATION OF RI/FS SITE INVESTIGATIONS

The project needs for QA programs and QAPPs were identified in the EPA's quality program guidance document QA Management Staff (QAMS) 005/80 and DOE Orders 5400.1 and 5700.6c for Project Management. QAPP requirements were developed to provide for the internal control and independent review by management to assess the extent of implementation and effectiveness of project work plans. These guidance documents were used to identify quality work elements for incorporation into the RI/FS Work Plan. Quality program elements were specifically identified in Volume V (QAPP) of the RI/FS Work Plan. The quality elements provided the requirements for field and sampling activities and laboratory analysis for the RI/FS programs.

The quality program elements identified in the RI/FS QAPP included:

- Quality Program Description
- Field Procedures
- Sample Collection Procedures
- Laboratory Analytical Procedures
- Data Reduction/Data Validation/Data Reporting
- QA Audits
- Nonconformance/Corrective Action Reporting.

783

These quality program elements established working procedures for performing, documenting, and determining the quality of work on the site investigations. Additional program quality or task-specific quality requirements were identified in Document Change Requests (DCRs) as necessary to ensure quality objectives were attained. Contractor quality programs were specified in the QAPP and DCRs, as appropriate, to cover field, laboratory, management, and operation activities. Additional independent quality oversight of these programs was provided by DOE. The verification and assessment of the effectiveness of programs and procedures required by the RI/FS Work Plan included the quality surveillance and quality audits. The quality surveillance was defined as spot checks of program implementation to determine conformance to specified requirements. These checks were comparable to EPA performance audits. The quality audit was defined as an in-depth review of an entire program including an evaluation of the associated quality program and procedures, effectiveness of their implementation, and review of associated documentation. These evaluations were comparable to EPA system audits.

Nonconformance and corrective action reporting programs and procedures were included in the RI/FS QAPP to format the document and report identified deviations. Nonconformance reports were used by management to review the nonconforming activities in order to determine technical program impacts to samples and laboratory analyses. The reports also allowed senior staff and QA personnel to independently review the response. Corrective Action Reports required an investigation of the root cause for significant and/or reoccurring nonconformances. The Corrective Action Report identified the steps taken to (1) identify the nonconformance and root cause, (2) prevent reoccurrence, and (3) assign resources to correct the nonconformance and provide for corrective action. These reports were reviewed by project management, and final actions were approved by senior staff and QA personnel.

A field variance program was also part of the RI/FS in recognition of the fact that field programs could not always perform the required work as specified because of obstacles or other changed site conditions. This program provided for a one-time change to field task or program management requirements with management approval. The approval by management was provided after technical impacts and justifications were reviewed by senior staff and QA personnel, and it had been determined that no significant impacts were identified.

Over 350 project surveillances were performed on the FEMP RI/FS and CIS. The surveillances covered field and sampling phases of work performed. The surveillance program required that a checklist be developed using task or project criteria. QA personnel reviewed the in-progress work during the surveillance against the respective checklist. Identified program or procedural deficiencies were reported through nonconformance reports. Differences with the work requirements were identified and reported to project management for review and assessment. A review of all RI/FS QA surveillance reports written between 1986 and 1992 was performed to categorize observations and nonconformances against applicable quality program elements. There were two nonconformance

163

reports issued specifically for Operable Unit 1. One was for duplicate sample numbers for which new sample numbers were assigned. The other nonconformance report was for not filtering radionuclide groundwater samples. The monitoring wells were subsequently resampled and tested for radionuclides. No quality surveillance or nonconformance reports were issued for Operable Unit 1 tasks that have not been addressed.

There were 11 program audits performed from 1985 through 1992 for the CIS and RI/FS programs. Audits were performed annually for the RI/FS by independent organizations (DOE, WEMCO, ASI Corporate). The audits were performed against the 18 quality program elements identified in the work plans for all FEMP program management, field, and laboratory activities. The audits identified program strengths, deficiencies, activities which were impacted by the quality program element deficiencies, and the effects of the impacts on the operable units. There were no Operable Unit 1 program-specific audit findings or nonconformances for the RI/FS. A review of FEMP audit impacts noted that there were no findings that impacted the samples or data collected for Operable Unit 1.

Project field variances generated during the RI/FS programs were issued for changes requested during the performance of field activities for work that could not be performed as specified. These variances were for one-time occurrences and provided a mechanism for review of field program variance requests.

Ninety-two DCRs had been initiated and approved through August 1992 for a permanent change to controlled distribution of project-specific procedures included in the Work Plan (SAP and QAPP). The changes involved such actions as analysis of geotechnical, chemical, and radiological parameters, modifying sampling strategy and analytical parameters, addition of treatability studies, and modifying DQO levels on specified analyses.

A review of all the FEMP quality reports including surveillance reports, audits and audit findings, field variance reports, and nonconformances was performed by QA personnel. This review was performed to determine the total number of reports and quality impacts of nonconformances and findings reported on the field-related sampling and analysis performed for the FEMP operable units. This review also assessed quality trends and quality performance. The primary deviations reported in the quality program (i.e., nonconformance reports and audit findings) were for RI/FS programmatic issues that did not impact specific samples collected for the Operable Unit 1 program.

2.12 DATA VALIDATION

The data validation process is an after-the-fact, systematic evaluation of the quality of a data set. The validation process evaluates the usability of data by assessing the manner in which it was collected, the QA/QC processes in use in the analytical laboratory, and how these QC parameters fall within established criteria. Validation reviews specific parameters associated with the data to determine

whether it meets the principal RAG of precision, accuracy, completeness, comparability, and representativeness. To verify that these objectives were met, a data validation program was established in accordance with Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (EPA 1988) and National Functional Guidelines for Data Review (EPA 1985, 1988, and 1990). All laboratory data used in the development of source term estimates for the Operable Unit 1 Baseline Risk Assessment were subject to data validation including: CIS data, RI/FS pit material data, RI/FS pit leachate data, and soil samples collected under the Waste Pit Area Storm Water Runoff Control Removal Action. Additionally, validation results from data used in the RI to describe the nature and extent of contamination are reported where available. The data sets employed in the determination of risk and therefore subject to data validation are identified in Table 2-2.

Each Operable Unit 1 validated data set was subjected to a consistently applied validation procedure. Although the CIS data was subjected to a slightly different set of validation criteria due to slightly differing analytical protocols and analytical requirements consistent with that time period, all other validated data sets were subjected to the same validation criteria. The criteria used to validate Operable Unit 1 data was established in the FEMP SCQ, approved by EPA on May 19, 1993. Through negotiations with EPA, it was decided that DOE would be proactive in implementing the SCQ prior to formal EPA approval. Thus, all validated Operable Unit 1 data sets were reassessed for consistency with SCQ procedures between April and June 1993. No other previously applied validation qualifiers were used in the Operable Unit 1 RI or the baseline risk assessment. However, a discussion of previously applied validation procedures is included in this section to document these changes.

Appendices A and B present the data collected in the CIS, RI site characterization program for Operable Unit 1, and the Waste Pit Area Storm Water Runoff Control Removal Action as well as the laboratory and data validation qualifiers assigned to the analytical results. Appendix G provides field quality assurance samples used in the data validation process for all validated data sets.

The validation program is divided into two phases and has been completed for all data collected under the RI/FS, which was used in the quantitative evaluation of risk in this RI Report.

Phase I: Field Validation

This evaluation includes a review of the documentation associated with the sampling event. Information reviewed includes the personnel training records, sample collection logs, boring logs, chain-of-custody, request-for-analysis, and field activity daily logs. This information is reviewed to determine if the requirements of the FEMP RI/FS were implemented and documented. The data associated with Operable Unit 1 was found to be in compliance with the EPA National Functional Guidelines for Data Review, and the RI/FS QAPP.

Phase II: Analytical Validation

The second phase is a review of the analytical data. The validation of these data is correlated to the Analytical Support Level (ASL) required for intended use of the data. The data used to support nature and extent fall into ASL's A through E; data used to support risk assessment are required to meet the requirements for ASL's C through E.

ASL's A and B are assigned to screening and field analyses. The level of QC is less stringent for these ASLs than for others. These ASLs were used to focus RI sampling efforts for higher ASL analyses, and to support evaluation of the nature and extent of contaminants present in Operable Unit 1.

ASL C includes all analyses performed in a laboratory, which may or may not participate in the EPA Contract Laboratory Program (CLP) Statement of Work (SOW). The analyses are reported under a Certificate of Analysis (COA) from the laboratory, including QC summaries, but associated QC raw data are not included in the data package. These data are evaluated based on the QC summary information presented with the COA.

ASL D includes all data analyzed and reported according to the EPA CLP SOW analytical services. All ASL D chemical analyses for Operable Unit 1 were performed at off-site laboratories using the analytical protocols established by the EPA CLP SOW, or in the case of the RI/FS 92 data, analytical protocols established by EPA SW846 methodologies but reported in a "CLP-like" format. This level (as in ASL C) is characterized by rigorous QA/QC procedures. ASL D requires full documentation consisting of QC information with raw analytical data to allow the data validator to recreate the analytical process. ASL D radiological analyses were conducted at off-site laboratories in accordance with methodologies as defined in the RI/FS QAPP. Specific EPA-approved methods for radiochemical analyses do not currently exist, however, all radiological analyses were performed according to the laboratory's SOW, SOP, and QA plan. These data are validated by an extensive evaluation of the raw data and the QC information in the data package for completeness, precision, and accuracy. The review criteria are based on EPA's National Functional Guidelines for Data Review and the sitewide CERCLA Quality Assurance Project Plan (SCQ).

ASL E includes analyses by nonstandard methods. Nonstandard methods are those that have not been evaluated for suitability and published by the EPA as acceptable. Dioxin/furan analyses and radiological analyses fall into this category, however, reference methods are published for these analyses. These analyses are subject to rigorous QA/QC requirements as and require additional internal verification of the method established by the laboratory to ensure suitability, accuracy, and precision of the method.

Data validation has evolved from a tool primarily for monitoring EPA CLP laboratory performance to a requirement for all data being used in decision making processes such as risk assessment. Improvement in the analytical capability of laboratories as well as increased scrutiny of data has induced more rigorous QA/QC requirements from EPA to be implemented in the laboratory. The guidance for data validation have changed in tandem with these changes in the laboratory requirements. Since 1985, there have been several revisions of the EPA National Functional Guidelines for Data Review; the most recent being June 1991. Data validation at the FEMP must take into account the timeframe in which the samples were collected and analyzed, as well as the data requirements in place at that time. A summary of data validation activities is provided in Table 2-23.

The Fernald SCQ details DQOs required for sample data collected on site, the ASL level data must meet for each intended use, and established site specific data validation criteria used in evaluating sample data as detailed in Table 2-24. Samples collected in support of the Operable Unit 1 RI were in accordance with the RI/FS QAPP. Validation of the data was completed within the provisions of the SCQ.

The data were evaluated for compliance with the following criteria:

- Sample Holding Times
- Initial Instrument Calibration
- Surrogate Recoveries
- Blank Contamination
- Linearity
- Detection Limits
- Initial calibration standards
- Continuing calibration standards
- Serial dilutions
- Instrument Tuning
- Continuing Instrument Calibrations
- Matrix Spike Recoveries
- Internal Standard Response
- Retention Time Shift
- Accuracy of Calculations
- Method of standard addition
- Laboratory control sample

Figure 2-22 describes the rationale for qualifying results. As in all data validation activities, the validator's professional judgment utilized in conjunction with established validation guidelines was applied in the assignment of qualifiers.

From April through June 1993, a comprehensive assessment of the Operable Unit 1 data set was conducted. Minor changes in holding time criteria for semivolatiles, pesticides, and PCBs were implemented for the CIS, RI/FS 91, and RI/FS 92 data (Table 2-25).

40 CFR 136 and EPA National Functional Guidelines for Organic Data Review delineate technical holding times for volatiles, semivolatiles, pesticides, PCBs, and inorganics. These criteria were developed in large part to ensure reasonable turnaround in analytical data moving through a laboratory. Studies investigating effects of extended holding times on high molecular weight polyaromatic

hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs) have determined the following:

- These compounds exhibit a low degree of solubility in aqueous solutions
- Chemical structure and bonding characteristics of these compounds favor adsorption to solid particulate matter
- Photochemical, microbial, and thermochemical degradation of these compounds is minimal when stored at 4°C in tightly closed glass vessels with teflon lids in absence of light
- When stored as described above, these compounds exhibit very low partition coefficients, therefore very little volatilization occurs
- After extraction, stability of high molecular weight PAHs, pesticides, and PCBs has been established (EPA requires the analytical laboratory to maintain sample extracts for semivolatiles, pesticides, and PCBs for 6 months after initial analysis.)

Based on these studies, guidance developed by EPA Region III and by Hanford in "Data Validation Procedure for Chemical Analysis", allows semivolatile, pesticide, and PCB compounds to be qualified as estimated "J" for exceeding hold time criteria, or in cases of gross violation of hold times be qualified based on the data validator's professional judgment (FERMCO 1993, ES&T, Carey and Sundberg 1977, Manahan 1989, and EMSL 1987).

The change in hold time criteria for late eluting semivolatiles, pesticides, and PCBs resulted in approximately 10 percent of samples being qualified as estimated "J" rather than rejected "R." These changes would provide additional data for consideration of risk.

Other changes in validation criteria relate to radiological parameters in the RI/FS data. Historically, lack of raw data, QA/QC information, and organized data packages led to a stringent criteria for validation of radiological data (Table 2-24). However, evaluation of these criteria determined basic inconsistencies with the philosophies of EPA National Functional Guidelines for Review of Data. Although precise criteria would be different for organics, inorganics, and radiological parameters, the overall logic for the evaluation of data are very similar. Therefore, criteria changes in radiological data validation criteria were implemented (Table 2-25) in April 1993. The impact of these changes was to requalify radiological results that were considered unreliable and qualified "R" rejected to estimated "J." Approximately 90 percent of the radiological samples collected under the RI/FS were requalified from "R" to "J" for at least one analyte during the comprehensive data review from April to June 1993. This increase in the number of acceptable data points provide added confidence in the comparability and representativeness of radiological data in the baseline risk assessment.

2.12.1 CIS Program Data Validation

The Characterization Investigation Study (CIS) was conducted by Roy F. Weston from 1986-1987. The purpose of the CIS was to conduct a preliminary study to characterize the contaminants in the FEMP waste storage facilities, i.e. waste pits, flyash, and lime sludge ponds, etc. and surrounding environmental media.

Samples collected as part of the CIS were sent to Weston Analytics or TMA NORCAL for chemical analyses, consistent with EPA CLP protocols existant for 1987.

An assessment of the CIS data was conducted in 1990 when it was determined that additional information was needed to validate this data (Table 2-23). In December 1992, the CIS chemical data was validated following the EPA Guidelines for Evaluation of Laboratory Data (EPA 1985). In May 1993, as part of an overall assessment of data relating to Operable Unit 1, the CIS data was again reviewed, missing information retrieved and validated, entered into the site-wide database, and a QC of results entered was conducted.

2.12.1.1 CIS Chemical Data

The CIS chemical data set was evaluated for completeness of the available documentation, adherence to established EPA procedures and compliance with established QC criteria following the Guidelines for Evaluation of Laboratory Data (EPA 1985). Validator professional judgment was applied to evaluate the data in accordance with the state-of the-art laboratory procedures and the documentation requirements at the time of analysis. Requirements for data that differ from the 1990 EPA CLP are as follows:

- Internal standard recoveries were not required to be documented on a QC form for organic parameters. Review of this criteria consisted of checking calculations of raw data.
- Organics gas chromatography/mass spectroscopy (GC/MS) criteria and deliverables were less stringent than current requirements.
- Inorganics parameters did not have contract required detection limits (CRDLs).
- CLP format was not yet a requirement for reporting of data results and QC information.

The CIS data was in general well documented and adequately reflected proper performance of EPA CLP procedures in accordance with contract requirements of the era in which the data were obtained. Therefore, very little data was rejected as result of the validation process.

2.12.1.2 CIS Radiological Data

CIS radiological data was evaluated in 1992 (Table 2-23 summary of Operable Unit 1 activities). At that time it was determined that there was not enough QC information or raw data to validate the CIS samples. An evaluation based on information available was performed and data useability was

determined to be supportive to other data. In 1993, the original analytical laboratories were contacted (Table 2-26), available QC and raw data was retrieved, and validation of these data was performed. These data are considered ASL Level D, suitable for use in risk assessment and in source term determinations.

The CIS radiological data were not supported as well as the RI/FS radiological data in as much documentation was difficult to obtain because of elapsed time since laboratory analysis of samples was performed. Overall, however, certain groups of data were extremely well documented, especially the data that were obtained for Np-237, Sr-90 and Tc-99. This data was validated consistent with current protocols as enough calibration data, raw data, and custody documents were available to ensure that the samples were handled properly and that no significant calculation errors occurred. The data were evaluated for the following compliance with good laboratory practice regarding the following criteria:

- Sample Holding Times
- Initial Instrument Calibration
- Continuing Instrument Calibrations
- Instrument Efficiency
- Matrix Spike Recoveries
- Blank Evaluation
- Duplicate results
- Sample Detection Limits
- Accuracy of Calculations
- Tracer Recoveries
- Chemical Yields

Validation of data was according to criteria as described in Table 2-24.

Data that were not adequately documented so as to provide a complete verification of the entire analytical process were assessed to determine if the available documents supported the results obtained. In most cases, the data set was largely complete, but calibration data for the counting instruments was difficult or impossible to obtain due to age and the fact that it was not routinely offered as part of the standard laboratory deliverable during the era in which the data were analyzed. The difficulty in acquiring complete laboratory documentation was not seen as an indication that good laboratory practices were not obtained. Further, review of audit findings and proficiency test results support the contention that the data were obtained by reputable, competent laboratories and does not support any contention that the data is unreliable.

Each sample was reviewed for compliance with the established criteria and qualifiers assigned as appropriate. Overall assessment of the data packages included verifying the positive sample activities. Positive activities were recalculated on a 10 percent basis. If these results were in agreement with the reported concentration, the data was considered acceptable. If in disagreement, all positive activities were recalculated. The validation process was verified by independent peer review. The validation

4783

findings were summarized in a Data Validation Summary Report, qualified data was sent to database, and a QC of data in database was performed.

2.12.2 RI/FS Program Data Validation

The RI/FS data was collected from 1991 to 1992 in two separate sampling events. These data were validated in 1992 according to EPA National Functional Guidelines for Data Review (Table 2-24). As part of the Operable Unit 1 1993 data, these data were reexamined and revalidated based on changes in hold time criteria as discussed in Section 2.12. For the metals data, the EPA functional guidelines were followed closely, with the exception that all results were qualified as unusable when the ICV or CCV exhibited recoveries that were less than 30 percent.

Samples collected to support the Operable Unit 1 1992 RI/FS treatability study were also used to support the baseline risk assessment. However, the storage of the RI/FS samples for Waste Pits 5, 6 and the Clearwell between the original pit sampling event and the collection of the laboratory samples from the storage drums did not meet accepted preservation and holding time criteria. The original sampling events for these open pits were accomplished by means of a clamshell dredge that placed the contents of the clamshell into drums which were then sealed for storage. It was the intent of the work plan to sample the drums on the succeeding day for submission to the chosen subcontract laboratory. In fact, the unlined drums were held a period of time that was between 2 and 5.5 months before laboratory sampling was accomplished. Because preservation criteria for organic compounds were not met, and probability of microbial action in the warm drum environment was high; all the RI/FS organics data for Waste Pits 5, 6 and the Clearwell were regarded as unusable with respect to the pit contents at the time of the sampling. The metals and general chemistry parameters were also suspect as indicators of the pit contents as a result of the drum storage before sampling for submission to the laboratory for analysis. The inorganic parameters that were of particular concern were mercury, nitrates and ammonia nitrogen. Samples were analyzed for mercury well over the required hold time of 28 days. Furthermore, mercury might have absorbed onto the drum wall or have been chemically reduced over time to form volatile compounds which would have been lost. In the validation team's best judgment, there was not a reason to regard any of the metals data as unusable. However, after the data were reviewed according to EPA National Functional Guidelines, all inorganics and radiological data were qualified as estimated. The general chemistry parameters nitrate, nitrite, and ammonia nitrogen, are easily degraded or generated, and it is not possible to estimate the bias that drum storage may have imposed upon the final results. Results of these parameters (nitrate, nitrite, and ammonia nitrogen) were considered unreliable and were qualified "R." The RI/FS 92 data were validated following EPA CLP 1990 SOW requirements, with the exception of the pesticide/PCB fractions, which were analyzed according to EPA CLP 1988 SOW requirements. Letters of non-conformance regarding the exceeded holding times were written and considered in the evaluation of this data. Evaluation of holding times and preservation of the organics fractions led to qualification of all organics results as unusable. Holding times were grossly exceeded and preservation of samples did not occur as samples

were held at ambient temperature (above required 4°C). Inorganic and radiological data were considered estimated for exceeding preservation and hold time requirements for samples as well.

The evaluation process and findings are summarized in a Data Validation Summary Report. The criteria and validation process was verified by independent peer review.

Radiological Data Validation

Specific EPA-approved methodologies do not presently exist for radiological analyses, nor does EPA have in place guidelines for radiological data validation. The radiological analyses are performed according to the SOPs and QA plan of the laboratory. As a result, an evaluation and verification of the laboratory procedures and QA program by DOE was necessary and was found to be compliant with established protocols and general industry standards. Two audits of the laboratory were also completed by EPA. All samples used to support the RI baseline risk assessment were then validated by criteria as presented in Table 2-24. The criteria reviewed includes:

- Sample Holding Times
- Continuing Instrument Calibration
- Matrix Spike Recoveries
- Duplicate results
- Accuracy of Calculations
- Chemical Yields
- Initial Instrument Calibration
- Instrument Efficiency
- Blank Evaluation
- Sample Detection Limits
- Tracer Recoveries

Holding times were evaluated to determine if the analyses were performed within the specified criteria. Professional judgement was used to determine the usability of the data in the cases where the holding times were exceeded. Initial and Continuing Calibrations were examined to established that the instruments were operating as outlined in the project specific plan (PSP) and were summarized in a Calibration Notebook. Because an initial calibration is required annually, unless adjustments were made to the instrument parameters, this initial calibration information was tabulated and summarized prior to the validation effort. Supplementary continuing calibration notebooks were used to verify that on a daily basis detectors for all radionuclides were operating within pre-established control limits. These notebooks were updated on a monthly basis. If the continuing calibration was not performed on the date of the sample analysis; the detector was out of service, not in use that day, or if the source counts differed by more than 3.000 sigma, the results were qualified unusable, "R." If the alpha/beta cross-talk factor exceeded 2 percent; if there was no instrument background count performed on the sample analysis date, or if background counts differed by more than 3.000 sigma, the results were qualified "J." Matrix spike or LCS recoveries were acceptable between 70 - 130 percent. Results were qualified "J" if recoveries were $\geq$ 40 but < 70 percent or > 130 but $\leq$ 160 percent. If no spike was performed, data were determined to be estimated. Method blanks were evaluated for contamination. Positive sample results that were less than five times the level of radionuclide contamination in an associated blank were considered estimated and qualified "J." Duplicate analyses were performed to determine the precision of the laboratory's operations. Duplicate analyses resulted in relative

percent differences (RPD) of > 20 percent for waters and > 35 percent for soils, where the sample results were greater than five times the CRDL or if one or both of the sample results is < 5x the CRDL the control limit becomes 1x the CRDL for liquids and 2x the CRDL for soils. If there were no duplicate or if the RPDs were outside of the control limits, the results were qualified as estimated. Detection limits were verified to determine that reported results were within contract compliance and reporting criteria. Tracer yields were evaluated for alpha spectrometry analyses. Tracer recoveries between 5 - 25 percent were considered acceptable. Recoveries outside of this range were qualified "J" as estimated. Neptunium-237 does not have a tracer added, therefore a separate spiked sample was analyzed. The acceptable range for this sample yield was 50 - 105 percent, yields > 105 but ≤ 120 percent and ≥ 20 but < 50 percent were qualified "J" as estimated, while yields < 20 percent or > 120 percent were unreliable, "R". Enrichment calculation were performed on the uranium isotopes by alpha spectrometry and tracers were identified as NIST traceable standards.

Overall assessment of the data packages included verifying the positive results. Positive activities were recalculated on a 10 percent basis. If these results were in agreement with the reported concentration, the data was considered acceptable. If in disagreement, all positive activities were recalculated. Data packages were peer reviewed and assigned qualifiers were concurred. The validation findings are summarized in the Data Validation Summary Report.

2.12.3 Validation Qualifiers

All of the laboratory analytical data for use in the Operable Unit 1 baseline risk assessment has been validated and assigned qualifiers where applicable. Upon completion of the validation process much of the data were assigned a validation qualifier providing a confidence level in the data. When positive values are correct and supported by the data package, no qualifier is assigned. Flags are assigned which have no direct bearing on the usability of the data, but provide information to guide the end user in making proper and correct decisions regarding the usability of the data. The following is a brief summary for the validation qualifiers and flags used in the Operable Unit 1 data set and how data so qualified is allowed by EPA guidance to be used in baseline risk assessment:

Validation Qualifiers

J: These data may be biased, and the associated numerical value is considered an estimated quantity. EPA guidance allows J qualified data to be used in both baseline risk assessment and in determination of nature and extent.

R: These data are considered unreliable (analyte may or may not be present) and are not used in baseline risk assessment, however, these data may be used to support nature and extent of contamination determinations.

U: This analyte was analyzed for but not found present at levels greater than the corresponding limit of detection. This qualifier was also used to denote a value that was adjusted by the use of the 5X/10X rule for evaluation of blank data. One-half of the

sample quantitation limit is used as an alternate value in calculating source term concentrations in the risk assessment.

N: This analyte was tentatively identified from interpretation of mass spectral or chromatographic data. Analytes qualified as tentatively identified "N" are not used in baseline risk assessment evaluations, however, these data may be utilized in consideration of nature and extent of contamination.

NV: This data was not validated. Nonvalidated data is not used in determination of risk, however, these data may be utilized in consideration of nature and extent of contamination.

Validation Flags

Validation flags are informational in nature and are not validation qualifiers. These flags provide the user of the data with additional information which may be helpful in the overall evaluation of the data set.

Z: Data qualified with a Z is not to be used. A more technically usable and representative result from either reanalysis or dilution of this sample exists for this analyte.

D: The radionuclide was analyzed for but not detected. The reported Sample Quantitation Limit (SQL) exceeds the Contract Required Quantitation Limit (CRQL) and professional judgment must be exercised in the use of these data, depending on the media that was sampled and the end use of the data (i.e., risk assessment, nature and extent, etc.) The D qualifier was established for evaluation of FEMP data to alert the end user of unavoidable matrix interference in sample analysis. The FEMP RI/FS Work Plan established a single set of required detection limits for all radioisotope analyses be it for environmental media or waste materials.

The D qualifier is most frequently encountered on analytical results of waste materials undergoing gamma spectroscopy. Here Ra-226 is present in relatively high gamma photon source intensity, resulting in a high background (from secondary gamma photons) for lower photon energies. D qualified data are also observed for alpha spectroscopy data when one isotope of an element is so abundant in a sample as to mandate the reduction of the size of the sample aliquot. This reduced sample aliquot results in a lowering of the sample quantitation limit, which is not a problem for the abundant isotope but is sometimes problematic for other less isotopes in the same analysis. An example of this is the high abundance of Th-230 (a member of the U-238 decay chain) in the cold raffinate with little or no Th-232 or Th-228 (members of Th-232 decay chain) present.

Ideally, the sample analysis would be repeated with a different methodology, but no generally accepted method exists for overcoming the matrix interferences noted. No commercial laboratory could be found with validated methods to improve the sensitivity of these analyses.

C: The total uranium analytical result (mass) does not agree within +/- 20 percent of the calculated uranium mass as determined by calculation of uranium mass from isotope specific analyses (U-238 is generally greater than 99 percent of the mass present).

This qualifier is not applied to analytical results, which are less than 10 times the CRQL. The end data user must chose between using the calculated value or the reported total uranium analytical result.

E: The calculated U-235/U-238 mass ratio is outside the range of 0.2 to 1.3 percent enrichment and may indicate man's involvement in isotope depletion or enrichment. Professional judgment should be exercised in evaluating the likelihood of this occurrence at FEMP. The U-235/U-238 ratio for soil in nature is 0.0072. This qualifier is not applied to analytical results, which are less than 10 times the CRQL.

F: The calculated U-234/U-238 activity ratio is less than 0.4 or greater than 1.3 and may indicate man's involvement in isotope separation. Professional judgment should be exercised in evaluating the likelihood of this occurrence at FEMP. The U-234 and U-238 isotopes are generally in equilibrium (or slightly depleted in U-234) in soil matrices. Varying enrichment in the U-234 isotope has been observed in nonimpacted groundwater. This qualifier is not applied to analytical results, which are less than 10 times the CRQL.

M: The matrix spike recovery associated with this sample was outside control limits (70 to 130 percent), which may be an indication of matrix interference problems.

The criteria for "E" and "F" qualifiers are FEMP specific because depleted uranium was handled on the site, and such results are expected for some samples. The criteria used for evaluation were based on the knowledge of the range of isotope ratios in materials processed at the site. These qualifiers are less of an assessment of the data quality but are an alert to the end user in later evaluation of data. It is possible to assign a number of qualifiers to a single analyte.

2.13 DATA QUALITY ASSESSMENT

This section discusses the evaluation process employed to establish the quality and quantity of available data for use in the Operable Unit 1 RI with respect to regulatory guidance and work plan objective. All data sets were evaluated in context with the proposed use of the information in a manner sufficient to (1) determine to what extent, a treat to human health or the environment exists and (2) develop and evaluate remedial alternatives.

Consistent with EPA guidance, a number of factors were examined to assess the quality and quantity of data available for characterizing Operable Unit 1. These factors included the age of the data set, sample collection methods, analytical methods, and available documentation regarding the study work plan and QA/QC procedures (if available). This information, including work plans, standard operating procedures and analytical results, were reviewed to indicate sample integrity and data comparability.

The quality of data received from the laboratory was evaluated by the data validation process as previously described in Section 2.12. However, broader data quality issues were evaluated against

regulatory guidance as will be described below. Data quantity was evaluated by (1) comparing the number of acceptance validated results for a given sampling program against the number planned.

2.13.1 Regulatory Guidance Applicable to Data Quality Assessment

The following section outlines what specific regulatory guidance the Operable Unit 1 data was compared to determine if guidance was satisfied. This section also explains why each of the above was chosen as a comparison benchmark for determining if the objectives of the RI/FS were met with respect to data quality and quantity.

A thorough review of approved and pending regulatory guidance was performed to select those documents which (1) applied to the FEMP RI/FS process, and (2) pertained to the quality and quantity of characterization data needed to fill the objectives of the RI/FS. From this review, four guidance documents were selected to evaluate Operable Unit 1 characterization data against:

- Guidance for conducting remedial investigations and feasibility studies under CERCLA (referred to as RI/FS Guidance)
- Data quality objectives for remedial response activities (referred to as DQO guidance)
- Guidance for data usability in risk assessment (referred to as Data Usability Guidance)
- Risk assessment guidance for Superfund sites (referred to as the RAGS)

Data Quality

As recommended in DQO Guidance, data quality will be assessed in part by evaluating precision, accuracy, representativeness, comparability, and completeness (PARCC), as was introduced and defined in Section 2.1. However, completeness will be assessed in the discussion of data quantity since they are more closely related. These terms are summarized again below:

Precision:	A quantitative measure of the repeatability of a single field or laboratory measurement. Evaluated from results of duplicates and split samples during data validation process. Data usability guidance specifies a confidence level of 80 percent.
Accuracy:	A measurement of the bias in an analytical system. Accuracy is determined by the analysis of laboratory spikes and method blanks. The FEMP QAPP recommends that chemical data meet a +/-20 percent recovery for chemical data, and a +/-30 percent recovery for radiological parameters.
Representiveness:	The degree to which a data set accurately and precisely reflects conditions and concentrations present at a sampling site (i.e., holding time, sample preparation, QA analyses). Is generally a result of field collection methodology, sample handling, and analysis.

Comparability: The confidence with which one data set can be compared with another. A factor of similar sampling techniques, analytical methodologies, and specified detection limits between different data sets.

Completeness: A measure of the amount of usable data resulting from a data collection activity, given the sample design and analysis. Data usability guidance defines completeness and the number of acceptable data points divided by the total number of samples collected. However, for the purpose of this evaluation, completeness is defined as the number of acceptable data points divided by the number of samples specified in the work plan. Data usability guidance also recommends 100 percent completeness for critical samples, which are defined as one sample per medium per exposure pathway. This guidance also states that the nationwide norm for CLP data is 80 percent complete.

Data Quantity

Data quantities needed to satisfy the objectives of the RI/FS were originally determined during the scoping effort of each study which was conducted subsequent to initiation of the RI/FS. Thus, data quantity was assessed by comparing the amount of data specified in each work plan versus the amount of acceptable data obtained. Data acceptability was determined by its originally intended use in this evaluation. Tables 2-27 through 2-30 present this information for each waste pit study.

2.13.2 Data Evaluation

The following section evaluates data quality and quantity for data collected within Operable Unit 1 from a programmatic viewpoint. This viewpoint took into account the intended use of data sets used for both the nature and extent evaluation and the baseline risk assessment. The mitigation of uncertainties which are introduced in this section are discussed in Section 7.6.

Data Quality Evaluation

Precision: Each data set was determined to be within the recommended range of +/-10 to 20 relative percent difference. Approximately 35 percent of these samples had estimated quantitation values due in part to matrix interference associated with the heterogenous nature of the waste.

Accuracy: Data validation qualifiers were assigned in part based on an evaluation of spike recoveries and laboratory blank contamination. Approximately 35 percent of the acceptable data fell outside the range of acceptable limits (exceeded guidance). These estimated results introduced bias to the data, thus increasing uncertainty but did not significantly impact the overall usability of the validated data. Direction of bias was considered in the evaluation of this data in Sections 4, 5, 6, and 7.

Representativeness: In general, the three waste pit sampling programs demonstrated similar analytical trends within a given pit, as evaluated in Section 4. Detection limits varied significantly between both validated data sets and unvalidated data sets. Due to the high percentage of chemical

analytes that were not detected, the actual concentration of these analytes was uncertain. However, this effect was mitigated in the calculation of baseline risks through consideration only of the higher detection limit for nondetected analytes, resulting in a more conservative risk evaluation.

Comparability: The comparability of the waste pit characterization data was limited due to varying sampling and analysis methodologies, differing age of each study, and sampling bias introduced in the 1992 RI/FS sampling event due to differing objectives. Comparability was not a significant inhibitor to evaluating nature and extent of contamination or baseline risks. A number of statistical determinations were made with combined data sets during the risk assessment process.

Completeness: Concurrent with guidance, at least one sample per pit per media per exposure pathway was collected and analyzed for each analytical fraction in Waste Pits 1, 2, 3, 4, and the Burn Pit. However, Waste Pits 5, 6 and the Clearwell were not analyzed for dioxins, organophosphate pesticides, and herbicides. This data limitation is addressed in Section 7.6. Overall completeness of the Operable Unit 1 characterization data, including radiological data was assessed to be approximately 85 percent as calculated based on the number of samples planned. As based on the number of samples collected, as EPA guidance suggests, completeness was assessed to be approximately 90 percent, above the reported national average of 80 percent for CLP generated data. This determination was based on information presented the "Percent Complete" column in Tables 2-13 through 2-16 and in Tables 2-27 through 2-30.

2.13.3 Summary

Section 2 of the Operable Unit 1 Remedial Investigation Report describes the objectives, methodologies, and analyses performed for environmental studies used in support of this report. Because many of these studies were conducted prior to development of requirements for the Operable Unit 1 RI/FS, Section 2 also outlines data requirements for the Operable Unit 1 RI Report and then evaluates pre-RI/FS studies for applicability. From the many available FEMP data sets, only those studies which (1) met the DQO's of the RI/FS and (2) filled a specific data need for the Operable Unit 1 RI Report were evaluated and reported in this document. However, additional studies that were not presented in this report were evaluated during the RI and screened.

TABLE 2-1

SUMMARY OF OPERABLE UNIT 1 ENVIRONMENTAL STUDIES

		Use in RI		
Studies	Years	Nature and Extent	Risk Assessment	Objective
1984 Groundwater Study	1984 to 1985	X		Identify the sources for the above-background concentrations of uranium detected in the off-site wells near the FEMP.
RCRA Groundwater Monitoring Program	1985 to Present	X		Maintain site-wide compliance with RCRA regulations.
1986 Radiological Survey and Analysis of Sediment Samples from Paddys Run	1986	X		Identify elevated concentrations of radiological constituents and identify if sediment could be acting as an intermediate or secondary source of contaminants in support of the FEMP Environmental Monitoring Program.
Characterization Investigation Study (CIS)	1986 to 1988	X	X	Aid in the formation of disposition alternatives for FEMP waste in support of a Remedial Investigation/Feasibility Study.
Best Management Practices Plan	1988	X		Evaluate liquid discharges from a series of drainages located on FEMP property.
Waste Pit Area Storm Water Runoff Control Removal Action	1989 to 1992	X		Characterize the soils in the proposed construction area for transportation and disposal under RCRA regulations.
Remedial Investigation/Feasibility Study Sampling (RI/FS)	1987 to 1992	X	X	Characterize the nature and extent of contamination, determine the associated risk to human health and the environment, and evaluate potential remedial options.
Waste Pit Radon Flux Survey	1991 to 1992	X		Provide estimate of long-term average radon emissions and verify average radon emissions below National Emission Standard for Hazardous Air Pollutants limit.
CERCLA/RCRA Background Soil Study	1992	X	X	Establish nature of variability of background concentrations with respect to depth and soil type. Obtain samples from area with geology representative of the FEMP, and analyze for constituents of potential concern.

4783

TABLE 2-2

OPERABLE UNIT 1 REMEDIAL INVESTIGATION DATA EVALUATION MATRIX

Information Need	Source of Data Used to Support RI	Section Discussed in RI Report	Data use in RI Report: Nature and Extent of Contamination	Data use in RI Report: Fate and Transport Modeling/Risk Assessment
Soil Capped Waste Pits (1-4 and Burn Pit)				
1. Chemical and Radiological Properties of Sludge	Process Knowledge	1.1.3.1	X	X
	Characterization Investigation Study Waste Pit Sampling	2.3.1.2	X	X
	1991 RI/FS Waste Pit Sampling	2.3.2.1	X	X
2. Chemical and Radiological Properties of Leachate	Process Knowledge	1.1.3.1	X	
	1991 RI/FS Waste Pit Sampling	2.3.2.1	X	X
3. Waste Pit Volumes	Construction Drawings	1.2.1		
	Characterization Investigation Study Waste Pit Sampling	2.3.1.2		X
	1991 RI/FS Waste Pit Sampling	2.3.2.1		X
	Photogrammetric Survey	2.2.2		X
	Aerial Photographic Interpretation	2.2.1		
4. Physical Properties of Waste	Process Knowledge	1.1.3.1	X	X
	Characterization Investigation Study Waste Pit Sampling	2.3.1.2	X	X
	Characterization Investigation Study Geophysical Survey	2.3.1.1	X	
	1991 RI/FS Waste Pit Sampling	2.3.2.1	X	X

4783

TABLE 2-2
(Continued)

Information Need	Source of Data Used to Support RI	Section Discussed in RI Report	Data use in RI Report: Nature and Extent of Contamination	Data use in RI Report: Fate and Transport Modeling/Risk Assessment
Water Capped Waste Pits (5, 6, and Clearwell)				
1 Chemical and Radiological Properties of Sludge	Process Knowledge	1.1.3.1	X	X
	Characterization Investigation Study Waste Pit Sampling	2.3.1.2	X	X
	1992 RI/FS Waste Pit Sampling	2.3.2.2	X	X
2. Chemical and Radiological Properties of Leachate/Decant	Process Knowledge	1.1.3.1	X	X
	Characterization Investigation Study Waste Pit Sampling	2.3.1.2	X	X
	1992 RI/FS Waste Pit Sampling	2.3.2.2	X	X
3. Waste Pit Volumes	Construction Drawings	1.2.1		X
	Photogrammetric Survey	2.2.2		X
	Aerial Photographic Interpretation	2.2.1		X
4. Physical Properties of Waste	Process Knowledge	1.1.3.1	X	X
	Characterization Investigation Study Waste Pit Sampling	2.3.1.2	X	X
	Characterization Investigation Study Geophysical Survey	2.3.1.1	X	
Berm Soils				
1. Chemical and Radiological Properties	RI/FS Well Program	2.7.2	X	X
2. Embankment Stability	Geotechnical Evaluation of the Waste Pit Berms	2.2.3	X	

TABLE 2-2
(Continued)

Information Need	Source of Data Used to Support RI	Section Discussed in RI Report	Data use in RI Report: Nature and Extent of Contamination	Data use in RI Report: Fate and Transport Modeling/Risk Assessment
Surface Soils				
1. Chemical and Radiological Properties	Characterization Investigation Study	2.6.1	X	X
	RI/FS Surface Soil Sampling	2.6.2	X	X
	Waste Pit Area Storm Water Surface Soil Sampling Removal Action	2.6.3	X	
	FEMP Environmental Monitoring Program	2.6.4	X	
2. Physical Properties	RI/FS Sampling Program	2.6.2		X
3. Background Concentrations of Naturally Occurring Constituents	CERCLA/RCRA Background Study	2.6.5	X	X
Subsurface Soils				
1. Chemical and Radiological Properties	1984 Groundwater Study	2.7.1	X	
	RI/FS Well Drilling	2.7.2	X	X
2. Leaching Characteristics (Lithology, Grain Size, Tm Exchange Capacity)	RI/FS Well Drilling	2.7.2	X	
3. Background Concentrations of Naturally Occurring Constituents	CERCLA/RCRA Background Study	2.6.5	X	X
Groundwater				
1. Chemical and Radiological Properties	1984 Groundwater Study	2.9.1	X	
	RCRA Groundwater Monitoring Program	2.9.2	X	
	RI/FS Groundwater Study	2.9.3	X	
2. Flow Characteristics	Historical Studies	1.4.4 3.4.2	X X	X X
	RI/FS Well Measurements	2.9.3		

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TABLE 2-2
(Continued)

Information Need	Source of Data Used to Support RI	Section Discussed in RI Report	Data use in RI Report: Nature and Extent of Contamination	Data use in RI Report: Fate and Transport Modeling/Risk Assessment
Sediments				
1. Chemical and Radiological Properties	1986 Paddy's Run Survey	2.5.2.1	X	
	FEMP Environmental Monitoring Program	2.5.2.2	X	
	CIS Sediment Sampling	2.5.2.2'	X	
	RI/FS Paddy's Run Sediment Sampling	2.5.2.4	X	
Surface Water				
1. Chemical and Radiological Properties	FEMP Environmental Monitoring Program	2.5.1.1	X	
	Best Management Practices Surface Water Sampling	2.5.1.2	X	
	RI/FS Surface Water Sampling	2.5.1.3	X	
2. Study Area Topography	Aerial Photographic Interpretation	2.2.1	X	X
	Photogrammetric Surveys	2.2.2	X	X
3. Rainfall Frequency/Intensity	Cincinnati/Northern Kentucky International Airport	3.2.2		X
Air				
1. Direct Radiation	CIS Direct Radiation Measurements	2.8.1.1	X	
2. Airborne Radon Measurements	FEMP Environmental Monitoring Radon Emission Program	2.8.3.1	X	X
	Waste Pit Radon Flux Survey	2.8.3.2	X	X
3. Meteorological Data	FEMP Site Meteorological Station	2.4	X	X

4783

TABLE 2-2
(Continued)

Information Need	Source of Data Used to Support RI	Section Discussed in RI Report	Data use in RI Report: Nature and Extent of Contamination	Data use in RI Report: Fate and Transport Modeling/Risk Assessment
Ecological				
1. Biological/Ecological habitat Characterization	Miami University Ecological Study	2.10.1	X	
2. Chemical and Radiological Uptake	Miami University Ecological Study	2.10.1	X	
	RI/FS Ecological Sampling	2.10.2	X	
Miscellaneous				
1. Population and Land Use	1990 Census Data	3.5.1		X

TABLE 2-3

QUALITATIVE DATA QUALITY OBJECTIVES

Plan	Objectives
Radiation Measurement Plan	- Collect sufficient data to quantify surface radiation fields. - Develop exposure rate contours for selected areas. - Develop uranium concentration contour estimates for selected areas. - Locate anomalies in both exposure rate contours and uranium. concentration contours for further investigation. - Indicate the locations for biased surface soil sampling.
Surface Soils Sampling Plan	- Collect sufficient data to determine the extent of contamination of surface soils by radioactive substances on site. - Confirm areas of surface radiological contamination identified in the radiation measurements survey and quantify the types and concentration of radionuclides found. - Provide data to characterize the source term for all radionuclides. which have the potential to contribute to off-site environmental dose. - Provide additional sampling to characterize surface soil. contamination along the FEMP perimeter and off-site locations. - Identify the types and determine the concentrations and areal extent of hazardous substance contamination in surface soils on-site. - Provide data that will determine where future subsurface soil sampling will be necessary.
Groundwater Sampling Plan	- Determine if subsurface water-bearing zones below the FEMP have been contaminated both on-site and off-site, and determine the extent (both vertically and horizontally) of any contamination. - Determine the concentrations and sources of contaminants on-site and indicate migration of radiological and hazardous substances off-site. - Characterize the rate and direction of groundwater flow within each separate hydrologic unit. - Determine the effects of pumping groundwater and what effects the resulting recharge/discharge relationships have on groundwater flow and contaminant transport. - Define areas of subsurface migration and groundwater discharge for contaminants.
Subsurface Soils Sampling Plan	- Provide additional information on the subsurface stratigraphy in the site area and its relationship to the distribution of groundwater. - Gather information on the lateral and vertical extent of radionuclide and hazardous substance contamination of subsurface soils to assess the nature and extent o potential subsurface pathways for groundwater contamination. - Collect data to determine the geochemical properties of the subsurface soils that may retard or enhance contaminant movement or define potential pathways. - Provide additional information on the geotechnical properties of the subsurface soils for use in evaluating the feasibility of remediation activities.

TABLE 2-3

(Continued)

Plan	Objectives
Surface Water and Sediment Sampling Plan	- Characterize the radiological and hazardous substances and their spatial distributions in surface water at one point in time along drainage pathways from the site towards Paddys Run, discharge points into Paddys Run, as well as in Paddys Run. - Identify the distribution and extent of radiological constituents in sediments from Paddys Run and site drainage systems leading into Paddys Run. - Determine the presence of radiological constituents and their concentrations at a given point in time at several locations in the Great Miami River both upstream and downstream of the FEMP outfall, and the confluence of Paddys Run with the Great Miami River. - Identify radiological constituents in the sediments of the Great Miami River at locations upstream and downstream of the FEMP NPDES outfall, at the confluence of Paddys Run with the Great Miami River, and at two depositional locations in the Great Miami River. - Determine if the FEMP is a source of organics and selected inorganics to the Great Miami River and Paddy's Run.
Biological Resources Sampling Plan	- Determine if any radiological or hazardous substance release to the FEMP environs resulted in significant uptake, assimilation, and transfer through ecological habitats, including surface water sediments and adjacent wetlands. - Determine if any radiological or hazardous substance release to the FEMP environs resulted in uptake and assimilation in agricultural products and crops. - Determine if the above represented significant pathways to human receptors. - Determine if federal or state threatened or endangered species exist within the FEMP environs and the potential risk which is posed to their existence or welfare through contaminant release from the FEMP.

TABLE 2-4

QUALITY ASSURANCE PROJECT PLAN
DATA QUALITY OBJECTIVES FOR PRECISION, ACCURACY, AND COMPLETENESS

Quality Indicator	Quality Objective
Precision	
Chemical Parameters[a]	10%
Radiological Parameters[b]	20%
Accuracy[c]	
Chemical Parameters	20% [d]
Radiological Parameters	30%
Completeness	90%[e]

[a]Relative percent difference.

[b](RPD) = $(RPD) = \frac{|R_1 - R_2|}{(R_1 + R_2 /2)} * 100$

where: R_1 = sample spike recovery and R_2 = sample duplicate spike recovery.

[c]Percent of recovery.

[d]Not applicable for alkalinity, total dissolved solids, pH, and specific conductance.

[e]Nationwide norm for CLP data is 80% complete as per Guidance for Data Usability in Risk Assessment, Interim Final, October 1990.

TABLE 2-5

SAMPLING AND ANALYSIS SUMMARY FOR WASTE PIT 1 - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-01-001	01-01	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-01-002	01-01	0.0-12.0	PM										X
CIS	1987	PS-01-015	01	0.0-12.0	PM	X	X	X	X	X					
CIS	1987	PS-01-017	01-05	0.0-12.0	PM										X
CIS	1987	PS-01-030	01-05	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-01-032	01-02	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-01-034	01-02	0.0-12.0	PM										X
CIS	1987	PS-01-047	01-03	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-01-049	01-03	0.0-12.0	PM										X
CIS	1987	PS-01-058	01-04	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-01-060	01-04	0.0-12.0	PM										X
RIFS	1991	063900	1765	8	PL	X	X	X	X	X	X	X			X
RIFS	1991	063903	1765	8	PL	X	X								
RIFS	1991	063904	1766	14	PL	X	X				X				X
RIFS	1991	063915	1766	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063919	1765	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063925	1767	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063945	1765	-	PL	X	X			X	X	X	X		X
RIFS	1991	063946	1767	-	PL		X								X
RIFS	1991	063004	1767	1.5-2	PM						X				
RIFS	1991	063015	1767	11-11.5	PM					X	X				
RIFS	1991	063017	1767	6-12	PM	X	X	X	X	X	X	X	X	X	X
RIFS	1991	063021	1767	15.5-16	PM					X	X				
RIFS	1991	063032	1767	12-20.7	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063033	1767	0-20.7	PM	X									

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TABLE 2-5
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
RIFS	1991	063048	1766	3.5-4	PM						X				
RIFS	1991	063060	1766	13.5-14	PM					X	X	X	X		
RIFS	1991	063061	1766	7-14	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063064	1766	17-17.5	PM						X				
RIFS	1991	063071	1766	14-20.5	PM	X	X	X	X	X				X	X
RIFS	1991	063072	1766	0-20.5	PM	X									
RIFS	1991	063088	1765	4-4.5	PM						X				
RIFS	1991	063098	1765	13-13.5	PM					X	X	X	X		
RIFS	1991	063100	1765	7-14	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063107	1765	19-19.5	PM						X				
RIFS	1991	063112	1765	14-22	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063113	1765	0-22	PM	X									
TOTALS:						**22**	**20**	**16**	**16**	**21**	**21**	**12**	**11**	**9**	**15**
TCLP															
RIFS	1991	63024	1767	17-17.5	PM						X				
RIFS	1991	63033	1767	0-20.7	PM		X	X	X	X		X			X
RIFS	1991	63065	1766	17.5-18	PM						X				
RIFS	1991	63072	1766	0-20.5	PM		X	X	X	X		X			X
RIFS	1991	63108	1765	19.5-20	PM						X				
RIFS	1991	63113	1765	0-22	PM		X	X	X	X					
TOTALS:						**0**	**3**	**3**	**3**	**3**	**3**	**2**	**0**	**0**	**2**

TABLE 2-6

SAMPLING AND ANALYSIS SUMMARY FOR WASTE PIT 2 - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-02-002	02-02	0.0-10.0	PM										X
CIS	1987	PS-02-007	02-01	0.0-10.0	PM	X	X	X	X	X	X				
CIS	1987	PS-02-009	02-01	0.0-8.0	PM										X
CIS	1987	PS-02-017	02-03	0.0-8.0	PM	X	X			X	X				
CIS	1987	PS-02-018	02	0.0-10.0	PM	X	X	X	X	X					
CIS	1987	PS-02-019	02-03	0.0-10.0	PM										X
CIS	1987	PS-02-026	02-04	0.0-10.0	PM	X	X	X	X	X	X				
CIS	1987	PS-02-028	02-04	0.0-10.0	PM										X
CIS	1987	PS-02-038	02-05	0.0-10.0	PM	X	X	X	X	X	X				
CIS	1987	PS-02-040	02-05	0.0-10.0	PM										X
RIFS	1991	063907	1769	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063909	1768	-	PL	X	X	X	X	X	X	X	X		
RIFS	1991	063913	1768	-	PL						X				
RIFS	1991	063914	1768	-	PL						X				
RIFS	1991	063947	1768	-	PL		X								X
RIFS	1991	063948	1769	-	PL		X								X
RIFS	1991	063952	1768	-	PL									X	
RIFS	1991	063512	1769	7.5-8	PM						X				
RIFS	1991	063524	1769	15-15.5	PM					X	X	X	X		
RIFS	1991	063531	1769	20-20.5	PM						X				
RIFS	1991	063536	1769	8-16	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063538	1769	16-22	PM	X	X	X	X	X				X	X
RIFS	1991	063540	1769	0-22	PM	X									
RIFS	1991	063609	1768	6-6.5	PM						X				
RIFS	1991	063620	1768	13-13.5	PM					X	X				

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100

TABLE 2-6
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
RIFS	1991	063625	1768	15.5-16	PM						X				
RIFS	1991	063630	1768	7-14	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063632	1768	14-17.5	PM	X	X	X	X	X				X	X
RIFS	1991	063634	1768	0-17.5	PM	X									
RIFS	1991	063866	1818	7.5-8	PM						X				
RIFS	1991	063867	1818	15-15.5	PM					X	X	X	X		
RIFS	1991	063868	1818	20-20.5	PM						X				
RIFS	1991	063876	1817	13-13.5	PM					X	X	X	X		
TOTAL:						**13**	**13**	**10**	**10**	**15**	**18**	**7**	**7**	**6**	**11**
TCLP															
RIFS	1991	063540	1769	0-22	PM		X	X	X	X					X
RIFS	1991	063634	1768	0-17.5	PM		X	X	X	X					X
RIFS	1991	063525	1769	15.5-16	PM						X				
RIFS	1991	063621	1768	13.5-14	PM						X				
TOTAL:						**0**	**2**	**2**	**2**	**2**	**2**	**0**	**0**	**0**	**2**

4783

TABLE 2-7

SAMPLING AND ANALYSIS SUMMARY FOR WASTE PIT 3 - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-03-002	03-01	0.0-4.0	PM										X
CIS	1987	PS-03-008	03-03	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-03-009	03-02	0.0-20.0	PM										X
CIS	1987	PS-03-028	03-04	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-03-030	03-03	0.0-20.0	PM										X
CIS	1987	PS-03-051	03-05	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-03-053	03-04	0.0-20.0	PM										X
CIS	1987	PS-03-072	03-06	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-03-074	03-05	0.0-14.0	PM										X
CIS	1987	PS-03-088	03-06	0.0-12.0	PM	X	X	X	X	X					
CIS	1987	PS-03-089	03-02	0.0-20.0	PM	X	X	X	X	X	X				
CIS	1987	PS-03-091	03-06	0.0-20.0	PM										X
CIS	1987	PS-03-109	03-07	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-03-111	03-07	0.0-12.0	PM										X
RIFS	1991	063926	1771	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063928	1772	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063930	1770	-	PL	X	X	X	X	X	X	X	X	X	
RIFS	1991	063949	1770	-	PL		X								X
RIFS	1991	063950	1771	-	PL		X								X
RIFS	1991	063951	1772	-	PL		X								X
RIFS	1991	063251	1772	6-6.5	PM						X				
RIFS	1991	063266	1772	13.5-14	PM					X	X				
RIFS	1991	063280	1772	22.5-23	PM						X				
RIFS	1991	063308	1772	9-18	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063310	1772	18-36.5	PM	X	X	X	X	X				X	X
RIFS	1991	063314	1772	0-36.5	PM	X									

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TABLE 2-7
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
RIFS	1991	063330	1770	6.5-7	PM						X				
RIFS	1991	063358	1770	22-22.5	PM						X				
RIFS	1991	063377	1770	33-33.5	PM						X				
RIFS	1991	063390	1770	12-24	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063392	1770	24-39	PM	X	X	X	X	X				X	X
RIFS	1991	063394	1770	0-39	PM	X									
RIFS	1991	063412	1771	7.5-8	PM						X				
RIFS	1991	063431	1771	17-17.5	PM					X	X	X	X		
RIFS	1991	063467	1771	38-38.5	PM						X				
RIFS	1991	063474	1771	14-28	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063476	1771	28-41	PM	X	X	X	X	X				X	X
RIFS	1991	063478	1771	0-41	PM	X									
TOTAL:						**19**	**19**	**16**	**16**	**18**	**18**	**7**	**7**	**9**	**16**
TCLP															
RIFS	1991	063267	1772	14-14.5	PM						X				
RIFS	1991	063314	1772	0-36.5	PM		X	X	X	X					X
RIFS	1991	063359	1770	22.5-23	PM						X				
RIFS	1991	063394	1770	0-39	PM		X	X	X	X					X
RIFS	1991	063432	1771	17.5-18	PM						X				
RIFS	1991	063478	1771	0-41	PM		X	X	X	X					
TOTAL:						**0**	**3**	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**2**

4783

194

TABLE 2-8

SAMPLING AND ANALYSIS SUMMARY FOR WASTE PIT 4 - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-04-001	04-01	0.0-20.0	PM	X	X			X	X	X	X	X	
CIS	1987	PS-04-003	04-01	0.0-20.0	PM										X
CIS	1987	PS-04-021	04-02	0.0-20.0	PM	X	X			X	X	X	X	X	
CIS	1987	PS-04-022	04	0.0-20.0	PM	X	X			X	X	X	X	X	
CIS	1987	PS-04-023	04-02	0.0-20.0	PM										X
CIS	1987	PS-04-038	04-03	0.0-20.0	PM	X	X			X	X	X	X	X	
CIS	1987	PS-04-040	04-03	0.0-20.0	PM										X
CIS	1987	PS-04-061	04-04	0.0-20.0	PM	X	X	X	X	X	X				
CIS	1987	PS-04-063	04-04	0.0-20.0	PM										X
CIS	1987	SW-04-001	-	-	SW					X	X				X
RIFS	1991	063932	1773	-	PL	X	X	X	X	X	X	X	X	X	X
RIFS	1991	063934	1775	-	PL	X	X	X	X	X	X	X	X	X	X
RIFS	1991	063936	1775	-	PL	X				X	X	X	X		
RIFS	1991	063937	1774	-	PL	X	X	X	X	X	X	X	X	X	X
RIFS	1991	063939	1774	-	PL	X				X	X		X		
RIFS	1991	063669	1774	9.5-10	PM						X				
RIFS	1991	063670	1774	10-12	PM										
RIFS	1991	063685	1774	19-19.5	PM					X	X	X	X		
RIFS	1991	063687	1774	20-22	PM										
RIFS	1991	063705	1774	30.5-31	PM						X				
RIFS	1991	063709	1774	10-20	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063710	1774	20-31.5	PM	X	X	X	X	X				X	X
RIFS	1991	063711	1774	0-31.5	PM	X	X	X	X	X					X
RIFS	1991	063742	1773	8.5-9	PM						X				
RIFS	1991	063747	1773	11-13	PM										
RIFS	1991	063754	1773	16-16.5	PM					X	X	X	X		

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TABLE 2-8
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
RIFS	1991	063778	1773	30-30.5	PM						X				
RIFS	1991	063782	1773	9-18	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063785	1773	18-31	PM	X	X	X	X	X				X	X
RIFS	1991	063787	1773	0-31	PM	X	X	X	X	X					X
RIFS	1991	063815	1775	7.5-8	PM						X				
RIFS	1991	063826	1775	15-17	PM										
RIFS	1991	063829	1775	18-18.5	PM					X	X	X	X		
RIFS	1991	063847	1775	29.5-30	PM						X				
RIFS	1991	063850	1775	10-19	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063852	1775	19-30	PM	X	X	X	X	X				X	X
RIFS	1991	063854	1775	0-30	PM	X	X	X	X	X					X
TOTAL:						**19**	**17**	**13**	**13**	**23**	**20**	**14**	**15**	**13**	**17**
TCLP															
RIFS	1991	063711	1774	0-31.5	PM	X	X	X	X	X					X
RIFS	1991	063753	1773	15.5-10	PM						X				
RIFS	1991	063787	1773	0-31	PM	X	X	X	X	X					X
RIFS	1991	063854	1775	0-30	PM	X	X	X	X	X					X
RIFS	1991	063660	1774	19.5-20	PM						X				
RIFS	1991	063830	1775	16.5-19	PM						X				
TOTAL:						**3**	**3**	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**3**

4783

TABLE 2-9

SAMPLING AND ANALYSIS SUMMARY FOR WASTE PIT 5 - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-05-001	05-06	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-05-002	05-06	0.0-12.0	PM										X
CIS	1987	PS-05-012	05-05	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-05-013	05-05	0.0-15.0	PM										X
CIS	1987	PS-05-014	05	0.0-2.0	PM					X					
CIS	1987	PS-05-024	05-04	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-05-026	05-04	0.0-30.0	PM										X
CIS	1987	PS-05-045	05-03	0.0-12.0	PM		X	X	X	X	X				
CIS	1987	PS-05-046	05-03	0.0-28.0	PM										X
CIS	1987	PS-05-065	05-02	0.0-14.0	PM	X	X	X	X	X	X				
CIS	1987	PS-05-066	05-02	0.0-14.0	PM										X
CIS	1987	PS-05-077	05-01	0.0-3.0	PM	X	X	X	X	X	X				
CIS	1987	PS-05-078	05-01	0.0-3.0	PM										X
CIS	1987	SW-05-001	05	-	SW	X	X	X	X	X	X				X
CIS	1987	SW-05-002	05	-	SW	X	X	X	X	X	X				X
RI/FS	1992	100210	05-01	18.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100211	05-02	18.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100212	05-03	18.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100213	05-04	16.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100214	05-05	8.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100215	05-06	8.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100216	05-07	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100217	05-08	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100218	05-08	6.0	PM	X	X	X	X	X	X				X
TOTAL:						16	17	17	17	18	17	0	0	0	17
TCLP															

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TABLE 2-9
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
RI/FS	1992	100210	05-01	15.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100211	05-02	18.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100212	05-03	18.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100213	05-04	16.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100214	05-05	8.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100215	05-06	8.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100216	05-07	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100217	05-08	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100218	05-08	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100219	05-04	16.0	PM		X			X	X				
TOTAL:						9	10	9	9	10	10	0	0	0	9

TABLE 2-10

SAMPLING AND ANALYSIS SUMMARY FOR WASTE PIT 6 - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-06-001	06-04	0.0-10.0	PM	X	X	X	X	X	X				
CIS	1987	PS-06-009	06-04	0.0-10.0	PM										X
CIS	1987	PS-06-011	06-03	0.0-15.0	PM	X	X	X	X	X	X				
CIS	1987	PS-06-012	06-03	0.0-15.0	PM										X
CIS	1987	PS-06-025	06-02	0.7-4.0	PM										X
CIS	1987	PS-06-028	06-01	1.2-4.5	PM										X
CIS	1987	PS-06-029	06-02	0.7-4.0	PM	X	X	X	X	X	X				
CIS	1987	PS-06-030	06-01	1.2-4.5	PM	X	X	X	X	X	X				
CIS	1992	SW-06-001	06	-	SW	X	X	X	X	X	X				X
CIS	1987	SW-06-002	06	-	SW	X	X	X	X	X	X				X
CIS	1987	SW-06-003	06	-	SW	X	X	X	X	X	X				X
CIS	1987	SW-06-004	06	-	SW	X	X	X	X	X	X				X
CIS	1987	SW-06-005	NA	-	SW	X	X	X	X	X	X				X
RI/FS	1992	100225	06-01	7.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100226	06-02	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100227	06-03	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100228	06-04	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100229	06-05	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100230	06-06	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100231	06-07	6.0	PM	X	X	X	X	X	X				X
RI/FS	1992	100232	06-08	6.0	PM	X	X	X	X	X	X				X
TOTAL:						**17**	**17**	**17**	**17**	**17**	**17**	**0**	**0**	**0**	**17**

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TABLE 2-10
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
TCLP															
RI/FS	1992	100225	06-01	7.0	PM	X	X	X	X	X	X				
RI/FS	1992	100226	06-02	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100227	06-03	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100228	06-04	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100229	06-05	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100230	06-06	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100231	06-07	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100232	06-08	6.0	PM	X	X	X	X	X	X				
RI/FS	1992	100233	06	-	PM		X	X	X	X	X				
TOTAL:						8	9	9	9	9	9	0	0	0	0

4783

4783

TABLE 2-11

SAMPLING AND ANALYSIS SUMMARY FOR THE BURN PIT - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-07-001	07-01	0.0-10.0	PM	X	X	X	X	X	X				
CIS	1987	PS-07-003	07-02	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-07-005	07	0.0-10.0	PM										X
CIS	1987	PS-07-015	07	0.0-12.0	PM					X					X
CIS	1987	PS-07-026	07-03	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-07-027	07	0.0-14.0	PM										X
CIS	1987	PS-07-033	07-04	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-07-035	07	0.0-16.0	PM										X
CIS	1987	PS-07-048	07-05	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-07-049	07	0.0-12.0	PM	X	X	X	X	X					
CIS	1987	PS-07-051	07-06	0.0-12.0	PM	X	X	X	X	X	X				
CIS	1987	PS-07-063	07	0.0-16.0	PM										X
CIS	1987	PS-07-073	07	12.0-12.0	PM										X
RIFS	1991	063940	1776	-	PL	X	X	X	X	X	X	X	X		X
RIFS	1991	063942	1776	-	PL	X				X	X		X		
RIFS	1991	063943	1777	-	PL	X	X	X	X	X	X	X	X	X	X
RIFS	1991	063130	1777	4.5-5	PM					X	X				
RIFS	1991	063135	1777	7-7.5	PM						X				
RIFS	1991	063147	1776	6-6.5	PM						X				
RIFS	1991	063148	1776	6.5-7	PM					X	X				
RIFS	1991	063160	1777	0-6.5	PM	X	X	X	X	X		X	X	X	X
RIFS	1991	063162	1777	6.5-26	PM	X	X	X	X	X				X	X
RIFS	1991	063164	1777	0-26	PM	X									
RIFS	1991	063171	1776	18-18.5	PM						X				
RIFS	1991	063201	1776	6.5-19.5	PM	X	X	X	X	X		X	X	X	X

FER/OU1RI/VC.1229.2-5/09-28-93 9:43am

TABLE 2-11
(Continued)

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
RIFS	1991	063203	1776	19.5-32.5	PM	X	X	X	X	X				X	X
RIFS	1991	063885	1819	6.5-7	PM					X		X	X		
TOTAL:						15	13	13	13	18	14	5	6	5	12
TCLP															
RIFS	1991	063137	1777	8-8.5	PM						X				
RIFS	1991	063164	1777	0-26	PM		X	X	X	X					X
RIFS	1991	063180	1776	22.5-23	PM						X				
RIFS	1991	063205	1776	0-32.5	PM		X	X	X	X		X			X
RIFS	1991	063885	1819	6.5-7	PM					X		X	X		
TOTAL:						0	2	2	2	3	2	2	1	0	2

4783

4783

TABLE 2-12

SAMPLING AND ANALYSIS SUMMARY FOR THE CLEARWELL - OPERABLE UNIT 1

Program	Year	Sample Number	Boring Number	Sample Depth (Ft)	Media	GC	INORG	PEST	PCB	SVOC	VOC	HERB	OP PE	D/F	RAD
Original															
CIS	1987	PS-08-001	08-01	11.0-13.0	PM										X
CIS	1987	PS-08-002	08-02	11.0-13.0	PM	X	X	X	X	X	X				
CIS	1987	PS-08-003	08-03	11.0-13.0	PM										X
CIS	1987	PS-08-004	08-04	11.0-13.0	PM	X	X	X	X	X	X				
CIS	1987	PS-08-005	08-05	11.0-13.0	PM										X
CIS	1987	PS-08-006	08-06	11.0-13.0	PM	X	X	X	X	X	X				
CIS	1987	PS-08-007	08-07	11.0-13.0	PM	X	X	X	X	X					
CIS	1987	PS-08-008	08-08	11.0-13.0	PM										X
CIS	1987	SW-08-001	-	0.0-2.5	SW	X	X			X	X				X
CIS	1987	SW-08-002	-	1.0-5.0	SW	X	X			X	X				X
RI/FS	1992	098526	CW-A	11.0-13.0	PL	X	X	X	X	X	X				X
RI/FS	1992	098527	CW-B	11.0-13.0	PL	X	X	X	X	X	X				X
RI/FS	1992	098528	CW-C	11.0-13.0	PL	X	X	X	X	X	X				X
RI/FS	1992	098529	CW-D	11.0-13.0	PL	X	X	X	X	X	X				X
RI/FS	1992	098530	CW-E	11.0-13.0	PL	X	X	X	X	X	X				X
RI/FS	1992	098531	CW-F	11.0-13.0	PL	X	X	X	X	X	X				X
TOTAL:						**12**	**12**	**10**	**10**	**12**	**12**	**0**	**0**	**0**	**12**
TCLP															
RI/FS	1992	098526	CW-A	11.0-13.0	PM	X	X	X	X	X	X				X
RI/FS	1992	098527	CW-B	11.0-13.0	PM	X	X	X	X	X	X				X
RI/FS	1992	098528	CW-C	11.0-13.0	PM	X	X	X	X	X	X				X
RI/FS	1992	098529	CW-D	11.0-13.0	PM	X	X	X	X	X	X				X
RI/FS	1992	098530	CW-E	11.0-13.0	PM	X	X	X	X	X	X				X
RI/FS	1992	098531	CW-F	11.0-13.0	PM	X	X	X	X	X	X				X
RI/FS	1992	098532	CW-B	11.0-13.0	PM	X	X	X	X	X	X				
TOTAL:						**7**	**7**	**7**	**7**	**7**	**7**	**0**	**0**	**0**	**6**

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TABLE 2-13

SUMMARY OF WASTE PIT ANALYTICAL COMPLETENESS - OPERABLE UNIT 1

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE[a]
PIT MATERIAL	CIS	RAD	(b)	43	86.7	86.7
		METALS	(b)	38	95.3	94.9
		VOC	(b)	39	98.6	91.3
		SVOC	(b)	44	99.9	97.6
		P/P	(b)	40	99.7	99.7
		GC	(b)	33	100	90.9
	RI/FS 1991	RAD	26	26	87.8	85.8
		METALS	26	25	100	99.8
		VOC	39	43	100	85.4
		SVOC	39	42	100	86.8
		P/P	39	26	100	89.1
		O/P	13	25	100	99.4
		HERB	13	25	100	95.8
		GC	26	38	100	82.5
		D/F	39	26	100	100
	RI/FS 1992	RAD	(c) 24	23	100	98.3
		METALS	24	30	80	80
		VOC	24	30	100	0
		SVOC	24	29	100	0
		P/P	24	23	100	0
		O/P	24	23	100	0
		HERB	24	23	100	0
		GC	24	23	88.7	88.7

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4783

TABLE 2-13
(Continued)

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE[a]
PIT LEACHATE	RI/FS 1991	RAD	13	14	85.2	77
		METALS	26	24	100	100
		VOC	26	30	100	89.6
		SVOC	26	21	100	72.7
		P/P	26	15	100	75.3
		O/P	13	18	100	90.3
		HERB	13	17	100	72.1
		GC	13	21	100	98.1
		D/F	26	13	100	100

(a) Usability is defined here by risk assessment data quality requirements. Does not include data which was qualified as "R", "Z" or "NV" (insufficient data available for validation to proceed).
(b) Sampling Plan is not available to make a determination of number of "Planned Analyses".
(c) Samples were estimated based on the assumption that 8 55-gallon drums of sample material were collected from each pit (pit 5, 6 and clearwell). Source: Sampling Plan for pit 5, 6, and Clearwell; Rev. 3; 1/92

4783

4783

TABLE 2-14

ASTM STANDARDS

Soil Physical Properties	ASTM Number	ASTM Title
Water contents	ASTM D2216-90	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock
Atterberg limits	ASTM D4318-84	Test method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
Specific gravity	ASTM D854-91	Test method for Specific Gravity of Soils
Grain size	ASTM D422-63	Test Method for Particle-Size Analysis of Soils
Due dimensional consolidation	ASTM D2435-90	Test method for One-Dimensional Consolidation Properties of Soils
Unconsolidated undrained triaxial	ASTM D2850-87	Test Method for Unconsolidated, Undrained Strength of Cohesive Soils in Triaxial Compression
Permeability of granular soils	ASTM D2434-68	Test Method for Permeability of Granular Soils (Constant Head)
Permeability of cohesive soils	ASTM D5084-90	Test Method for Hydraulic Conductivity of Saturated Porous materials Using a Flexible Wall Permeameter
Classification of Soils	ASTM D2487-90	Classification of Soils for Engineering Purposes
In situ density	ASTM 2922-91	Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods

TABLE 2-15

SUMMARY OF SURFACE WATER AND SEDIMENT ANALYTICAL COMPLETENESS - OPERABLE UNIT 1

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE
SURFACE WATER	CIS	RAD	(b)	10	88.7	88.7
		METALS	(b)	9	100	100
		VOC	(b)	12	95.9	91.2
		SVOC	(b)	12	98.8	97.3
		P/P	(b)	11	100	100
		GC	(b)	9	100	100
	1984 G/W Study	Total U	(b)	13	NA[d]	NA
		Iron		13	NA	NA
	FEMP EMP	Total U	(b)	549	NA	NA
	BMP PLAN	RAD	(b)	3	NA	NA
		METALS		3	NA	NA
		GC		3	NA	NA
SEDIMENT	RI/FS	RAD	(c)	3	60	60
		METALS	3	-	-	
		VOC	3	-	-	
		SVOC	3	-	-	
		P/P	3	-	-	
		O/P	3	-	-	
	CIS	RAD		20	86.7	86.7

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4783

4783

TABLE 2-15
(Continued)

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE
	FEMP EMP	Total U	(b)	66		
		Ra-226		66		
		Th-228		66		
		Th-230		66		
		Th-232		66		
	1986 Rad Survey of Paddy's Run	RAD		28		

(a) Usability is defined here by risk assessment data quality requirements. Does not include which was qualified as "R", "Z", or "NV" (insufficient data available for validation to proceed).
(b) Sampling Plan is not available to make a determination of number of "Planned Analyses".
(c) Final determination of the number of samples was to be made during sampling depending on whether or not water was present in the drainageway or stream. Radiological analysis was to be done on selected samples from certain drainageways.
(d) Not applicable.

207

4783

TABLE 2-16

SUMMARY OF SURFACE SOIL ANALYTICAL COMPLETENESS

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE[a]
SURFACE SOIL	CIS	RAD	(b)	60	86.7	86.7
	RI/FS	RAD	(c) NA	14	94.4	83.3
	WPASRCRA	METALS	44	(d) 17	100	100
		VOC	44	16	100	100
		SVOC	44	16	100	100
		P/P	44	17	100	100
		GC	44	17	100	100
	FEMP EMP	Total U	(b)	36	NA	NA

(a) Usability is defined here by risk assessment data quality requirements. Does not include data which was qualified as "R", "Z", "NV" (insufficient data available for validation to proceed).
(b) Sampling Plan is not available to make a determination of number of "Planned Analyses".
(c) NA=Not Available specifically for OU1 because the Sampling Plan was not designed under the OU concept but sitewide (200 samples were planned to be collected over the whole site: RI/FS Work Plan, Rev. 3, 3/88).
(d) Only 17 samples out of 44 were assessed in the Operable Unit 1 RI.

TABLE 2-17

SUMMARY OF SUBSURFACE SOIL ANALYTICAL COMPLETENESS - OPERABLE UNIT 1

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE[a]
SUBSURFACE SOIL	RI/FS	RAD	(b)	107	97.8	94.6
		METALS	(b)	1	100	100
		VOC	(b)	8	100	100
		GC	(b)	25	100	100

(a) Usability is defined here by risk assessment data quality requirements. Does not include data which was qualified as "R", "Z", or "NV" (insufficient data available for validation to proceed).

(b) NA = Not Available. Approximately 1500 split spoon samples were to be collected sitewide. The final determination of the number of samples to be taken was based on field screening results (RI/FS Work Plan, Rev. 3, 3/88, Sec 4.6, page 6).

TABLE 2-18

OPERABLE UNIT 1 MONITORING WELLS

Well Number	Completion Date	Total Depth (feet)	Riser Pipe Material	Diameter Casing	Screen Length (feet)	Screen Slot Size
MW-1004	2/88	31.0	Stainless Steel	4"	10.0	0.01
MW-1011	12/87	36.5	Stainless Steel	4"	10.0	0.01
MW-1019[a,c]	2/85	12.0	Stainless Steel	4"	5.0	0.02
MW-1021[a,c]	2/85	12.0	Schedule 4.0 PVC	4"	5.0	0.02
MW-1022[a,c]	2/85	12.0	Stainless Steel	4"	5.0	0.02
MW-1025	1/88	23.0	Stainless Steel	4"	10.0	0.01
MW-1027	12/87	31.5	Stainless Steel	4"	10.0	0.01
MW-1028	1/88	31.0	Stainless Steel	4"	10.0	0.01
MW-1031	4/88	30.0	Stainless Steel	4"	10.0	0.01
MW-1073	4/88	29.0	Stainless Steel	4"	11.0	0.01
MW-1074	4/88	24.0	Stainless Steel	4"	11.0	0.01
MW-1075	4/88	28.0	Stainless Steel	4"	5.0	0.01
MW-1076	3/88	50.0	Stainless Steel	4"	11.0	0.01
MW-1077	3/88	33.0	Stainless Steel	4"	11.0	0.01
MW-1078	12/87	34.6	Stainless Steel	4"	10.0	0.01
MW-1079	10/87	39.0	Stainless Steel	4"	5.0	0.01
MW-1080	4/88	51.5	Stainless Steel	4"	10.0	0.01
MW-1081	12/87	33.0	Stainless Steel	4"	10.0	0.01
MW-1082	12/87	24.0	Stainless Steel	4"	10.0	0.01
MW-1083	1/88	22.5	Stainless Steel	4"	10.0	0.01
MW-1084	11/87	33.0	Stainless Steel	4"	10.0	0.01
MW-1643[b]	10/90	30.0	Stainless Steel	4"	10.0	0.01
MW-1644	10/90	30.0	Stainless Steel	4"	10.0	0.01
MW-1645	9/90	25.5	Stainless Steel	4"	10.0	0.01
MW-1646	9/90	25.5	Stainless Steel	4"	10.0	0.01
MW-1765[c]	7/91	22.5	Stainless Steel	4"	10.0	0.01
MW-1766[c]	7/91	20.5	Stainless Steel	4"	10.0	0.01
MW-1767[c]	7/91	21.0	Stainless Steel	4"	10.0	0.01
MW-1768[c]	8/91	17.5	Stainless Steel	4"	10.0	0.01

TABLE 2-18
(Continued)

Well Number	Completion Date	Total Depth (feet)	Riser Pipe Material	Diameter Casing	Screen Length (feet)	Screen Slot Size
MW-1769[c]	8/91	22.0	Stainless Steel	4"	10.0	0.01
MW-1770[c]	8/91	39.0	Stainless Steel	4"	10.0	0.01
MW-1771[c]	8/91	41.0	Stainless Steel	4"	10.0	0.01
MW-1772[c]	8/91	36.5	Stainless Steel	4"	10.0	0.01
MW-1773[c]	9/91	31.0	Stainless Steel	4"	10.0	0.01
MW-1774[c]	8/91	32.0	Stainless Steel	4"	10.0	0.01
MW-1775[c]	9/91	30.0	Stainless Steel	4"	10.0	0.01
MW-1776[c]	7/91	32.5	Stainless Steel	4"	10.0	0.01
MW-1777[c]	7/91	26.0	Stainless Steel	4"	10.0	0.01
MW-1836	7/92	16.5	Stainless Steel	4"	7.9	0.01
MW-1838	7/92	20.0	Schedule 4.0 PVC	2"	10.0	0.02
MW-2004[a]	8/59	43.0	Stainless Steel	8"	NA[d]	NA
MW-2011[a]	**/82	130.0	Galvanized Steel	6"	NA	NA
MW-2019[a,e]	2/85	80.0	Stainless Steel	4"	5.0	0.02
MW-2021[a,e]	2/85	80.0	Stainless Steel	4"	5.0	0.02
MW-2022[a,e]	NA	90.0	Stainless Steel	4"	5.0	0.02
MW-2027	12/87	76.5	Stainless Steel	4"	15.0	0.01
MW-2028	5/90	79.0	Stainless Steel	4"	15.0	0.01
MW-2084	11/87	77.0	Stainless Steel	4"	15.0	0.01
MW-2643[b]	10/90	82.0	Stainless Steel	4"	15.0	0.01
MW-2648	9/90	80.0	Stainless Steel	4"	15.0	0.01
MW-2649	10/90	70.0	Stainless Steel	4"	15.0	0.01
MW-2821	7/92	80.0	Stainless Steel	4"	15.0	0.01
MW-2822	5/92	70.0	Stainless Steel	4"	15.0	0.01
MW-3001[a]	8/59	8/59	Stainless Steel	8"	NA	NA
MW-3003[a]	8/59	NA	Stainless Steel	8"	20.0	NA
MW-3004	2/88	135.0	Stainless Steel	4"	10.0	0.01
MW-3005[a,e]	8/59	95.0	Stainless Steel	8"	NA	NA
MW-3011	11/87	150.0	Stainless Steel	4"	10.0	0.01
MW-3019[a,e]	2/85	130.0	Stainless Steel	4"	5.0	0.02

TABLE 2-18
(Continued)

Well Number	Completion Date	Total Depth (feet)	Riser Pipe Material	Diameter Casing	Screen Length (feet)	Screen Slot Size
MW-3084	11/87	124.0	Stainless Steel	4"	10.0	0.01
MW-3821	6/92	120.0	Stainless Steel	4"	10.0	0.01
MW-4001[a]	4/65	193.0	Stainless Steel	4"	10.0	NA
MW-4011	9/90	193.0	Stainless Steel	4"	10.0	0.01

[a]Installed before the RI under NLO monitoring program

[b]1600 and 2600 Series - Replacment wells installed in 1990

[c]1700 Series - Leachate well installed in pits (1991)

[d]NA - Not available

[e]Monitoring well has been plugged and abandoned.

TABLE 2-19

SUMMARY OF OPERABLE UNIT 1 GROUNDWATER SAMPLING DATES

Well No.	Completion Date	1987 4th Qtr	1988 1st Qtr	1988 2nd Qtr	1988 3rd Qtr	1988 4th Qtr	1989 1st Qtr	1989 2nd Qtr	1989 3rd Qtr	1989 4th Qtr	1990 1st Qtr	1990 2nd Qtr	1990 3rd Qtr	1990 4th Qtr	1991 1st Qtr	1991 2nd Qtr	1991 3rd Qtr	1991 4th Qtr	1992 1st Qtr	1992 2nd Qtr	1992 3rd Qtr	1992 4th Qtr	1993 1st Qtr	1993 2nd Qtr
1004	2/88		X			X				X														
1011	12/87	X	X		X	X	X	X		X	O	O	O		O									
1019	NA	X		X	X	X	X				O				O	O								
1021	NA	X		X	X	X	X				O				O	O					X			
1022	NA	X		X	X	X	X				O				O	O					X			
1025	1/88	X	X	X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	
1027	12/87	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
1028	1/88		X			X		X	X	X			O											
1031	4/88			X	X	X		X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
*1072	NA																							
1073	4/88			X	X	X	X				O													
1074	4/88			X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
1075	4/88			X	X	X	X				O													
1076	3/88		X	X	X	X	X				O									O				
*1077	NA																							
1078	12/87	X		X	X	X	X				O													
1079	10/87	X		X	X	X	X	X	X	X	O	O	X	O	O	O	O	O	O	O	O	O	O	O

TABLE 2-19
(Continued)

Well No.	Completion Date	1987 4th Qtr	1988 1st Qtr	1988 2nd Qtr	1988 3rd Qtr	1988 4th Qtr	1989 1st Qtr	1989 2nd Qtr	1989 3rd Qtr	1989 4th Qtr	1990 1st Qtr	1990 2nd Qtr	1990 3rd Qtr	1990 4th Qtr	1991 1st Qtr	1991 2nd Qtr	1991 3rd Qtr	1991 4th Qtr	1992 1st Qtr	1992 2nd Qtr	1992 3rd Qtr	1992 4th Qtr	1993 1st Qtr	1993 2nd Qtr
1080	4/88			X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
1081	12/87	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
1082	12/87	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
1083	1/88		X	X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
1084	11/87	X	X		X	X	X				O													
1643	10/90												X	X	X		X	O	X	O	O	O	O	O
1644	10/90												X	X	X		O	O	X	O	O	O	O	O
1645	9/90												X				O	X	X	O	O	O	O	O
1646	9/90												X				O	O	X	X	O	O	O	O
1765	7/91																X	X						
1766	7/91																X	X						
1767	7/91																X	X						
1768	8/91																X	X						
1769	8/91																X	X						
1770	8/91																X	X						
1771	8/91																X	X						
1772	8/91																X	X						

TABLE 2-19
(Continued)

Well No.	Completion Date	1987 4th Qtr	1988 1st Qtr	1988 2nd Qtr	1988 3rd Qtr	1988 4th Qtr	1989 1st Qtr	1989 2nd Qtr	1989 3rd Qtr	1989 4th Qtr	1990 1st Qtr	1990 2nd Qtr	1990 3rd Qtr	1990 4th Qtr	1991 1st Qtr	1991 2nd Qtr	1991 3rd Qtr	1991 4th Qtr	1992 1st Qtr	1992 2nd Qtr	1992 3rd Qtr	1992 4th Qtr	1993 1st Qtr	1993 2nd Qtr
1773	8/91																X	X						
1774	8/91																X	X						
1775	9/91																X	X						
1776	7/91																X	X						
1777	7/91																X	X						
1836	7/92																				X			
1838	7/92																				X			
2004	NA	X		X	X	X	X				X	O	O	O	O	O								
2011	NA	X		X	X	X	X			X	O	O	O	O	O	O								
2019	NA	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	X			
2021	NA	X		X	X	X	X	X	X	X	O	O	X	O	O	O	O	O	O	O	O			O
2022	NA	X		X	X	X	X				X	O		O				O	O	O	X			
2027	12/87	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
2028	5/90											X	X											
2084	11/87	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	
2643	10/90												X	X	O	O	X	O	X	O	O	O	O	
2648	9/90												X	X	O		O	O	X	O	O	O	O	O

4783

TABLE 2-19
(Continued)

Well No.	Completion Date	1987 4th Qtr	1988 1st Qtr	1988 2nd Qtr	1988 3rd Qtr	1988 4th Qtr	1989 1st Qtr	1989 2nd Qtr	1989 3rd Qtr	1989 4th Qtr	1990 1st Qtr	1990 2nd Qtr	1990 3rd Qtr	1990 4th Qtr	1991 1st Qtr	1991 2nd Qtr	1991 3rd Qtr	1991 4th Qtr	1992 1st Qtr	1992 2nd Qtr	1992 3rd Qtr	1992 4th Qtr	1993 1st Qtr	1993 2nd Qtr
2649	10/90													X	O		X	O	X	O	O	O	O	
2821	7/92																			X	X	X	O	
2822	5/92																			X	X	O	O	
3001	NA			X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O
3003	NA	X		X	X	X	X				X	O		O										
3004	2/88		X	X	X	X	X				X	O	O											
3005	NA	X		X	X	X	X				X	O	O	O	O						O			
3011	11/87	X		X	X	X	X	X		X		O	O	O	O		O	O	O	O	O	O	O	O
3019	NA	X		X	X	X	X	X	X	X	O	O	O	O	O	O	X	O	O	O	O			
3084	11/87	X		X	X	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	
3821	6/92																			X	X	X		
4001	NA	X		X	X	X	X	X	X	X	O	O	X	O	O	O	O	O	O	O	O	O	O	O
4011	9/90												X	X	X	O	O	O	O	O	O	O	O	O

* - Plugged or abandoned well as of 12/16/92.
NA - Not Available.
Shaded areas signify time periods before wells were installed.
X - Sampled under RI/FS program.
O - Sampled under RCRA program.

TABLE 2-20

CONSTRUCTION SUMMARY OF MONITORY WELLS OUTSIDE OPERABLE UNIT 1

Well Number	Completion Date	Total Depth (feet)	Riser Pipe Material	Diameter Casing	Screen Length (feet)	Screen Slot Size (inches)
MW-1008	3/88	31.0	Stainless Steel	4"	10.0	0.01
MW-1029	10/87	31.0	Stainless Steel	4"	10.0	0.01
MW-2008	3/88	72.8	Stainless Steel	4"	10.0	0.01
MW-2010	3/88	75.5	Stainless Steel	4"	15.0	0.01
MW-3008	4/51	116.0	Stainless Steel	4"	NA	NA
MW-3010	10/82	130.0	Galvanized Steel	6"	NA	NA
MW-3043	12/87	120.0	Stainless Steel	4"	10	0.01
MW-4008	4/65	180.0	Stainless Steel	4"	NA	NA
MW-4101	10/51	210.0	Stainless Steel	38"	NA	NA
MW-4102	10/51	210.0	Stainless Steel	38"	NA	NA
MW-4103	10/51	210.0	Stainless Steel	38"	NA	NA

217

TABLE 2-21

SUMMARY OF GROUNDWATER SAMPLING DATES OUTSIDE OPERABLE UNIT 1

	Completion Date	1st 1990	2nd 1990	3rd 1990	4th 1990	1st 1991	2nd 1991	3rd 1991	4th 1991	1st 1992	2nd 1992	3rd 1992	4th 1992	1st 1993	2nd 1993
1008	3/88		X	X	X										
1029	10/87		X		X										
2008	3/88		X	X	X	X	X		X	X	X	X	X	X	
2010	3/88	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3008	4/51	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3010	10/82	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3043	12/87	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4008	10/51	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4101	10/51	X		X		X		X	X	X	X	X		X	X
4102	10/51	X		X		X		X	X	X	X	X		X	X
4103	10/51	X		X		X		X	X	X	X	X		X	X

TABLE 2-22

SUMMARY OF GROUNDWATER ANALYTICAL COMPLETENESS

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE[a]
Perched Groundwater (1000-series wells)	RI/FS	RAD	(b) 98	114	99.7	80.3
		METALS	98	120	81.2	80.9
		VOC	48	62	93.9	88.2
		SVOC	48	26	99.8	91.7
		P/P	48	26	98	98
		O/P	48	15	100	100
		HERB	-	16	81.6	79.6
		GC	98	112	85.8	84.2
		D/F	-	12	100	100
Perched Water	1984 Groundwater Study	Total U	(c)	17	NA[d]	NA
		Iron		17	NA	NA
Groundwater (GMA) (2000-, 3000-, and 4000-series wells)	RI/FS	RAD	(b) 73	119	96.8	83.7
		METALS	73	132	78.7	77.7
		VOC	24	80	84.1	79.1
		SVOC	24	40	81.8	67.8
		P/P	24	40	67.9	59.9
		O/P	24	20	63.5	55.6
		HERB	-	31	27.9	24.8
		GC	73	136	80.7	78.1

TABLE 2-22
(Continued)

MEDIA	STUDY	FRACTION	ANALYSES PLANNED	ANALYSES REPORTED	% VALIDATED	% USABLE[a]
Groundwater (GMA)	1984 Groundwater Study	Total U	(c)	26	NA	NA
		Iron		26	NA	NA

(a) Usability is defined here by risk assessment data quality requirements. Does not include data which was qualified as "R", "Z", or "NV" (insufficient data available for validation to proceed).

(b) The number of samples has been determined based on the sampling round for the wells that fall within OU1 boundaries per the Sampling Plan as follows:
Wells installed before the RI/FS program were to be sampled 4 times along with RI/FS wells.
Wells installed 11/87 - 4/88 were to be sampled 4 times
Wells installed 5/90 - 9/91 were to be sampled 2 times
Wells installed 5/92 - 7/92 were sampled 1 time
Sources: 1) Work Plan Addendum for OU1, 8/91; 2) RI/FS Work Plan, Rev. 3, 3/88.

(c) Sampling Plan is not available to make a determination of number of "Planned Analyses".

TABLE 2.23

SUMMARY OF DATA VALIDATION ACTIVITIES FOR OPERABLE UNIT 1

Study	Year	Validation	Action
		CIS	
Chemical	1990	ASI	Overall assessment of data
	1992	ASI/IT	Validation
	1993	FERMCO/IT	Assessment with HT criteria changes
Radiological	1992	Ebasco	Overall assessment of data
	1993	FERMCO	Validation
		RI/FS 91	
Chemical	1992	ASI/Ebasco	Validation
	1993	FERMCO/IT/Ebasco	Assessment with HT criteria changes
Radiological	1992	ASI	Validation
	1993	Ebasco/FERMCO	Validation with criteria changes
		RI/FS 92	
Chemical	1992	ASI	Validation Level III
	1993	FERMCO/IT	Validation Level IV (additional data available for evaluation from laboratory
Radiological	1992	ASI	Validation
	1993	FERMCO	Validation with criteria changes
		STORM WATER RUN OFF CONTROL REMOVAL ACTION	
Chemical	1992	ASI	Validation
	1993	FERMCO	Assessment/peer review

221

TABLE 2-24

CRITERIA USED IN ASSIGNMENT OF QUALIFIERS FOR OPERABLE UNIT 1 DATA

Validation Criteria	Inorganics	Volatile Organics	Semivolatile Organics Pesticides/PCBs
Holding Times (time between sample collection, extraction, and analysis)	J - Holding time exceeded 6 months for aqueous metals (except mercury) samples acidified to pH = 2.	J - Holding time was greater than 7 days for aqueous nonpreserved aromatic compounds. J - Holding time was greater than 14 days but less than 28 days for preserved soil/aqueous samples.	J - Holding time between collection and extraction exceeded 7 days (aqueous samples) or 14 days (soil samples) but was less than 21 days.
	J - Holding time exceeded 28 days for mercury samples acidified to pH = 2.	R - Holding time was greater than 28 days for non-detected analytes.	J - Holding time between extraction and analysis was greater than 40 but less than 54 days.
	J - Holding time exceeded 14 days for aqueous cyanide samples preserved at pH - 12.		R - Holding time between collection and extraction was greater than 21 days (non-detected compounds only).
			R - Holding time between extraction and analysis was greater than 54 days (non-detected compounds only).
Instrument Tuning/Performance		J - Instrument tuning/performance did not meet established criteria.	J - Instrument tuning/performance did not meet established criteria.
		R - Instrument tuning/performance was not acceptable.	R - Instrument tuning/performance was not acceptable.
Initial Calibration	J - Correlation coefficient for the standard curve relating to a particular compound was less than 0.995.	J - Relative response factor (RRF) was below 0.05 for 2 detected analyte.	J - RRF was below 0.005 for a detected analyte.
	J - Percent recovery (%R) for the initial calibration verification (ICV) was greater than 110% or less than 90% for detected analytes.	J - Percent relative standard deviation (%RSD) was greater than or equal to 30% but less than 75%.	J - %RSD
	J - %R for ICV was less than 75% for non-detected analytes.	R - %RSD was greater than 75%	R - %RSD was greater than 75%.
	R - Instrument was not calibrated daily or the minimum number of standards was not analyzed.	R - RRF was below 0.05 for a non-detected analyte.	R - RRF was below 0.05 for a non-detected analyte.
	R - %R for ICV was greater than 125% for detected analytes.		

TABLE 2-24
(Continued)

Validation Criteria	Inorganics	Volatile Organics	Semivolatile Organics Pesticides/PCBs
Continuing Calibration	J - %R for the continuing calibration verification (CCV) was greater than 110% or less than 90% for detected analytes.	J - RRF was below 0.05 for a detected analyte.	J - RRF was below 0.05 for a detected analyte.
	J - %R for CCV was less than 75% for non-detected analytes.	J - Percent difference (%D) was greater than or equal to 25% but less than 75%.	J - %D was greater than or equal to 25% but less than 75%.
	R - %R for CCV was greater than 125% but less than 75% for detected analytes.	R - %D was greater than 75%	R - %D was greater than 75%
		R - RRF was below 0.05 for a non-detected analyte.	R - RRF was below 0.05 for a non-detected analyte.
Surrogate Recovery		J - One volatile surrogate compound exhibited recovery below CLP protocol limits.	J - Two or more semivolatile surrogates for either the base-neutral or acid fraction or one pesticide/PCB surrogate exhibited recovery below CLP protocol limits.
		R - One volatile surrogate compound exhibited recovery below 10%.	R - One semivolatile surrogate compound exhibited recovery below 10%.
Internal Standard Performance		J - Internal standard recoveries were not within CLP protocol limits.	J - Internal standard recoveries were not within CLP protocol limits.
		J - Internal standard recoveries were below 25% (non-detected analytes only).	J - Internal standard recoveries were below 25% (non-detected analytes only).
Blank Contamination (method, field, and trip blanks)	Apply 5X Rule.	Apply 5X/10X Rule (Positive values present as a result of contamination but below the contract required detection limit (CRDL) were reported as non-detects at the CRDL. Positive values present as a result of contamination but above the CRDL were reported as nondetects at the laboratory result.	Apply 5X/10X Rule.
Matrix Spike Recoveries Retention Time Shift Detection Limits Accuracy of Calculations	Qualifier assigned based on validator's professional judgement.	Qualifier assigned based on validator's professional judgement.	Qualifier assigned based on validator's professional judgement.

TABLE 2-24
(Continued)

Validation Criteria	Radiological	
Holding Times (time between sample collection, extraction, and analysis	J -	Holding time exceeded 6 months
Initial calibration Continuing Calibration	J -	Supplmental chart for associated sample data, instrument, geometry
	R -	Calibration not performed on date of sample analysis
		Detector out of service or not in use that dat
		Source counts differ more than 3.000 sigma
	J -	Alpha/Beta cross-talk factor exceeded 2%
	J -	No instrument background count performed on sample analysis date or background counts differed by more than 3.000 sigma
Matrix Spike	J -	Percent recovery between ≥40 but (70 or)130 but ≤160
LCS (laboratory control sample)	J -	Percent recovery between ≥40 but (70 or)130 but ≤160
	J -	No spike performed
Blank Contamination	J -	Positive sample results that are (5X the level of radionuclide contamination in an associated blank
Duplicate	J -	No duplicate results available
	J -	Relative percent difference (RPD))20% for water,)35% for soils
Detection Limits Tracer Yields	J -	Alpha spectroscopy analyses tracer recoveries)25%

4783

TABLE 2-24
(Continued)

Validation Criteria	Radiological
Analytical Spike - Neptunium -237	J - Yields >105% but ≤120% or ≥20% but ≤50%
	R - Yields <20% or >120%

TABLE 2-25

DATA VALIDATION CRITERIA REVISIONS

Criteria	1992 Qualifier	1993 Qualifier	Technical Justification
Holding Time			
Volatiles 7 days unpreserved 14 days preserved	J positive results UJ nondetected results	J positive results UJ nondetected results	40CFR136 EPA National Functional Guidelines for Data Review
Semivolatiles, Pesticides/PCBs 7 days to extraction 40 days to analysis	J positive results UJ nondetected results	J positive results UJ nondetected results	40CFR136 EPA Functional Guidelines for Data Review EPA Region III Functional Guidelines for Data Review
>22 days from sampling date	R all results	J positive results UJ nondetected results	PAHs, phthalates, pesticides/PCBs are persistent in environment degradation by chemical, microbial action is minimal when stored at 4°
15-22 days extraction 41-54 days analysis	R all results	J positive results UJ PAHs, phthalates, Pesticides/PCBs R phenols -> penta-chlorophenol	
>22 days extraction >55 days analysis			
Quality control information incomplete	R	J	Consistent application of U. S. EPA National Functional Guidelines suggest data should be estimated
Additive Qualifiers 3J	R	J	Consistent application of U. S. EPA National Functional Guidelines suggest data should be estimated
Utilization of laboratory control spike and sample matrix spike recovery	None	None alone	Provides additional information and is considered in conjunction with other QC data

TABLE 2-26

SUMMARY OF OPERABLE UNIT 1 ANALYTICAL LABORATORIES

Study	Laboratory	Year
CIS	Weston Analytics ThermoNuclear Laboratory -Eberline -NORCAL	1987 1987
RI/FS 91	IT Analytical Services -Knoxville, TN -Oak Ridge, TN -St. Louis, MO -Pittsburgh, PA	1991-1992
RI/FS 92	EcoTek	1992
Stormwater Removal Action Study	IT Analytical Services Oak Ridge, TN	1991

227

Table 2-27
Operable Unit 1 CIS Pit Material Data Summary

Pit Material	Pit 1			Pit 2			Pit 3			Pit 4			Pit 5		
Fraction	Samples Analyzed (a)	% Analytes Validated (b)	% Analytes Acceptable (c)	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable
General Chemistry	5	100	100	4	100	100	6	100	83.3	4	100	100	4	100	50
Metals	5	100	100	4	100	100	6	100	100	4	100	99	6	99.3	98.6
Pesticides/ PCBs	6	100	100	5	100	100	7	98.1	98.1	4	100	100	6	100	100
Radiological	5	86.7	86.7	5	86.7	86.7	7	86.7	86.7	4	86.7	86.7	6	86.7	86.7
Semivolatile Organics	7	100	98.7	5	100	98.4	6	100	94.1	4	100	98.5	7	100	99.2
Volatile Organics	5	100	80.6	4	100	97.1	6	100	92.9	4	97.3	90.5	6	100	93.7

(a) Samples Analyzed = total unique sample numbers, excluding QA samples.

(b) % Analytes Validated = (total no. analytes where validation qualifer not "Z" or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.

(c) % Analytes Acceptable = (total no. analytes where validation qualifier not "R", "Z", or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.

(d) % Complete = % analytes acceptable since CIS was prior to Consent Agreement

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Table 2-27 (cont.)
Operable Unit 1 CIS Pit Material Data Summary

Pit Material	Pit 6			Burn Pit			Clearwell			TOTAL			
Fraction	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	% Complete (d)
General Chemistry	1	100	100	6	100	100	3	100	100	33	100	91	91
Metals	4	26.7	26.7	6	100	99.3	3	100	100	38	92	92	92
Pesticides/ PCBs	1	100	100	7	100	100	4	100	100	40	100	100	100
Radiological	4	86.7	86.7	6	86.7	86.7	4	86.7	86.7	41	87	87	87
Semivolatile Organics	4	100	98.1	7	100	98.4	3	100	97.9	43	100	98	98
Volatile Organics	4	100	97.6	6	100	97.6	3	100	93.4	38	100	93	93

(a) Samples Analyzed = total unique sample numbers, excluding QA samples.
(b) % Analytes Validated = (total no. analytes where validation qualifer not "Z" or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.
(c) % Analytes Acceptable = (total no. analytes where validation qualifier not "R", "Z", or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.
(d) % Complete = % analytes acceptable since CIS was prior to Consent Agreement

Table 2-28
Operable Unit 1 1991 RI/FS Pit Material Data Summary

Pit Material	Pit 1				Pit 2				Pit 3				Pit 4				Burn Pit				TOTAL			
Fraction	Planned Samples	Samples Analyzed (a)	% Analytes Validated (b)	% Analytes Acceptable (c)	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	% Complete (d)
Dioxin/Furan	9	6	100	100	6	4	100	100	9	6	100	100	9	6	100	100	6	4	100	100	26	100	100	67
General Chemistry	6	9	100	100	4	6	100	100	6	9	100	84	6	9	100	60.9	4	5	100	100	38	100	87	127
Herbicides	3	7	100	87.5	2	5	100	100	3	4	100	100	3	6	100	100	2	3	100	100	25	100	97	186
Metals	9	6	100	99.4	6	4	100	100	9	6	100	100	9	5	100	100	6	4	100	100	25	100	100	64
Organo-phosphorus Pesticides	3	7	100	100	2	5	100	100	3	4	100	100	3	6	100	97.6	2	3	100	100	25	100	99	191
Pesticides/ PCBs	9	6	100	99.4	6	4	100	100	9	6	100	75	9	6	100	83.3	6	4	100	100	26	100	90	60
Radiological	6	6	88	83	4	4	86.2	86.2	6	6	88.6	88.6	6	6	86.2	82.8	4	4	88.9	88.9	26	88	86	86
Semivolatile Organics	9	10	100	91.1	6	8	100	94.7	9	8	100	57.7	9	9	100	94.7	6	7	100	99.2	42	100	88	94
Volatile Organics	12	9	100	98.2	8	10	100	91.4	12	10	100	95.3	12	9	100	65.4	8	5	100	82.1	43	100	87	72

(a) Samples Analyzed = total unique sample numbers, excluding QA samples.

(b) % Analytes Validated = (total no. analytes where validation qualifer not "Z" or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.

(c) % Analytes Acceptable = (total no. analytes where validation qualifier not "R", "Z", or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.

(d) % Complete = (Total % analytes acceptable for fraction) x (total number of samples analyzed/total number of samples planned)

Table 2-29
Operable Unit 1 1991 RI/FS Pit Leachate Data Summary

Pit Leachate	PIT 1				PIT 2				PIT 3				PIT 4				BURN PIT				TOTAL			
Fraction	Planned Samples	Samples Analyzed (a)	% Analytes Validated (b)	% Analytes Acceptable (c)	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	% Complete
Dioxin/Furan	6	4	100	100	4	2	100	100	6	3	100	100	6	3	100	100	4	1	100	100	13	100	100	50
General Chemistry	3	8	100	100	2	2	100	94.4	3	3	100	100	3	5	100	94.7	2	3	100	100	21	100	98	159
Herbicides	6	6	100	91.3	4	2	100	88.9	6	3	100	44.4	6	4	100	76.5	4	2	100	80	17	100	78	51
Metals	6	9	100	100	4	4	100	100	6	6	100	100	6	3	100	100	4	2	100	100	24	100	100	92
Organo-phosphorus Pesticides	3	5	100	84.6	2	2	100	88.9	3	3	100	33.3	3	5	100	100	2	3	100	100	18	100	83	115
Pesticides/ PCBs	6	5	100	99.3	4	2	100	100	6	3	100	42.9	6	3	100	77	4	2	100	100	15	100	84	48
Radiological	3	4	87.3	72.7	2	2	85.2	77.8	3	3	80	73.3	3	3	87.2	83	2	2	83.3	79.2	14	85	77	83
Semivolatile Organics	6	8	100	91.6	4	2	100	60.4	6	3	100	15.6	6	5	100	89.8	4	3	100	96.5	21	100	78	63
Volatile Organics	6	15	100	94.9	4	4	100	96.3	6	3	100	73.1	6	5	100	82.1	4	3	100	91.7	30	100	90	104

(a) Samples Analyzed = total unique sample numbers, excluding QA samples.
(b) % Analytes Validated = (total no. analytes where validation qualifer not "Z" or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.
(c) % Analytes Acceptable = (total no. analytes where validation qualifier not "R", "Z", or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.
(d) % Complete = (Total % analytes acceptable for fraction) x (total number of samples analyzed/total number of samples planned)

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4783

Table 2-30
Operable Unit 1 1992 RI/FS Pit Material Data Summary

Pit Material	PIT 5				PIT 6				CLEARWELL				TOTAL			
Fraction	Planned Analyses	Samples Analyzed (a)	% Analytes Validated (b)	% Analytes Acceptable (c)	Planned Analyses	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Planned Samples	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	Samples Analyzed	% Analytes Validated	% Analytes Acceptable	% Complete (d)
General Chemistry	8	9	86.1	86.1	8	8	92.2	92.2	8	6	87.5	87.5	23	89	89	85
Herbicides	8	9	100	0	8	8	100	0	8	6	0	0	23	74	0	0
Metals	8	12	75	75	8	12	75	75	8	6	100	100	30	80	80	100
Organo-phosphorus Pesticides	8	9	100	0	8	8	100	0	8	6	100	0	23	100	0	0
Pesticides/ PCBs	8	9	100	0	8	8	100	0	8	6	100	0	23	100	0	0
Radiological	8	9	100	95.9	8	8	100	100	8	6	100	100	23	100	98	94
Semivolatile Organics	8	10	100	0	8	11	100	0	8	6	100	0	27	100	0	0
Volatile Organics	8	11	100	0	8	11	100	0	8	6	100	0	28	100	0	0

(a) Samples Analyzed = total unique sample numbers, excluding QA samples.

(b) % Analytes Validated = (total no. analytes where validation qualifer not "Z" or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.

(c) % Analytes Acceptable = (total no. analytes where validation qualifier not "R", "Z", or "NV") / (total no. analytes where validation qualifier not "Z") x 100, excluding QA samples.

(d) % Complete = (Total % analytes acceptable for fraction) x (total number of samples analyzed/total number of samples planned)

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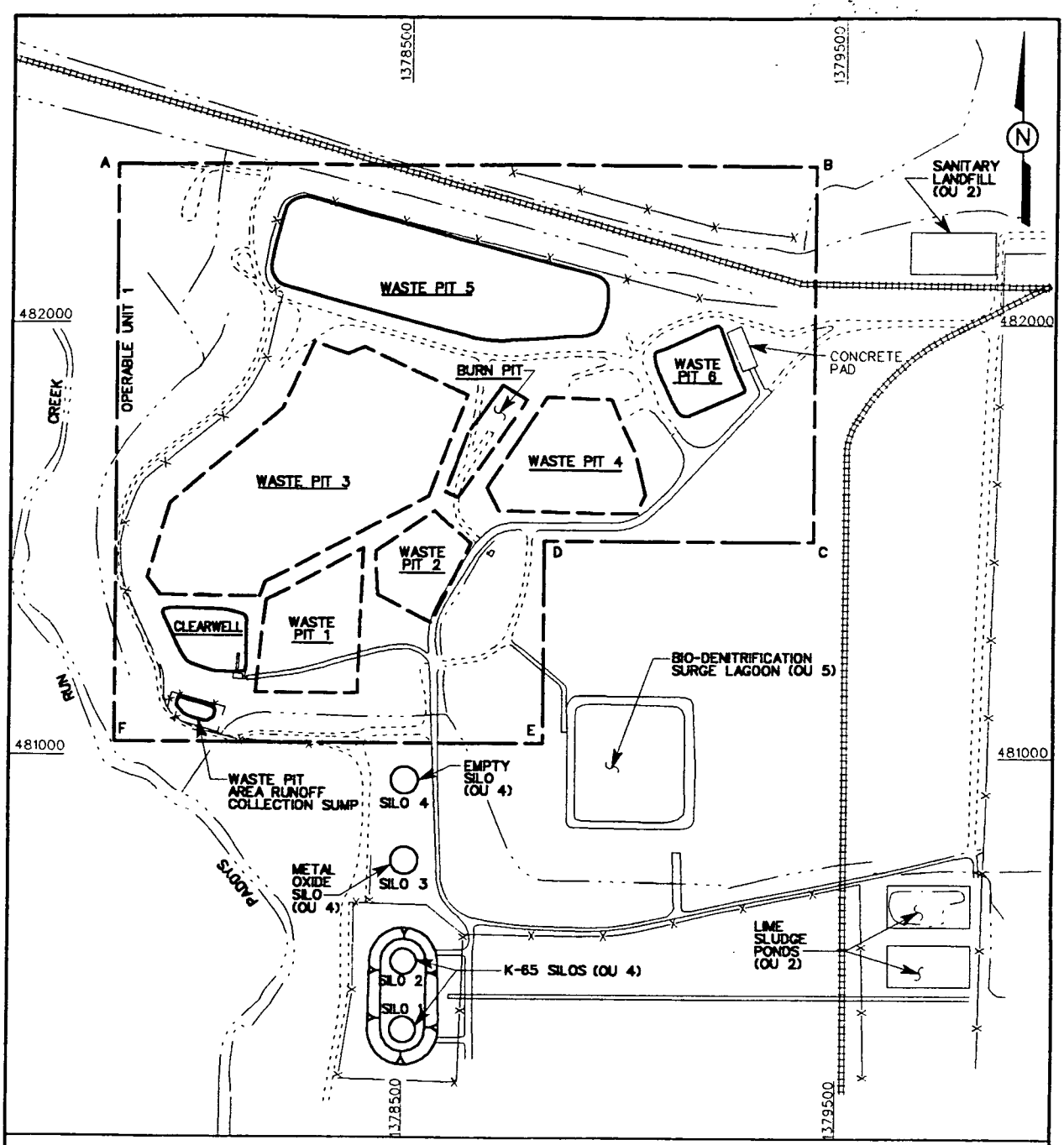


NOTES:

1. PITS 1, 2, 3 AND THE BURN PIT ARE COVERED WITH SOIL CAPS AND VEGETATED.
2. PIT 4 HAS AN INTERIM CAP.
3. PITS 5, 6 AND CLEARWELL ARE WATER COVERED
4. COORDINATES SHOWN ARE OHIO STATE PLANAR COORDINATES, ADJUSTED PER THE NORTH AMERICAN DATUM (NAD) OF 1983.
5. OPERABLE UNITS (OU) ARE IDENTIFIED. OU 5 INCLUDES GROUNDWATER, SURFACE WATER, SOILS, FLORA & FAUNA IN THE AREA OTHERWISE IDENTIFIED.

OU1 STATE PLANAR COORDINATES		
POINT	NORTHING	EASTING
A	482364	1377824
B	482364	1379432
C	481499	1379432
D	481499	1378812
E	481033	1378812
F	481033	1377824

LEGEND:

—X—X— FENCE LINE
DRAINAGE WAY
CSX RAIL LINE
PAVED ROADWAY
GRAVEL ROADWAY
OPERABLE UNIT 1 OUTLINE
COVERED PIT OUTLINE
OPEN PIT OUTLINE

SCALE:
0 350 FEET

409193-A-29 / OU1/ KNOX/ DS
409193-28.OU1 09/21/93 LLS

FIGURE 2-1. OPERABLE UNIT 1 SITE MAP

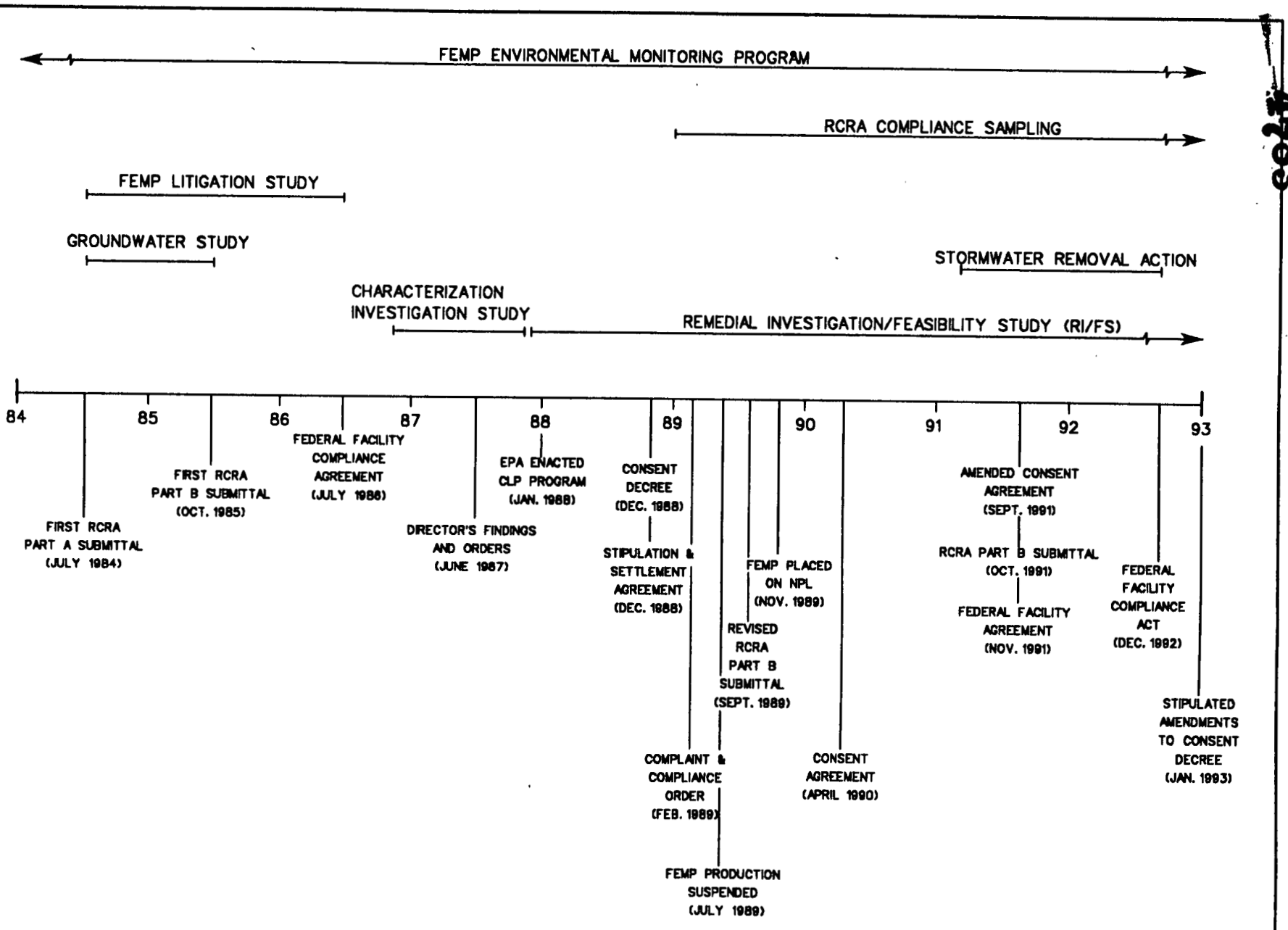


FIGURE 2-2. OU-1 TIMELINE OF REGULATORY PROMULGATIONS AND ENVIRONMENTAL STUDIES

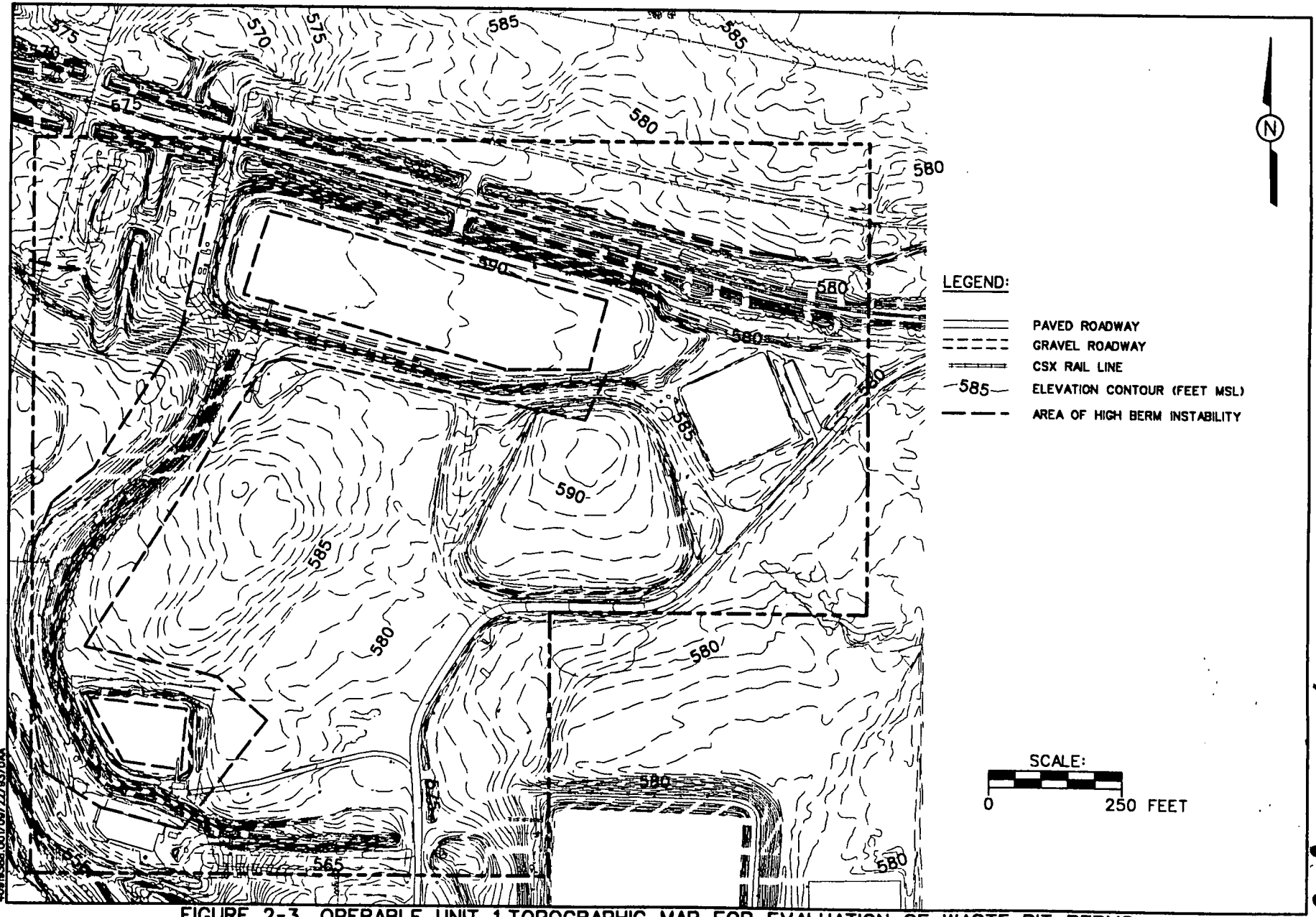
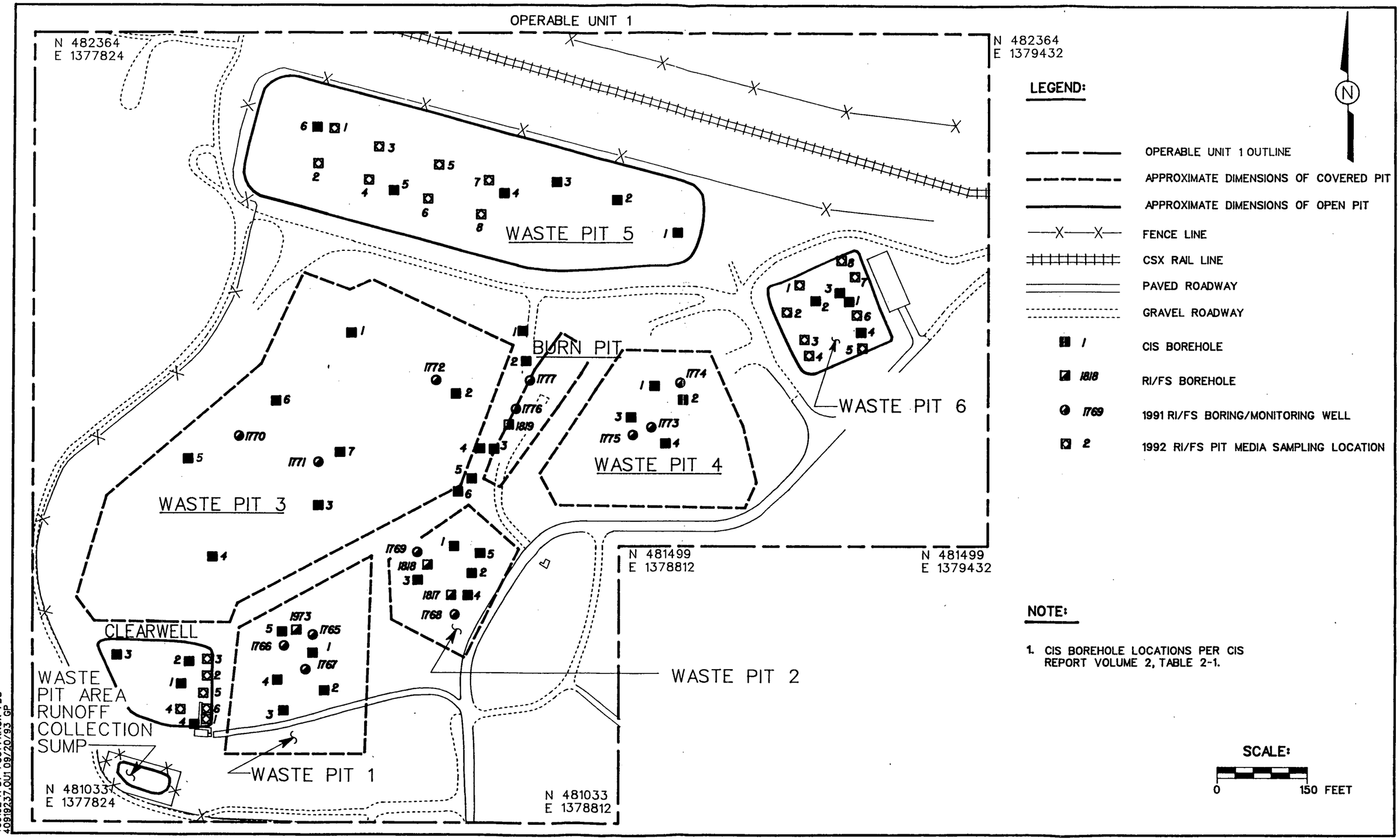


FIGURE 2-3. OPERABLE UNIT 1 TOPOGRAPHIC MAP FOR EVALUATION OF WASTE PIT BERMS

235

4783



409192-A-37 /OU1 /KNOX /DS
40919237.OU1 09/20/93 GP

FIGURE 2-4. WASTE PIT SAMPLING LOCATIONS

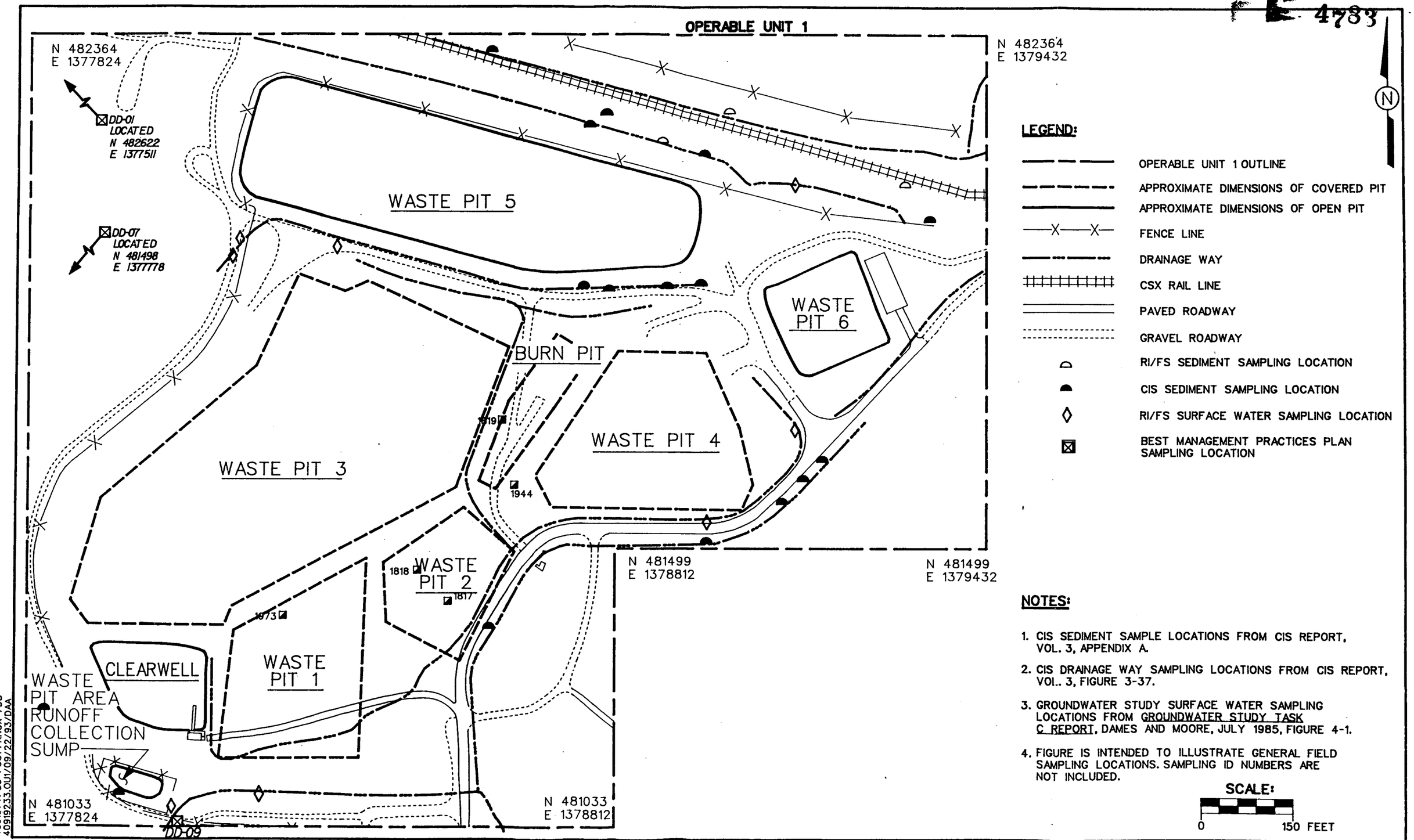
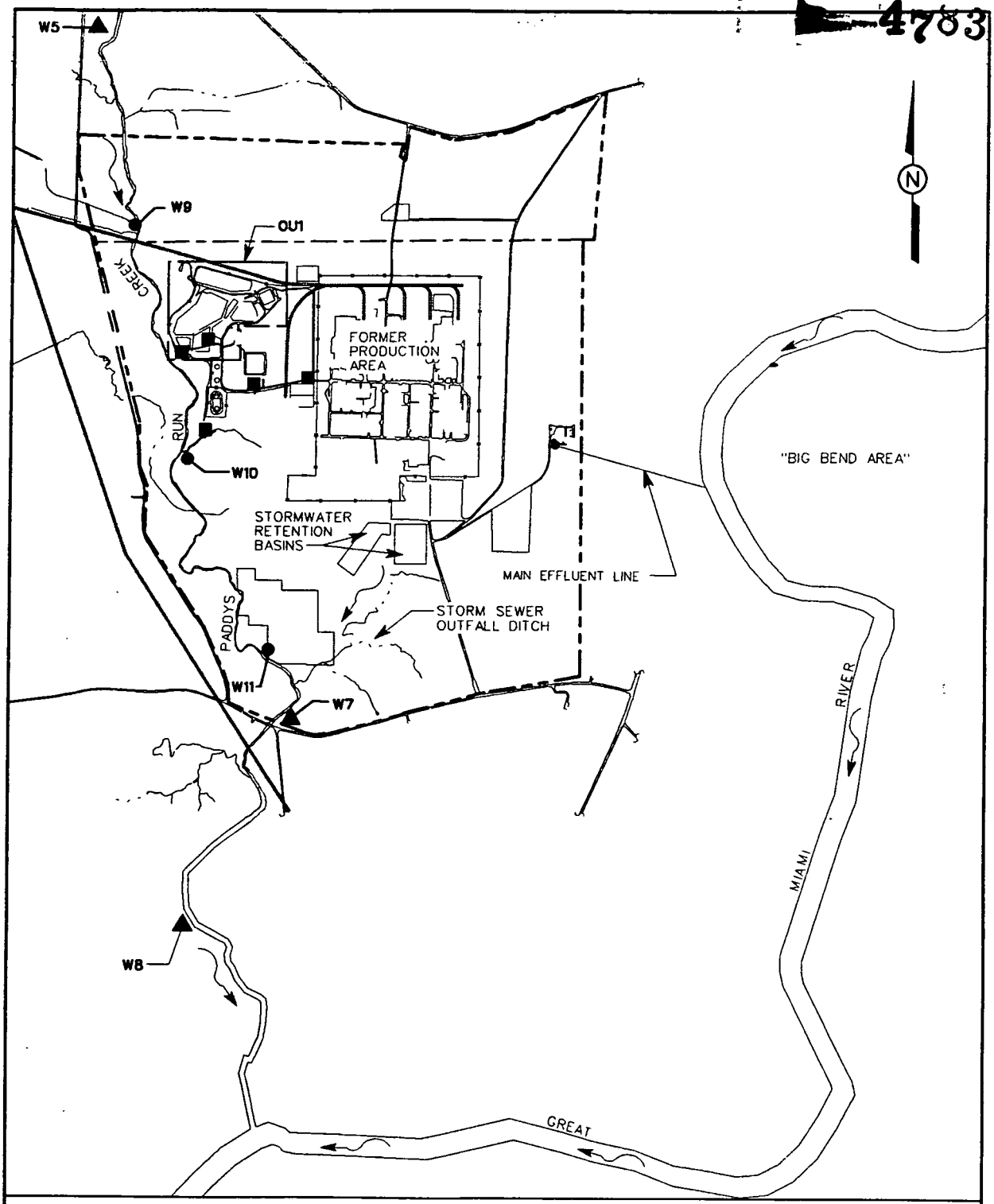


FIGURE 2-5. SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS



SCALE:
NOT TO SCALE

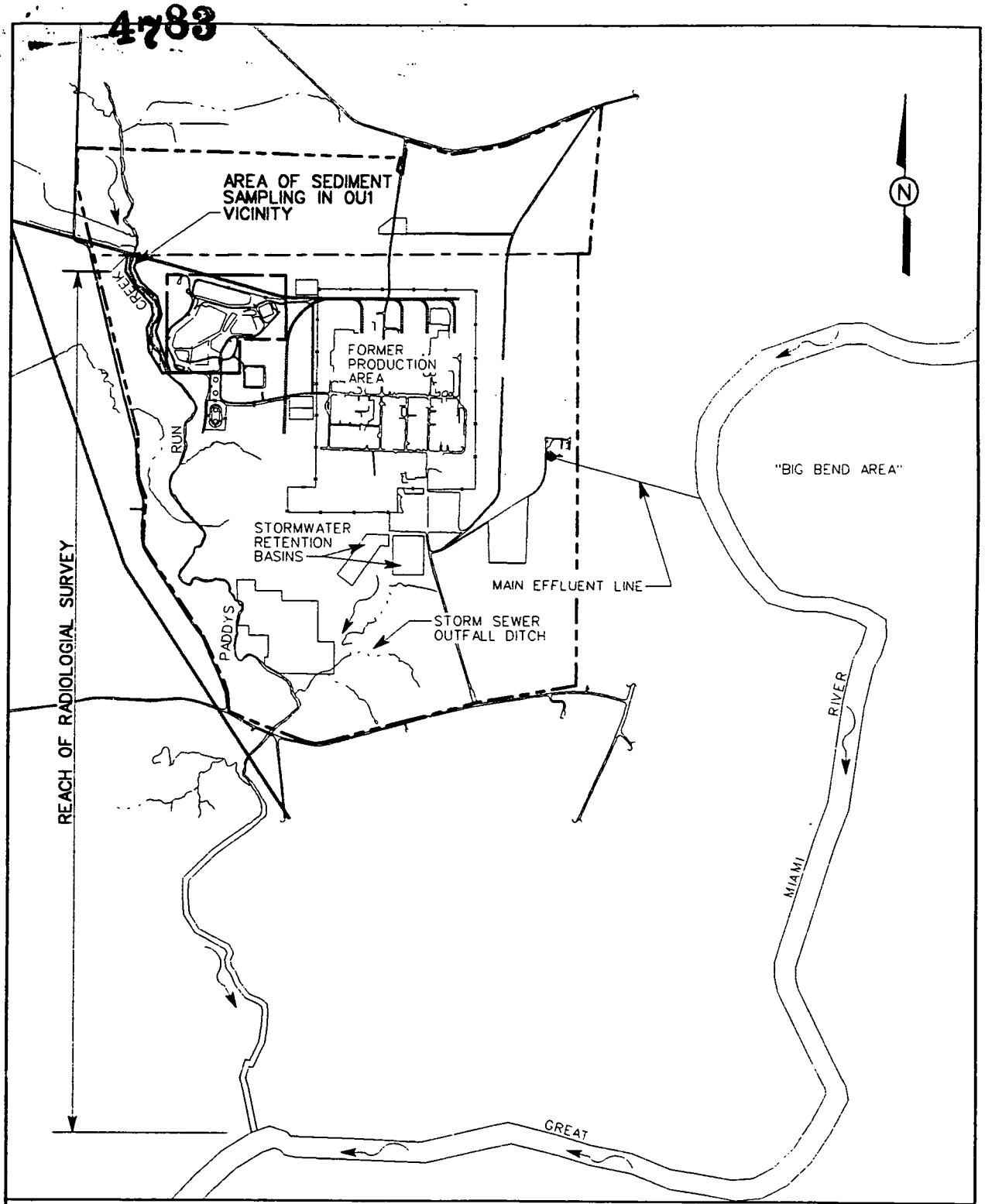
LEGEND:

- DRAINAGE WAY
- CSX RAIL LINE
- DIRECTION OF FLOW
- OPERABLE UNIT 1 OUTLINE
- FEMP PROPERTY BOUNDARY

- ▲ SAMPLED 1979-1991
- ● SAMPLED 1985-1991
- ■ SAMPLED 1988-1989

400113-A-GB /OU1/00X/00 8/17/93 10:00:00 AM

FIGURE 2-6. FEMP ENVIRONMENTAL MONITORING SURFACE WATER SAMPLING LOCATIONS



NOTES:

1. RADIATION SURVEY EXTENDS FROM SOUTH OF CSX RAIL LINE BRIDGE TO THE CONFLUENCE OF PADDYS RUN CREEK AND THE GREAT MIAMI RIVER.
2. SAMPLES RETRIEVED AT 100' INTERVALS FOR 1200' DIRECTLY WEST OF THE FEMP.
3. DIRECT RADIATION WALK-OVER CONDUCTED ALONG ENTIRE SURVEY REACH.

SCALE:
NOT TO SCALE

LEGEND:
- DRAINAGE WAYS
- CSX RAIL LINE
- DIRECTION OF FLOW
- OPERABLE UNIT 1 OUTLINE
- FEMP PROPERTY BOUNDARY

400153-A-04 / OU1 / KNOX / DS
400153-A-04 / 09/29/03 GP

FIGURE 2-7. 1986 RADIOLOGICAL SURVEY OF PADDYS RUN CREEK

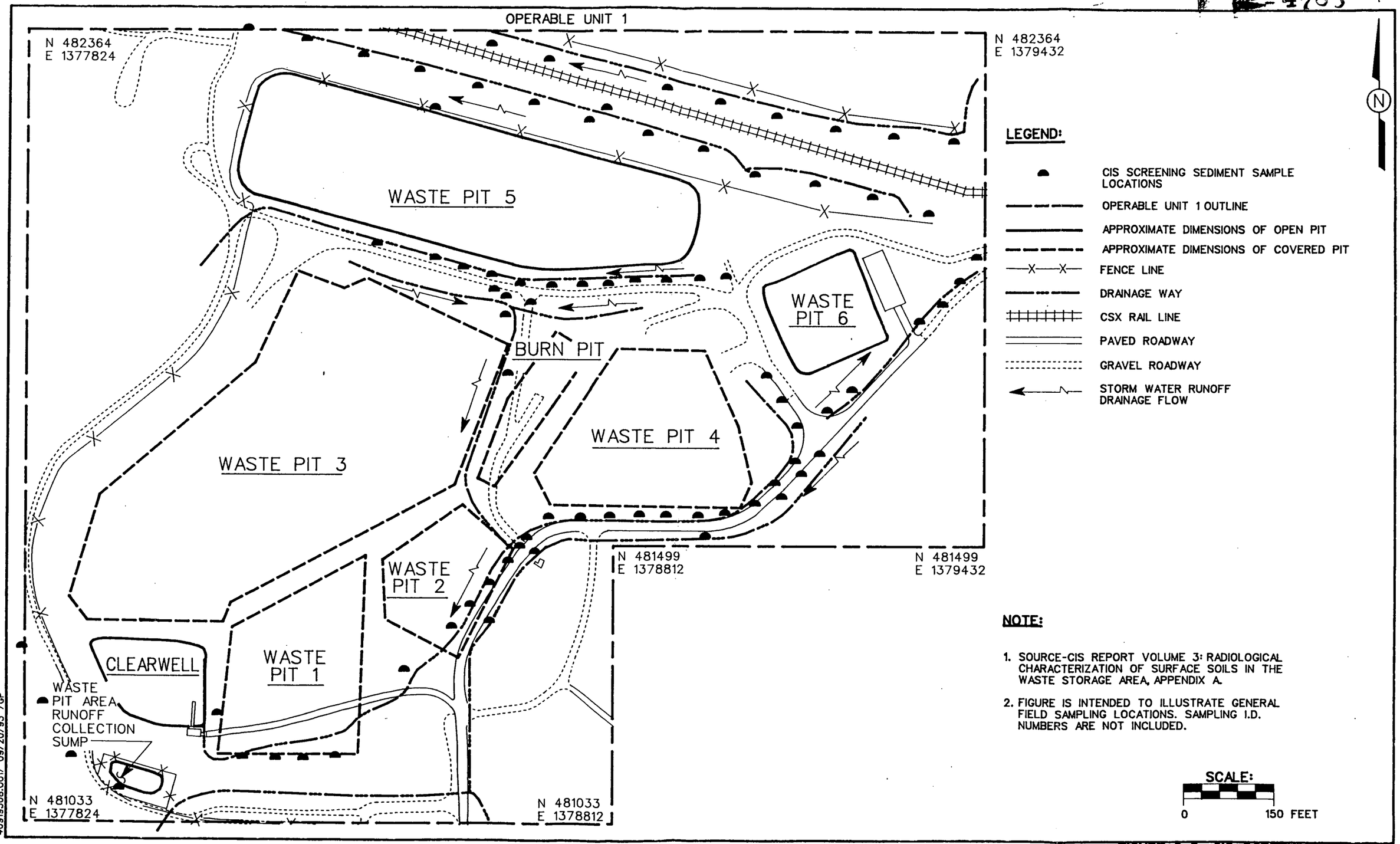


FIGURE 2-8. CIS SCREENING SEDIMENT SAMPLING LOCATIONS

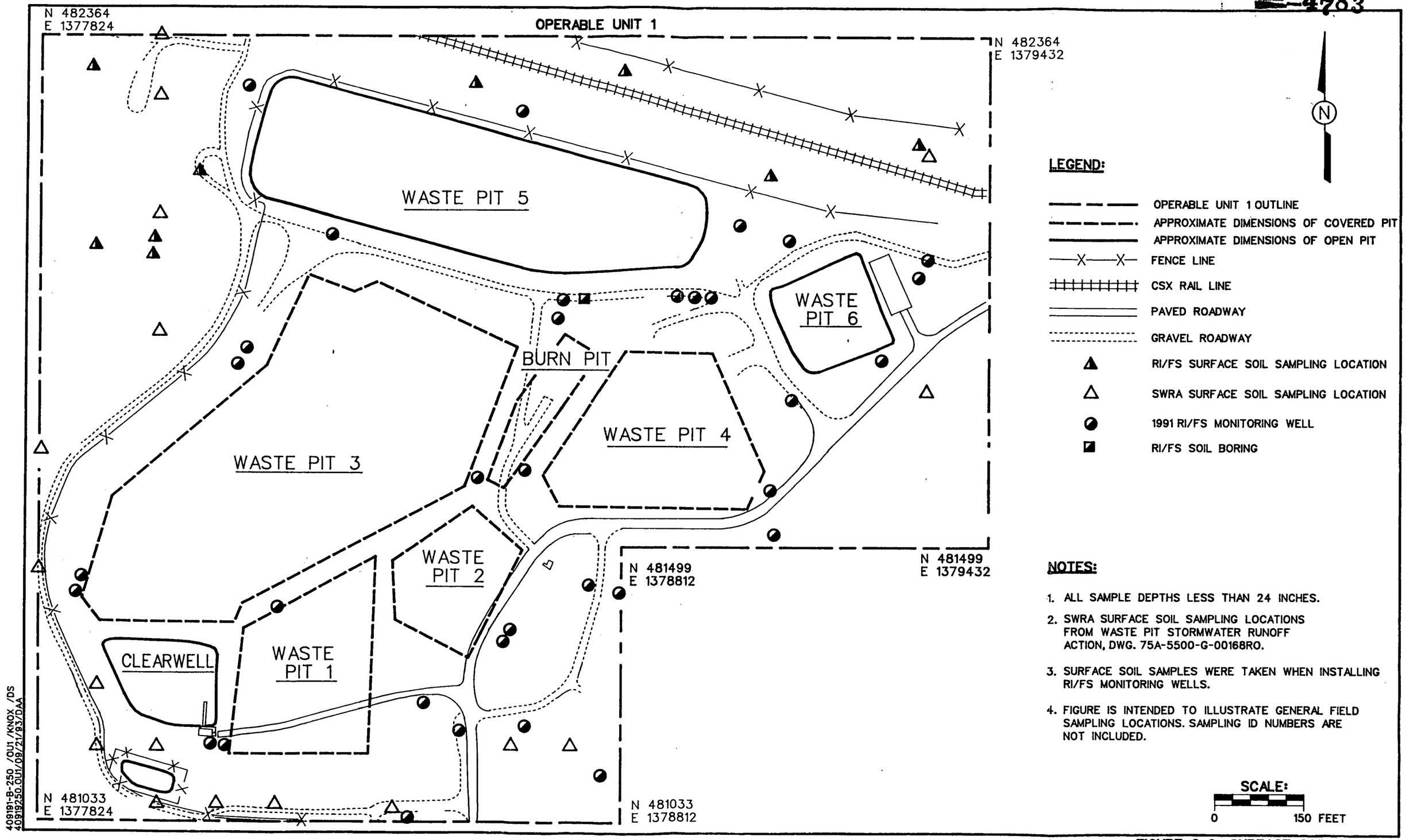


FIGURE 2-9. SURFACE SOIL SAMPLING LOCATIONS

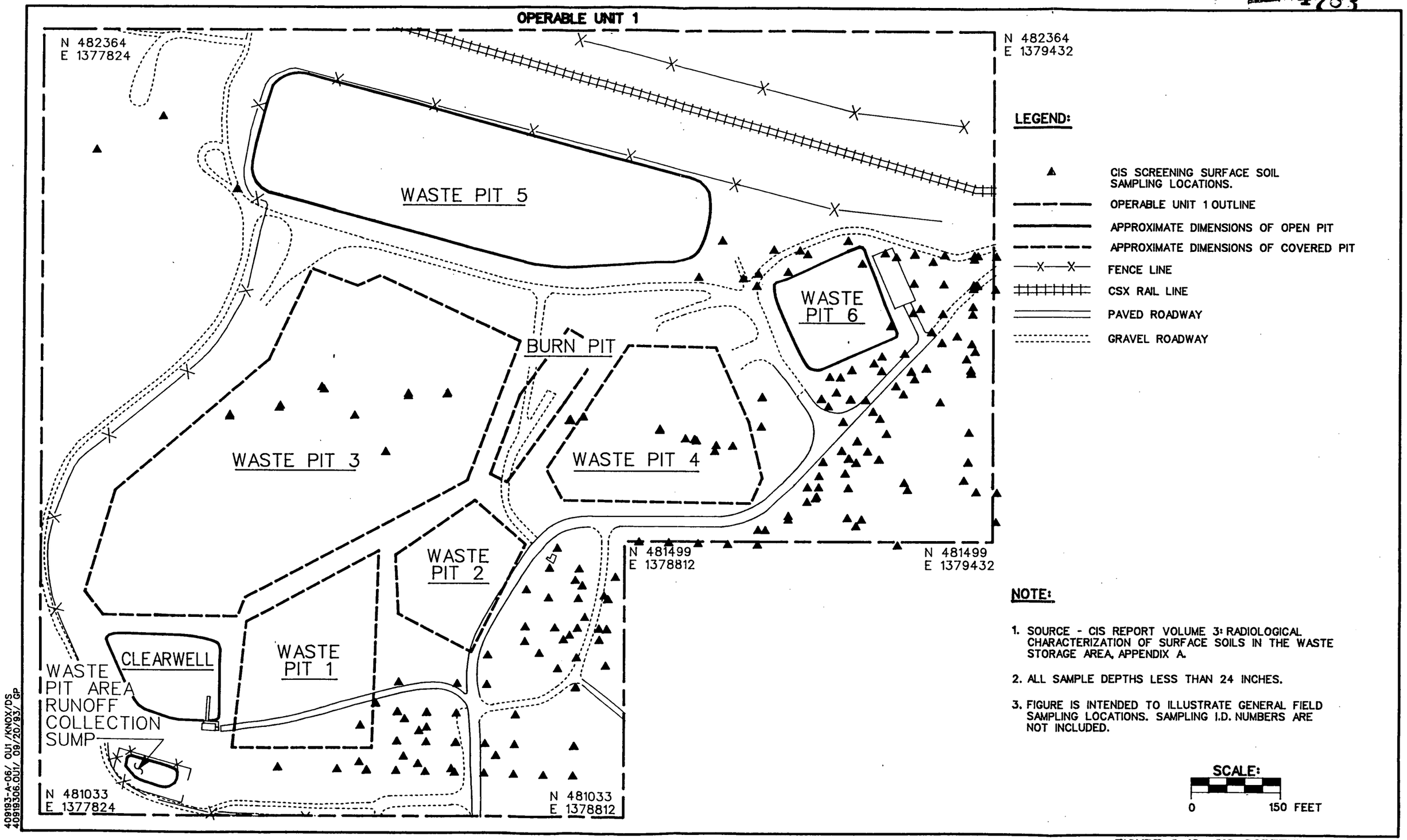
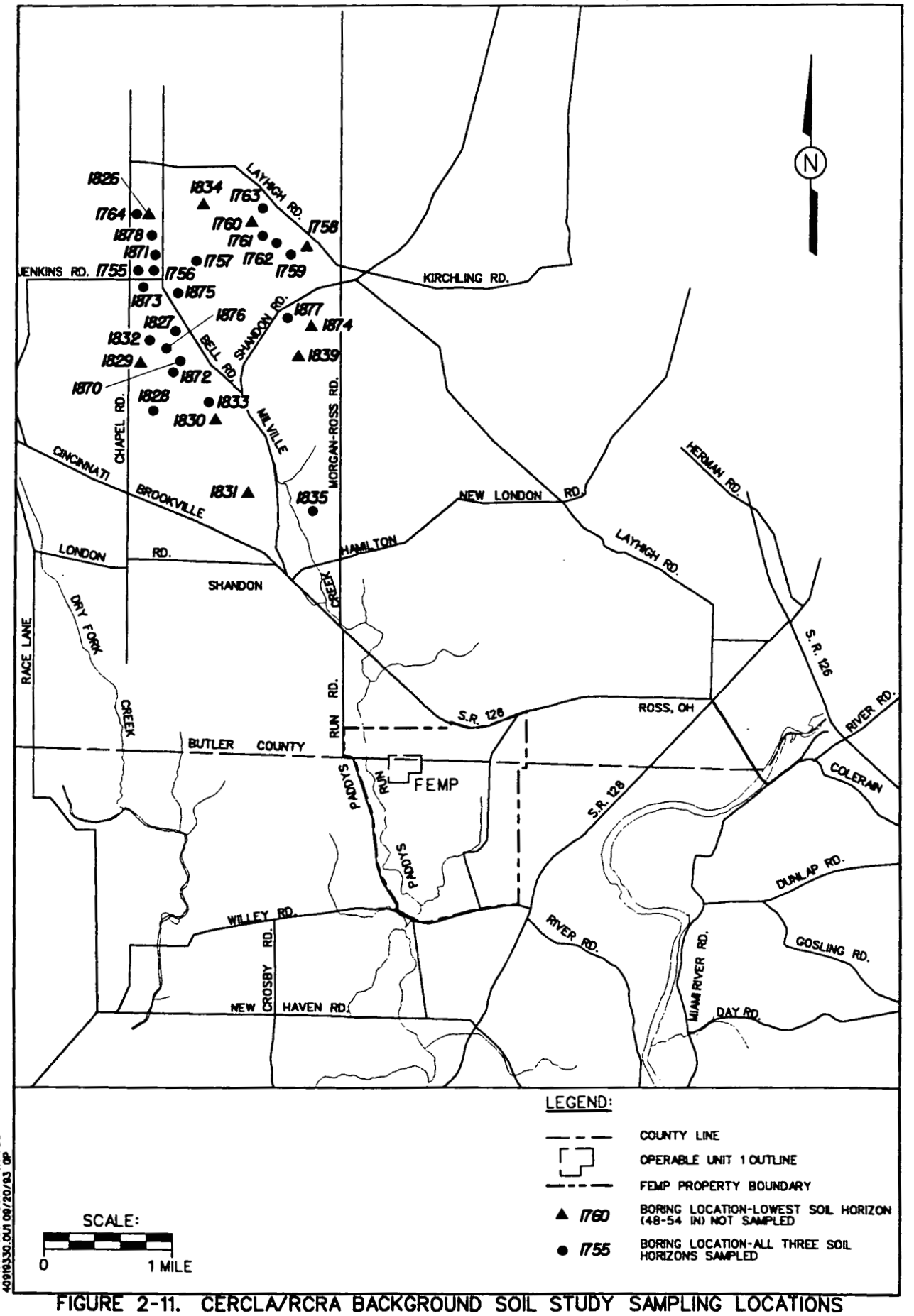
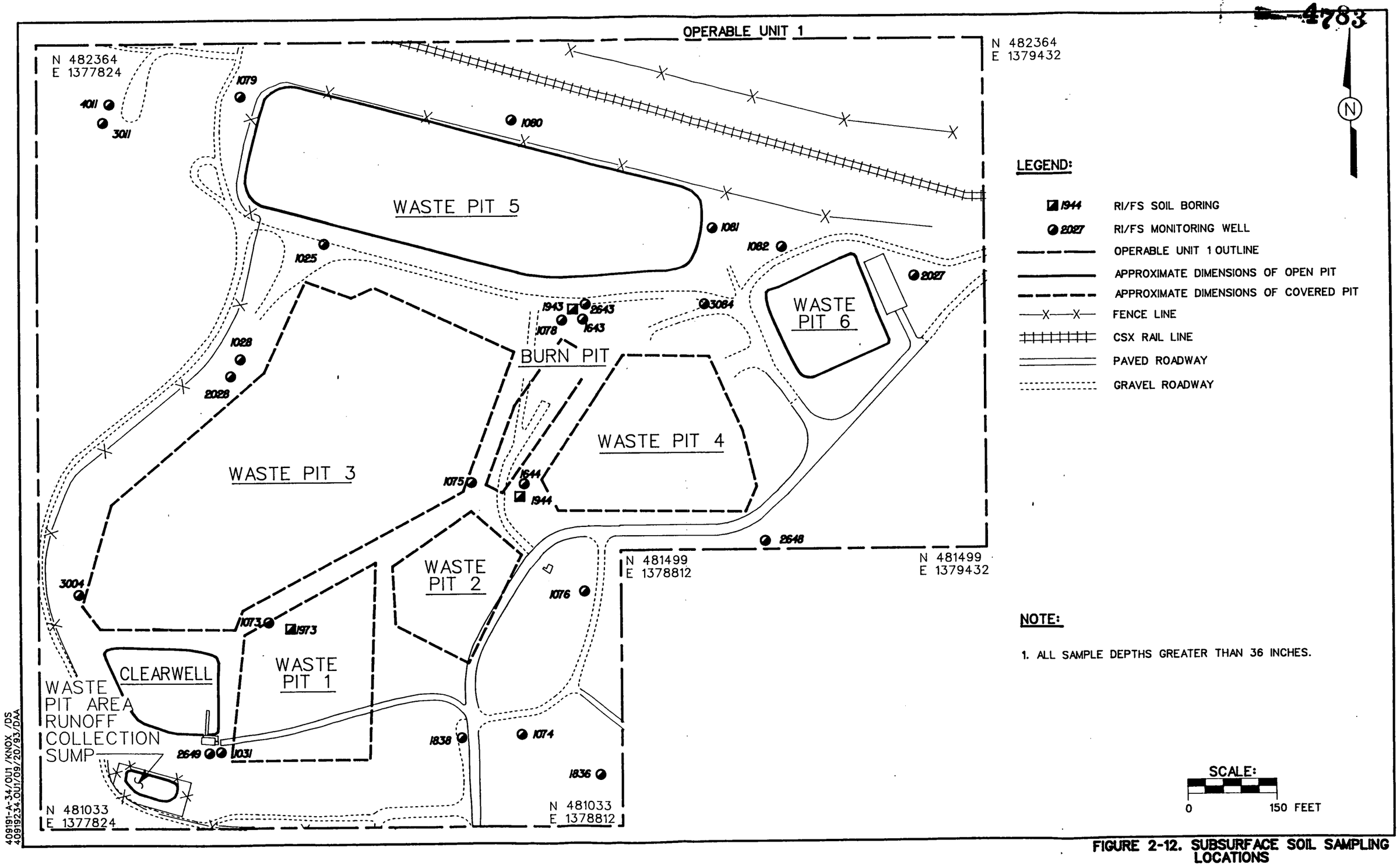


FIGURE 2-10. CIS SCREENING SURFACE SOIL SAMPLING LOCATIONS.



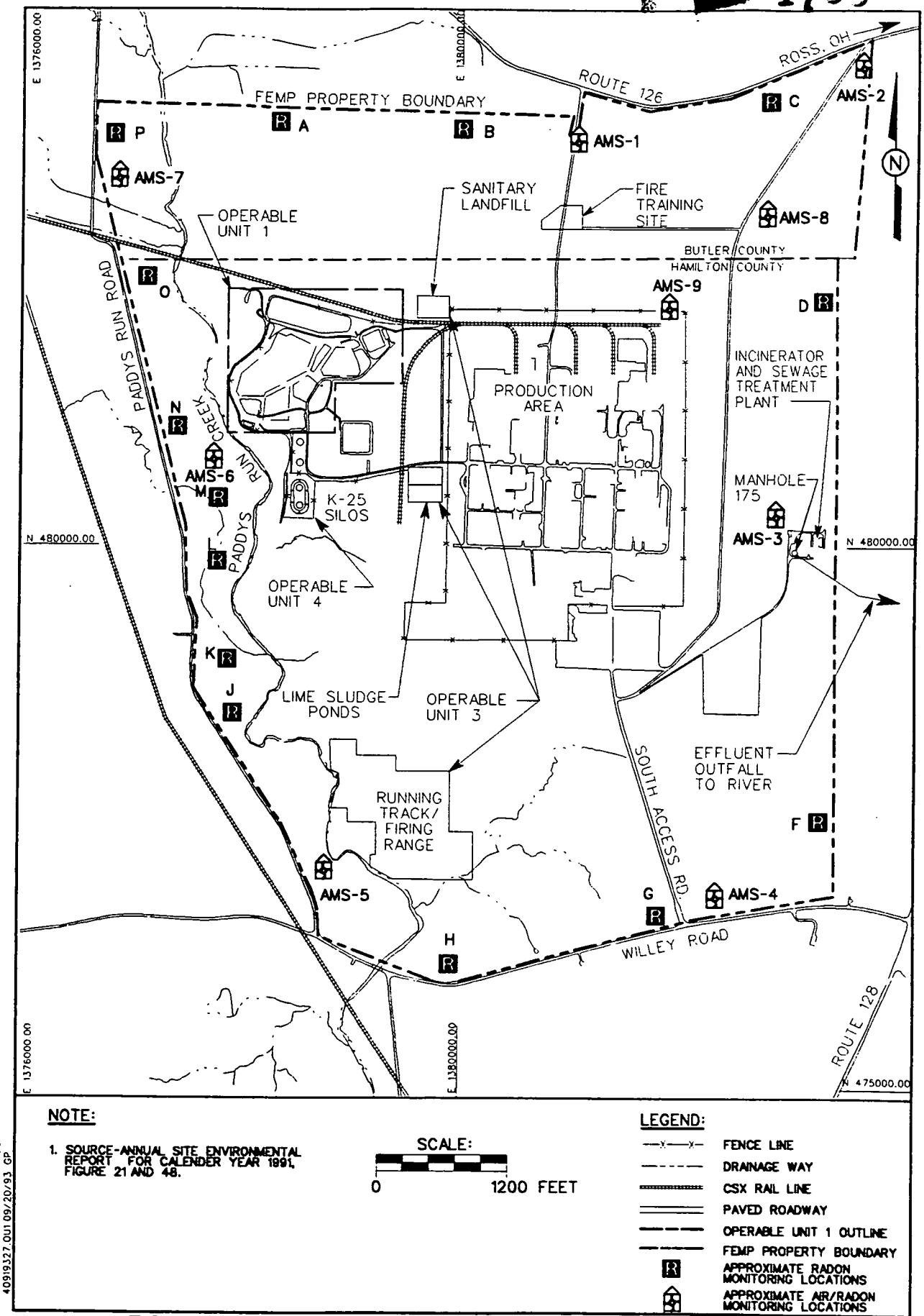
409181-A-330 /OU1 /KNOX /DS
409181330.OU1 09/20/93 GP

FIGURE 2-11. CERCLA/RCRA BACKGROUND SOIL STUDY SAMPLING LOCATIONS



409191-A-34/OU1 /KNOX /DS
409192-34.OU1/09/20/93/DAA

FIGURE 2-12. SUBSURFACE SOIL SAMPLING LOCATIONS



NOTE:

1. SOURCE-ANNUAL SITE ENVIRONMENTAL REPORT FOR CALENDER YEAR 1991, FIGURE 21 AND 48.

SCALE: 0 — 1200 FEET

LEGEND:

- FENCE LINE
- DRAINAGE WAY
- CSX RAIL LINE
- PAVED ROADWAY
- OPERABLE UNIT 1 OUTLINE
- FEMP PROPERTY BOUNDARY
- APPROXIMATE RADON MONITORING LOCATIONS
- APPROXIMATE AIR/RADON MONITORING LOCATIONS

409191-A-327 /OU1/KNOX /DS
40919327.OU1 09/20/93 GP

FIGURE 2-13. ON-SITE RADON/AIR MONITORING LOCATIONS

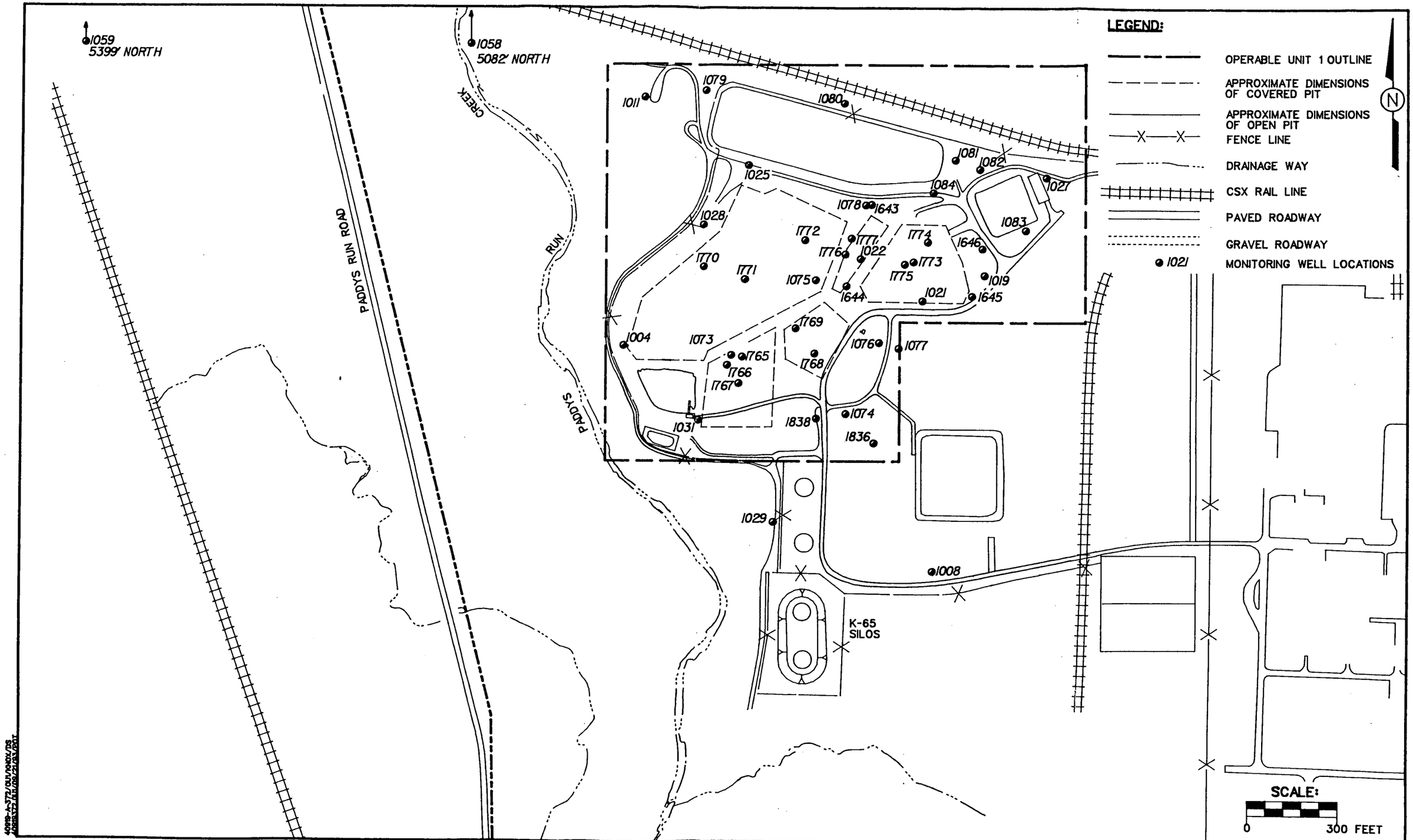


FIG 2-14. PERCHED WATER SAMPLING LOCATIONS (1000 SERIES WELLS)

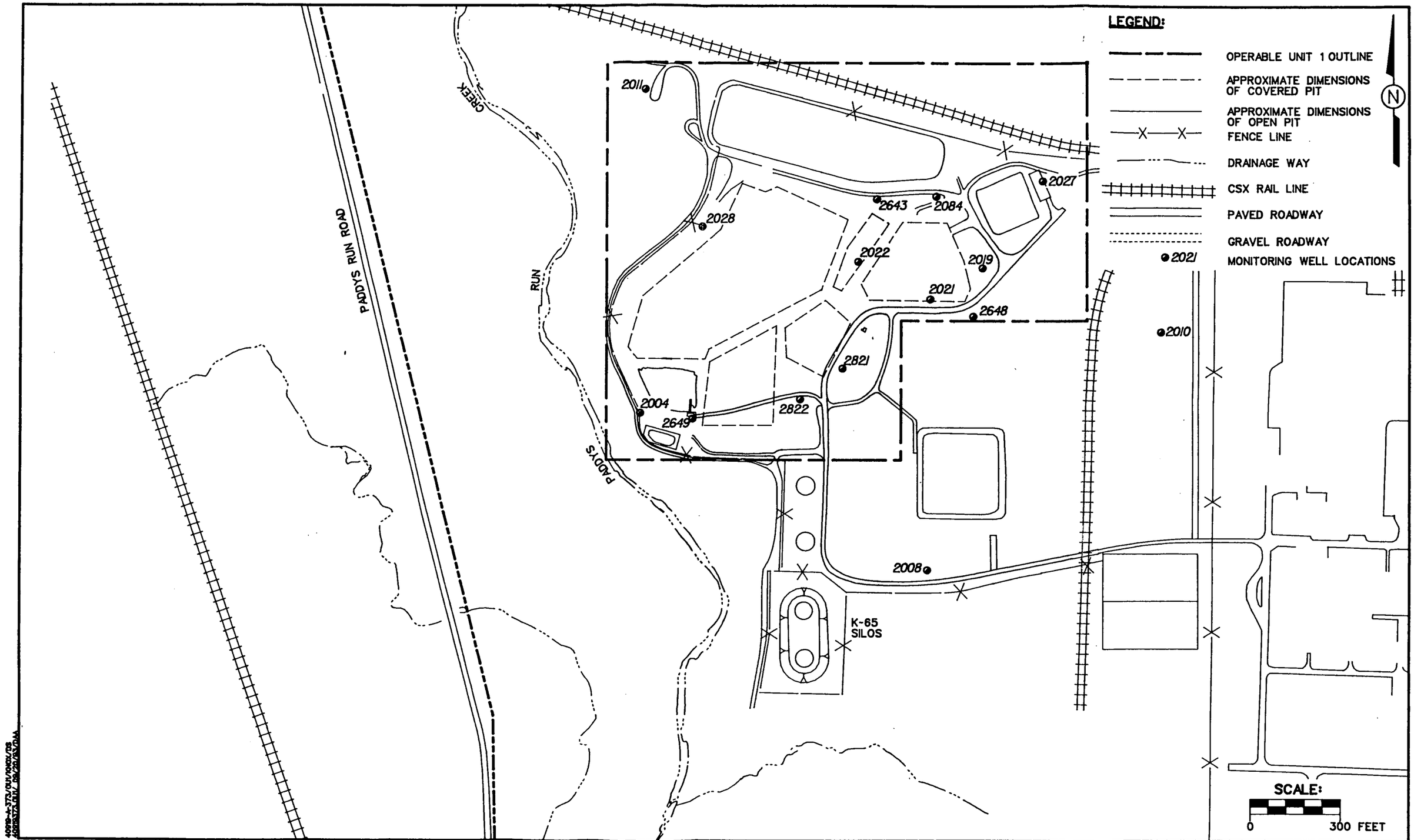


FIG 2-15. GROUNDWATER SAMPLING LOCATIONS (2000 SERIES WELLS)

247

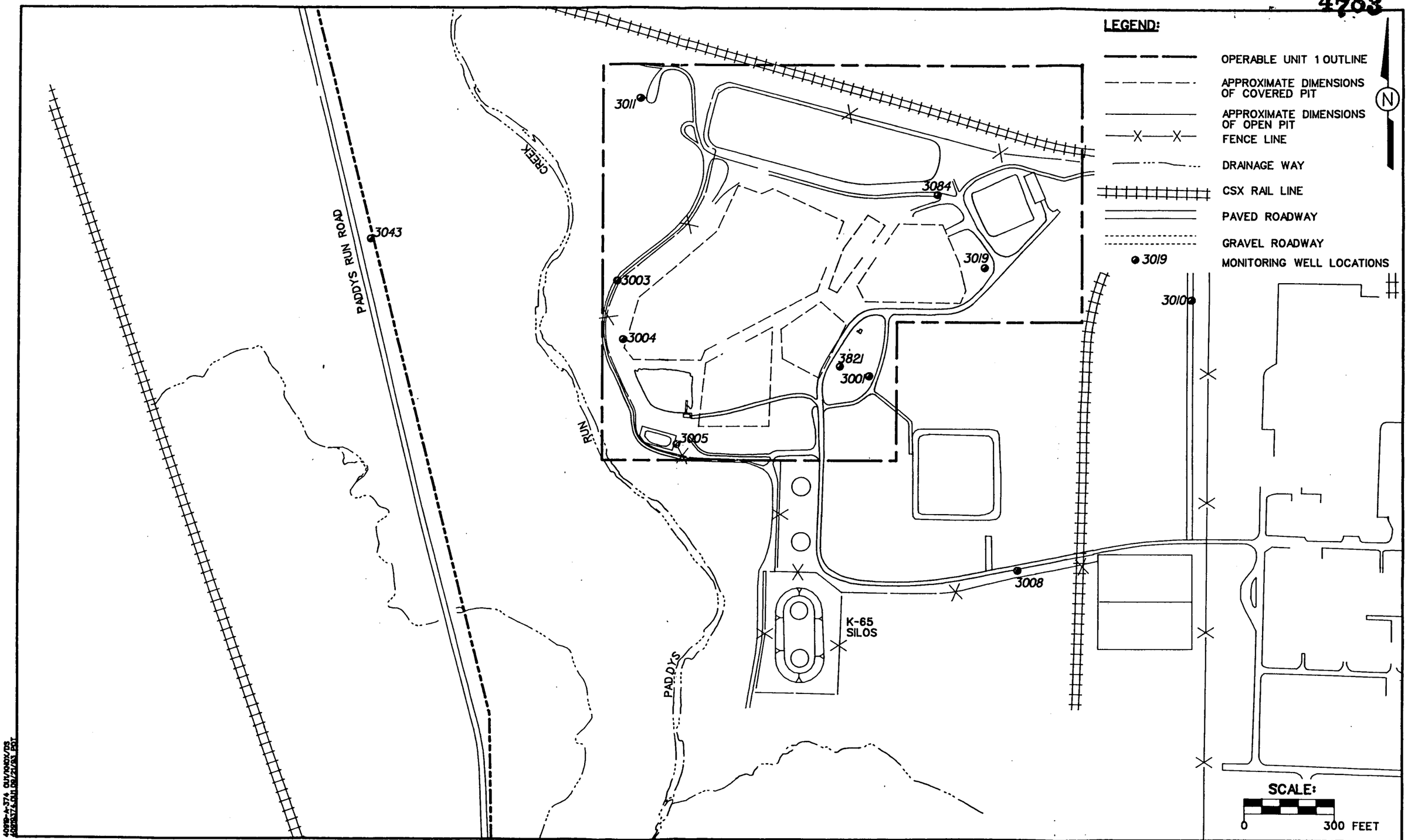


FIG 2-16. GROUNDWATER SAMPLING LOCATIONS (3000 SERIES WELLS)

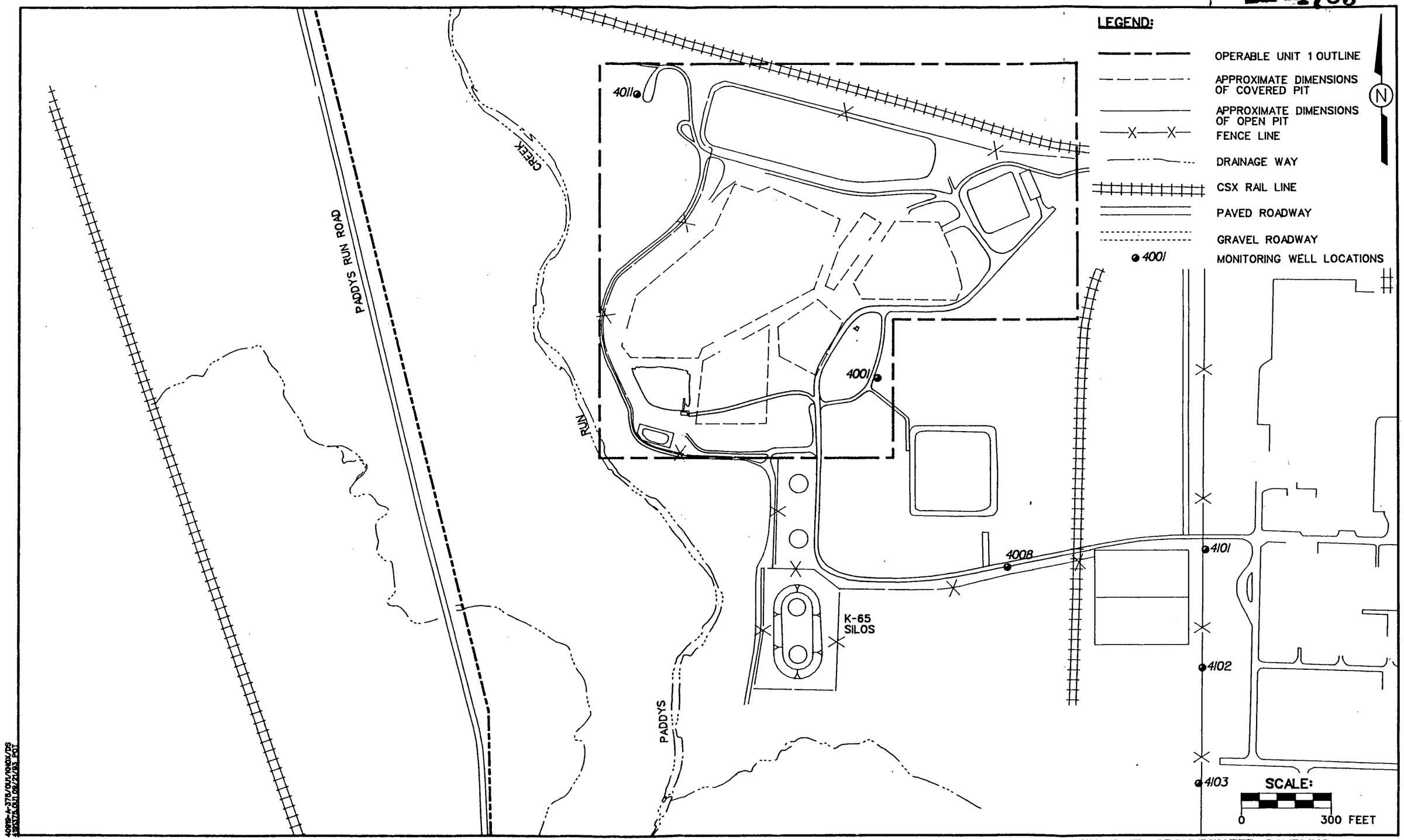
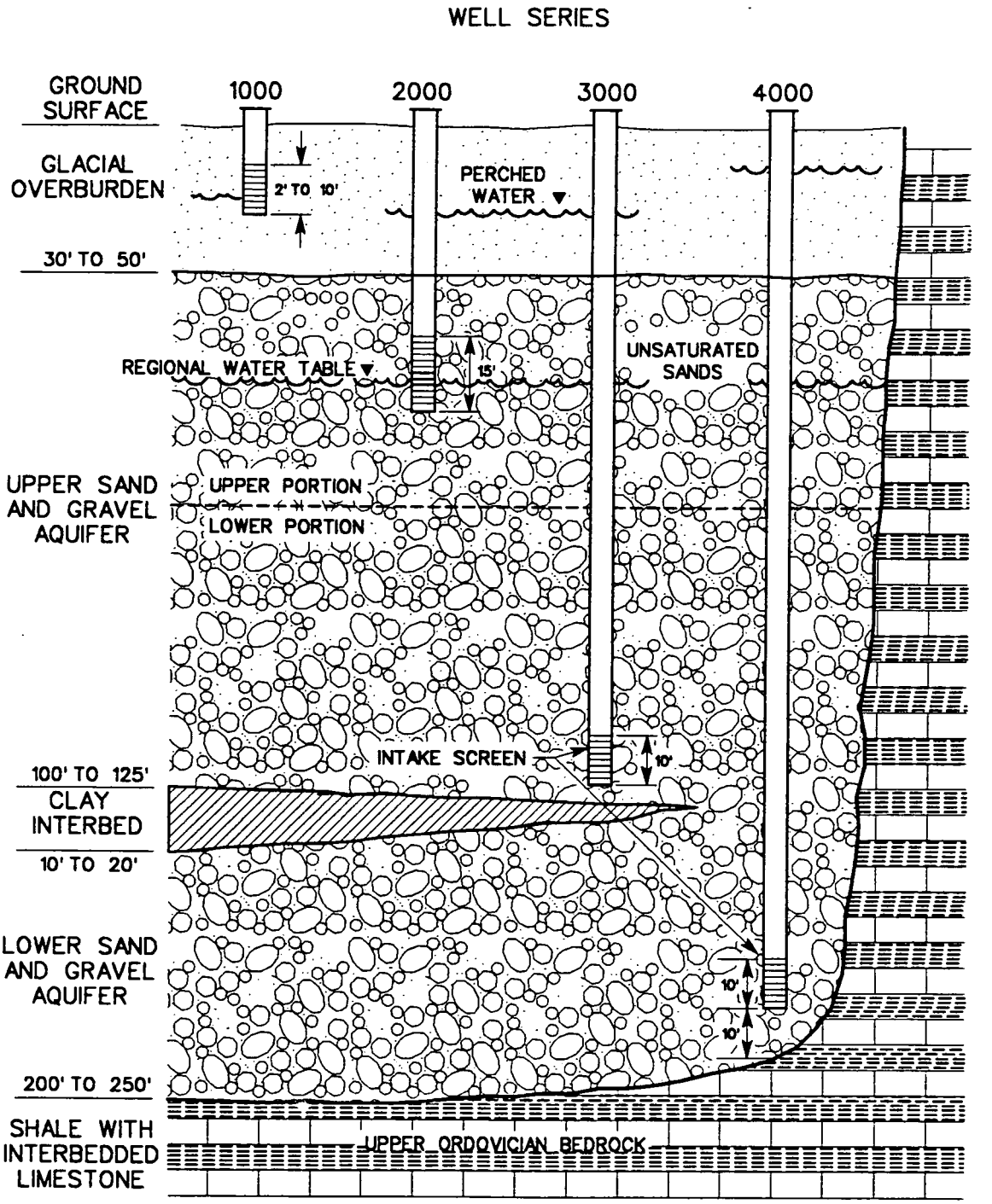


FIG 2-17. GROUNDWATER SAMPLING LOCATIONS (4000 SERIES WELLS)

249



NOTE:

1. SOURCE-1981 RCRA ANNUAL REPORT.

FIGURE 2-18. GROUNDWATER MONITORING WELL COMPLETION DEPTHS

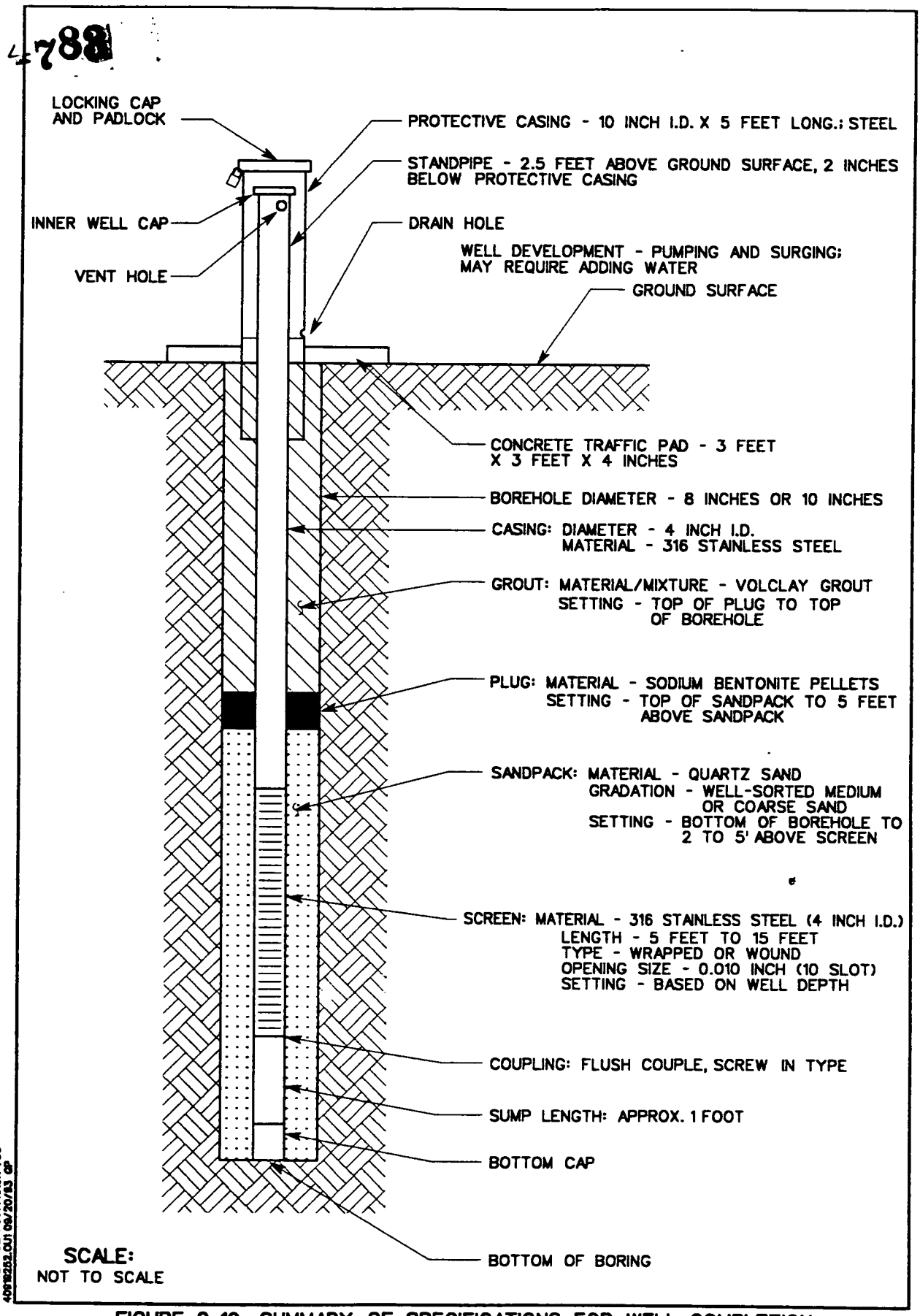


FIGURE 2-19. SUMMARY OF SPECIFICATIONS FOR WELL COMPLETION 1000/2000 SERIES WELLS

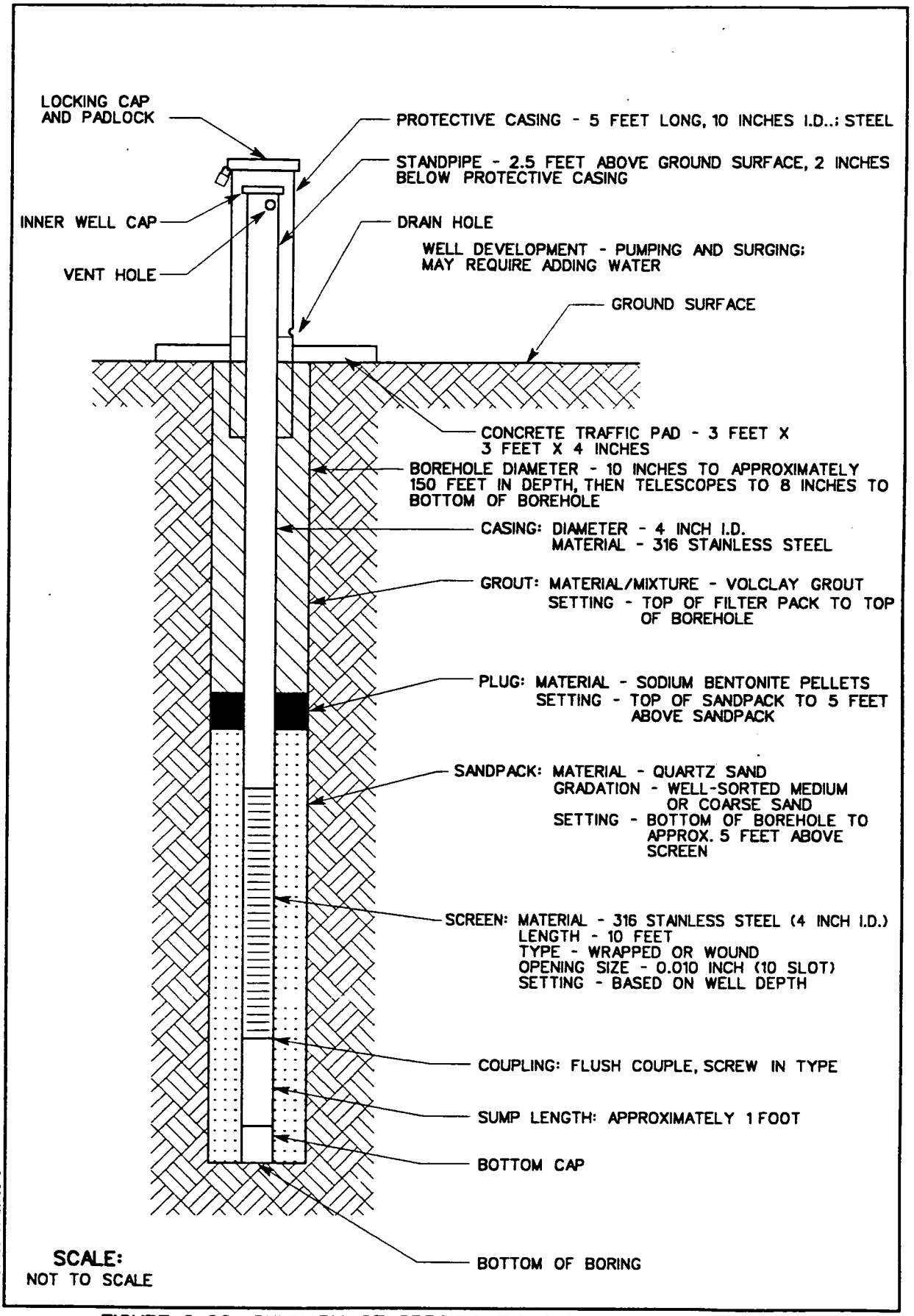


FIGURE 2-20. SUMMARY OF SPECIFICATIONS FOR WELL COMPLETION 3000/4000 SERIES WELLS

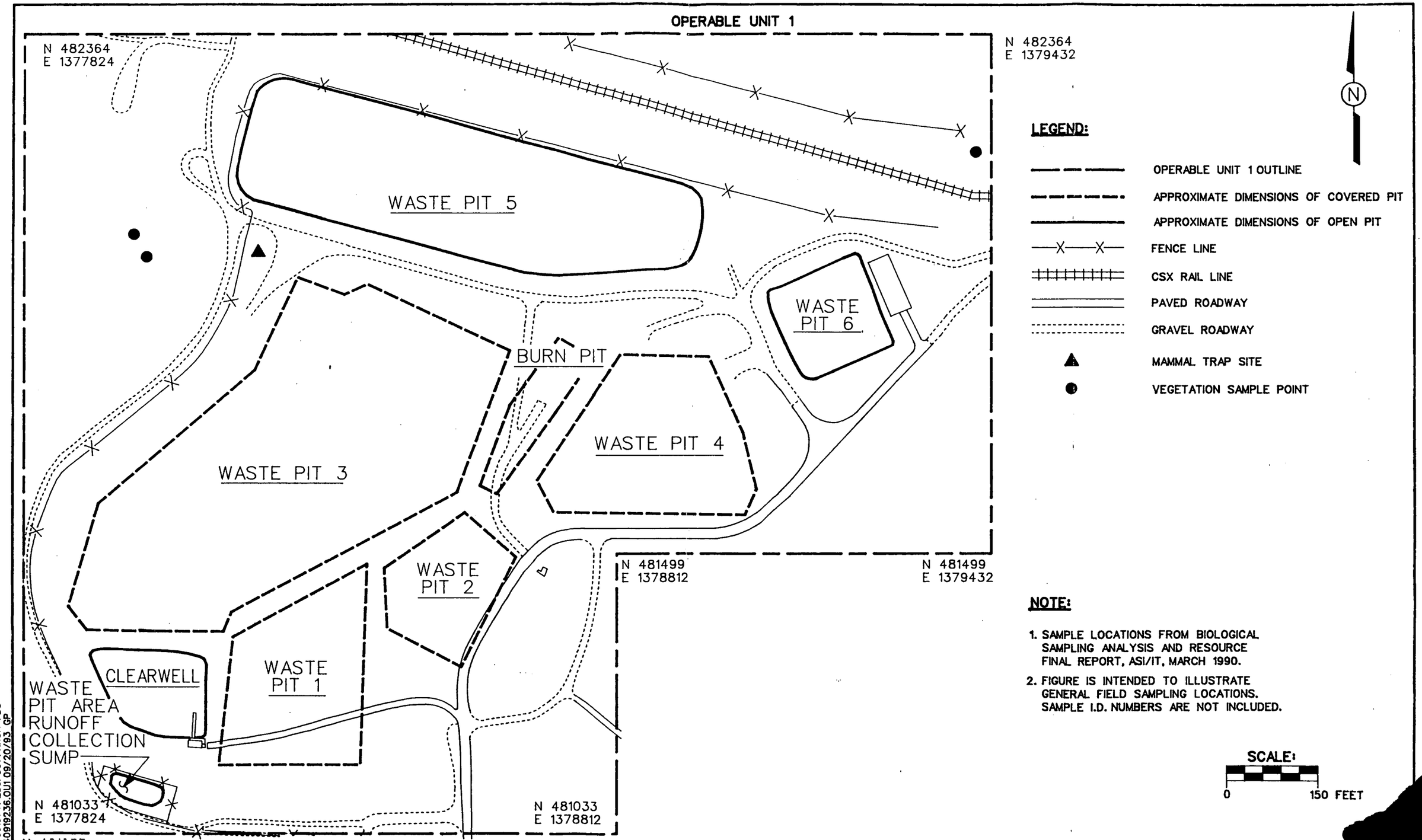
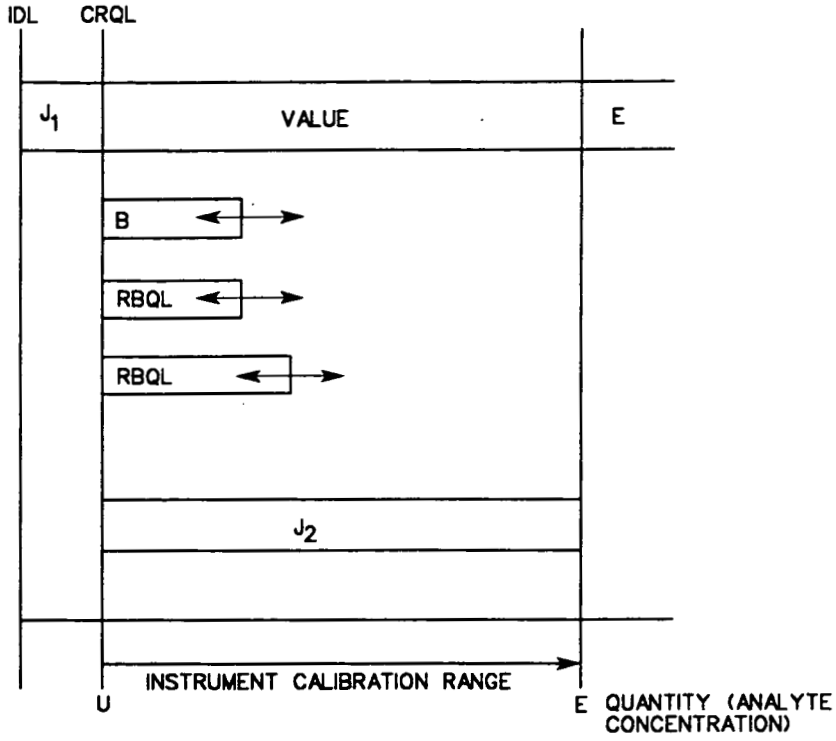


FIGURE 2-21. ECOLOGICAL SAMPLING LO



NOTES

VALUE RANGE IN WHICH A RESULT WITHOUT A QUALIFIER CAN BE EXPECTED.

IDL INSTRUMENT DETECTION LIMIT-QUANTITY ABOVE WHICH AN ANALYTE IN A CLEAN MATRIX CAN BE IDENTIFIED, BUT NOT QUANTIFIED WITH CERTAINTY (APPROXIMATELY 2 TIMES INSTRUMENT NOISE). THIS CAN VARY WITH ENVIRONMENTAL CHANGES OF PRESSURE, TEMPERATURE, AND HUMIDITY. (NOTE: A CLEAN MATRIX IS WHEN SAMPLE PEAKS ARE WELL-DEFINED AND DO NOT OVERLAP).

CRQL CONTRACT-REQUIRED QUANTIFICATION LIMIT-QUANTITY ABOVE WHICH AN ANALYTE IN A CLEAN MATRIX CAN BE QUANTIFIED WITH CERTAINTY (APPROXIMATELY 5 TIMES INSTRUMENT NOISE). THIS AMOUNT DOES NOT VARY WITH ENVIRONMENTAL FACTORS. THE LOWER LIMIT OF THE CALIBRATION RANGE IS OFTEN SET AT THE CRQL.

RBQL RISK-BASED QUANTIFICATION LIMIT-CALCULATED VALUE ABOVE WHICH AN ANALYTE CONCENTRATION POSES A RISK TO HUMAN HEALTH.

SQL SAMPLE QUANTIFICATION LIMIT-SAMPLE SPECIFIC QUANTITY. ANALYTE CAN BE IDENTIFIED BUT NOT QUANTIFIED WITH CERTAINTY BELOW THE SQL. USUALLY IT EQUALS OR IS LESS THAN THE CRQL (FOR CLEAN MATRICES), BUT SUCH AS MATRIX INTERFERENCES AND DILUTION CAN INCREASE THE SQL.

J_1 REPORTED VALUE WAS ESTIMATED BY THE LABORATORY. COMPOUND WAS SEEN ABOVE THE IDL, BUT BELOW THE CRQL.

J_2 REPORTED VALUE WAS ESTIMATED BY THE LABORATORY. ANALYTE WAS SEEN, BUT SLIGHTLY OUTSIDE OF QA/QC LIMITS; IN THE CHEMIST'S PROFESSIONAL JUDGMENT, THE RESULT WARRANTED REPORTING.

U ANALYZED FOR, BUT NOT DETECTED. REPORTED VALUE IS AT SQL OR CRQL, WHICHEVER IS HIGHER.

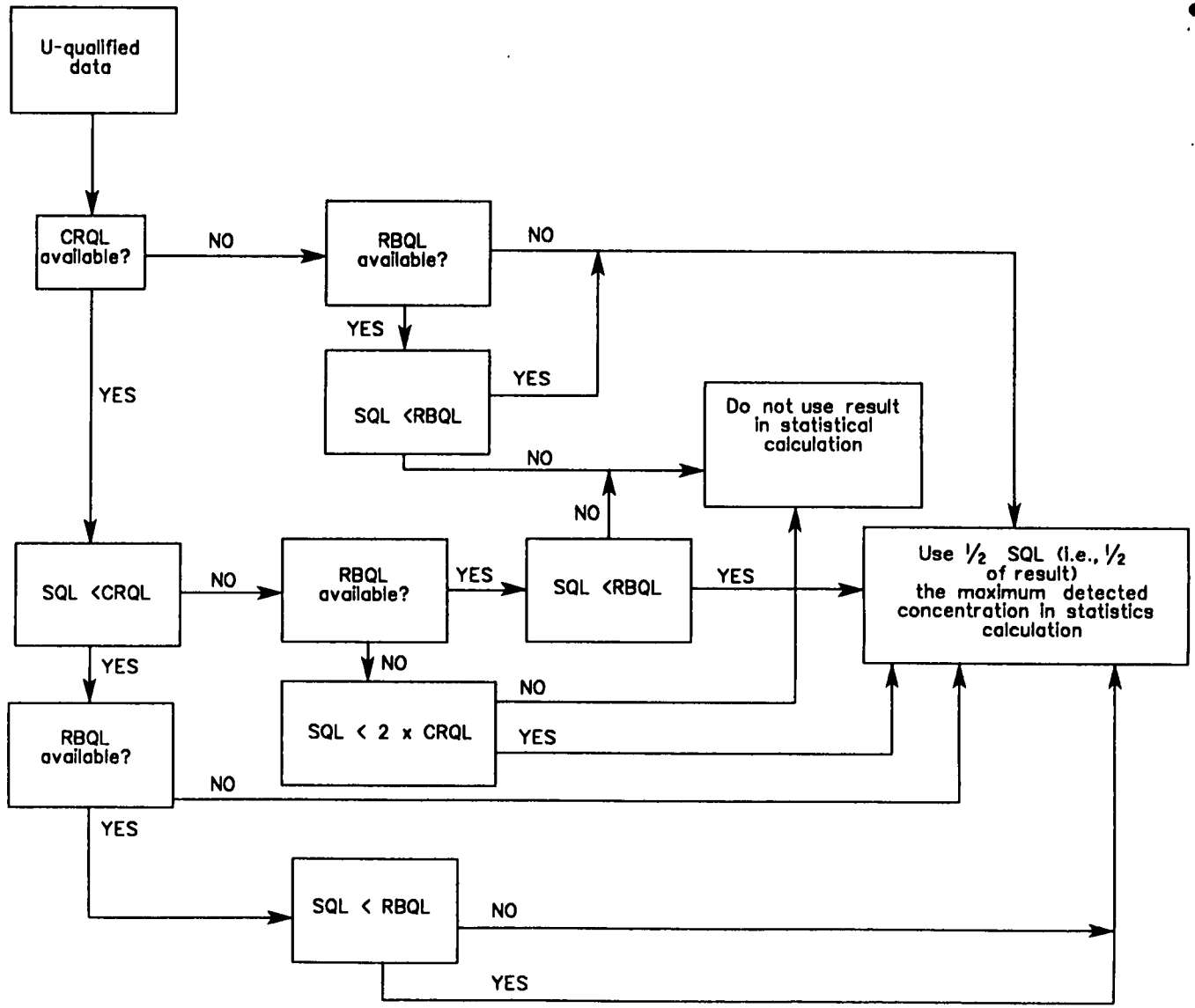
B ANALYTE WAS SEEN IN ASSOCIATED BLANK AS WELL AS IN SAMPLE. QUANTITY REPORTED MAY BE INDICATIVE OF LABORATORY CONTAMINATION AND NOT SITE CONTAMINATION. FUTHER INVESTIGATION IS NEEDED.

E REPORTED VALUE IS ESTIMATED. QUANTITY REPORTED EXCEEDS RANGE OF INSTRUMENT CALIBRATION. SAMPLE MAY REQUIRE DILUTION AND REANALYSIS.

⟷ INDICATES THAT THESE LIMITS CAN INCREASE OR DECREASE WITH EACH SAMPLE ANALYZED.

409193-A-B4 /0U1 /0K0X /DS
40916384.0U1 08/15/93/DAA

FIGURE 2-22. REPORTING RESULTS: QUALIFIERS AND QUANTITATION LIMITS



NOTES:

U-NON-DETECT

CRQL- CONTRACT REQUIRED QUANTIFICATION LIMIT

SQL-SAMPLE QUANTIFICATION LIMIT

RBQL- RISK BASED QUANTIFICATION LIMIT

40019385.OUT/0K01/DS
40019-A-385/08/15/93/DAA

FIGURE 2-23. DECISION TREE FOR QUANTIFYING U QUALIFIED DATA

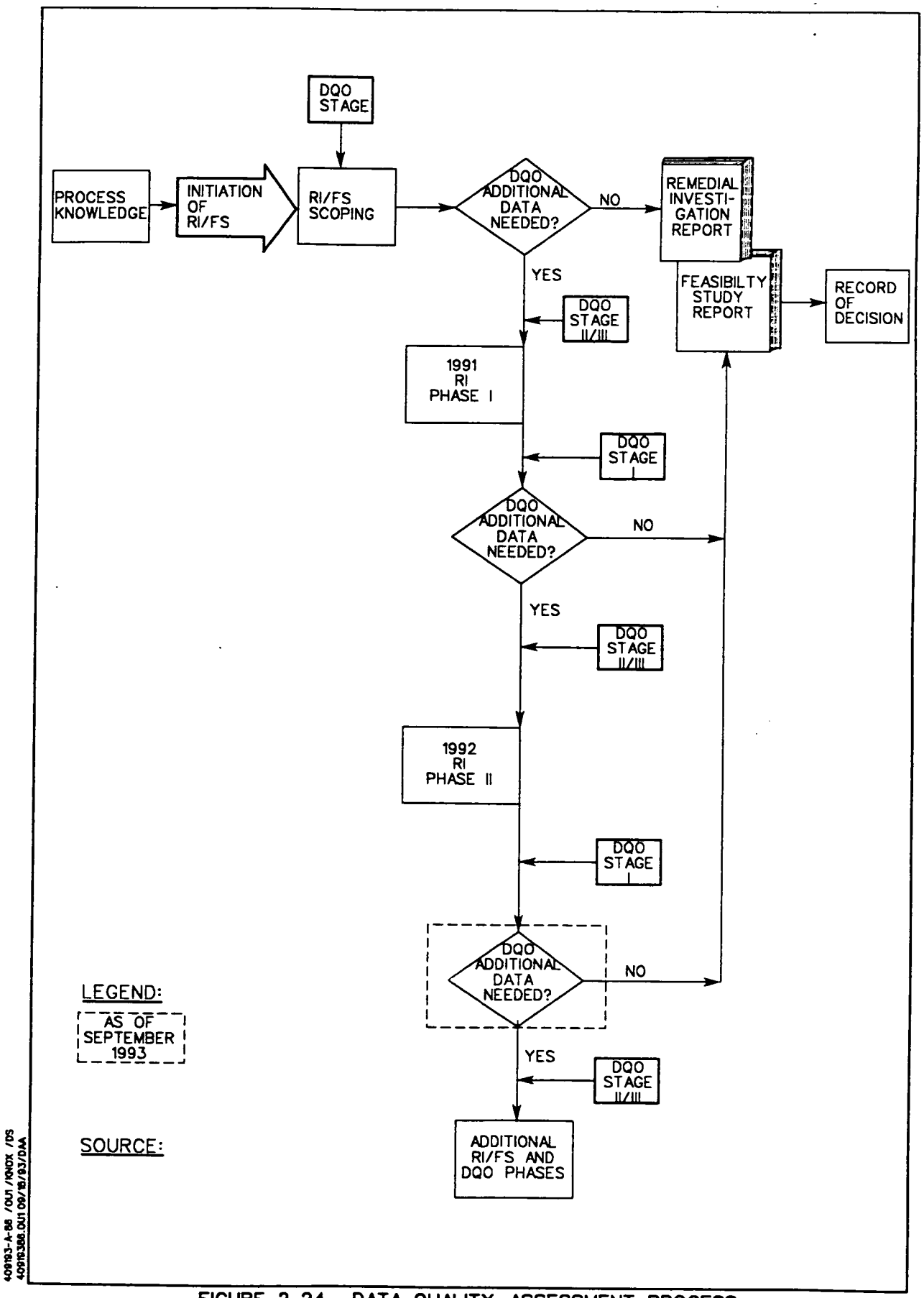


FIGURE 2-24. DATA QUALITY ASSESSMENT PROCESS

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

This section describes the physical characteristics of Operable Unit 1, which comprises the waste pits, Burn Pit, Clearwell, and the specified surrounding environment and the environment of the FEMP area. The following discussions define the physical characteristics of the waste pit contents and the important physical characteristics of the FEMP area that must be understood in order to evaluate potential transport pathways, receptor populations, and exposure scenarios in transport models, risk assessment, and evaluation of remedial action alternatives.

Section 1.0 of this report presents a detailed construction and operational history of the waste pits, the Clearwell, and the Burn Pit. Section 3.1 describes the physical characteristics of the waste pit contents. The discussion is based on information obtained from historic records and data collected primarily during the CIS and RI environmental drilling investigations. The drilling and sampling methodology for the previously mentioned investigations are discussed in Section 2.0 of this report.

Sections 3.2 through 3.6 describe environmental characteristics and include details for areas outside the physical boundaries of the FEMP and Operable Unit 1 because some characteristics cannot be addressed in operable-unit-specific terms. For example, the discussion of air, groundwater, and surface water cannot be limited to operable unit geographical boundaries. Site-wide data required for the analyses of potential impacts of site-wide remedial activities are contained in the SWCR (DOE 1992b). This report contains detailed technical appendices that include site-specific studies of wetlands, threatened and endangered species, and population estimates.

3.1 PHYSICAL CHARACTERISTICS OF THE WASTE PITS

The following discussion provides a summary of the physical characteristics of the waste residues within Waste Pits 1 through 6, the Burn Pit, and the Clearwell. The discussion also examines the structural integrity of the waste storage area berms located around Waste Pits 3 and 5, and the Clearwell. A general physical description of the waste pits is based on available geotechnical data. See Figure 3-1 for cross-section locations. An interpretation of the waste contents in Waste Pits 1 through 4 and the Burn Pit are shown in Figures 3-2 through 3-6. Geotechnical data on the waste material is summarized in Table 3-1.

3.1.1 Waste Pit 1

Historic records indicate that Waste Pit 1 received radioactive wastes such as neutralized filter cakes, sump cakes, depleted MgF_4 slag, scrap graphite, and contaminated brick. The volume of waste material in Waste Pit 1 is approximately 48,500 cubic yards.

A review of the boring logs indicates that the maximum depth of the waste material in this pit is 18 feet. The material encountered is very dark gray in color predominantly of silt- and clay-size

consistency. The color of the material occasionally changed, in two borings, from dark gray to green. Moisture content of geotechnical samples averaged 21 percent. Waste Pit 1 is covered with 0.5 feet of clean fill. The depth to saturation in Waste Pit 1 leachate wells is approximately 3 feet.

3.1.2 Waste Pit 2

Historic records indicate that Waste Pit 2 received wastes including neutralized filter cakes, sump cakes, depleted MgF_4 slag, and dust collector residue—similar to what was disposed of in Waste Pit 1. The approximate volume of the waste is approximately 24,200 cubic yards.

Based on boring data, the maximum depth of the waste material in Waste Pit 2 is 15 feet. The upper portion of the waste, approximately 4 feet thick, is brown in color. Pieces of concrete were encountered in some of the borings. The material in Waste Pit 2 also includes a yellowish brown, olive brown, very pale brown, and white heterogeneous mixture of what appears to be silty clays. Waste Pit 2 is covered with 1 to 4 feet of clean fill. The depth to saturation in Waste Pit 2 leachate wells is approximately 1.5 feet.

3.1.3 Waste Pit 3

Historic records indicate that Waste Pit 3 received lime neutralized raffinate, lime sludge, slag leach residues, filter cakes, and flyash. The volume of waste material in Waste Pit 3 is approximately 204,100 cubic yards.

Near the surface, the waste material is yellowish brown to black or very dark gray, consisting of a mixture of clay and fine sand. Underlying the brown material is very soft or loose, moist to wet material varying in color from reddish brown, brown gray to white, with wood fragments encountered in some boreholes. The depth of the waste material is a maximum of 27 feet. Waste Pit 3 is covered with 14 feet of clean fill. The depth to saturation in Waste Pit 3 varies between 2 and 5 feet.

3.1.4 Waste Pit 4

Historic records indicate that Waste Pit 4 received filter cakes, process residue, contaminated graphite, nonburnable trash, construction rubble, asbestos, and barium chloride salt. The estimated volume of waste material in Waste Pit 4 is 55,100 cubic yards.

The maximum depth of the waste material is 25 feet. A review of the borings indicates that near the surface, the material is a brownish clay mixed with a fine gravel. Pieces of concrete were encountered in some borings. Generally, the material is dense with occurrences of sludge. Waste Pit 4 is covered by an interim measure RCRA cap. The depth to saturation in Waste Pit 4 varies between 8 and 11 feet.

3.1.5 Waste Pit 5

Historic records indicate that Waste Pit 5 received sump slurry, lime sludge, slag leach slurry, and neutralized raffinate. The volume of the waste material is approximately 97,900 cubic yards.

Waste Pit 5 contains water covered sludge. The sludge is semisolid from approximately 2 to 4 feet below the sludge surface to maximum depth. Some sand-size particles were present in the sludge samples collected. The sludge exhibits a variety of colors including brown, green, and gray. The approximate depth of the sludge in Waste Pit 5 is 28 feet.

3.1.6 Waste Pit 6

Historic records indicate that depleted MgF_4 slag, scrap green salt, dust collector residue, and filter cake were disposed of in Waste Pit 6. The volume of the waste material is estimated to be approximately 9600 cubic yards.

The material in this pit consists of sand-size sediment and semisolid sludge material that varies in color from red to brown to black. The waste material in Waste Pit 6 is 20 feet deep and is covered with water.

3.1.7 Burn Pit

Historic records indicate that the Burn Pit was excavated to provide material to line Waste Pits 1 and 2. Subsequently, the Burn Pit was used to dispose of laboratory chemicals and to burn combustible materials, including pyrophoric and reactive chemicals, oils, and other low-level contaminated combustible materials. The depth of waste material in this pit is approximately 26 feet and the volume of waste material is estimated to be 30,300 cubic yards.

A review of the boring logs indicates that near-surface material consists of yellowish and dark brown clay with varying amounts of sand- and silt-size particles. The Burn Pit was backfilled during the construction of Waste Pit 5. The depth to saturation in the Burn Pit is approximately 3 feet.

3.1.8 Clearwell

The Clearwell receives surface water runoff from the waste storage area. The Clearwell was used until March 1987 as a final settling basin for surface water prior to its discharge into the Great Miami River via the FEMP National Pollutant Discharge Elimination System (NPDES) discharge point. The volume of sediment in the Clearwell is estimated to be 3700 cubic yards.

The material in this pit consists of a sediment and semisolid sludge that varies in color from red to brown to black. The Clearwell waste materials are covered by water.

3.1.9 Geotechnical Evaluation of the Waste Pit Berms

An evaluation of the structural integrity of the waste storage area berms located around Waste Pits 3 and 5 and the Clearwell was conducted. The scope of work was divided into three separate activities. The first activity consisted of a field investigation of the subsurface soil and groundwater conditions in and around the berms. The second activity involved geotechnical laboratory testing of soil samples obtained during the field investigation. In the final activity, the slope stability analysis, the data from the field investigation, and laboratory testing were utilized in a computer model to evaluate the potential for slope failure. Results of this study can be found in Waste Pits 3 and 5 and Clearwell Dikes Stability Analysis Report.

The stability analysis determined that all three perimeter berms are structurally stable based on existing berm geometry, soil strength, and groundwater conditions encountered during the subsurface investigation of the area. Eight cross sections were calculated at various locations along the berms with a "Factor of Safety" for each section. The Factors of Safety of the eight cross sections analyzed ranged from 1.42 to 2.31. These values are greater than the minimum value (1.25) recommended by the Naval Facilities Engineering Command (NAVFAC). The sections of berm with the lowest Factor of Safety were found in Waste Pit 3. Based on these Factors of Safety, NAVFAC-recommended Factors of Safety, and documented studies of slope failures, the potential for the occurrence of structural slope failure was determined to be very low.

The stability analyses considered two other conditions that could lead to structural instability of the berms. One condition was that of high groundwater elevations caused by the low probability event of a 100-year rain storm. The Factors of Safety for the eight cross sections under these conditions ranged from 1.22 to 1.88. All cross sections analyzed except one at Waste Pit 3 had Factors of Safety greater than the NAVFAC-recommended minimum value of 1.25. Based on these results, NAVFAC recommended Factors of Safety, and documented studies of slope failures, the potential for failure of these sections during high groundwater conditions was determined to be very low. The cross section at Waste Pit 3 with a Factor of Safety of 1.22 was also determined to have a low probability for failure during high groundwater conditions.

The other condition considered in the stability analysis was earthquake loading. To determine the berms' stability during an earthquake, the forces associated with a horizontal acceleration of 0.1g were factored into the analyses. This value is consistent with the provisions of the Uniform Building Code (UBC) and the recommendations and evaluation guidance developed for the FEMP by the Lawrence Livermore National Laboratory. An earthquake producing these accelerations has an approximate return period of 500 years. The Factors of Safety under static and dynamic loading for cross sections,

except those of Waste Pit 3, ranged from 1.36 to 1.83. These values are greater than the minimum Factor of Safety of 1.15 recommended by NAVFAC for earthquake loading conditions indicating a low potential for failure during a 500-year earthquake.

The Waste Pit 3 dike cross sections showed Factors of Safety of approximately 1.10 during a 500-year earthquake. This value is less than the NAVFAC recommended lower limit value of 1.15. The Waste Pit 3 berm, then, does have the potential for failure under the magnitude of forces anticipated during a 500-year earthquake. The stability analysis estimated a 0.14g horizontal acceleration would be required to place the Waste Pit 3 dike at a condition of impending failure. Earthquakes producing horizontal accelerations of that magnitude are estimated to have a return period of approximately 1000 years.

Only geotechnical data were collected in the geotechnical evaluation of the waste pit berms and it will not be further used or evaluated in the Operable Unit 1 RI. A more comprehensive evaluation of the study's findings will appear in the Operable Unit 1 FS draft report scheduled for release in November 1993.

3.2 METEOROLOGY AND AIR QUALITY

Information on the local climate of the FEMP area was gathered from two sources: an on-property meteorological system, installed at the FEMP in 1986, and the National Weather Service at the Greater Cincinnati/Northern Kentucky International Airport. Information on air quality was gathered from on-site monitoring stations during the FEMP Environmental Monitoring Program and by the Southwestern Ohio Air Pollution Control Agency (SWOAPCA).

3.2.1 Wind

The FEMP meteorological system was used by the National Oceanic and Atmospheric Administration (NOAA) to examine the complexity of the local wind field at the FEMP. This system was installed to collect site-specific data for wind speed and direction, ambient air temperature, lapse rate, dew point, temperature, relative humidity, barometric pressure, and precipitation. The study showed that two major features affect the site, the Great Miami River Valley and the ridges surrounding the site. A 1986 study by IT showed that the wind flow data from the Greater Cincinnati/Northern Kentucky International Airport were sufficiently representative of local conditions to serve as a database for the years prior to the installation of the on-property meteorological system (IT 1986).

Figure 3-7 shows the yearly wind patterns at the FEMP recorded from a 33-foot tower during 1992. Data reviewed for 1987 through 1991 are comparable. Prevailing winds are generally from the southwest and west-southwest. The annual frequency distribution is noted on the scale of the Figure 3-7 as is the stability class distribution, a parameter that is used in air dispersion modeling. Atmospheric stability is a measure of the potential for vertical mixing, mechanical and thermal, and is

classified from A through F, Class F being the most stable, based on the wind speed, net solar radiation, and atmospheric turbulence.

As part of the probabilistic risk assessment performed for the K-65 silos (DOE 1990), an annual probability was assessed for a tornado occurring per square mile within Ohio. Based on data accumulated from Ohio from 1978 to 1990, the annual probability was calculated to be 1.25 in 10,000.

3.2.2 Precipitation

The average annual precipitation for the Cincinnati area from 1960 to 1989 was 40.56 inches and ranged from 27.99 inches in 1963 to 52.76 inches in 1979. The highest precipitation occurs during the spring and early summer. The maximum 24-hour rainfall event on record occurred in March 1964 when 5.21 inches fell. Precipitation is typically lowest in late summer and fall.

The average annual snowfall for the 1960 to 1989 period was 23.5 inches, with the heaviest snowfall usually occurring in January. The maximum monthly snowfall of 31.5 inches occurred in January 1978. The maximum recorded snowfall over a 24-hour period occurred in March 1968 when 9.8 inches was recorded by the National Weather Service at the Greater Cincinnati/Northern Kentucky International Airport.

3.2.3 Temperature

The regional climate is defined as continental, with temperatures ranging from a monthly average of 29.2°F in January to 75.7°F in July. The highest temperature recorded from 1960 through 1989 was 103°F in July 1988, and the lowest was -25°F in January 1977. Average ambient air temperatures measured at the FEMP meteorological system for 1987 through 1992 are shown in Table 3-2.

The average number of days per year with a minimum temperature of 32°F or less is 109 days, and the average number of days per year with a maximum temperature of 90°F or greater is 20 days.

3.2.4 Site-Wide Air Quality

Air quality and meteorology at the FEMP have been extensively investigated in the past. Brief descriptions of reports from these investigations are presented in the SWCR (DOE 1992b). Uranium and radon are the principal present-day airborne constituents of potential concern, which are extensively monitored by the FEMP. The following summary was condensed from the SWCR.

The last full year of production at the FEMP was 1988, so radionuclide emissions decreased substantially during 1989 and 1990. Corresponding reductions in concentrations of airborne uranium occurred at the 16 monitoring sites in and around the FEMP property. Concentrations of airborne radon in the waste pit area were not monitored until 1991.

Average concentrations of airborne radionuclides during 1990 at each of the 16 air monitoring sites were well within the DOE Derived Concentration Guide (DCG). The DCG lists the concentration of a radionuclide in air that, under conditions of continuous exposure for 1 year by one exposure mode (e.g., inhalation), would result in an effective dose equivalent of 100 millirem for a dose to a member of the general pubic. This 100-millirem dose is the DOE public dose limit, an average aggregate including all DOE sources of radiation and all exposure modes. It is the sum of the effective dose equivalent from exposures of radiation external to the body (e.g., direct gamma radiation) during 1 year, plus the committed effective dose equivalent from radionuclides taken into the body (e.g., by inhalation and ingestion) during that same year.

The effective dose equivalent from all airborne radionuclides during 1990 (excluding radon) has been shown to be less than 10 millirem (WEMCO 1991), demonstrating compliance with 40 CFR 61, Subpart H: "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities."

Overall, air quality in the vicinity of the FEMP is generally regarded as "good," with respect to National Ambient Air Quality Standards (NAAQS). These nationally-adopted health-protective standards apply to six pollutants regulated under the CAA of 1990: inhalable particulates, carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, and lead. Historically, none of these pollutants has been detected in the immediate vicinity of the FEMP because there are few sources of them present in the area.

Air quality standards for toxic compounds not regulated under the CAA are defined by individual states. The State of Ohio, acting through the SWOAPCA, has established standards for chemically toxic compounds including ammonia, hydrogen fluoride, and nitric acid—all of which have been released from the FEMP in relatively small amounts. Dispersion modeling based on estimates of the amounts released has been performed and indicates that concentrations in recent years are well within the limits set by the State of Ohio (DOE 1992b).

3.2.5 Air Quality of Operable Unit 1

3.2.5.1 Radon Sampling

Waste Pits 1, 2, 3, and 4 contain radium-bearing materials and were surveyed for a radon-flux measurement. Measurements were made to provide a best estimate of the long-term average radon emissions from these waste pits. The survey involved a one-time measurement of radon release using large area activated charcoal collectors (LAACC). The LAACCs absorb radon emitted from the surface of the waste pit. The charcoal is analyzed using gamma spectroscopy, following the exposure to determine the amount of radon absorbed, from which the radon flux density is calculated.

In November 1991, approximately 100 LAACCs were placed on Waste Pits 1, 2, and 3, left for 24 hours, removed, and then sent to an off-site laboratory for analysis. The results of the radon flux density exhibit average values well below the National Emission Standards for Hazardous Air Pollutants (NESHAP) emission limit of 20 picoCuries/square meter/second (pCi/m^2/s). The average radon-flux densities calculated for Waste Pits 1, 2, and 3 were 9.1, 6.4, and 2.6 pCi/m^2/s, respectively.

Waste Pit 4 was surveyed for a radon-flux measurement in November 1992 using LAACCs. The surface radon-flux measurements conducted during the 24-hour exposure period resulted in a radon flux density of less than 0.1 pCi/m^2/s, which is considerably lower than the previous studies conducted on Waste Pits 1, 2, and 3.

3.2.5.2 Control of Exposed Material in Waste Pit 6 (Removal Action No. 6)

This removal action involved redistributing the exposed material so that all solids were below the water level in Waste Pit 6 to reduce particulate emissions to the environment. Movement of the waste material began on December 17, 1990 and was completed on December 19, 1990. A procedure was established for maintaining a water blanket at all times to ensure that none of the material will be exposed above the waterline. As a result of this removal action, Waste Pit 6 is no longer a significant source of particulate emissions.

3.2.5.3 Control of Exposed Material in Waste Pit 5 (Removal Action No.18)

This removal action, like Removal Action No. 6, involved submerging the exposed material below the waterline. With the completion of this removal action, the threat of release of airborne particulate radioactive emissions from Waste Pit 5 has been reduced. Field work on this removal action was completed in December 1992.

3.3 TOPOGRAPHY AND SURFACE WATER HYDROLOGY

This section provides an overview of the topographic features of the FEMP established through aerial photogrammetry and surface water hydrology. Site studies or published data from the USGS and the Miami Conservancy District were used as sources.

Maximum elevation along the northern boundary of the FEMP property is a little more than 700 feet above MSL (Figure 3-8). The former production and waste storage areas rest on a relatively level plain at about 580 feet above MSL. The plain slopes from 600 feet above MSL along the eastern - boundary of the FEMP to approximately 575 feet above MSL at the west edge of Waste Pit 3, and then drops off toward Paddy's Run at an elevation of 550 feet above MSL (Figure 3-9). All surface water drainage on the FEMP is generally from east to west toward Paddy's Run with the exception of that from the extreme northeast corner, which drains east toward the Great Miami River. Surface water runoff from the controlled areas of the former production and waste storage areas are now collected and treated before being discharged into the Great Miami River. The soils of the FEMP are

predominantly silts and clays. A major portion of the precipitation that falls on the FEMP runs off as surface water flow because the soils have poor capabilities to absorb water.

The FEMP is located within the Great Miami River Basin drainage but above the river's present floodplain. The Great Miami River flows within 0.75 mile of the facility's eastern boundary and discharges into the Ohio River approximately 24 river miles (RM) from the FEMP effluent line, which is located at RM marker 24.1 (Figure 3-10). Tributaries to the Great Miami River in the FEMP region include Four Mile Creek at RM 38.4, approximately 14 RM above the FEMP; Indian Creek at RM 27, just east of Ross, Ohio; Dry Run, approximately 1 RM above the FEMP; Owl Creek at RM 22; and Blue Rock Creek, which enters the river at RM 21. Paddy's Run, which flows along the FEMP's western boundary, joins the Great Miami River at approximately RM 19.5, and Taylor Creek enters the river at approximately RM 14.4. The Whitewater River discharges into the Great Miami River at RM 6.

Surface waters on and adjacent to the FEMP are the storm sewer outfall ditch, Paddy's Run, and the Great Miami River. The storm sewer outfall ditch originates within the FEMP and flows toward the southwest where it enters Paddy's Run, which flows southward along the western boundary of the facility. Paddy's Run, in turn, is a tributary of the Great Miami River. The Great Miami River flows generally toward the southwest, but locally it flows to the east and south of the FEMP. These waters are described in detail in the following paragraphs and are shown in Figure 3-11.

3.3.1 Storm Sewer Outfall Ditch

The storm sewer outfall ditch, which originates east of the former production area, is culverted under the parking lot south of the former production area, flows southwest across the southern portion of the site, and enters Paddy's Run near the southwest corner of the property. The outfall ditch is cut more than 30 feet through the clay-rich surface deposits of the FEMP. Much of the stream bottom of this drainage course is composed of sand and gravel and is highly permeable. Potential loss of flow to the underlying Great Miami Aquifer is therefore possible. Throughout the year, this drainage course is generally dry, with flows occurring only during and immediately after precipitation.

The storm sewer outfall ditch historically has conveyed surface water runoff from the former production area directly into Paddy's Run during periods of heavy precipitation when the pumping capacity of the FEMP storm sewer lift station has been exceeded. The storm sewer lift station transfers former production area storm water runoff through an effluent line to the Great Miami River. Two chambers of the storm water retention basin were constructed, one in October 1986 and one in December 1989, at the discharge point on the storm sewer outfall ditch (Figure 3-12). Stormwater runoff from the former production area is now conveyed to the retention basin. After a minimum retention period of 24 hours to allow for settling of suspended solids, the water is pumped out of the basin into the Great Miami River through the main effluent line of the FEMP. The basin is designed

to retain the runoff from a 10-year, 24-hour rainfall event; only in the event of an overflow would storm water from the former production area enter the storm sewer outfall ditch.

3.3.2 Paddy's Run

Paddy's Run originates north of the FEMP, flows southward along the western boundary of the facility, and enters the Great Miami River approximately 1.5 miles south of the southwest corner of the FEMP property. The stream is approximately 8.8 miles long and drains an area of approximately 15.8 square miles.

Natural surface drainage from the FEMP is toward Paddy's Run and has cut 30 feet or more through the clay-rich near surface deposits upon which the facility is built. Because of the highly permeable channel bottom, the stream loses water to the underlying Great Miami Aquifer. Loss of Paddy's Run water to the underlying Great Miami Aquifer begins at approximately the south side of Waste Pit 3 and continues to Willey Road. This characteristic contributes to the intermittent nature of the stream, which usually flows throughout its entire length between January and May.

Paddy's Run is a steep-sided stream, and its banks erode severely during high flow periods. In 1961 and 1962, the course of the stream was altered to prevent it from eroding into the waste pit area (WMCO 1987). In 1970, a stretch of the stream south of the K-65 silos was straightened to prevent erosion of Paddy's Run Road. The stream is ungauged, but typical flows from January through May ranging from 0.2 to 4.0 cubic feet per second (ft^3/s). Channel overflow resulting from 25-year, 100-year, and 24-hour storm events is possible, but peak flows occurring during storm events have not been measured.

3.3.3 Great Miami River

The Great Miami River is the main surface water feature in the vicinity of the FEMP, and receives water from an NPDES-permitted discharge from the FEMP. The river flows generally to the southwest and has a drainage area of approximately 3360 square miles at the Hamilton gauge, which is located about 10 miles upstream from the FEMP discharge outfall.

The river exhibits meandering patterns that result in sharp directional changes over distances of less than 3000 feet. Directly east of the FEMP and within the site-wide RI/FS study area, the river passes through a 180-degree curve known as the Big Bend (Figure 3-11). A 90-degree bend in the river also occurs near New Baltimore, approximately 2 miles downstream from the FEMP point of discharge. The average discharge of the Great Miami River at Hamilton, based on 55 years of records, is 3305 ft^3/s. Using drainage area scaling, the corresponding average flow at the FEMP point of discharge has been estimated at 3460 ft^3/s. The maximum discharge recorded for the Great Miami River at Hamilton occurred on March 26, 1913 and was estimated at 352,000 ft^3/s. The maximum discharge since the construction in 1922 of five retarding basins, located approximately 7 miles

upstream of Ross, was 108,000 ft^3/s and occurred on January 21, 1959. The minimum daily discharge of 155 ft^3/s was recorded on September 27, 1941. This value is approximately half of the 7-day, 10-year low flow value of 267 ft^3/s, as computed by the USGS for the Hamilton gauge. This value corresponds to 280 ft^3/s along the portion of the river shown in Figure 3-10.

3.3.4 Topography and Surface Water Hydrology of Operable Unit 1

Surface water flow within Operable Unit 1 has varied over the operational years of the FEMP. From pit construction and initial operation in 1952 until 1958, precipitation falling on the Operable Unit 1 surface soils flowed either directly to Paddy's Run or indirectly to Paddy's Run through a drainage swale located adjacent to the railroad tracks north of the waste pit area and another drainage swale located south of Waste Pit 1 between Operable Unit 1 and Operable Unit 4. In 1958, with initial operation of Waste Pit 3 and the Clearwell, a portion of the storm water falling in the Operable Unit 1 Study Area was redirected to the Clearwell. This surface configuration continued until 1992 when the Waste Pit Area Storm Water Runoff Control Removal Action was completed. As part of the removal action, a series of trench drains and concrete curls and gutters were installed around the perimeter of the study area to redirect storm water flow to either the Clearwell or a new underground sump in the waste pit area. This removal action has effectively stopped all surface water flow in the waste pit area from entering Paddy's Run.

3.3.4.1 Topography of Operable Unit 1

Before the construction of the waste pits, all surface waters falling on Operable Unit 1 surface soils flowed either directly to Paddy's Run or indirectly to Paddy's Run through a tributary located between what is now Waste Pit 3 and Waste Pits 1 and 2 (Figure 3-13). This small tributary was more than 2200 feet in length, and at its junction with Paddy's Run was about 25 feet below the level of its source. Construction of the pits consisted of the excavation into native soils and the construction of berms above the original grade. The clay liners in Waste Pits 1 and 2 were excavated from between Waste Pits 3 and 4, creating the Burn Pit. The waste pit area in its current state is relatively flat but previously exhibited much greater elevation change prior to the decommissioning, backfilling, and capping of Waste Pits 1, 2, 3, 4, and the Burn Pit. The current highest elevation within Operable Unit 1 is approximately 590 feet above MSL on top of the berm surrounding Waste Pit 5, and the lowest elevation is 560 feet above MSL on the western edge of the Clearwell (Figure 3-9).

3.3.4.2 Surface Water Hydrology of Operable Unit 1

As stated in 3.3.4.1, the majority of storm water runoff from Operable Unit 1 naturally flowed west-southwest towards Paddy's Run. The stream bed of Paddy's Run was relocated along the west side of Operable Unit 1 to prevent further erosion into the waste pit area. The relocation, performed in 1961 and 1962, directed the flow of Paddy's Run away from the waste pit area in a more southerly direction.

4783

Currently, the Clearwell and a collection sump receive storm water runoff from the waste pit area. The storm water from Waste Pit 5 flows by gravity to the Clearwell in the pipeline previously used to decant settled process flows from Waste Pit 5.

In November 1990, new NPDES rules were established by EPA to monitor industrial storm water discharges. The waste pit runoff has been controlled by the Waste Pit Area Storm Water Runoff Control Removal Action. This removal action can be broadly defined as management and capture of potentially radioactively contaminated storm water runoff from the Operable Unit 1 study area. The removal action construction was completed June 15, 1992 (Figure 3-14).

The Waste Pit Area Storm Water Runoff Control Removal Action included installation of concrete drainage ditches, dikes, and culverts, which along with existing topographic features serves to collect the waste pit storm water runoff. A concrete collection sump was installed south of the Clearwell to collect contaminated storm water runoff before it is pumped into the BSL. The storm water runoff from outer uncontaminated portions of the waste storage area is rerouted away from the waste pit perimeter drainage areas and flows by gravity into Paddy's Run which in turn empties into the Greater Miami River. The completion of this removal action has provided runoff control, as well as a collection system for storm water runoff from the Operable Unit 1 study area. The potential for release of contaminants to the environment has been reduced through the implementation of this removal action.

3.4 GEOLOGY AND GROUNDWATER HYDROLOGY

Significant published investigations of the geology in the FEMP area include Fenneman (1916), Durrell (1961), and Spieker (1968b), U.S. Soil Conservation Service mapping (USDA 1980 and 1982), and Brockman (1988). A comprehensive geologic and hydrogeologic history have been developed for the FEMP and surrounding area based on these and other published studies, with modifications and extensions resulting from data collected during the RI/FS.

3.4.1 Geology

3.4.1.1 Geologic History

In summary, the FEMP overlies a 2- to 3-mile-wide buried Pleistocene valley known as the New Haven Trough. This valley was formed (eroded) by the ancestral Ohio River during the Pleistocene and was subsequently filled with glacial outwash materials. These materials were covered by glacial overburden as glaciers advanced across the area (Figure 3-15). The outwash deposits under the FEMP are a part of the Great Miami Aquifer, which is a widely distributed buried valley aquifer. In addition to surface water, the valley fill aquifer system is the major source of drinking water in the southwestern Ohio area.

In Late Ordovician time (approximately 450 million years ago), sediment that eventually became a predominantly flat-lying shale with thin interbedded limestone was deposited in a shallow sea. This shale is the relatively impermeable bedrock that now underlies the FEMP study area and forms the adjacent highlands. The advance of Nebraskan and Kansan glaciation to the north of Cincinnati created a drainage system known as the deep stage drainage system (Figure 3-16). This drainage system was composed of three major rivers — the Miami River, the East Fork of the Little Miami River, and the Licking River. The Miami River followed much the same channel as the present-day Great Miami River from Middletown to Ross. The East Fork of the Little Miami River entered the area from the northeast. The Licking River came in from the south in essentially its present-day channel, but continued to the north of the present day Ohio River. These three rivers combined to form what is known as the ancestral Ohio River, which entered the area from the east along the present-day channel of the Ohio River, then turned northeast through the valley now occupied by the Little Miami River.

Several tributary streams of later importance entered the main stream in the vicinity of the FEMP. Two streams originated near Miamitown—one flowed north to join the main stream between Shandon and Fernald, and the other flowed south following the course of the present-day Great Miami River. Two other small streams originated near New Baltimore and flowed north to the main stream. The Dry Fork of the Whitewater River, which now lies to the west of the area, formerly turned eastward to Shandon and then flowed south through what is now the Paddy's Run Valley.

During the time of Deep Stage Drainage and the early stages of Illinoisan Glaciation (300,000 to 400,000 years ago), the river valleys cut deeply into the shale bedrock to depths up to 200 feet below current land elevations. As the Illinoisan ice sheet advanced into the area, ice began to block the Great Miami River and its confluence with the ancestral Ohio River. For a time, water still flowed westward along the front of the advancing ice sheet and carved the present-day Great Miami River Valley along the tributary system near Miamitown.

When the confluence of the Great Miami River and the ancestral Ohio River was completely blocked, ponded water in the Mill Creek Valley rose until it overflowed low divides and carved outlets at Anderson's Ferry and at what is now downtown Cincinnati. This course created the present-day channel of the Ohio River (Figure 3-16).

The Great Miami River was forced out of the Deep Stage Valley during a subsequent ice advance, carving a new narrow deep stage valley from just north of New Baltimore to a location about 1 mile west of Cleves, where it returned to the original Deep Stage Valley. Because only water from the Great Miami River and its tributaries carved this valley, it was much smaller than the ancestral Ohio Valley. This 2-mile-wide valley where the FEMP is located was termed the New Haven Trough by Fenneman (1916). As the ice retreated, the Deep Stage Valley, including the New Haven Trough, was

filled with well-sorted sand and gravel outwash deposits. This formed the Great Miami Aquifer, and the Great Miami and Ohio rivers were established in their present-day channels. During the Wisconsin glaciation (approximately 20,000 years ago), the front of the ice sheet advanced southward as far as the south side of the FEMP site, perhaps as far as 1 to 2 miles south of Willey Road. As the glacier advanced south across the glacial outwash deposits of the Great Miami Aquifer, it deposited till beneath its moving ice sheet. All of the sediment that lies above the sand and gravel of the Great Miami Aquifer is referred to as glacial overburden. The glacial overburden consists of till deposited beneath the moving ice sheet, but the bulk of the glacial overburden consists of deposits of debris flows and streams that were shed off the ice margin as the glacier retreated. The unsorted clay deposits of debris flows are referred to as till and the stream deposits are referred to as glaciofluvial sediment.

As the ice retreated, the glacier deposited a terminal moraine (Figures 3-17 and 3-18), a ridge of glacial overburden composed primarily of till (i.e., debris flow deposits). The topographic basin that lay behind the terminal moraine, filled with debris flow deposits and lake deposits. The lake deposits are called lacustrine in later text. The glacier deposited a second ridge of glacial overburden, a recessional moraine, in the vicinity of the waste storage area (Figure 3-18). Moraines are not always distinct geologic entities. A moraine is a topographic high that occurs where a retreating glacier deposits a relatively greater amount of sediment at the toe of the glacier (hence, the relatively greater topography). A moraine typically takes the form of an arcuate ridge oriented at right angles to the direction of ice flow. The method of sediment deposition does not necessarily differ between moraine sediment and nonmoraine sediment. At the FEMP site, the terminal moraine is a broad feature on the order of 1000 to 1500 feet wide. The recessional moraines are on the order of several hundred feet wide. Following the retreat of the glacier, a blanket of windblown silt (loess) was deposited across the area.

Since the last retreat of continental glaciers, the streams in the area have removed much of the glacial overburden and lacustrine strata left by the ice sheets. The Great Miami River has eroded through the glacial overburden and is now in direct contract with the glaciofluvial outwash deposits that compose the Great Miami Aquifer. Paddy's Run is also in contact with these deposits in its lower reaches.

The FEMP area is located on an eroded glacial overburden plain left by the Wisconsin Glaciation. Figures 3-17 and 3-18 show the surface geology as it would have appeared prior to site construction. The generalized cross section in Figure 3-15 and stratigraphic column in Figure 3-19 show the general subsurface geology; a valley carved into shale bedrock, filled with outwash sand and gravel, and capped by clay/silt dominated glacial overburden.

3.4.1.2 Bedrock Geology

The bedrock in the region consists of nearly flat-lying sedimentary rock of Ordovician Age, approximately 450 to 500 million years old (Fenneman 1916). The bedrock also consists primarily of interbedded shales and limestones of the Cincinnati Group of the Upper Ordovician System (Swinford 1990). In the FEMP area, the bedrock is overlain by glacial deposits including outwash and till which, in turn, are covered by surface soils and fill materials.

During Pleistocene interglacial periods prior to the Illinoian glacial advances, the ancestral Ohio River eroded a valley, termed the New Haven Trough, into the bedrock. The New Haven Trough has a broad, relatively flat bottom and steep valley walls. During the retreat of the Illinoian ice sheets, the valley was filled with up to 200 feet of glaciofluvial sand and gravel.

Watkins and Spieker (1971) performed extensive seismic refraction surveys to determine the thickness and extent of the sand and gravel deposits filling the bedrock valley. Test drilling was used in conjunction with the refraction surveys to verify the accuracy of the seismic determination of the depth of the valley floor. The map of the top of bedrock (Figure 3-20) was derived from the bedrock map produced by Watkins and Spieker (1971), with additional information provided by Leow (1985), Vormelker (1985), and wells constructed for the RI. Top of bedrock elevation contours are shown in Figure 3-20.

3.4.1.3 Seismology

A seismic risk zone of one, a measurement of earthquake intensity on a scale of less-than-one to four, has been assigned to the FEMP region. An earthquake in the FEMP region could damage facilities and cause release of contaminants into the environment. Local geologic structures and historic seismicity are used to analyze the potential for seismic events and structural damage.

The presence of minor faults is not evident, but it cannot be dismissed because bedrock in the region is largely covered by Pleistocene sediment. Pre-Pleistocene fault traces could be obscured; however, the historic record of seismicity and the absence of post-Wisconsin faults indicate that significant local earthquakes are unlikely. Throughout the 19th and 20th centuries, no damaging earthquakes have been recorded within 71 miles of the FEMP. Nine earthquakes caused minor damage at locations between 71 and 199 miles from the FEMP. One earthquake, in 1937, caused moderate damage at Anna, Ohio, located 81 miles north of the FEMP. The Anna, Ohio earthquake had a reported intensity of VIII, on a scale of I to XII, according to the Mercalli Intensity scale (IT 1993). The equivalent Richter scale magnitude for the Anna, Ohio earthquake is estimated to be 5 to 6 (Nuttli 1979).

3.4.1.4 Glacial Outwash Deposits

During the Illinoian glacial episode approximately 125,000 years ago, the Deep Stage Valley, including the New Haven Trough, was filled with about 200 feet of glaciofluvial sediment. This

sediment was deposited by water running from the margins of the glaciers and consisted mainly of well-sorted sand and gravel. The thick sand and gravel deposits in the bedrock troughs are the present-day Great Miami Aquifer. A blanket of poorly-sorted, clay-dominated glacial overburden was then deposited on top of these sediment during the Wisconsin ice advance, about 20,000 years ago.

Since the last retreat of continental glaciers, the streams in the area have removed much of the glacial overburden and lacustrine mantle left by the ice sheets. Postglacial erosion by the Great Miami River and its tributaries removed significant portions of the glacial overburden and left terrace remnants that stand topographically higher than surrounding bottom lands. The Great Miami River has eroded through the glacial overburden and is now in direct contact with the glaciofluvial outwash deposits that comprise the buried valley (Great Miami Aquifer). Paddy's Run is also in direct contact with these deposits in its lower reaches.

Figure 3-19 is a generalized stratigraphic column of the valley fill deposits. As indicated by the generalized cross section (Figure 3-15) and bedrock topography map (Figure 3-17), the buried valley is about 0.5 to 2 miles wide and is U-shaped, having a broad, relatively flat bottom and steep valley walls. Interbedded fine-grained fluvial and lacustrine deposits occur within the outwash deposits but, in most cases, are of limited lateral extent.

The portion of the Great Miami Aquifer that underlies the FEMP study area consists primarily of glaciofluvial sand and gravel outwash deposited during the latest two Pleistocene Glaciations. These deposits lie unconformably on the Ordovician Shales, filling the bedrock valley to a depth of 200 feet in places. In the FEMP study area, the thickness of the Great Miami Aquifer varies from 120 to 200 feet in the centers of the valley and tributary valley to only a few feet thick along the valley walls. Although the glaciofluvial deposits are heterogeneous, they are typically well-sorted sands and gravels with only minor amounts of silt and clay. Within the coarse-grained sediment of the Great Miami Aquifer lies a clay layer that underlies most of the FEMP and parts of the surrounding areas (Figure 3-21). The clay interbed lies about 100 to 125 feet below the surface and generally about 60 to 80 feet below the water table. It ranges from 0 to 20 feet in thickness (Figure 3-22) and consists of a low permeability homogeneous clay that acts as an aquitard within the Great Miami Aquifer. Because of this interbed, the aquifer is divided into upper and lower halves. The clay of the interbedded layer is uniform in texture and contains only a small amount of silt and sand. It was deposited in a lacustrine or low-energy fluvial environment and displays variation in some samples. The interbed pinches out to the south and east, extends an unknown distance to the west, and grades into other lacustrine, glaciofluvial, and glacial till deposits to the north in the Shandon Tributary.

3.4.1.5 Geology of the Glacial Overburden

The FEMP is built upon a sequence of lacustrine and till strata (glacial overburden) that overlies the buried-valley sand and gravel aquifer. Glacial overburden is largely clay-dominated till with variable proportions of discontinuous coarse-grained fluvial and lacustrine strata.

Three depositional units are recognized in the glacial overburden. The units are—from youngest to oldest—aeolian loess, lacustrine basin fill, and till. Till is a clay-dominated sedimentary unit deposited by the Wisconsin glacier as it advanced across and then retreated from the FEMP area. The till unit is pervasive across the FEMP, except in areas where it has been removed by erosion or excavation activities. Lacustrine basin fill is a clay-dominated sedimentary unit that filled a closed topographic basin left by the retreating Wisconsin glacier. The basin fill was deposited in a lacustrine setting contemporaneously with the melting of dead ice that filled the topographic depression. Both till and lacustrine basin fill units have discontinuous subunits: lenses; pockets; and sheets of silt, sand, and gravel. These silt, sand, and gravel layers resulted from the transport, sorting, and redeposition of glacial till materials by flowing water such as proglacial streams, shorelines, and debris flows. The following paragraphs present basic stratigraphic descriptions of the three units that comprise the glacial overburden.

Loess

Loess is an aeolian silt deposit that is regionally pervasive in southwest Ohio and the Fernald area. During and after the Wisconsin Glaciation, extensive wind transport of dust distributed a blanket of silt over the area. Silts were entrained by wind from denuded plains, outwash fans, and river valleys. At the FEMP, loess is a surficial deposit that is today readily identifiable only in areas not modified by construction excavations and/or grading. Loess is typically about 3 feet thick, but may locally be up to 8 feet thick in areas where silts have washed or crept downslope. Loess has been stripped or regraded throughout much of the Operable Unit 1 study area such that it is absent or unidentifiable, if present. In the method of field description used for the RI, loess cannot be distinguished from silts that occur within the glacial tills except by its occurrence as a surface deposit.

Till

Till is an unsorted heterogeneous mixture of clay, silt, sand, and angular pebble- to cobble-size material. Typically, approximately 70 percent of the material is clay and silt size. Till is predominantly reworked local shale and limestone that was transported southward by the glacier and deposited in front of or beneath the active glacier. Lodgement till overridden by the glacier, is a compact and tight material. Ablation till was deposited by debris flows and streams as the active front of the glacier receded or melted in place. It is less dense than lodgement till, not having been compacted by the weight of an ice mass as was the lodgement till. It is assumed that, site-wide, an indeterminant thickness (probably less than 5 feet) of till at the base of the glacial overburden is lodge-

ment facies. There is no readily available method for distinguishing lodgement from ablation facies in boring logs.

Till contains sparse, thin, and discontinuous lenses of silt, sand, and gravel. These subunits have, in the past, been referred to as perched water bodies if they are below the water table of the perched zone and they yield water in core samples or in open borings. The subunits are most often described as silty sands, clayey sands, clayey gravels, silty gravels, and silt. Clayey and silty sands are most common. These glaciofluvial subunits were deposited by proglacial streams and debris flows and possibly subglacial streams. The subunits typically have lateral dimensions of less than 200 feet. Lateral grain size changes are rapid and it is often difficult to use lithologic logs to prove or disprove lateral correlations of coarse grain subunits.

Lacustrine

The first workers to map the extent of lacustrine strata in the FEMP area were employed by the Soil Conservation Service (SCS) (USDA 1980 and 1982). A large region of soil is identified as having formed in lacustrine sediments. Comparisons of the SCS mapping with the USGS topographic map reveal that the SCS mapped the edge of lacustrine strata approximately coincided with the 580- to 590-foot elevation contour. The mapped extent of lacustrine strata presented in Figures 3-17 and 3-18 are based on SCS mapping, Brockman's (1988) mapping, and more detailed RI/FS data.

The lacustrine clay, in field descriptions, is distinguished from till clays by the lack of sand and gravel. Till clays are typically described as having a minor component of sand size and coarser material. Within the lacustrine basin fill, clays are rarely described as having a component of sand size or greater size material. Lacustrine basin fill contains extensive deposits of silt, sand, and gravel bodies.

3.4.1.6 Geology of Operable Unit 1 Area

Cross sections A through H (Figures 3-23 through 3-31) portray strata within the Operable Unit 1 area. The cross sections show major geological details: (1) the subsurface geometries of the waste pits, (2) the distinction between in situ glacial overburden and fill material, (3) geometries of glacio-fluvial bodies within the till of the glacial overburden, (4) the weathering profile of the glacial overburden, (5) water levels in the perched groundwater and the Great Miami Aquifer, and (6) locations of borings and wells. Cross sections A through D were originally drafted to meet the technical needs of Operable Unit 1 by illustrating the relationship between the waste pits and the surrounding geology. On the other hand, cross sections E through H were drawn at locations between the waste pits to meet the technical needs of Operable Unit 5 by illustrating the geology within Operable Unit 1.

The subsurface geometries of the waste pits are based upon the 1991 analysis of the waste pits for the RI/FS (IT 1991) and the Waste Pit Contents Study Report (Parsons 1993). The distinction between in

situ glacial overburden and fill material is based largely on the 1951 topographic map of the Operable Unit 1 study area (Figure 3-13) and geologic boring logs where distinguishable.

The unifying characteristic of field classifications of clay materials at the FEMP is that they all have a plastic material property. The cross sections (Figures 3-24 through 3-31) show that the glacial overburden is predominantly clay. Within the clay of the glacial overburden are lenses of coarse, non-plastic glacio-fluvial sediment: silt, sand, and gravel. The coarse lenses are glacio-fluvial deposits, typically sand and gravel, that were deposited within a glacial environment. These coarse grain lenses have complex geometries and are difficult to correlate laterally without closely spaced borings. Two lenses have been correlated within the Operable Unit 1 study area (Figure 3-32).

One coarse lens is present within the till along the south and west sides of Waste Pit 4 and ranges from less than 1 foot to 20 feet in thickness. The other coarse lens is located in the area north of Waste Pit 6. This lens is approximately 550 feet in length and ranges from less than 1 foot to 6 feet in thickness.

Prior to construction of the waste pits, the terrain of the waste storage area was eroded by small tributaries to Paddy's Run (Section 3.3.4.1). The in situ glacial overburden was entirely till; lacustrine strata at the FEMP was not deposited in the waste pit area, and most loess was likely removed by the natural erosion that predated pit construction. The waste pits are constructed above and below the original grade of the dissected landscape. The material that was used to make the above-grade additions was imported from excavations in the waste storage area or elsewhere at the FEMP. Consequently, all fill above the original grade (paleotopography) shown in the cross sections is clay- and silt-dominated strata typical of the glacial overburden.

Below the fill material in each cross section, the glacial overburden is divided into oxidized and unoxidized strata. The boundary shown in the cross sections (Figures 3-24 through 3-31) represents the location of a color change from brown-hued strata above to gray-hued strata below. At the FEMP, this transition is relatively sharp within the glacial overburden, occurring over a distance of typically 1 foot and at a depth of 10 to 20 feet below the ground surface. The brown hue is a physical expression of oxidation of iron and manganese as a direct result of exposure of strata to oxygen. The transition represents either a past period of low water levels or present-day maximum depth of circulation for oxygenated groundwater.

3.4.1.7 Soils

Soil characteristics affect the suitability of a site for agriculture or construction, the likelihood of erosion during remedial actions, and the kinds of habitat, such as wetlands, which can develop on a site. Soils in the region of the FEMP were formed from materials deposited by the Wisconsin and Illinoian glaciers. These parent materials consist mainly of glacial till, but include sand, gravel, glacial

lake clays, and silt clays. Three major soil associations (i.e., groups of soils which typically occur together) exist in the vicinity of the FEMP: Russell-Xenia-Wynn, Fincastle-Xenia-Wynn, and Fox-Genesee (USDA 1980 and 1982). These soils are usually light colored, acidic, and poorly to moderately-well drained. Many of them have developed on windblown material (loess), except along river basins where the Fox-Genesee soils are of glacial till origin. The soils are moderately high in productivity and are frequently used for growing cash crops and producing livestock.

The Butler County and Hamilton County soil surveys have 15 specific soil series or types mapped within FEMP boundaries as shown in Figure 3-33 (USDA 1980 and 1982). The major series are Fincastle-Xenia silt loams, which cover large areas west of the FEMP. These soils are light colored, medium acidic, and moderately high in productivity when properly managed. Moisture-supplying capacity is moderate, as is fertility and organic content. The Fincastle Series consists of deep, nearly level, somewhat poorly-drained soils on broad flats. Permeability is low, and the available water capacity is high. The seasonal high water table is commonly found between 1 and 3 feet below the ground surface from January to April. In areas where these soils are predominant, artificial drainage is required for moderate crop productivity. These soils are associated with the former production area at the facility and with the pastures to the east and west. The Xenia Series is a deep, nearly level, moderately well-drained soil located on till plains. Permeability is moderately low, available water capacity is high, and the runoff hazard is low. The seasonal high water table is usually within 2 to 6 feet of the surface from March to April. These soils are located within the northern pine plantation and in the pastures to the east of this area.

The remaining soil series occurring within the FEMP are Dana, Eden, Fox, Genesee, Hennepin, Henshaw, Markland, Martinsville, Miamian, Ragsdale, Raub, Russell, and Uniontown. Table 3-3 lists the symbol, name, slope, and drainage classification for each soil within the FEMP boundaries.

One soil mapped within FEMP boundaries is considered hydric; that is, periodically depleted of oxygen due to water saturation. This very poorly-drained soil, Ragsdale silty clay loam, is mapped for approximately 53 acres (five percent of the area of the FEMP) in the northern portion of the FEMP. The Ragsdale soil series is nearly level, deep, and very poorly drained. It is usually located in long, narrow depressions or in shallow basins. The permeation rate is slow, available water capacity high, and the seasonal high water table is near the surface from December through May. These soils are associated with a jurisdictional wetland in the northern end of the FEMP.

Three soil series at the FEMP, represented by four map units, are classified as somewhat poorly-drained soils. These series include the Fincastle Series described above, the Henshaw Series, and the Raub Series. Somewhat poorly-drained soils occupy approximately 364 acres (35 percent) at the FEMP, excluding the highly-developed portions of the Fincastle-Urban land complex. Henshaw soils are deep, nearly level, somewhat poorly-drained soils on flats and low stream terraces and in basins.

Permeability is moderately low, available water capacity is high, and runoff is slow. The seasonal high water table is usually within 2 feet of the ground surface between November and March. These soils exist along the western property line adjacent to Paddy's Run Road and south of the former production area.

Raub soils are deep, nearly level, somewhat poorly drained, dark soils located on glacial till plains. These soils have slow permeation rates and high available water capacity. The seasonal high water table is between 1 and 3 feet during January through April. These soils are located on upland terraces in the southeast portion of the FEMP and immediately north of the former production area.

The remaining 10 soil series mapped within FEMP boundaries are moderately well-drained and well-drained upland soils. The Dana Series consists of deep, gently sloping, moderately well-drained soils on slopes or in gently sloping basins on till plains and moraines. This series has moderate permeability, and the available water capacity is high. The water table is usually perched at a depth of 3 to 6 feet between March and April. These soils occupy the upper third of the northern pine plantation.

The Eden Series is moderately deep, steep, well-drained soil on valley walls and hillsides. This series has a low permeability and the available water capacity is low. The water table is usually found at a depth greater than 6 feet. This series is located between the northern pine plantation and State Route 126.

Soils along Paddy's Run are categorized as Fox-Genesee loams. Fox soils are deep, gently sloping, well-drained soils on slight rises and stream terraces. Erosion has removed the majority of the original surface layer, and permeability is moderate in the upper horizons and very rapid in the lower horizons. The seasonal high water table is normally more than 6 feet below the surface. A small area of Fox soils exists along the southern property line of the FEMP on the upland terrace immediately east of Paddy's Run. Genesee soils are deep, nearly level, well-drained soils located on terraces adjacent to floodplains. The areas that they occupy are subject to occasional brief flooding. The permeability is moderate, and the available water capacity is very high. Normally, the seasonal high water table is deeper than 6 feet below the surface. This series is associated with the north-south corridor containing Paddy's Run and part of the storm sewer outfall ditch. The Hennepin Series is a deep, very steep, well-drained soil along streams in dissected parts of the level plain. The permeability is moderately low to low, the available water capacity is moderate, and runoff is very rapid. The seasonal high water table is usually greater than 6 feet below the surface. These soils are associated with the steep banks of Paddy's Run, on either of the Genesee soils. Hennepin soils also occur in association with Miamian soils along the storm sewer outfall ditch.

The Markland Series consists of deep, gently sloping, moderately well-drained soils. Permeability of this soil is low, the available water capacity is moderate, and the runoff hazard is medium. The seasonal high water table is usually perched between 3 and 6 feet below the surface from March to April. These soils are located adjacent to the Hennepin soils, just outside the woodlands bordering Paddy's Run, the storm sewer outfall ditch, and other drainings on property.

Martinsville soils are deep, nearly level, well-drained soils on stream terraces and outwash plains. The permeability is moderate, the available water capacity is high, and the runoff hazard is low. The seasonal high water table is more than 6 feet below the surface. Martinsville soils are found on a level terrace in the southern end of the FEMP, adjacent to a tributary to Paddy's Run.

Miamian soils are deep, steeply sloping, well-drained soils located on dissected plains. Erosion has removed portions of the original surface layer and the subsoil has been filled into the existing surface layer. Permeability is moderately low, and the available water capacity is moderate. The seasonal high water table is usually greater than 6 feet below the surface. Miamian soils exist along the northern property line of the FEMP and, associated with Hennepin soils, along the storm sewer outfall ditch and one of its tributary drainages running from Willey Road to the northwest. Russell silt loams are gently sloping, deep, well-drained soils on slight rises and knolls of till plains. Russell soils have moderate permeability in the lower horizons, and surface runoff is medium. The seasonal high water table is perched and commonly found between 3 to 6 feet below the surface from March to April. Russell soils are mapped east of the former production area.

Uniontown soils are deep, gently sloping, well-drained soils formed in deposits on stream terraces. These soils have moderate permeability with a very high available water capacity. The seasonal high water table is between 2.5 and 6 feet below the surface from November to May. Uniontown soils are mapped in the northwest corner of the FEMP on a terrace above Paddy's Run.

Neither the former production area or waste storage area have undisturbed soils. In most every area, natural soil profiles were destroyed or modified during construction and regrading. These soils are described as Fincastle urban land complex.

3.4.1.8 Geochemistry and Mineralogy

The glacial overburden of the FEMP is a calcareous till. The major components of the glacial overburden constituting more than 95 percent are - in decreasing abundance - calcite, dolomite, quartz, potassium feldspar, illite, and corrensite. These conclusions are from an RI/FS study that examined site suitability for the on-site disposal cell (IT 1993). As part of the study, 20 soil samples were collected in the till from 15 borings in the north and east areas of the FEMP. Samples were collected from depths between 4 and 30 feet. Results presented in Table 3-4 are considered representative of mineralogic composition of the till unit across the site.

3.4.2 Groundwater Hydrology

Within a hydrogeological context, two major types of geologic material underlie the FEMP site: the Ordovician Shale and limestone bedrock and the unconsolidated glacial and fluvial deposits which overlie the Ordovician bedrock and fill the New Haven Trough. Significant saturated zones occur only in the glacial overburden, as perched groundwater, and the valley fill glacial outwash deposits, as the Great Miami Aquifer.

Groundwater at the FEMP occurs as (1) saturated clays and silts in the glacial overburden, (2) saturated sands and gravels in the glacial overburden, (3) saturated sands and gravels of the glacial outwash deposits, and (4) saturated limestone/shale bedrock.

In the FEMP study area, the sand and gravel deposits of the Great Miami Aquifer represent a classic aquifer. The perched groundwater of the glacial overburden is important as a potential contaminant pathway from the ground surface to the regional aquifer, streams, and springs. Groundwater occurs in fractures within the limestone of the bedrock. The bedrock is nearly impermeable and does not have significant groundwater or flow. The Great Miami Aquifer is the principal aquifer within the study area and has been designated a sole source aquifer under the provisions of the Safe Drinking Water Act. On a regional basis, precipitation is the dominant source of groundwater recharge. Infiltration of rainfall (12 inches/yr) provides approximately 570,000 gallons per day/square mile (gpd/mi^2) of recharge to the unconsolidated aquifer systems (Dove 1961).

3.4.2.1 Groundwater Hydrology of the Glacial Overburden

Overlying the Great Miami Aquifer throughout most of the FEMP property are a series of glacial overburden deposits. The glacial overburden is composed primarily of till; a dense, silty clay that contains discontinuous and isolated lenses of poorly sorted fine- to medium-grained sand and gravel, silty sand, and silt. Lacustrine deposits lie upon till in places. The lacustrine deposits have at least one, and possibly more, laterally extensive permeable sand/silt strata. The glacial overburden exposed at the surface has relatively low permeability, so most of the precipitation that falls on it evaporates or becomes surface water runoff. Limited infiltration occurs along the upper weathered portion of the overburden and in isolated areas where more permeable deposits of silt, sand, and gravel are the primary overburden constituents.

The thickness of the glacial overburden ranges from 0 to 50 feet within the FEMP study area, but most commonly averages between 20 and 30 feet. Except for some scattered deposits, this overburden does not exist along the floodplain of the Great Miami River to the east and south of the FEMP. The only on-property areas that lack overburden are certain reaches of Paddy's Run and the storm sewer outfall ditch, where this material has been completely eroded (Figure 3-18). These streams are in direct contact with the upper Great Miami Aquifer along their reaches, allowing surface water leakage

directly to the Great Miami Aquifer. Areas of surface water infiltration to the aquifer along Paddy's Run and the storm sewer outfall ditch are shown in Figure 3-34.

Erratically distributed pockets of sand and gravel within the glacial overburden contain zones of perched groundwater. Perched groundwater is separated from the underlying aquifer by the surrounding relatively impermeable clay and silt components of the overburden. These low-permeability units behave as an aquitard that can store groundwater but transmit it slowly downward from one more porous saturated zone to another.

Depth to perched groundwater at the FEMP ranges from 1 to 15 feet below ground surface. This measurement can fluctuate seasonally by up to 10 feet at a single location, with the highest water levels occurring during the early spring and the lowest during the late fall. Perched groundwater underlying the FEMP property generally flows laterally down topographic gradient or toward surface drains and potentially at a lower rate vertically downward. There is uncertainty, however, regarding the rate of horizontal movement of perched groundwater, because the perched zones may not be interconnected across the property and the materials comprising the overburden vary considerably in their ability to confine or transport water. Other influences on flow patterns within perched zones include seasonal variations in rainfall and recharge and the presence of features, such as leaky storm sewers (Wynne 1986) and agricultural drain tiles that were installed before the construction of the FEMP. Consequently, the rate of groundwater flow within the glacial overburden is discontinuous and nonuniform across the FEMP.

Core permeability tests (undisturbed sample tests) have been performed on 28 samples from soil borings. All of the materials in these cores were clay-rich till and lacustrine deposits collected from depths of 1 to 23 feet, except one sample collected between 31 and 33 feet deep. The values of hydraulic conductivities measured for these cores ranged from 3.9×10^{-9} to 7.2×10^{-7} centimeters/second (cm/s). In terms of primary permeability, it is evident that the clay-rich tills have very low hydraulic permeabilities.

Table 3-5 lists 31 field measurements of hydraulic conductivity that were performed by using slug test methods. All of the slug tests were performed in wells or piezometers completed in glacial overburden materials that included at least a few feet of glaciofluvial sand or sandy silt. These values range from 2.5×10^{-6} to 3.1×10^{-3} cm/s. Although there are significant differences between the testing procedures of laboratory core tests and in-situ slug tests, the sand and silt materials clearly have a significantly greater hydraulic conductivity than the clay-rich materials. Based on these data, the differences are as much as three orders of magnitude.

3.4.2.2 Groundwater Hydrology of the Great Miami Aquifer

Figure 3-35 shows the lateral extent of the sand and gravel of the Great Miami Aquifer. Also shown in Figure 3-35 are generalized groundwater flow directions and approximate horizontal groundwater flow velocities in the Great Miami Aquifer. In the northeast, groundwater moves southwest from the Ross area into the portion of the New Haven Trough now occupied by the Great Miami River. In the northwest, groundwater moves southeast from the Shandon area, which is a tributary to the New Haven Trough. The majority of the groundwater from the Shandon Tributary flows under the waste storage area and the former production area and leaves the eastern boundary of the FEMP to flow east to the Great Miami River. The Ross and Shandon flows eventually leave the FEMP area via the Great Miami River Valley. This discharge is referred to as the New Baltimore outlet. The third source of groundwater is from the west. Recharge of groundwater at the Dry Fork of the Whitewater River, located approximately 2 miles west of the FEMP, causes groundwater to move east toward the FEMP. This flow turns southward under the southern part of the FEMP and flows to the Great Miami River Valley via the Paddy's Run outlet. Although these regional flow patterns dominate the regional flow system, local short-term and long-term variations do occur within the flow pattern.

Figure 3-36 portrays groundwater elevations of the FEMP and surrounding area. Groundwater flows perpendicular to the groundwater elevation contours are shown on the map. A major depression of the water table occurs east of the FEMP where the Southwest Ohio Water Company (SOWC) has collector wells that together pump approximately 26 million gpd (unpublished Miami Conservancy data for March and April 1986). The removal of groundwater from the collector wells has an effect on groundwater elevations and flow directions at the FEMP. Because of pumping, groundwater beneath the north half of the FEMP has a more easterly direction of flow than it would in the absence of pumping. In the absence of pumping, the groundwater would have a stronger southeast flow direction.

Figures 3-37 through 3-40 are a series of quarterly groundwater elevation maps. The maps show a complete hydrologic cycle for the FEMP. Aquifer water table elevations in the FEMP area display a broad cyclic annual trend, as shown in hydrographs (Figures 3-41 through 3-46). Though these hydrographs portray only wells near the waste storage area, they are representative of data from most other wells downgradient of Operable Unit 1. Maximum water table elevations usually occur during the spring and early summer months, which are also the major groundwater recharge months. Minimum water table elevations generally occur during the late fall and early winter months. These low groundwater elevations occur at the end of southern Ohio's dry season, which usually starts in late summer or early fall and runs to late fall. During most years, the water table fluctuates on the order of 4 to 5 feet, with increases occurring faster than decreases. The average recharge period is 4 to 5 months, while the average discharge period lasts 7 to 8 months, which is a typical water cycle for southern Ohio. The hydrographs shown in Figures 3-43 through 3-45 all have paired wells that are completed on opposing sides of the clay interbed. The hydrographs show that vertical hydraulic

gradients do not exist across the clay interbed. (Water levels are the same on both sides of the clay interbed, so there is no potential for flow across the interbed.)

Spieker (1968a) divided the Great Miami Aquifer into a number of hydrological "types." The specifics of the types are not presented here, only the summary. The Type I environment is along the Great Miami River, where the river flows above and in contact with the aquifer. In this area, where no significant confining layers or aquitards are present, and the aquifer is 150 to 200 feet thick, stream infiltration is significant and aquifer transmissivity ranges from 40,000 to 67,000 square feet/day (ft^2/day). Individual wells can yield as much as 3000 gallons per minute (gpm).

The Type II hydrogeologic environment is characterized by having less than 150 feet of sand and gravel, with no really extensive interstratified clay layers present. Recharge by stream infiltration is not available. The specific yield for the aquifer is about 0.2 gpm. Large groundwater supplies are not generally available from the Type II aquifer. Those portions of the Great Miami Aquifer that exhibit characteristics of a Type II environment are of limited areal extent within the study area. They are generally located near bedrock valley walls.

The Type III hydrogeologic environment is characterized by clayey glacial overburden overlying the Great Miami Aquifer. In the region directly beneath the FEMP, the aquifer is divided into upper and lower parts by a clay interbed approximately 10 to 20 feet thick occurring approximately 140 feet below land surface. Hence, the lower aquifer is classified as a semiconfined or leaky confined aquifer. Estimates of the hydraulic conductivity of the clay interbed range from 2.5 to 3.3 gallons per day/square foot (gpd/ft^2). Spieker and Norris (1962) have estimated a coefficient of storage of 0.001 for the lower sand and gravel aquifer. Spieker (1968b) estimated a transmissivity range of 47,000 to 40,000 ft^2/day.

3.4.2.3 Groundwater Flow in the Operable Unit 1 Study Area

Potential contaminants may enter the Great Miami Aquifer from the waste pit area by (1) surface water flowing down Paddy's Run from the waste storage area and infiltrating to the Great Miami Aquifer through areas where the bed of Paddy's Run is the Great Miami Aquifer (Figure 3-34) or (2) vertical groundwater flow through the waste pits and glacial overburden. Groundwater in the waste storage area flows along the following conceptual steps:

1. Precipitation that does not runoff as surface flow infiltrates through unsaturated surface material to the saturated glacial overburden or the saturated portion of a waste pit.

2. Groundwater in the saturated glacial overburden flows downward and laterally; lateral flow is approximately parallel to the topographic gradient.

282

3a. Lateral groundwater flow exits the glacial overburden into deep surface depressions such as the Paddy's Run Valley or the deep drainage ditch that is present between Waste Pit 5 and the railroad tracks. Subsequently, surface water flows down the Paddy's Run channel.

3b. Vertical groundwater flow exits the glacial overburden or the base of a waste pit into the unsaturated upper portion of the Great Miami Aquifer.

4a. Within the Great Miami Aquifer, groundwater flows downward through the unsaturated sand and gravel; upon reaching the saturated Great Miami Aquifer, groundwater flows laterally to the east and northeast.

4b. Surface water that flows down Paddy's Run enters the Great Miami Aquifer via infiltration through the creek bed or enters the Great Miami River.

Three graphic tools are used to understand groundwater flow in the waste storage area. First, groundwater elevation maps (Figures 3-37 through 3-40, 3-47 and 3-48) portray the lateral flow gradients. In the groundwater elevation maps, groundwater flows perpendicular to the elevation contours and flows from regions of high elevation to low elevation. Second, water table elevations are shown on a number of cross sections in Figures 3-24 to 3-31. Within the cross sections of the glacial overburden, groundwater flows downward and laterally along the groundwater elevations gradient toward points of lower groundwater elevation. Third, the hydrographs in Figures 3-41 to 3-46 show the seasonal variability of groundwater elevations in the waste storage area. The hydrographs show seasonal changes in groundwater elevation that are directly related to and approximately synchronous with the seasonal pattern of precipitation at the FEMP.

Groundwater elevations of the waste storage area glacial overburden for a low and high season are shown in Figures 3-47 and 3-48, respectively. The data used to compose these figures were collected from waste pit area monitoring wells and from monitoring wells completed within the waste pit contents (quarterly maps are not presented as with the Great Miami Aquifer, because water level data were only collected in waste pit wells in autumn 1991 and from May 1993 to present). Groundwater of the glacial overburden has a radial flow pattern (approximately concentric groundwater elevation contours), with the exception of the Burn Pit during autumn, the low season (Figure 3-47). Comparisons of Figures 3-47 and 3-48 show that seasonal variations of water level elevation are only a few feet in Waste Pits 1 through 4, but are up to 10 feet in the Burn Pit. The greater variation and low season depression in the Burn Pit may be because (1) evapotranspiration of groundwater is relatively greater for the Burn Pit area, or (2) Waste Pits 1 through 4 are relatively well-sealed basins, whereas the Burn Pit has a vertical or lateral drain. Given the observed gradient of the waste pit area, groundwater will flow laterally from the higher elevations inside the waste pits to the lower elevations outside the waste pits, if there is no hydraulic barrier.

Groundwater flow within the Great Miami Aquifer beneath the waste storage area is portrayed in Figures 3-37 to 3-40. In general the groundwater flow is to the east. However, infiltration of surface water along Paddy's Run (Figure 3-34) into the Great Miami Aquifer affects local groundwater flow in the waste storage area. During the high precipitation seasons of winter and spring there is more flow in Paddy's Run and stream water infiltrates into the Great Miami Aquifer, creating a groundwater mound centered beneath Paddy's Run. The mound creates a local reversal of gradient beneath the waste storage area during the wet season (Figures 3-38 and 3-39) that results in north and northwest flow of groundwater. During the dry season when there is relatively little recharge to the regional aquifer, the mound is not present and flow is predominantly eastward (Figures 3-37 and 3-40).

3.5 DEMOGRAPHICS AND LAND USE

3.5.1 Demographics

This section provides a summary of population data from the FEMP region and information on land use in the FEMP RI/FS study area. Additionally, a summary of available archaeological and historic resource data is presented for the FEMP RI/FS study area.

The FEMP is located approximately 17 miles northwest of Cincinnati, the focal point of a regional market encompassing eight counties in Ohio, Kentucky, and Indiana: Butler, Clermont, Hamilton, and Warren counties in Ohio; Boone, Campbell, and Kenton counties in Kentucky; and Dearborn County, Indiana. These eight counties also define the Cincinnati Consolidated Metropolitan Statistical Area. Population within the eight-county metropolitan area was more than 1.7 million in 1990, and within a 5-mile radius of the FEMP there were an estimated 22,927 residents.

There are no residences on the FEMP. The on-property worker population of 1700 includes employees of DOE, the prime contractor, and other contractors. Workers are on the FEMP approximately 8 hours per day, 5 days per week. Structures housing on-property workers are on approximately 136 acres (55 hectares) in the center of the FEMP in the administration area and the former production area.

Scattered residences and several villages, including Fernald, New Baltimore, Ross, New Haven, and Shandon are located near the FEMP. The nearest residence is within 0.75 mile from the center of the facility. The nearest residences to the western FEMP property boundary are located along the western side of Paddy's Run Road. A dairy farm is located on Willey Road just outside the southeast corner of the FEMP property boundary. Several residences are located off Paddy's Run Road approximately 0.5 mile south of the FEMP property boundary. These residences are in the vicinity of the south plume, a body of uranium-contaminated groundwater that extends south of the FEMP property boundary approximately 0.75 mile.

Current subpopulations of potential concern within 5 miles of the FEMP are identified below and are listed by the categories suggested by the EPA (1989a). The subpopulations include those that fall within the area extending between 3 and 4 miles beyond the leading edge of the south plume. Population descriptions within this area are based on 1990 census data.

- Schools: No schools are located within 1 mile of the FEMP. The Northwest, Ross, and Southwest school districts provide public education from kindergarten through high school for children living within 5 miles of the FEMP.

- Daycare Centers: No daycare facilities are located within 1 mile of the FEMP. Two daycare centers operate within the FEMP study area: (1) Ross County Day Nursery, with an average enrollment of 126 students per day and a total weekly enrollment of 180, is located north of the intersection of State Route 128 and US 27 about 2.5 miles northeast of the center of the FEMP; (2) Venice Presbyterian Preschool, with an average daily enrollment of 30 and a total weekly enrollment of 110, is located in the village of Venice (Ross) approximately 2 miles northeast of the center of the FEMP.

- Hospitals, Nursing Homes, and Retirement Communities: No care facilities of these types operate within 5 miles of the FEMP.

- Residential Areas with Children: In 1988, approximately 58 adults and 29 children were residing within 1 mile of the FEMP. Most of the residences within 5 miles of the FEMP are scattered and reflect the agricultural setting of the area. Population concentrations include Ross, Harrison, Shandon, Fernald, New Haven, New Baltimore, and one large trailer park. An estimated 8140 children lived within 5 miles of the center of the FEMP in 1988.

- Commercial and Recreational Fisheries: No commercial fisheries operate within 1 mile of the center of the FEMP. Recreational fishing occurs on Whitewash Lake of the Miami Whitewater Forest Park. This heavily stocked lake lies completely within 5 miles of the FEMP. The Great Miami River does not support any commercial fisheries in the vicinity of the FEMP. A recreational fishing advisory for polychlorinated biphenlys in bottom-feeding fish was issued in 1989. The fishing advisory was based on data collected by the OEPA.

- Major Industries Using Chemicals: No industrial facilities are located within 1 mile of the center of the FEMP Two companies located within 2 miles of the FEMP center, Ruetgers-Nease Chemical Company and Albright & Wilson Co., store and handle chemicals. Collectively known as the Paddy's Run Road Site, these facilities are classified as CERCLA sites, are listed on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), and are undergoing a state-led RI/FS. Proctor & Gamble has a research facility approximately 2 miles from the FEMP that is listed on CERCLIS and has undergone a Screening Site Inspection by EPA. Employees at these facilities are only considered a sensitive subpopulation if they reside within 5 miles of the FEMP.

3.5.2 Land Use

The land adjacent to the FEMP is primarily devoted to open land use such as agriculture and recreation (Figure 3-49). Commercial activity is generally restricted to the village of Venice (Ross), approximately 3 miles northeast of the facility, and along State Route 128 just south of the village. Industrial use is concentrated in the areas south of the FEMP, along Paddy's Run Road, in Fernald, and in a small industrial park on State Route 128 between Willey Road and New Haven Road. Concentrations of residential units are situated (1) immediately north of the FEMP, (2) in Ross, and (3) directly east in a trailer park adjacent to the intersection of Willey Road and State Route 128. Other residences are scattered around the area, generally associated with farms. The former Camp Ross Trails, owned by the Great Rivers Girl Scout Council, is located within 1 mile to the northeast of the FEMP.

More than 400 acres of the open land on the FEMP are leased to a nearby dairy farmer whose livestock grazes on the property. Pine plantations are located to the northeast and southwest of the former production area. A considerable amount of the soils within the boundaries of the FEMP are designated by the USDA (1980 and 1982) as prime agricultural land. Because the area had been intensively used for agricultural purposes prior to the establishment of the FEMP, there is no land on or in the vicinity of the FEMP property where a predeveloped natural environment remains intact. The land closest to this description would be recreated prairie lands in Miami Whitewater Forest Park, several miles south of the FEMP.

The area surrounding the FEMP property has a large and diverse archaeological and historic resource base. According to records kept by the Miami Purchase Association for Historic Preservation, an unusually high percentage of the existing 19th Century buildings in the area are historically important. Within a 2-mile radius from the boundary of the FEMP there are three properties listed in the National Register of Historic Places (NRHP) and a number of additional structures that have been judged eligible for inclusion in the listing. Six major archaeological sites lie within 5 miles of the FEMP and five of these are included in the NRHP. No archaeological sites or properties on the NRHP are located in or adjacent to the study area.

3.6 ECOLOGY

This section describes the regional ecology, the floodplains and wetlands, ecological communities on the FEMP, and threatened and endangered species at the FEMP.

3.6.1 Regional Ecology

The FEMP and surrounding areas lie in a transition zone between two distinct sections of the Eastern Deciduous Forest Province described by Bailey (1978): the Oak-Hickory and the Beech-Maple (Figure 3-50). The region is characterized by a mosaic of these forest types. The Oak-Hickory and Beech-Maple forest sections share many characteristics, including similar fauna and the presence of

white oak as a common species. The Beech-Maple section covers northern Ohio, Indiana, and lower Michigan. It is bordered by Oak-Hickory to the southwest, Mixed Mesophytic to the southeast, and Appalachian Oak to the east. Beech-Maple forests are typically dominated by beech trees in the canopy, the uppermost layer of the forest, with sugar maples dominant in the understory, below the canopy. The Oak-Hickory section covers southwest Ohio; western Kentucky and Tennessee; and parts of Indiana, Illinois, Missouri, and Arkansas. The dominant species are oaks, with an abundance of hickories. The fauna vary little between the two forest sections and include white-tailed deer, gray fox, gray squirrel, white-footed mouse, and short-tailed shrew; the cardinal, woodthrush, summer tanager, red-eyed vireo, and the hooded warbler; the box turtle, common garter snake, and timber rattlesnake (Bailey 1978; Shelford 1963).

Ecological communities on the FEMP consist of grazed and ungrazed pastures, two pine plantations, deciduous woodlands, riparian woodlands, and the "reclaimed flyash pile area" (Figure 3-51). The reclaimed flyash area coincides approximately with the south field and the inactive flyash pile, and it was considered a distinct habitat by Facemire et al. (1990) because of the unique plant and animal species composition. A total of 47 species of trees and shrubs, 190 species of herbaceous plants, 20 mammal species, 98 bird species, 10 species of amphibians and reptiles, 21 species of fish, 47 families of benthic macroinvertebrates, and 132 families of terrestrial invertebrates inhabit the FEMP.

Typical grasses found on the FEMP are red fescue, Kentucky bluegrass, timothy, and red top. Herbs include teasel, red and white clovers, and goldenrod. The dominant tree species in the pine plantations are white and Austrian pine, with Norway spruce occurring occasionally. Common trees in the deciduous woodlands are white ash, American elm, shagbark hickory, and slippery elm. Dominant tree species in the riparian woodlands are eastern cottonwood, hackberry, American elm, and box elder. The reclaimed flyash pile is dominated by American elm, eastern cottonwood, and black locust.

Mammal species observed on the FEMP include white-tailed deer, coyote, red fox, opossum, raccoon, groundhog, eastern cottontail, fox squirrel, and several species of bats. Common small mammals are the white-footed mouse, short-tailed shrew, meadow vole, meadow jumping mouse, and eastern chipmunk.

The most common birds breeding on site include the mourning dove, American robin, blue jay, American crow, American goldfinch, northern bobwhite, and common grackle. Species occurring in the greatest density are the goldfinch, song sparrow, and robin. Raptor species observed on site are the northern harrier, red-shouldered hawk, Cooper's hawk, red-tailed hawk, and American kestrel. The eastern screech owl and great horned owl have been observed in the vicinity of the FEMP.

Amphibians and reptiles that occur on the FEMP include the American toad, spring peeper, eastern box turtle, and snapping turtle. Several species of snakes also occur on site, including the eastern garter snake, Butler's garter snake, black rat snake, northern water snake, and the queen snake.

Approximately 130 insect families from 15 orders are represented in FEMP habitats. Leaf hoppers are abundant in all habitats, while less abundant groups include short-horned grasshoppers, leaf beetles, springtails, fruit flies, dark-winged fungus gnats, ants, bees, and wasps.

A baseline ecological risk assessment was performed as part of the SWCR to estimate potential present and future baseline risks that FEMP contaminants may present to ecological receptors. This risk assessment was based on data available as of December 1991. Ecological receptors considered included all organisms, exclusive of humans and domestic animals.

3.6.2 Floodplains and Wetlands

Floodplains within the FEMP property are confined to the north-south corridor containing Paddy's Run (Figure 3-52). Outside the boundaries of the FEMP, the 100-year floodplain of the Great Miami River extends west of Big Bend nearly to the eastern boundary of the facility. The 100-year floodplain of the river also extends northward along Paddy's Run from the confluence of the two streams to a point about 600 feet from the southern boundary of the FEMP. This area overlaps the south plume, a body of uranium-contaminated groundwater that is a component of Operable Unit 5. The inset in Figure 3-52 shows the 100-year floodplain in the Operable Unit 1 study area.

A site-wide wetland delineation was conducted in February 1993 in accordance with the 1989 U.S. Army Corps of Engineers Wetlands Delineation Manual and in compliance with 10 CFR 1022. The purpose of the delineation was to determine the extent of jurisdictional wetlands and waters of the United States and to avoid or minimize impacts to these resources during future activities at the FEMP. A jurisdictional determination has been requested from the U.S. Army Corps of Engineers to verify the wetland boundaries and waters of the United States.

Preliminary results from the site-wide delineation, subject to the U.S. Army Corps of Engineers' approval, indicate a total of 35.9 acres of wetlands on the FEMP site. Delineated wetlands included 26.58 acres of palustrine forested wetlands, 6.95 acres of drainage ditches/swales, and 2.37 acres of isolated emergent and emergent-scrub/shrub wetlands. Figure 3-53 shows the preliminary results of the site-wide wetlands delineation. Several wetlands are located adjacent to Operable Unit 1.

The largest of the four palustrine forested wetland areas is located north of the former production area. The remaining three areas are located: (1) along the east bank of Paddy's Run near the northern site border, (2) in the northeast corner of the site, and (3) southwest of the K-65 silos.

Drainage ditches and swales constituting wetlands are located in four sections throughout the site: (1) north of the former production area traversing west into Paddy's Run, (2) drainage of the waste pit area, (3) drainage of the area south of the K-65 silos, and (4) adjacent to the east boundary of the former production area, draining higher elevations of the site to the east. As an action relevant to Removal Action No. 22, a maintenance action was completed on the drainage ditch containing wetland WX. The drainage ditch is located within Operable Unit 1 boundaries along the east side of the road that borders the east side of Waste Pit 2. The ditch silted and lost positive drainage because of inadequate culvert design. The maintenance action that impacted wetland WX was completed under Nationwide Permit Number 26 with concurrence of the Louisville District of the U.S. Army Corps of Engineers.

Two of the four isolated scrub/shrub and/or emergent wetlands are located in the northern part of the site; one near the eastern corner and the other just east of Paddy's Run near the western corner of the site. The remaining two wetlands are located in the vicinity of the waste pit area, one to the east, and one to the west.

On-site waters of the United States are confined to Paddy's Run and its unnamed tributaries, and total approximately 8.9 acres (Figure 3-53).

3.6.3 Threatened and Endangered Species

Miami University of Ohio performed an Ecological Characterization Study of the FEMP in 1989. Section 7(a)(2) of the Endangered Species Act of 1973 as amended, requires that federal agencies, "in consultation with the assistance of "the Secretaries of the Interior and Commerce, ensure that their actions are "not likely to jeopardize the continued existence of any endangered species or threatened species or results in the destruction or adverse modification of the critical habitat of such species." The following discussion was drawn from conclusions of the study and supplemental investigations conducted as part of the RI.

3.6.3.1 Indiana Bat (*Myotis sodalis*)

The Indiana bat is listed as both a federal and state endangered species and occurs in Butler and Hamilton counties. Surveys were conducted at the FEMP to determine the distribution and presence of the Indiana bat and to identify potential habitat on the FEMP and in the immediate vicinity. The Indiana bat has not been identified at the FEMP, but during the summer of 1988 a population was identified approximately 3 miles northeast of the FEMP on Banklick Creek, a tributary of the Great Miami River (DOE 1992b). Potential habitat for the Indiana Bat occurs in portions of the riparian woodland associated with Paddy's Run. As depicted in Figure 3-54, potentially good to excellent habitat occur within the western boundaries of Operable Unit 1.

3.6.3.2 Cave Salamander (*Eurycea lucifuga*)

The cave salamander, a state endangered species, has not been identified at the FEMP. During the summer of 1988, a population was identified 1 mile northeast of the FEMP at the Ross Trails Girl Scout Camp (DOE 1992b). Potential habitat occurs along Paddy's Run, which extends into the western boundaries of Operable Unit 1 (Figure 3-55).

3.6.3.3 Other Species

The northern waterthrush (*Seivrus noveboraceusis*), a state endangered species, was reported as a spring migrant along Paddy's Run during the spring of 1987 by Facemire et al. (1990).

The northern harrier (*Circus cyaneus*), a state endangered species, and the red-shouldered hawk (*Buteo lineatus*), a state threatened species, were observed flying over the FEMP by Facemire et al. (1990) on two separate occasions. Neither species has been reported to nest at the FEMP.

Slender finger-grass (*Digitaria filiformis*) and mountain bindweed (Polygonum cilinode) are state endangered species recorded in low densities along Paddy's Run and in the northern pine plantation by Facemire et al. (1990).

The dark-eyed junco (*Junco ayemalis*), a state endangered species, was observed throughout the FEMP during the winter of 1986 and 1987 by Facemire et al. (1990). Running buffalo (*Trifolium stoloniferum*), a state and federally endangered species has not been identified at the FEMP. A population was identified less than 5 miles southwest of the FEMP at Miami Whitewater Forest County Park. Potential habitat exists in introduced grassland areas, riparian and deciduous woodlands, and forested wetlands on the FEMP.

Sloan's crayfish (*Orconectes sloanii*) is a state threatened species reported from Paddy's Run by Facemire et al. (1990). One individual of this genus, not identified to species, was recorded in Paddy's Run during RI/FS sampling (DOE 1992b).

The cobblestone tiger beetle (*Cicendela marginpennis*), listed as a Federal 2 (F2) species and state-listed special-interest species, was found in 1988, on a gravel bar in the Great Miami River 2 miles west/southwest of the bridge at New Baltimore, Ohio. As an F2 species, this beetle has been considered by the U.S. Fish and Wildlife Service for possible inclusion on the federal threatened or endangered species list. Special-interest species are listed by the Ohio Department of Natural Resources and are often eligible, with more information, to be listed as state threatened or endangered. This beetle remains on both lists because of insufficient information on its past existence and habitat prevents it from being elevated to a threatened or endangered category.

TABLE 3-1

GEOTECHNICAL RESULTS FOR WASTE PITS 1, 2, 3, 4 AND BURN PIT

Waste Pit No.	Boring No.	Sample I.D.	Depth Interval	Depth to Water Level	Water % Content	Specific Gravity	Liquid Limit	Plastic Index	200 Sieve % Finer	Consistency	USCS Symbol
1	1765	63089	4.5′ - 7.0′	3.17′	23.6	3.0327	NP*	NP	90.3	Sludge	ML
	1765	63101	14.0′ - 16.5′	3.17′	20.9	2.9235	NP	NP	91.7	Sludge	ML
	1766	63050	4.5′ - 7.0′	3.07′	19.3	3.0342	20	3	91.2	Sludge	CL
	1766	63054	8.5′ - 11.0′	3.07′	15.9	3.1515	NP	NP	90.0	Sludge	ML
	1766	63062	14.0′ - 16.5′	3.07′	21.8	3.0295	NP	NP	89.8	Sludge	ML
	1767	63008	3.5′ - 6.0′	3.47′	23.3	3.0650	NP	NP	71.1	Sludge	ML
2	1768	63619	8.5′ - 11.0′	1.29′	290.0	2.8033	NP	NP	61.0	-	ML
	1769	63608	4.0′ - 6.0′	1.49′	120.0	2.8328	48	12	68.2	Sludge	ML
	1769	63521	12.0′ - 14.0′	1.49′	231.2	2.6395	117	44	59.5	Sludge	MH
	1769	63530	18.0′ - 20.0′	1.49′	169.8	2.6352	181	72	58.1	Sludge	MH
3	1770	63328	4.0′ - 6.0′	4.52′	63.7	2.1956	NP	NP	43.5	Sludge	NP
	1770	63357	20.0′ - 22.0′	4.52′	138.7	2.8357	116	61	43.4	Sludge	MH
	1770	63370	28.0′ - 30.0′	4.52′	131.1	2.7734	119	71	50.3	Sludge	MH
	1771	63458	32.0′ - 34.0′	4.25′	55.1	2.8396	93.0	25	62.7	Sludge	MH
	1772	63278	19.5′ - 22.0′	2.23′	35.4	2.4470	NP	NP	52.9	Sludge	NP
4	1773	63747	11.0′ - 13.0′	9.04′	21.4	2.6163	34	8	56.5	Sludge	CL
	1774	63670	10.0′ - 12.0′	10.93′	15.9	2.7897	32	10	76.6	Sludge	CL
	1774	63687	20.0′ - 22.0′	10.93′	17.6	3.1001	NP	NP	92.1	Sludge	NP
	1775	63826	8.5′ - 11.0′	8.52′	61.5	3.5888	41	7	63.9	Sludge	CL-ML
Burn Pit	1776	63146	4.5′ - 6.0′	3.16′	43.3	3.7429	NP	NP	47.1	Sludge	NP

*NP - Nonplastic

4788

TABLE 3-2

AMBIENT AIR TEMPERATURE MEASURED
BY THE FEMP METEOROLOGICAL SYSTEM

Year	Average Annual Temperature (^{0}F)	Average Annual Daily Minimum Temperature (^{0}F)	Average Annual Daily Maximum Temperature (^{0}F)
1987	50.7	41.0	61.5
1988	52.3	41.9	63.7
1989	52.2	44.1	62.8
1990	52.5	43.2	62.4
1991	55.4	46.8	65.1
1992	52.0	43.3	61.7

TABLE 3-3

SOIL CONSERVATION SERVICE SOILS DRAINAGE CLASSIFICATIONS AT THE FEMP

Symbol	Name	Slopes (%)	Drainage Classification
DaB	Dana silt loam	2-6	Moderately well drained
EcE2	Eden silty clay loam	15-25	Well drained
EcF2	Eden silty clay loam	25-50	Well drained
FcA and FdA	Fincastle silt loam	0-2	Somewhat poorly drained
FeA	Fincastle-Urban land complex	0-2	Somewhat poorly drained
FoA	Fox loam	0-2	Well drained
Gn	Genesee loam	0-2	Well drained
HeF	Hennepin silt loam	35-60	Well drained
HoA	Henshaw silt loam	0-2	Somewhat poorly drained
MaB	Markland silty clay loam	2-6	Moderately well drained
MaC2	Markland silty clay loam	6-12	Moderately well drained
McA	Martinsville silt loam	0-2	Well drained
MnC2	Miamian silt loam	8-15, eroded	Well drained
MoE2	Miamian-Hennepin silt loams	25-35, eroded	Well drained
MsC2	Miamiam-Russell silt loams	2-6	Well drained
MsD2	Miamiam-Russell silt loams	12-18, moderately eroded	Well drained
Ra	Ragsdale silty clay loam	level	Very poorly drained
RdA	Raub silt loam	0-2	Somewhat poorly drained
RvB	Russell-Miamian silt loams	2-6	Well drained
RwB2	Russell silt loam	3-8, eroded	Well drained
UnA	Uniontown silt loam	0-2	Well drained
UnB	Uniontown silt loam	2-6	Well drained
XeB	Xenia silt loam	2-6	Moderately well drained
XeB2	Xenia silt loam	2-6	Moderately well drained
XfA	Xenia silt loam	0-2	Moderately well drained
XfB2	Xenia silt loam	0-2, eroded	Moderately well drained

SOURCES: USDA (1980, 1982)

TABLE 3-4

MODAL PERCENT FOR MINERALS IN SUBSURFACE SOIL SAMPLES

Sample ID	Calcite	Dolomite	Quartz	K-feldspar	Illite	Corrensite	Iron Oxides	Biotite	Chlorite	Hornblende	Humus
100882	39.41	25.06	14.81	12.98	2.56	0.86	0.23	0.00	0.00	1.14	2.95
101403	0.00	0.00	0.00	0.00	65.00	35.00	0.00	0.00	0.00	0.00	0.00
100844	17.72	5.92	42.65	11.14	1.22	0.38	0.00	1.66	0.00	0.47	5.45
101366	26.03	17.57	22.34	21.48	1.55	1.27	1.95	2.17	0.00	2.39	3.25
100787	28.69	27.64	20.47	14.34	1.73	1.43	0.63	0.84	0.00	1.90	2.33
100813	22.34	35.19	11.65	18.20	2.21	0.95	0.49	3.40	0.00	0.49	3.88
100758	34.33	24.42	20.97	12.21	1.78	1.45	0.46	0.46	0.24	1.61	2.07
100771	36.77	31.26	12.64	11.26	1.29	0.32	0.46	0.46	0.00	0.69	1.84
101329	39.96	25.24	10.34	13.93	2.97	1.60	0.60	4.37	0.00	0.80	0.19
100719	22.20	19.03	20.93	18.60	5.20	3.47	2.54	0.00	0.00	2.11	5.92
100732	19.04	27.52	18.58	22.25	4.29	1.44	0.23	4.36	0.00	0.23	2.06
101285	32.26	23.73	15.67	18.20	1.89	1.14	0.46	2.07	0.23	0.70	4.15
101295	24.66	19.73	20.85	26.90	1.55	1.27	0.63	0.00	0.00	2.24	2.02
100704	33.80	25.41	18.18	11.89	2.50	1.34	0.70	0.47	0.00	1.16	3.96
101277	32.64	36.81	13.34	11.81	1.66	0.89	0.92	0.00	0.23	0.69	1.01
100690	21.31	14.14	27.69	24.30	2.19	2.19	1.59	0.00	0.00	0.81	5.78
101234	33.49	26.28	18.45	14.35	1.63	0.88	1.91	2.28	0.00	0.45	0.28
100677	37.30	23.20	12.70	18.28	4.72	0.84	1.79	0.00	0.00	0.67	0.57
100552	2.16	0.00	27.11	7.93	31.76	13.62	0.25	0.00	0.00	0.25	16.92
100567	9.79	7.33	11.25	5.14	45.29	15.10	0.73	0.00	0.00	0.25	5.13

Note: Sampling locations are described in detail in IT Technical Report 5.1B (February 1993)

TABLE 3-5

SLUG TEST RESULTS FOR GLACIAL OVERBURDEN

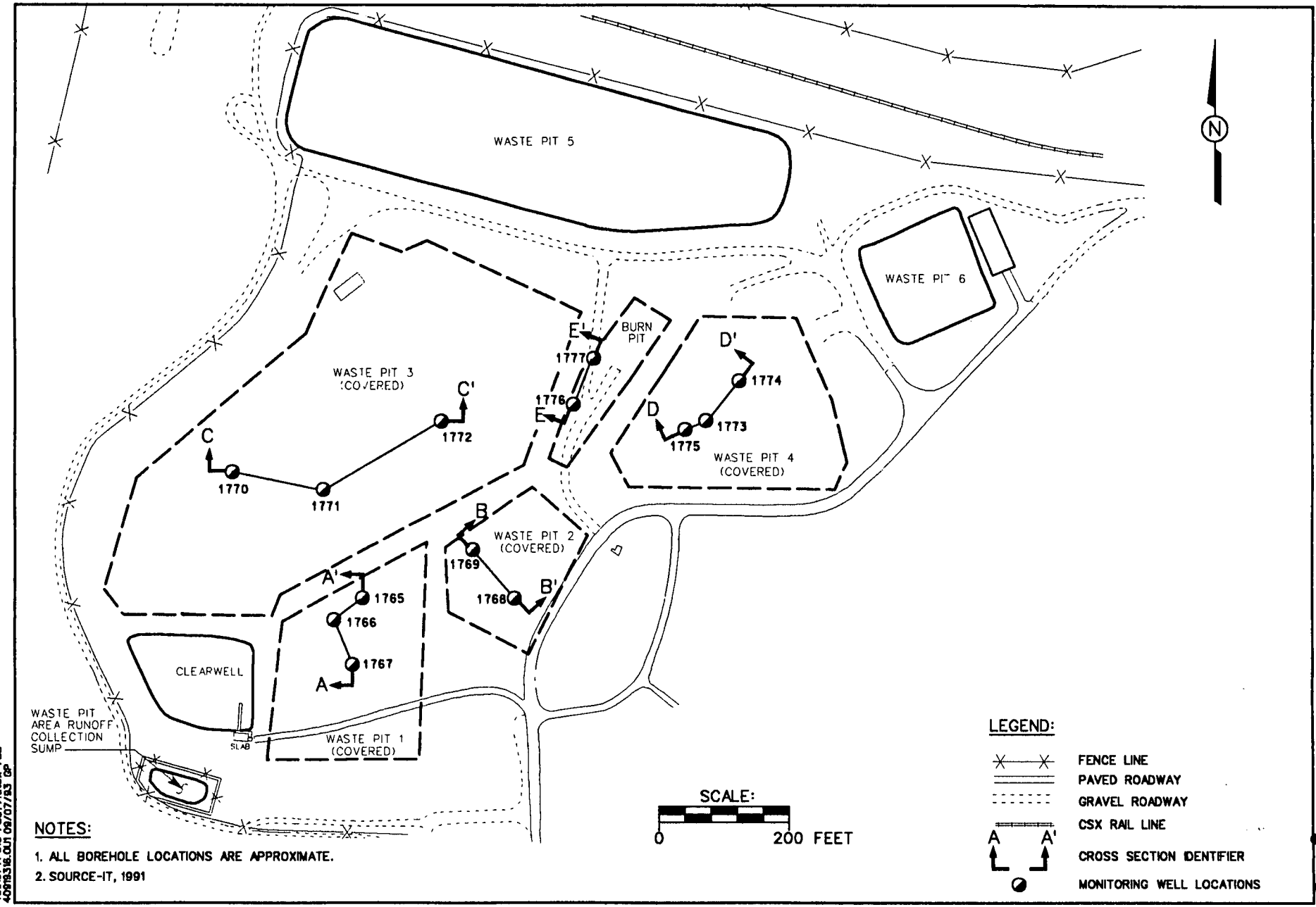
Well No.	Source of Data	Hydraulic Conductivity (cm/s)
PWT-1	SME, 1985[a]	5.6×10^{-6}
PWT-2	SME, 1985[a]	4.3×10^{-4}
PWT-3	SME, 1985[a]	3.5×10^{-4}
PWT-4	SME, 1985[a]	3.4×10^{-4}
PWT-5	SME, 1985[a]	2.0×10^{-4}
1008	GW, SWCR[b]	1.3×10^{-4}
1012	GW, SWCR[b]	1.6×10^{-3}
1018	GW, SWCR[b]	5.7×10^{-4}
1025*	GW, SWCR[b]	2.5×10^{-6}
1034	GW, SWCR[b]	2.5×10^{-5}
1035	GW, SWCR[b]	2.5×10^{-5}
1041	GW, SWCR[b]	1.1×10^{-4}
1046	GW, SWCR[b]	6.8×10^{-5}
1048	GW, SWCR[b]	1.6×10^{-4}
1065	GW, SWCR[b]	2.2×10^{-5}
1079	GW, SWCR[b]	1.8×10^{-5}
1185	OU-3 RI[c]	2.0×10^{-4}
1186	OU-3 RI[c]	2.4×10^{-4}
1195	OU-3 RI[c]	7.6×10^{-4}
1196	OU-3 RI[c]	3.1×10^{-3}
1197	OU-3 RI[c]	8.9×10^{-4}
1199	OU-3 RI[c]	6.2×10^{-4}
1208	OU-3 RI[c]	1.8×10^{-4}
1209	OU-3 RI[c]	1.6×10^{-3}
1212	OU-3 RI[c]	1.2×10^{-3}
1213	OU-3 RI[c]	2.6×10^{-4}
1224	OU-3 RI[c]	1.3×10^{-4}
1228	OU-3 RI[c]	7.0×10^{-5}
1231	OU-3 RI[c]	3.6×10^{-5}
1233	OU-3 RI[c]	1.2×10^{-3}
1234	OU-3 RI[c]	2.2×10^{-4}

*Well located within Operable Unit 1 Study Area. See Figure 3-23 and Figure 3-31.

[a]Soil and Material Engineers, Inc., 1985, "Hydrogeologic Investigation of the Proposed Storm Water Collection Basin," Report prepared for NLO and U.S. DOE.

[b]Groundwater Report (1990) and Site-Wide Characterization Report (1992).

[c]Draft Operable Unit 3 RI Report (1990); results were listed incorrectly in the report. The correct values are reported here.



NOTES:

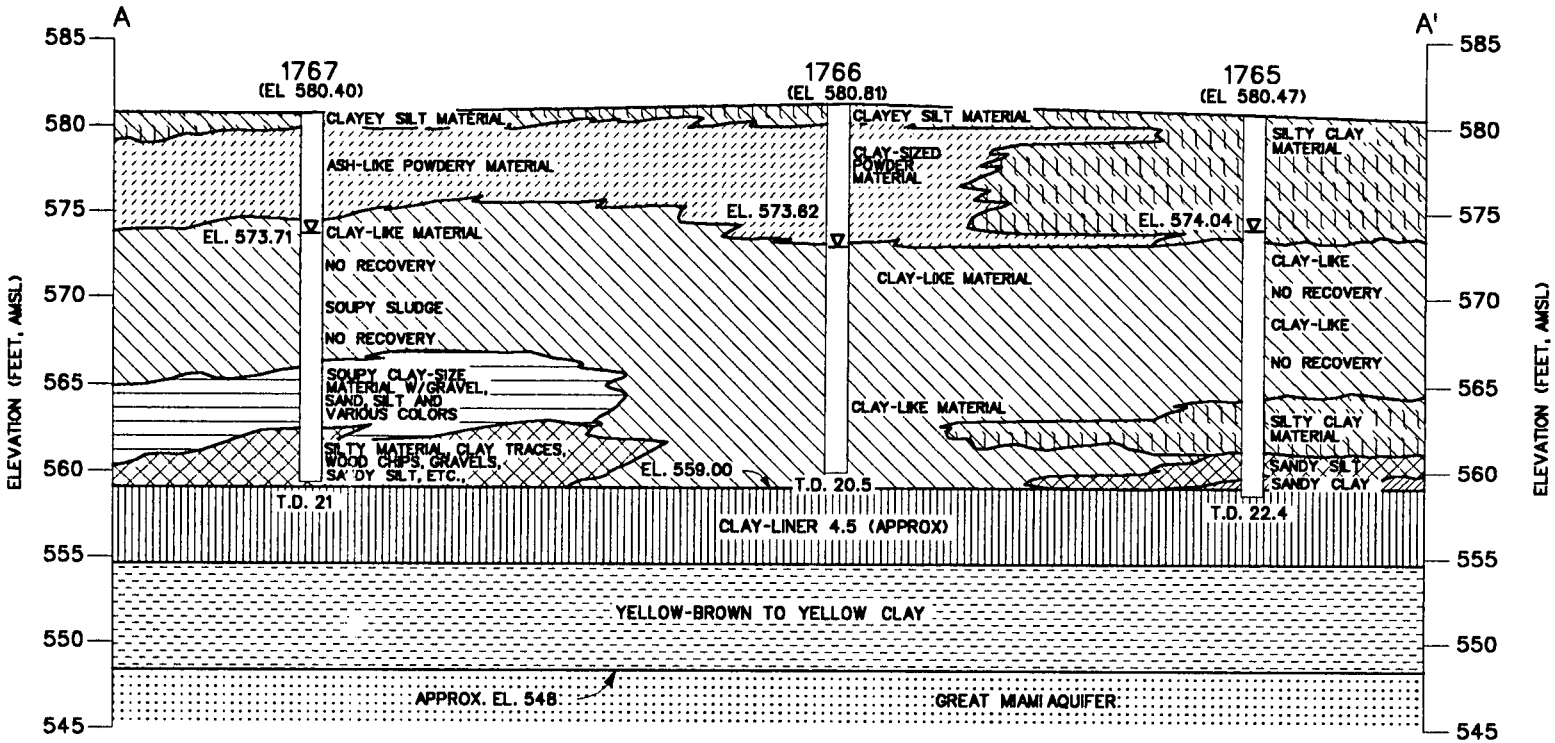
1. ALL BOREHOLE LOCATIONS ARE APPROXIMATE.
2. SOURCE-IT, 1991

FIGURE 3-1. PIT CROSS SECTION LOCATIONS

409191-A-318 /OU1 /KMOX /DS
409191316.OU1 09/07/93 GP

296

4783



SECTION A-A'
HORIZONTAL SCALE 1"=25'

LEGEND:

- CLAY-LIKE MATERIAL
- SAND OR GRAVEL MATERIAL
- SILT MATERIAL
- ASH-LIKE OR CLAY-SIZED POWDER MATERIAL
- UNDIFFERENTIATED GLACIAL OVERBURDEN
- GREAT MIAMI AQUIFER
- CAP (CLAYS)
- CLAY-LINER
- CLAY MATERIAL OR OLIVE-GRAY TO GRAY CLAY
- SOUPY SLUDGE, WASTE, DEBRIS OR VERY WET WASTE MATERIAL
- SOUPY CLAY-SIZE MATERIAL W/ GRAVEL, SAND & SILT W/ VARIOUS COLORS
- YELLOW-BROWN TO BROWN CLAY
- CLAY-LIKE MATERIAL WITH SAND
- SILTY CLAY MATERIAL
- SILTY MATERIAL, CLAY TRACES, WOOD CHIPS, GRAVELS, SANDY SILT
- CLAY WITH PEBBLES, GRAVEL AND SANDY MATERIAL

FIGURE 3-2. CROSS SECTION OF WASTE PIT 1 CONTENTS

409191-A-311 /OU1 /NNOX /DS
409193.11.OU1/09/29/93/GP

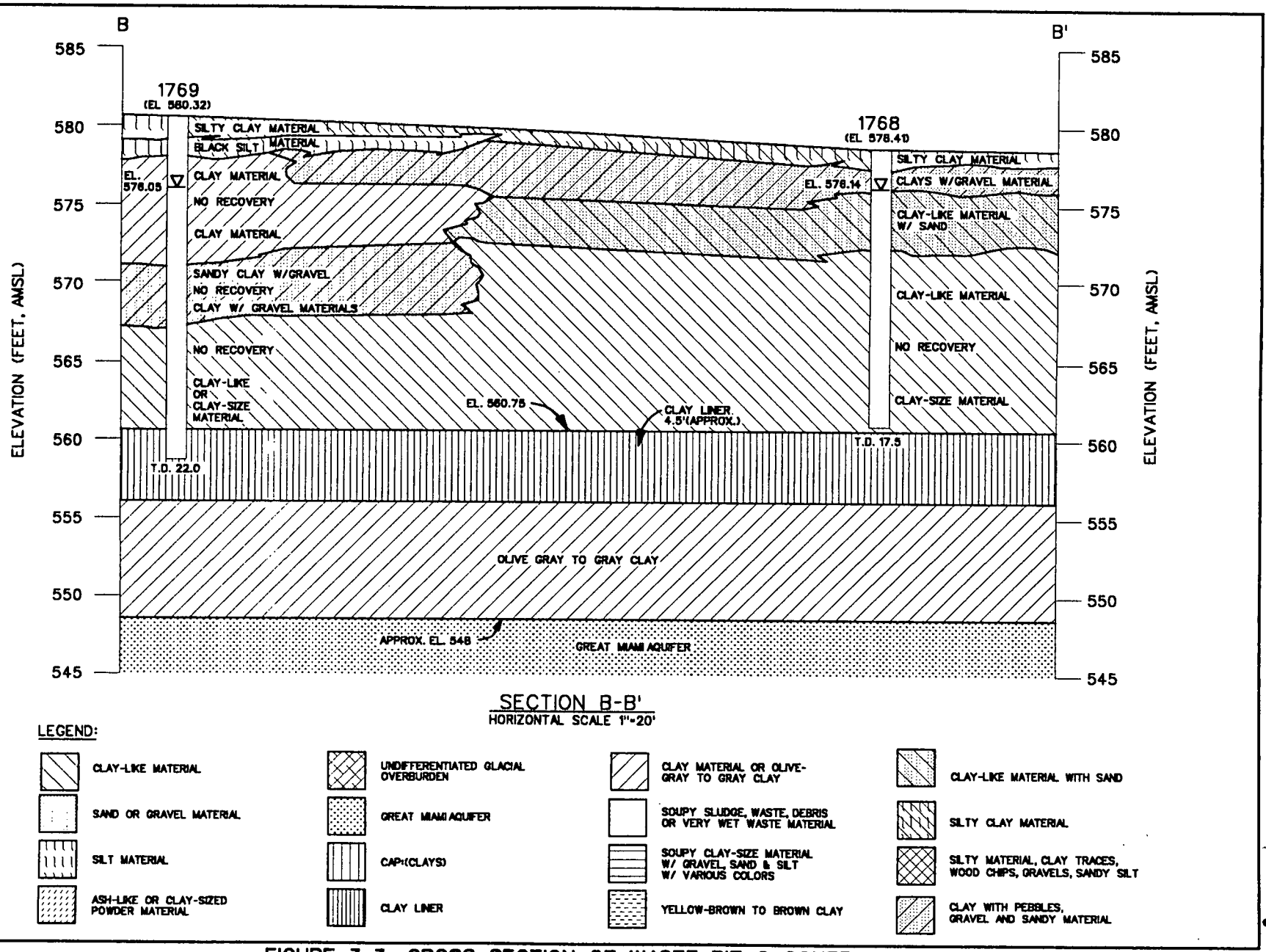
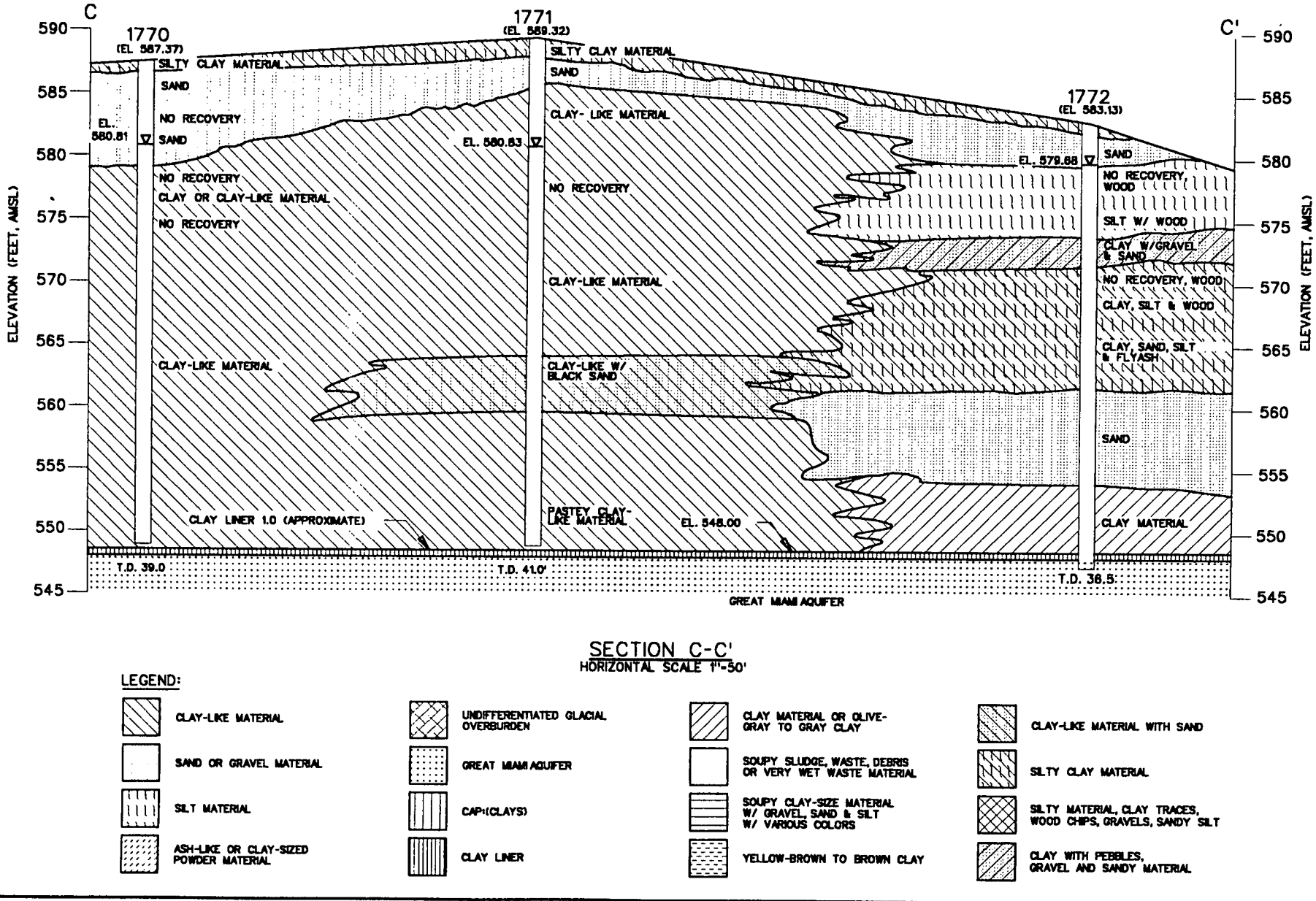


FIGURE 3-3. CROSS SECTION OF WASTE PIT 2 CONTENTS

408191-A-312 /OUT /KNOX /DS
408963-T2L OUT 07/28/93 CP

4783



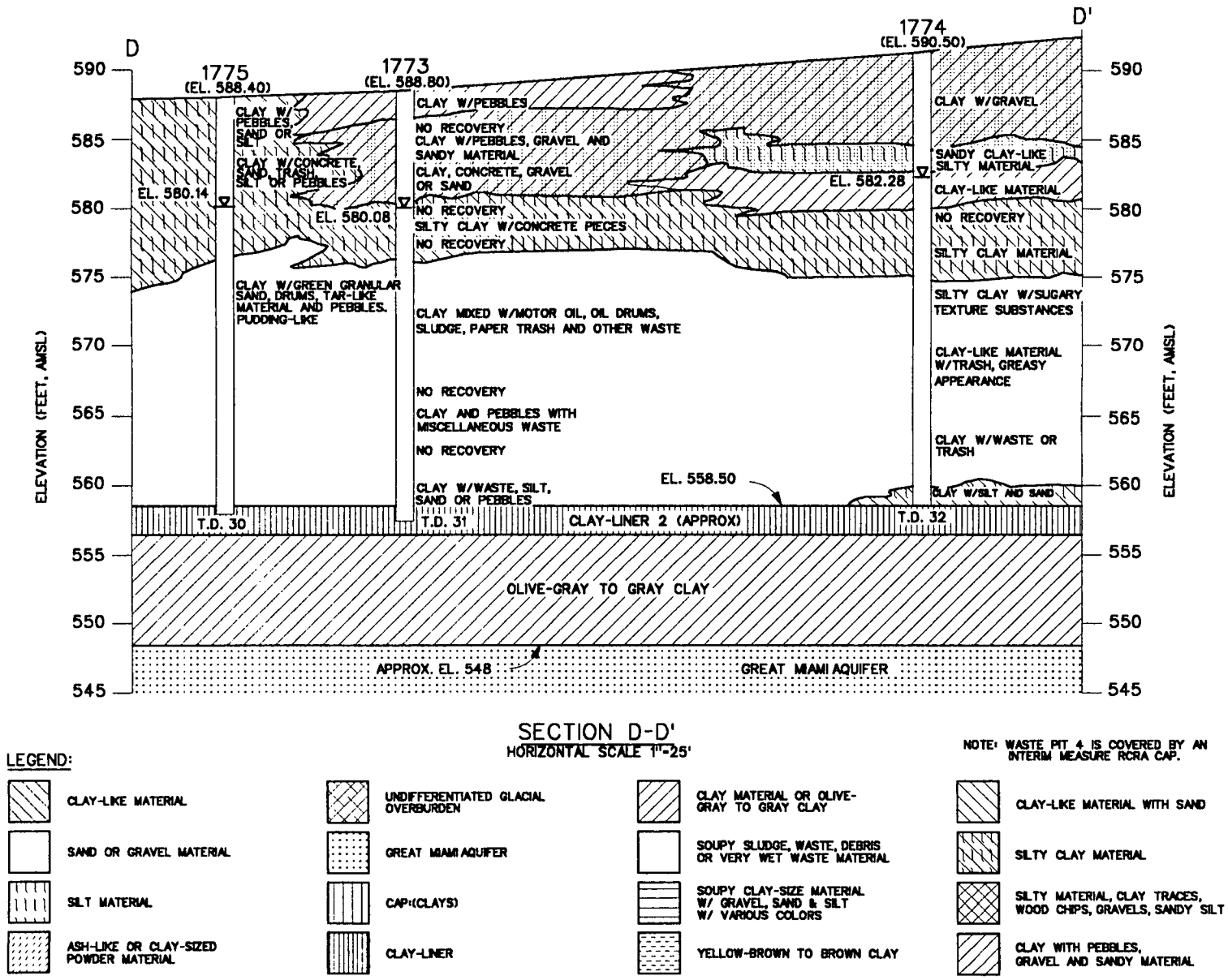
SECTION C-C'
HORIZONTAL SCALE 1"=50'

LEGEND:

- CLAY-LIKE MATERIAL
- SAND OR GRAVEL MATERIAL
- SILT MATERIAL
- ASH-LIKE OR CLAY-SIZED POWDER MATERIAL
- UNDIFFERENTIATED GLACIAL OVERBURDEN
- GREAT MIAMI AQUIFER
- CAP:(CLAYS)
- CLAY LINER
- CLAY MATERIAL OR OLIVE-GRAY TO GRAY CLAY
- SOUPY SLUDGE, WASTE, DEBRIS OR VERY WET WASTE MATERIAL
- SOUPY CLAY-SIZE MATERIAL W/ GRAVEL, SAND & SILT W/ VARIOUS COLORS
- YELLOW-BROWN TO BROWN CLAY
- CLAY-LIKE MATERIAL WITH SAND
- SILTY CLAY MATERIAL
- SILTY MATERIAL, CLAY TRACES, WOOD CHIPS, GRAVELS, SANDY SILT
- CLAY WITH PEBBLES, GRAVEL AND SANDY MATERIAL

FIGURE 3-4. CROSS SECTION OF WASTE PIT 3 CONTENTS

409191-A-313 /OUT /10NOX /SO
409193313.OUT 09/29/93 GP



SECTION D-D'
HORIZONTAL SCALE 1"=25'

NOTE: WASTE PIT 4 IS COVERED BY AN INTERIM MEASURE RCRA CAP.

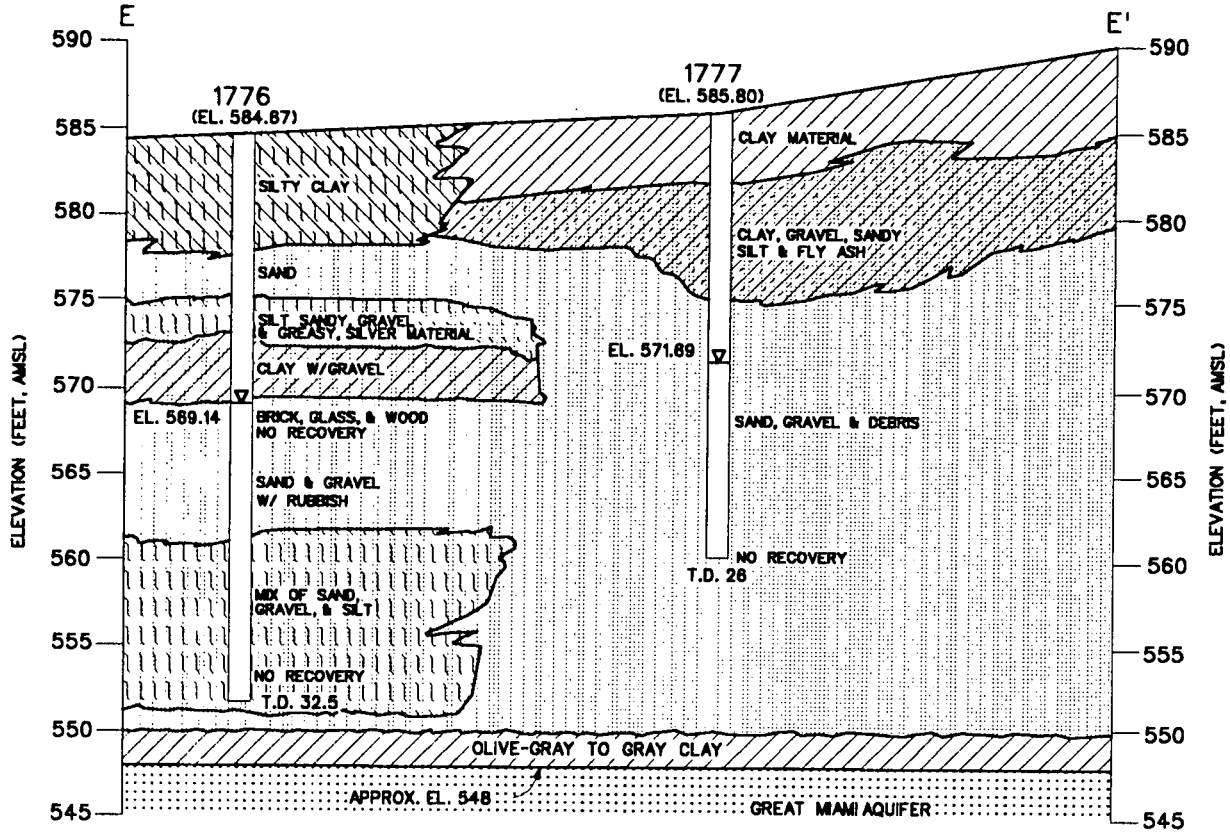
LEGEND:

- CLAY-LIKE MATERIAL
- SAND OR GRAVEL MATERIAL
- SILT MATERIAL
- ASH-LIKE OR CLAY-SIZED POWDER MATERIAL
- UNDIFFERENTIATED GLACIAL OVERBURDEN
- GREAT MIAMI AQUIFER
- CAP (CLAYS)
- CLAY-LINER
- CLAY MATERIAL OR OLIVE-GRAY TO GRAY CLAY
- SOUPY SLUDGE, WASTE, DEBRIS OR VERY WET WASTE MATERIAL
- SOUPY CLAY-SIZE MATERIAL W/ GRAVEL, SAND & SILT W/ VARIOUS COLORS
- YELLOW-BROWN TO BROWN CLAY
- CLAY-LIKE MATERIAL WITH SAND
- SILTY CLAY MATERIAL
- SILTY MATERIAL, CLAY TRACES, WOOD CHIPS, GRAVELS, SANDY SILT
- CLAY WITH PEBBLES, GRAVEL AND SANDY MATERIAL

FIGURE 3-5. CROSS SECTION OF WASTE PIT 4 CONTENTS

408181-A-314 /OU1 /KNOX /DS
408181314:OU1/09/29/93/DAA

4783



SECTION E-E'
HORIZONTAL SCALE 1"=25'

LEGEND:

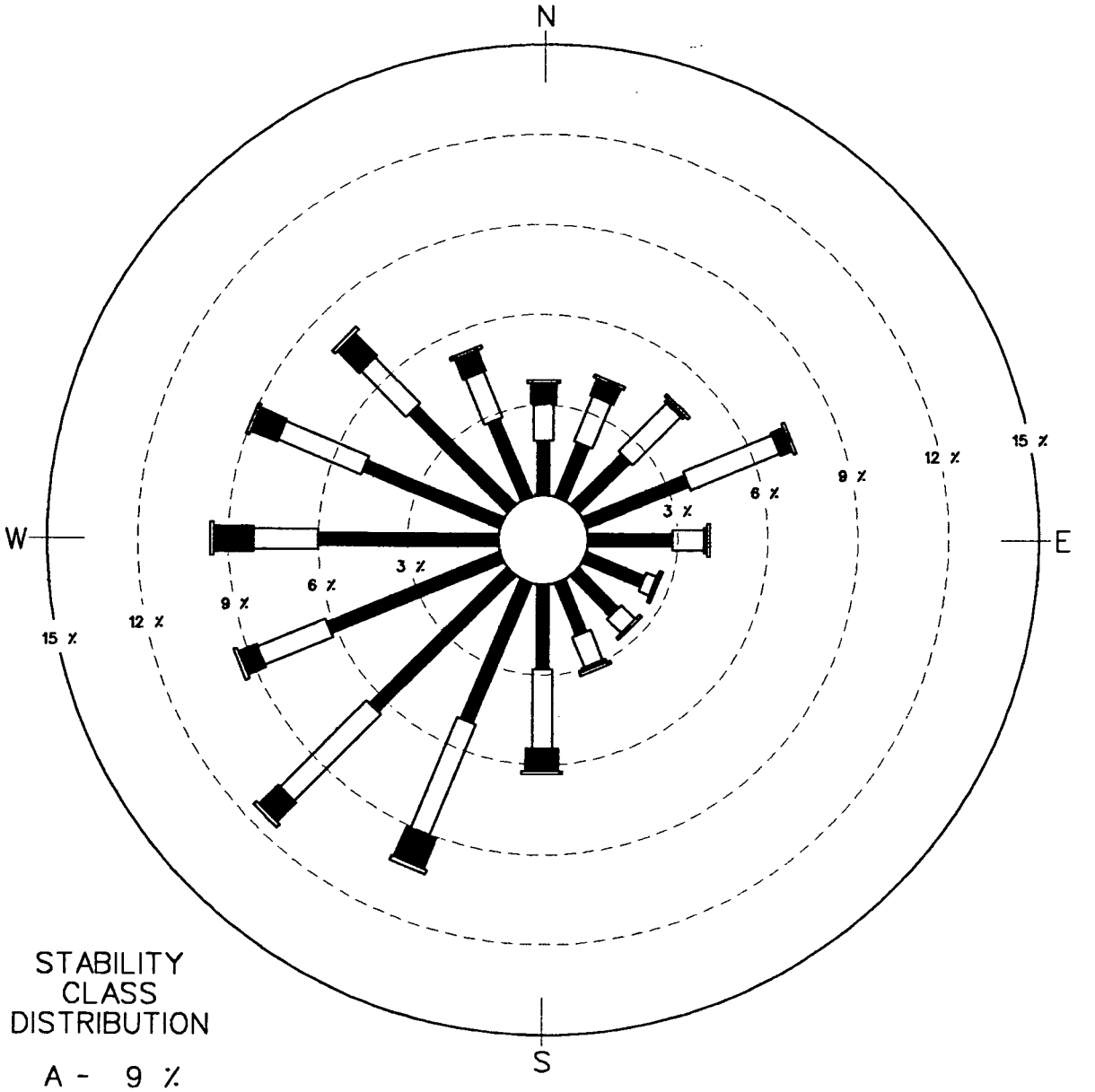
- CLAY-LIKE MATERIAL
- SAND OR GRAVEL MATERIAL
- SILT MATERIAL
- ASH-LIKE OR CLAY-SIZED POWDER MATERIAL
- UNDIFFERENTIATED GLACIAL OVERBURDEN
- GREAT MIAMI AQUIFER
- CAP:(CLAYS)
- CLAY LINER
- CLAY MATERIAL OR OLIVE-GRAY TO GRAY CLAY
- SOUPY SLUDGE, WASTE, DEBRIS OR VERY WET WASTE MATERIAL
- SOUPY CLAY-SIZE MATERIAL W/ GRAVEL, SAND & SILT W/ VARIOUS COLORS
- YELLOW-BROWN TO BROWN CLAY
- CLAY-LIKE MATERIAL WITH SAND
- SILTY CLAY MATERIAL
- SILTY MATERIAL, CLAY TRACES, WOOD CHIPS, GRAVELS, SANDY SILT
- CLAY WITH PEBBLES, GRAVEL AND SANDY MATERIAL

FIGURE 3-6. CROSS SECTION OF BURN PIT CONTENTS

409191-4-315 /OU1 /KNOX /DS
409193.15.OU1 08/22/03 Pc01

301

4788



STABILITY CLASS DISTRIBUTION

A - 9 %
B - 4 %
C - 4 %
D - 33 %
E - 27 %
F - 22 %

NOTES:

1. DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 4.8 PERCENT OF THE TIME.

2. RECORDED AT FEMP FROM A 33-FEET (10 METERS) TOWER DURING 1992.

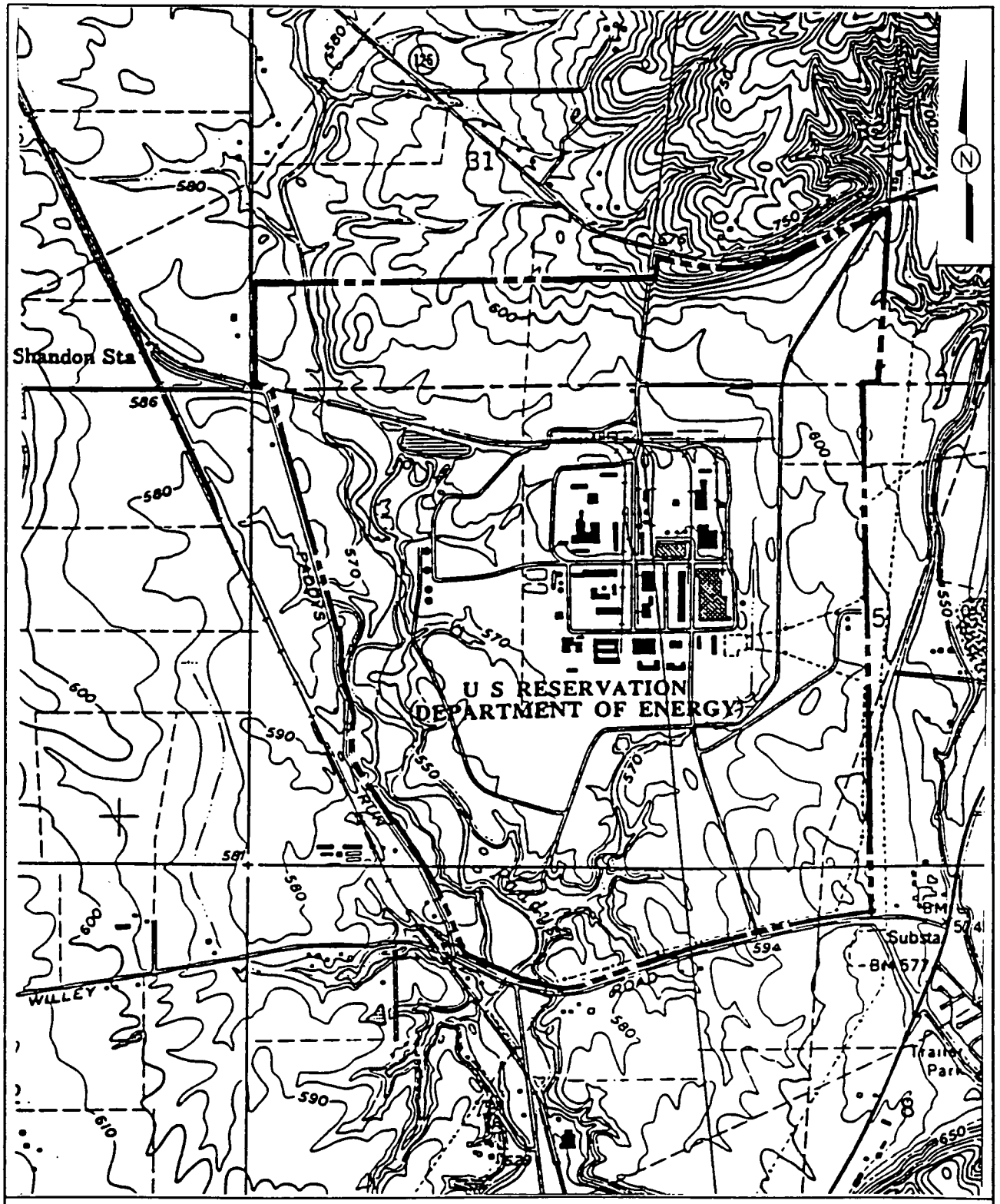
LEGEND:

0-3	4-6	7-10	11-16	17-21	22-99
(57 %)	(32 %)	(10 %)	(0 %)	(0 %)	(0 %)

WIND SPEED SCALE (KNOTS)
(1 KNOT EQUALS 1.15 MPH)

409191-A-275 /OUV KNOX/ DS
409192.75.OUT 09/07/93 GP

FIGURE 3-7. WIND ROSE FOR THE FEMP SITE YEAR 1992



NOTE:

1. SOURCE-USGS (1981) SHANDON, OHIO QUADRANGLE.

LEGEND:

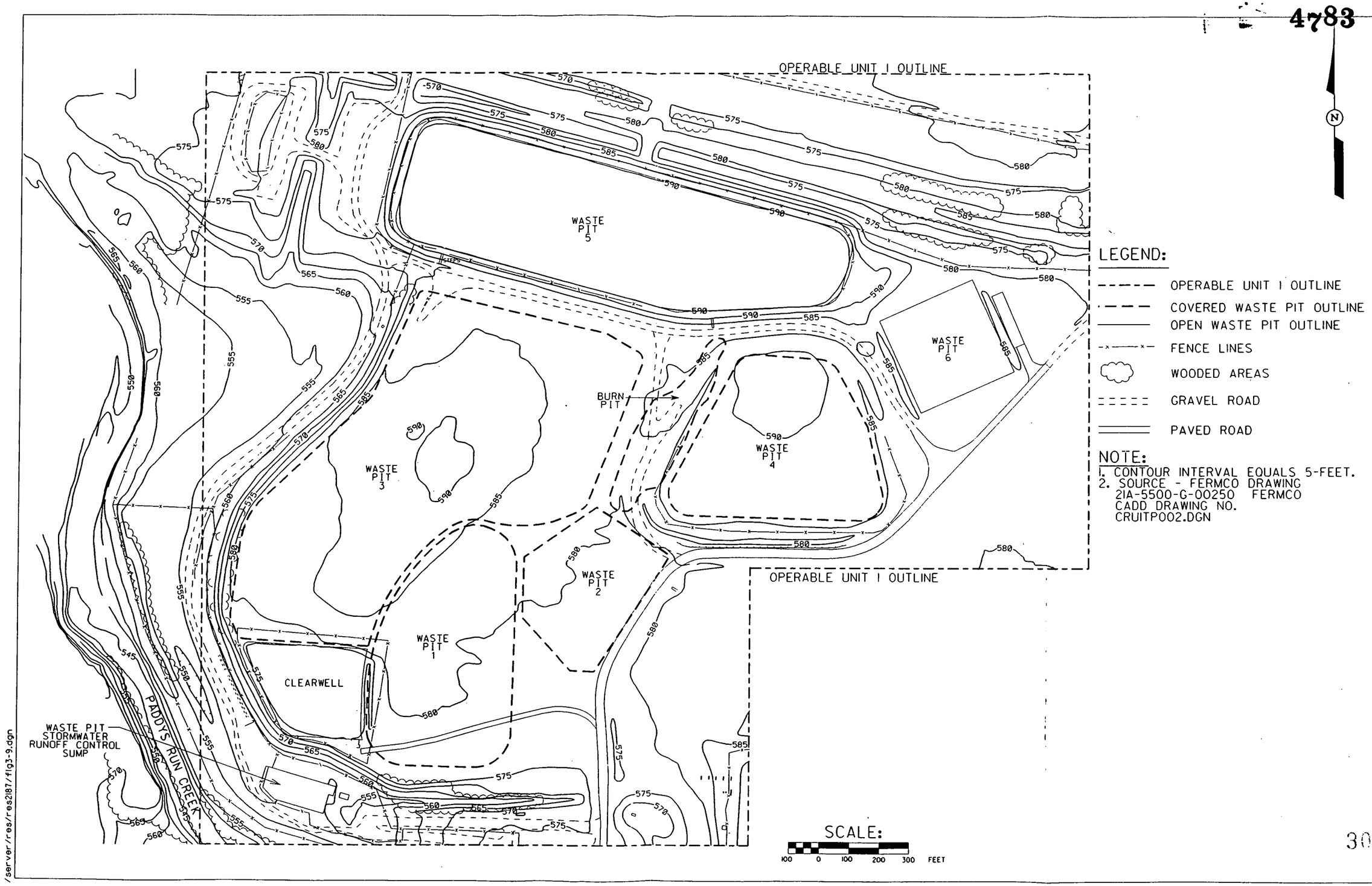
—10—	10 FEET CONTOUR INTERVAL
— · · · —	DRAINAGE WAY
	CSX RAIL LINE
	ROADWAY
	OPERABLE UNIT 1 OUTLINE
	FEMP PROPERTY BOUNDARY

SCALE:

0 1600 FEET

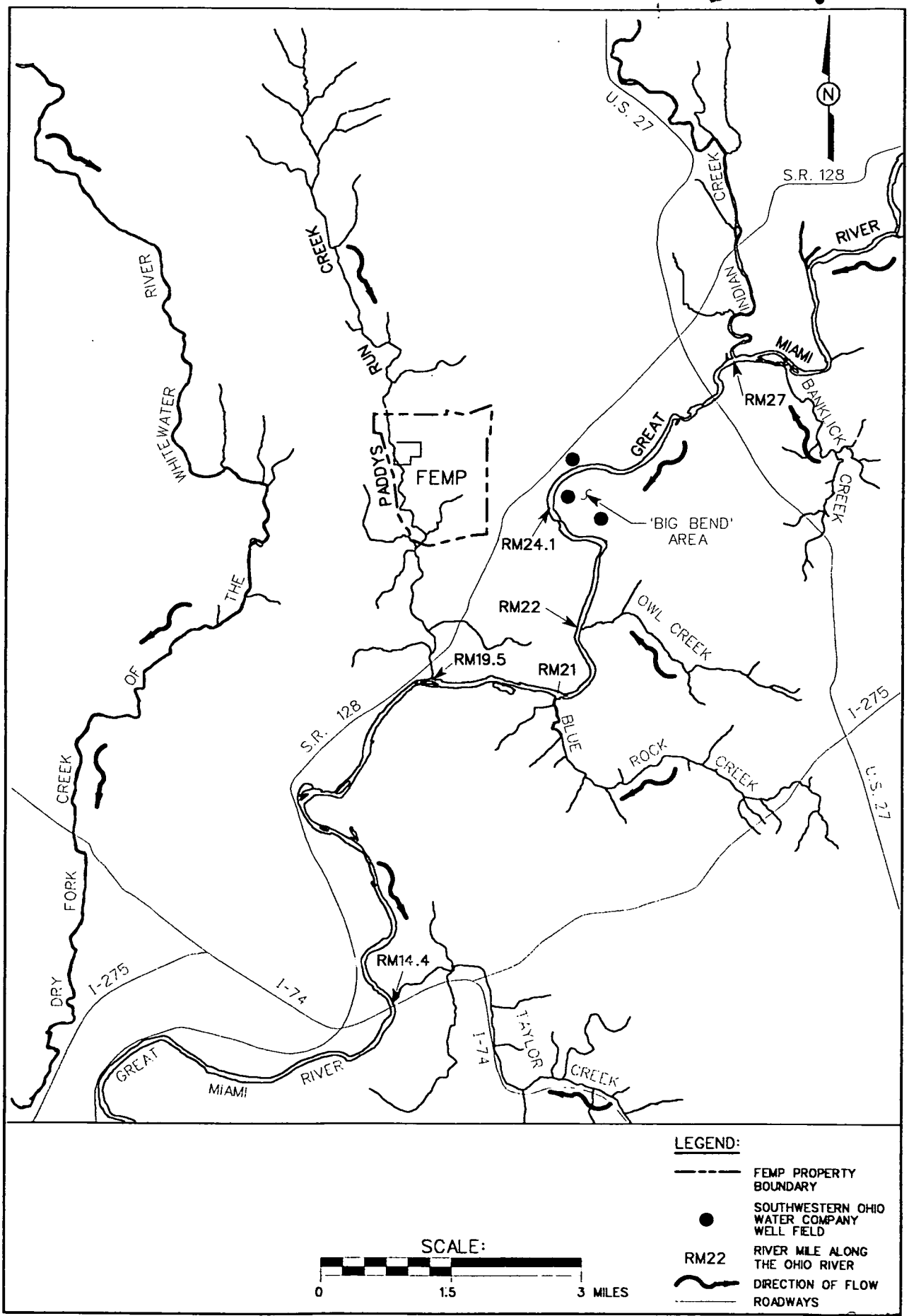
409191-A-298/OUI/KNOX/DS
40919298.OUI 07/07/93 DAA

FIGURE 3-8. USGS TOPOGRAPHIC MAP OF THE FEMP



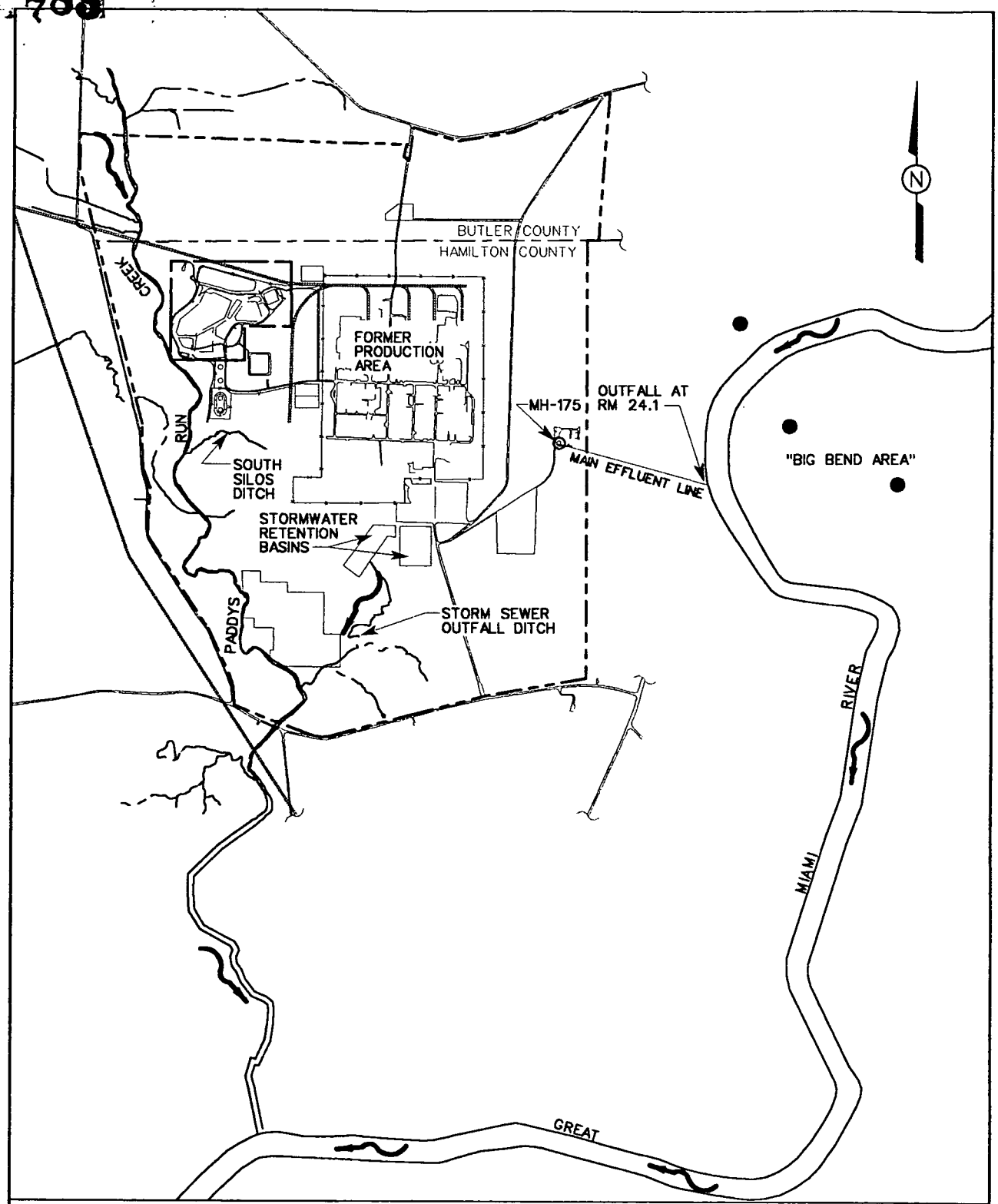
304

FIGURE 3-9. 1993 TOPOGRAPHIC MAP OF THE OPERABLE UNIT I STUDY AREA



409191-A-143/ OUV/ KNOX/ DS
4091914 3.OUT/09/22/93/OAA

FIGURE 3-10. SURFACE WATER FEATURES AND DRAINAGE PATTERNS



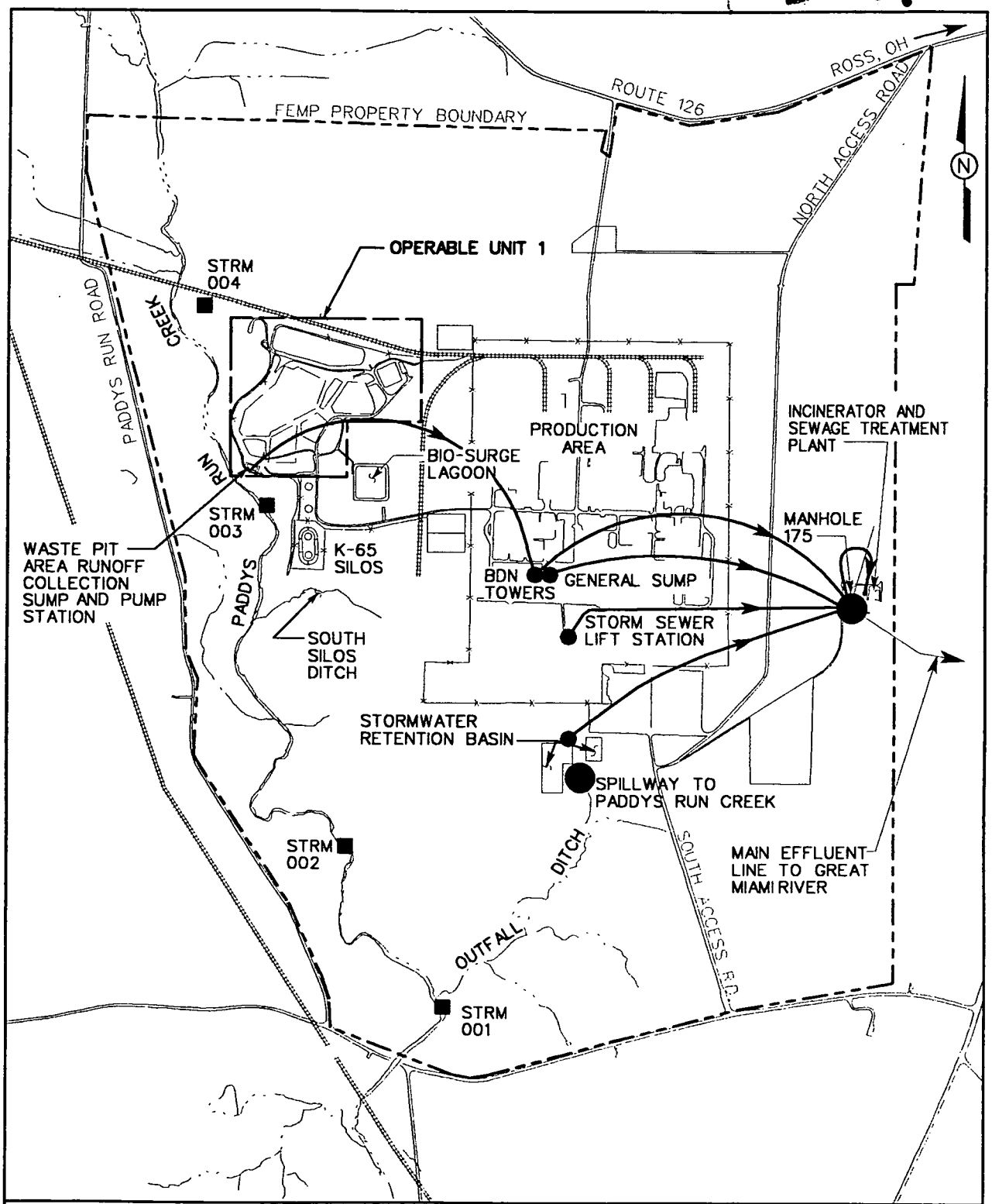
LEGEND:

RM24.1	RIVER MILE FROM THE OHIO RIVER
------	DRAINAGE WAY
▒▒▒▒▒	CSX RAIL LINE
~~	DIRECTION OF FLOW
— — —	OPERABLE UNIT 1 OUTLINE
- - - -	FEMP PROPERTY BOUNDARY
●	SOUTHWESTERN OHIO WATER COMPANY WELL FIELD

SCALE:
NOT TO SCALE

409191-A-174 /OU1/KNOX/DS
4091917A.OU1/09/22/93/DAA

FIGURE 3-11. SURFACE WATER BODIES ON AND ADJACENT TO THE FEMP



NOTE:

1. SOURCE-FEMP ANNUAL SITE ENVIRONMENTAL REPORT FOR CALENDAR YEAR 1991, FEMP-2255.

SCALE:

0 1300 FEET

LEGEND:

- NPDES EXTERNAL DISCHARGE TO OHIO WATERS
- NPDES INTERNAL MONITORING LOCATION
- STRM 002 NPDES STORMWATER MONITORING LOCATION
- PATH OF PUMPING
- FENCE LINE
- DRAINAGE WAY
- CSX RAIL LINE
- ROADWAY
- OPERABLE UNIT 1 OUTLINE
- FEMP PROPERTY BOUNDARY

409191-A-78/OU1/KNOX/DS
40919178.OU1 09/22/93 LLS

FIGURE 3-12. STORM WATER COLLECTION SYSTEM FOR THE FEMP

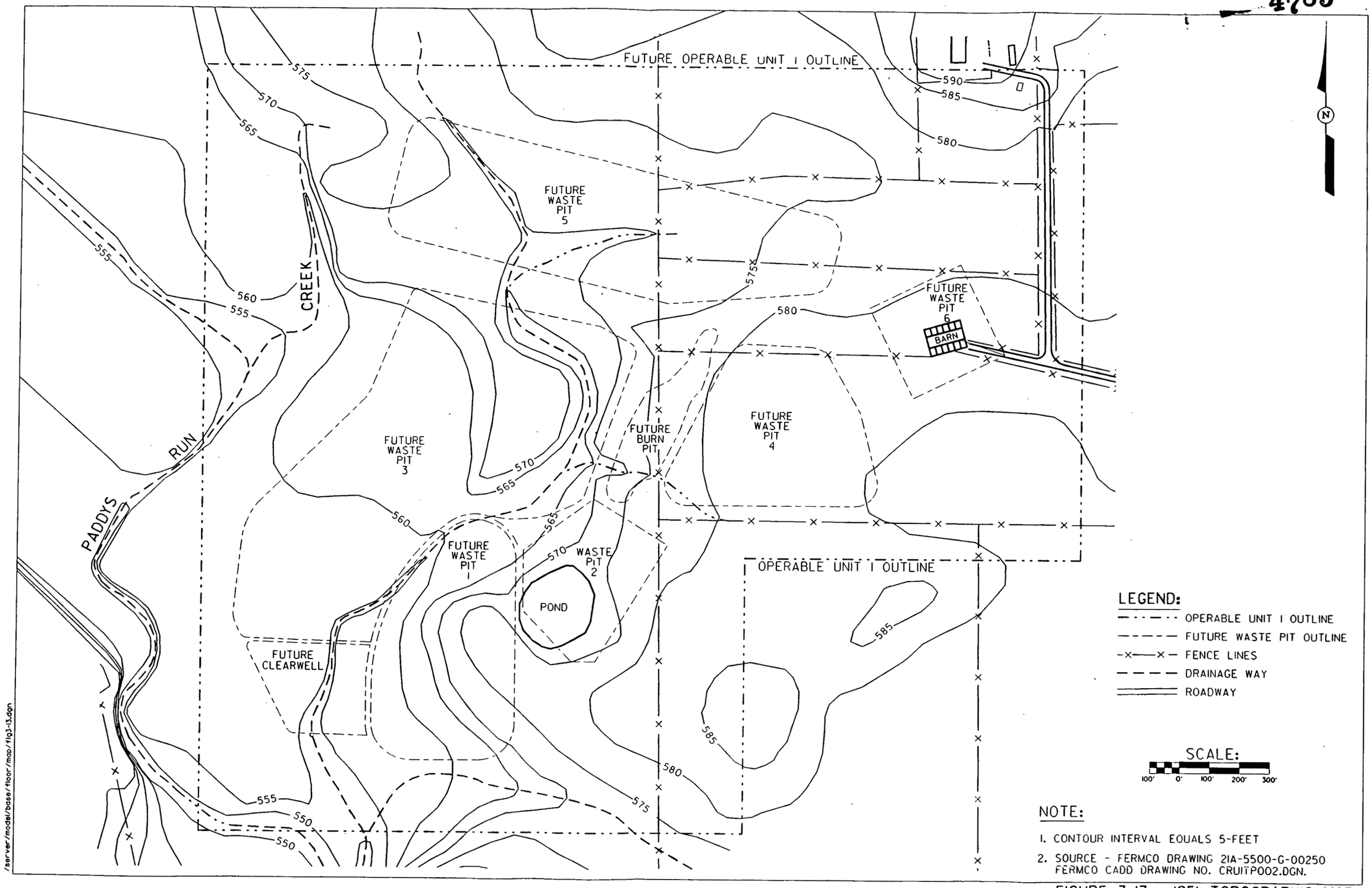
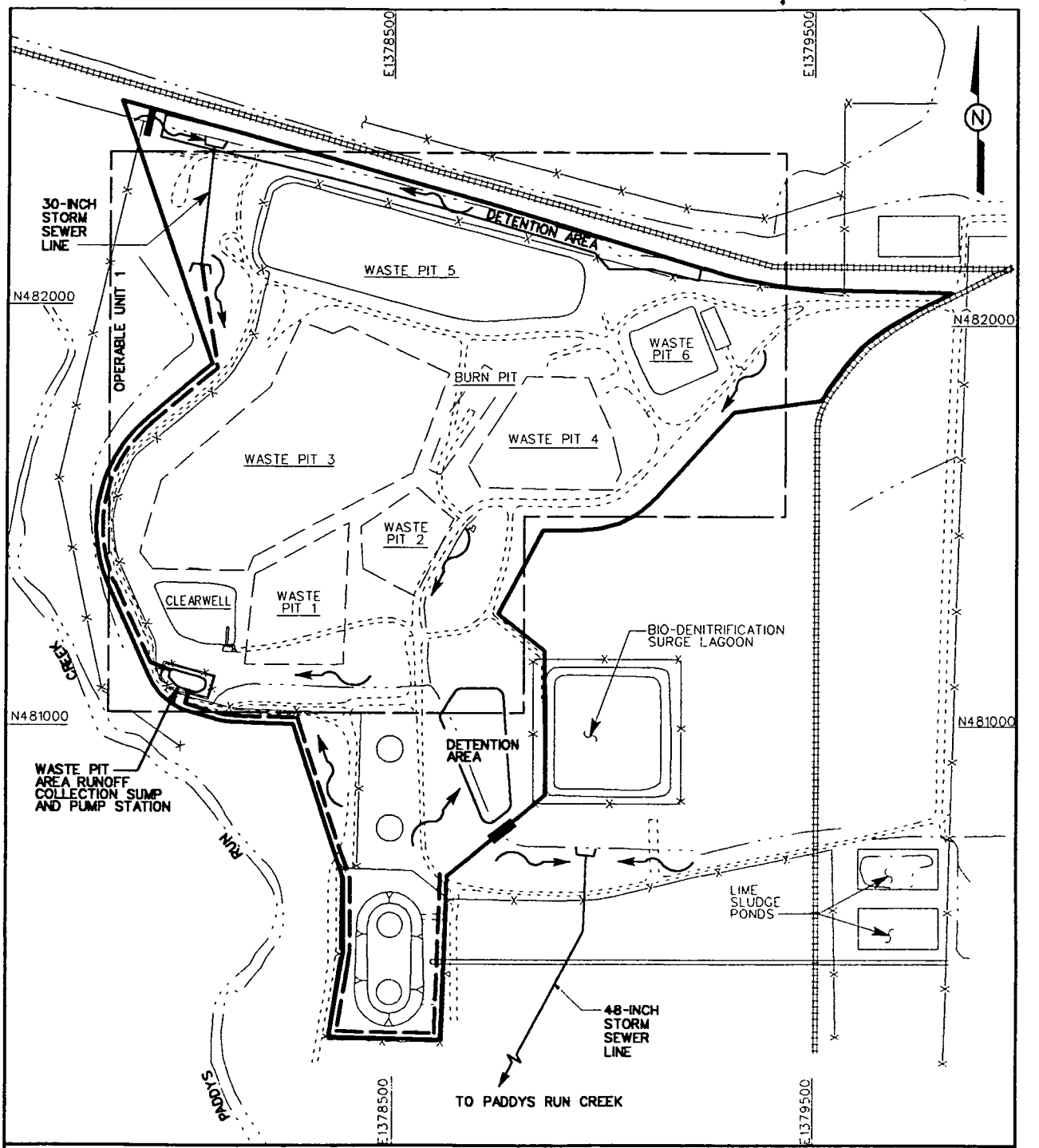


FIGURE 3-13. 1951 TOPOGRAPHIC MAP OF OPERABLE UNIT I STUDY AREA



NOTE:

1. SOURCE - FEMP WASTE PIT AREA STORM WATER RUNOFF CONTROL REMOVAL ACTION POSTER, WEMCO GRAPHICS NO. 1774.

LEGEND:

- SMALL EARTHEN DAM
- FENCE LINE
- DRAINAGE WAY
- CSX RAIL LINE
- PAVED ROADWAY
- GRAVEL ROADWAY
- OPERABLE UNIT 1 OUTLINE
- CONCRETE TRENCH DRAIN
- STORM SEWER LINE
- LIMITS OF STORM WATER RUNOFF COLLECTION AREA
- DIRECTION OF FLOW

SCALE:

0 350 FEET

408191-A-177/OU1/KNOX/DS
40819177.OU1 09/02/93 GP

FIGURE 3-14. STORM WATER COLLECTION SYSTEM FOR OPERABLE UNIT 1

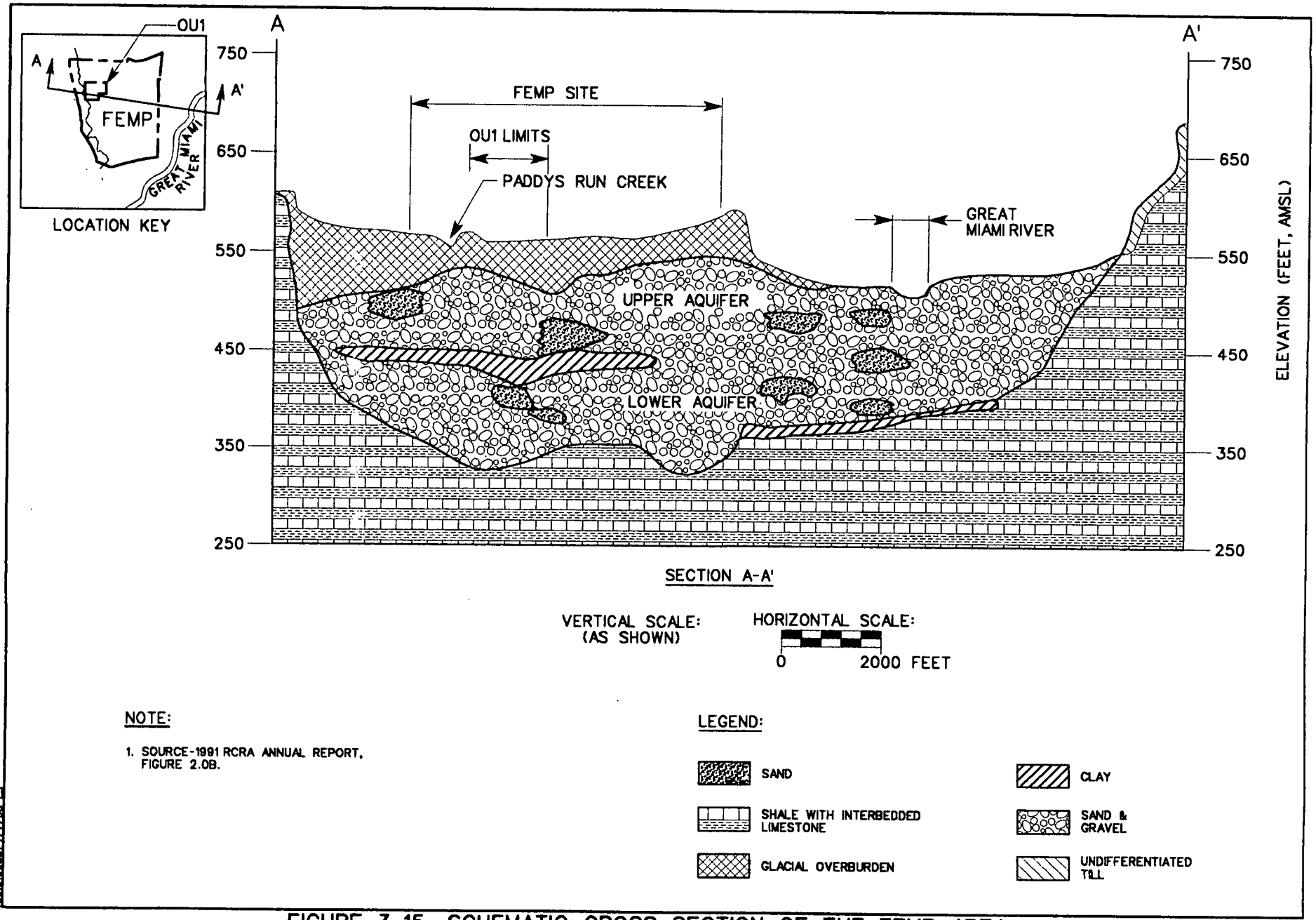


FIGURE 3-15. SCHEMATIC CROSS SECTION OF THE FEMP AREA

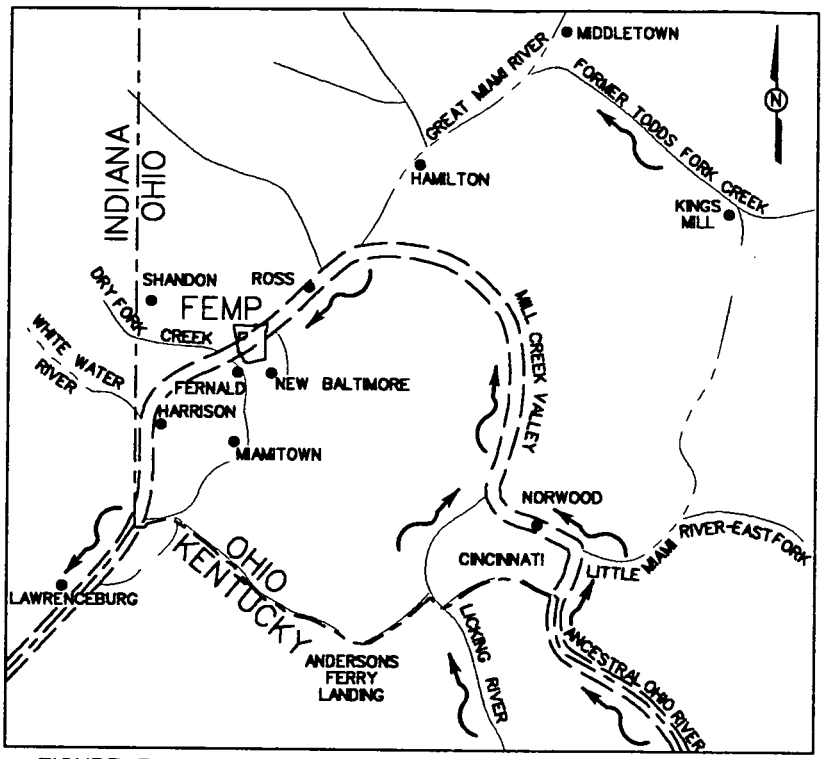


FIGURE 3-1A. DEEP STAGE (ANCESTRAL) DRAINAGE SYSTEM

LEGEND:

- DIRECTION OF FLOW
- ANCESTRAL OHIO RIVER
- STATE BOUNDARY
- DRAINAGE WAY

NOTE:

1. SOURCE - FENNEMAN, N.M., 1916 "THE GEOLOGY OF CINCINNATI AND VICINITY", GEOLOGICAL SURVEY OF OHIO, BULLETIN 19.

SCALE:
NOT TO SCALE

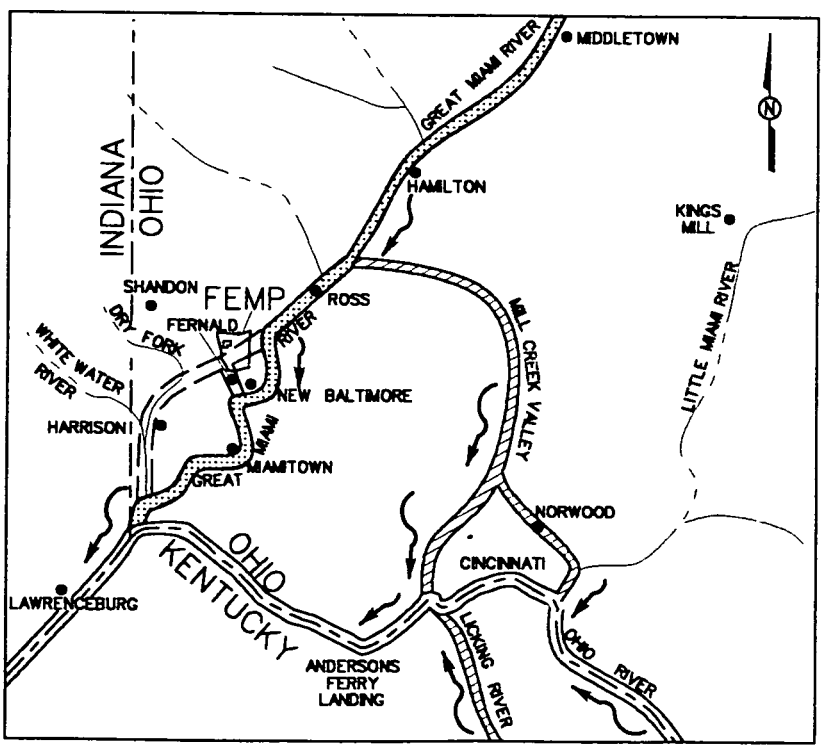


FIGURE 3-1B. PRESENT DRAINAGE SYSTEM

LEGEND:

- DIRECTION OF FLOW
- GREAT MIAMI RIVER
- PRESENT OHIO RIVER
- NEW HAVEN TROUGH
- MILL CREEK BASIN
- STATE BOUNDARY
- DRAINAGE WAY

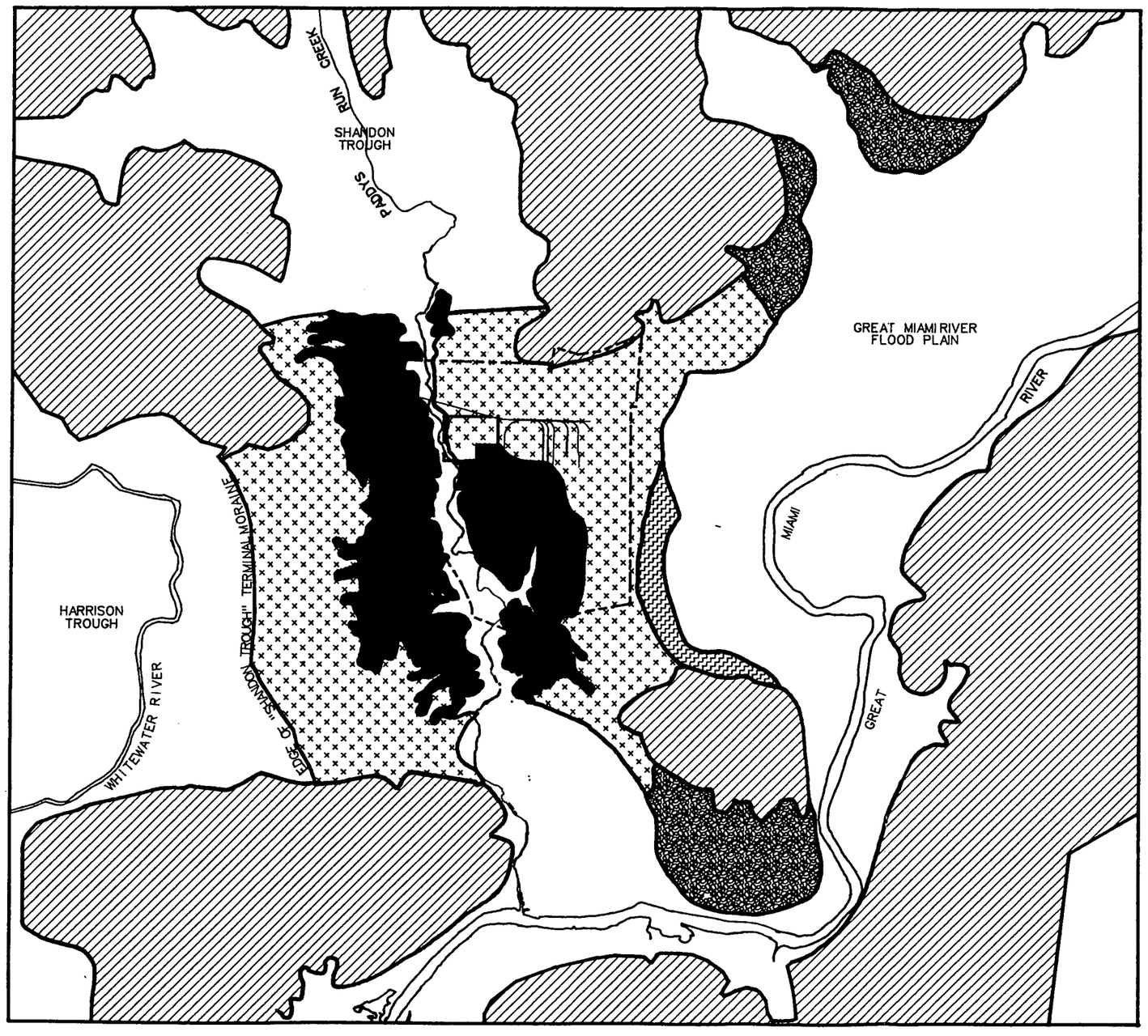
NOTE:

1. SOURCE - FENNEMAN, N.M., 1916 "THE GEOLOGY OF CINCINNATI AND VICINITY", GEOLOGICAL SURVEY OF OHIO, BULLETIN 19.

SCALE:
NOT TO SCALE

409191-A-158 /OU1 /NOX /DS
409191SS.OU1 7/7/93 LS

FIGURE 3-16. SCHEMATIC DIAGRAMS OF THE DEEP STAGE DRAINAGE AND THE PRESENT DRAINAGE SYSTEM



LEGEND:

- UNDIFFERENTIATED ALLUVIUM AND GLACIAL SEDIMENTS
- WISCONSIN TILL WITH LOESS CAP
- ALLUVIAL TERRACES
- UNDIFFERENTIATED TERRACES/TILL
- WISCONSIN LACUSTRINE SEDIMENTS WITH LOESS CAP
- ORDOVICIAN LIMESTONE/SHALE WITH THIN MANTLE OF ILLINOISAN, WISCONSIN, OR RECENT SEDIMENTS
- FEMP PROPERTY BOUNDARY
- OPERABLE UNIT 1 OUTLINE

N

SCALE:
0 1 MILE

409191-B-309/OU1/KNOX/DS
409191309.OU1/ 09/22/93/DAA

FIGURE 3-17. CONCEPTUAL MAP OF SURFACE GEOLOGY

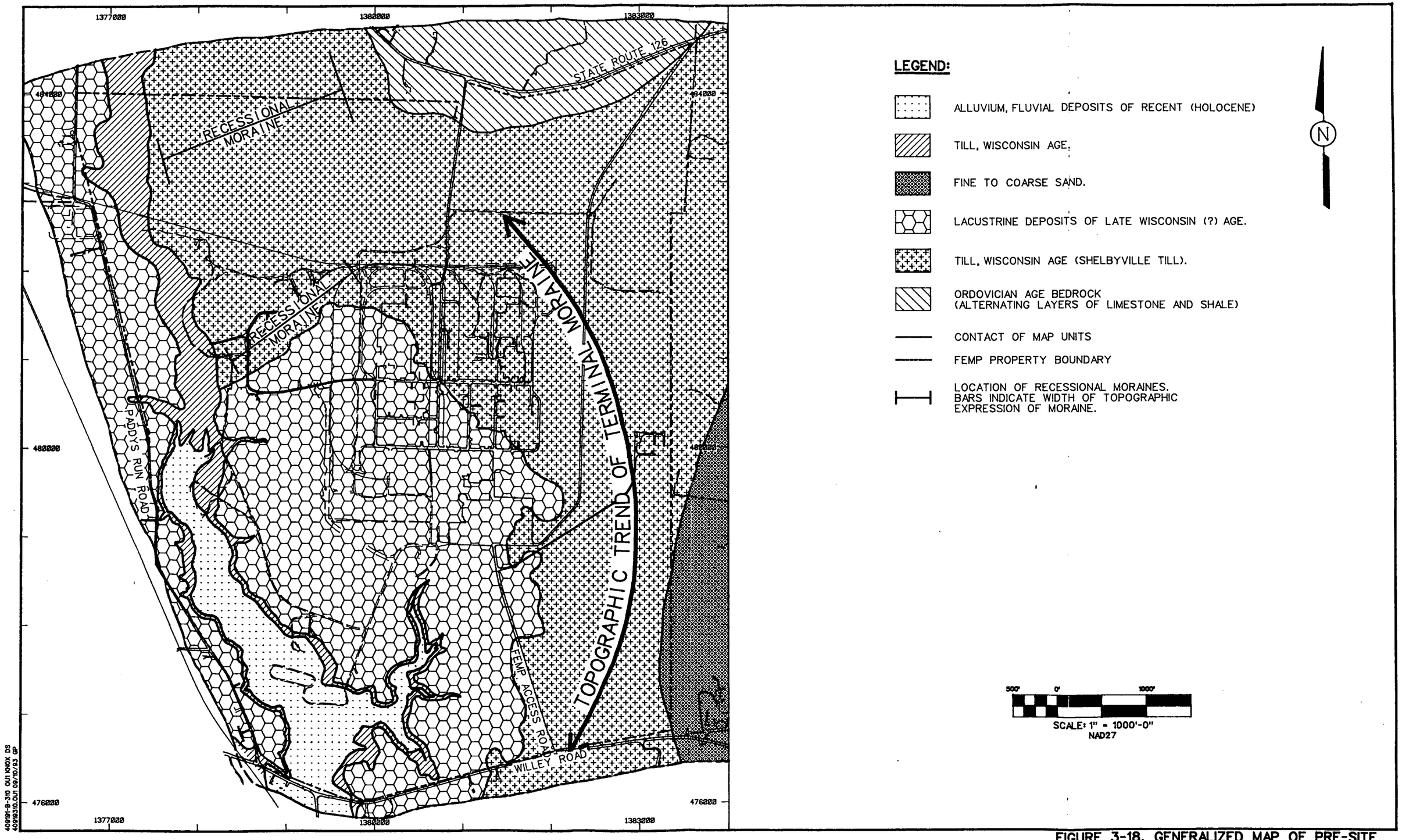
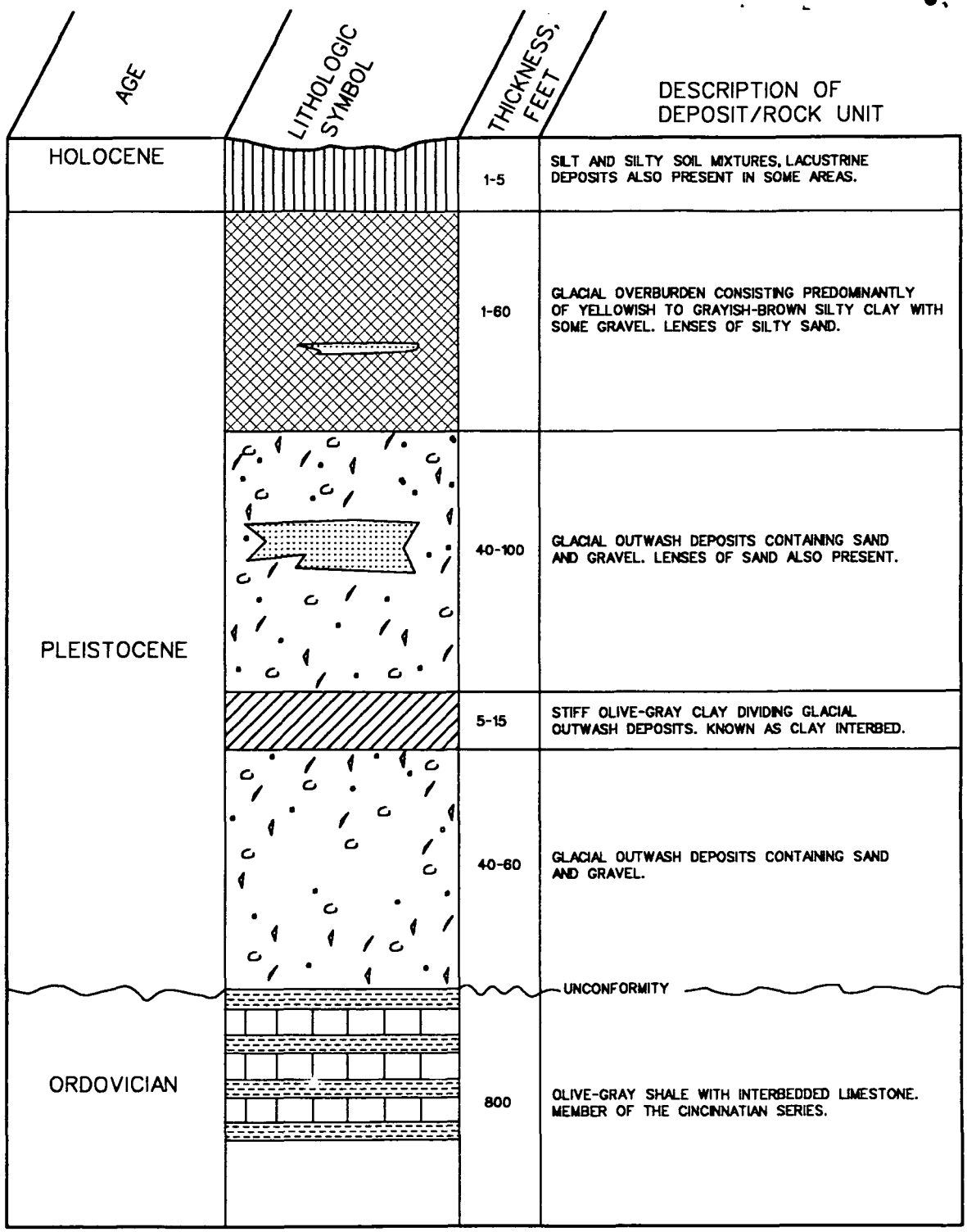


FIGURE 3-18. GENERALIZED MAP OF PRE-SITE CONSTRUCTION SURFACE GEOLOGY



409191-A-137 /OU1 /KNOX /DS
40919137.OU1 09/09/93 GP

FIGURE 3-19. GENERALIZED STRATIGRAPHIC COLUMN OF THE FEMP REGION

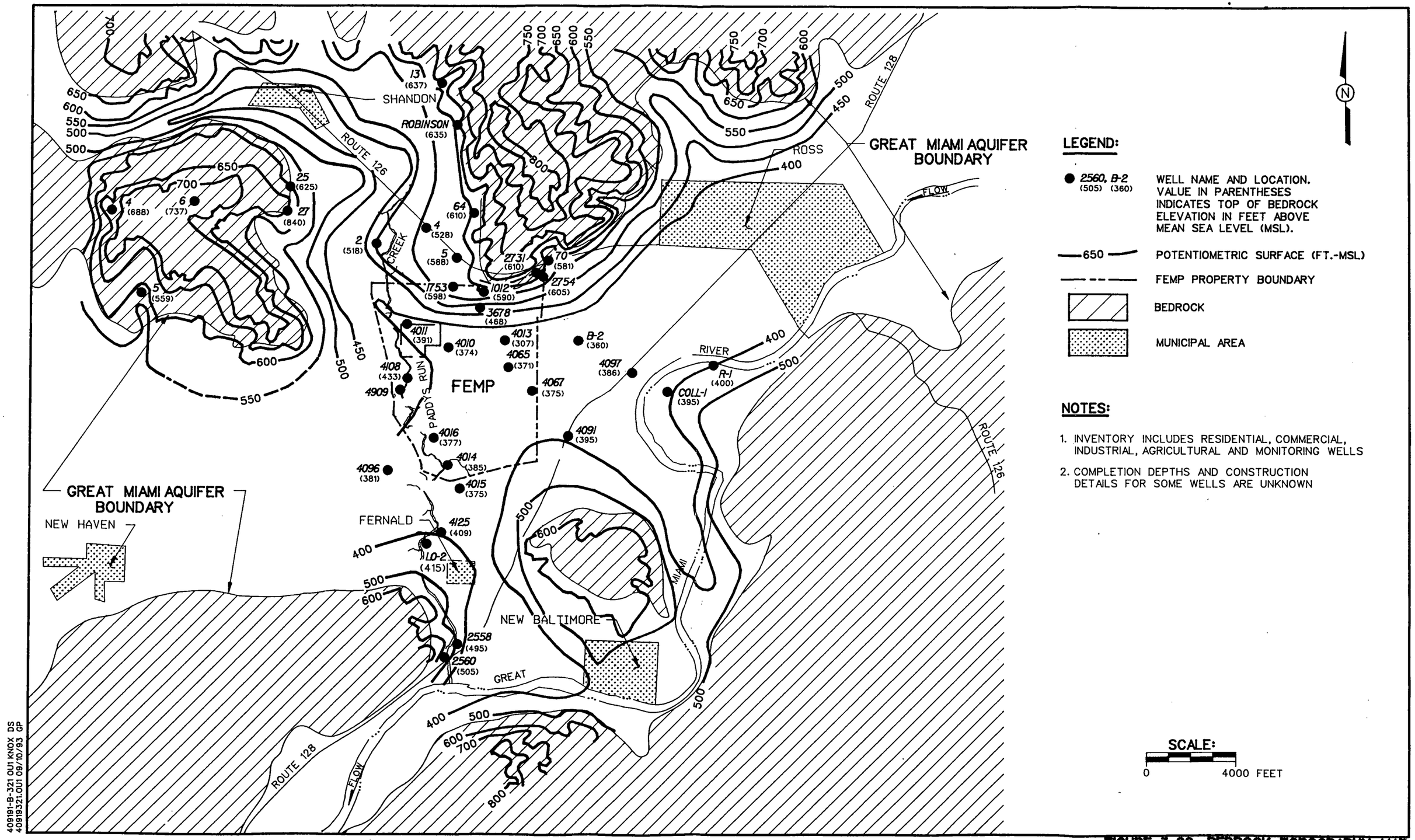
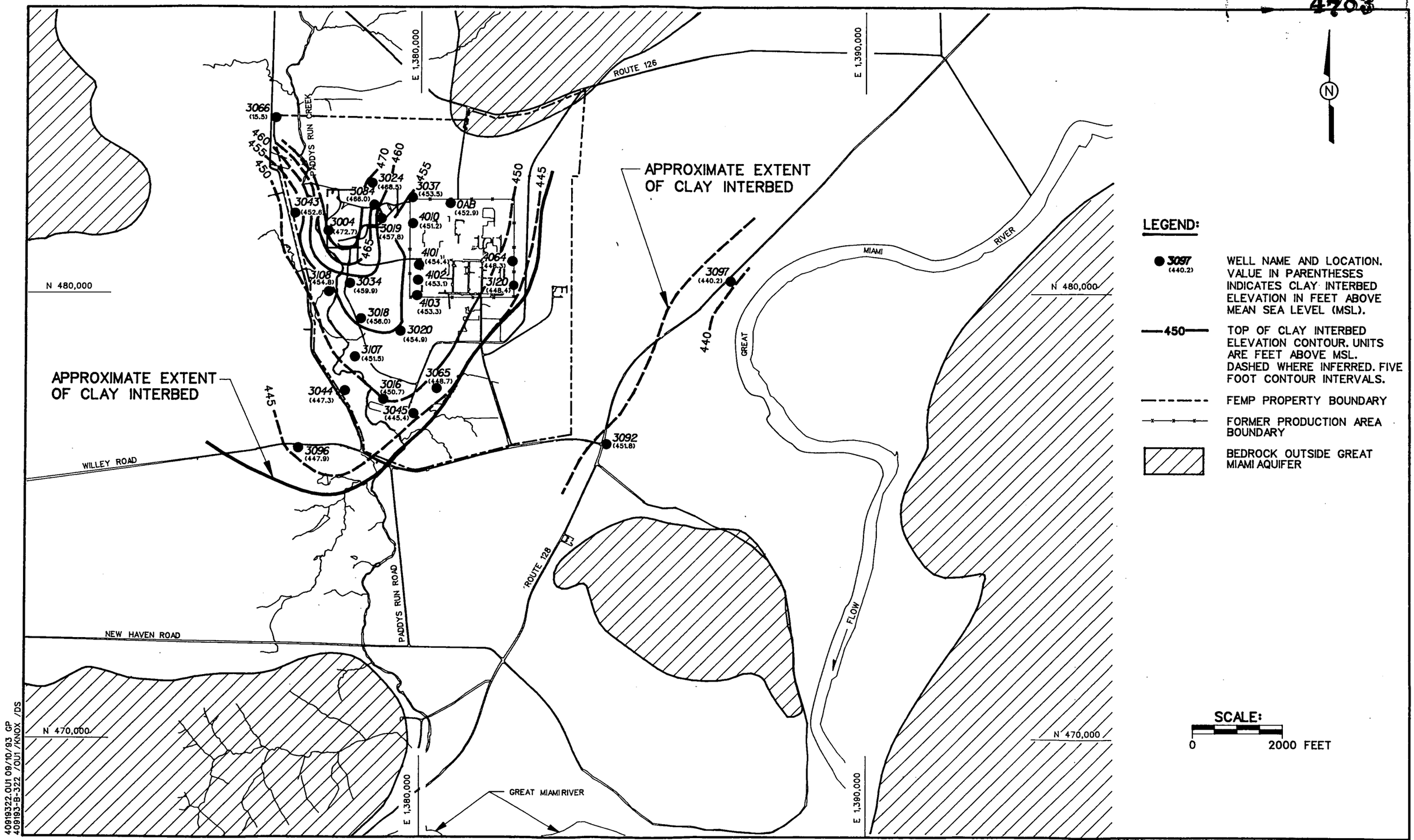


FIGURE 3-20. BEDROCK TOPOGRAPHY MAP



4091322.OU1 09/10/93 GP
409193-B-322 /OU1 /KNOX /DS

FIGURE 3-21. CLAY INTERBED TOPOGRAPHIC SURFACE

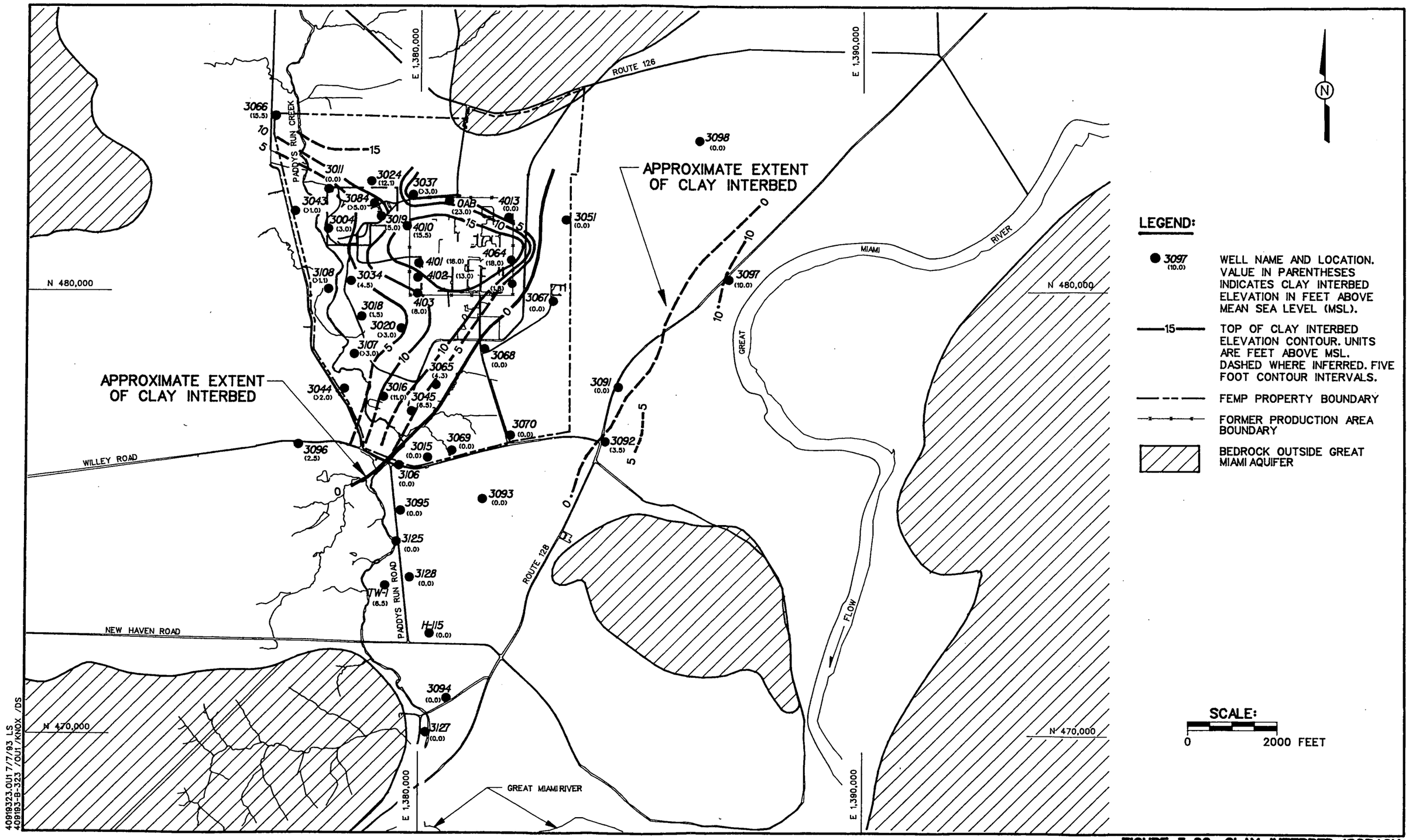
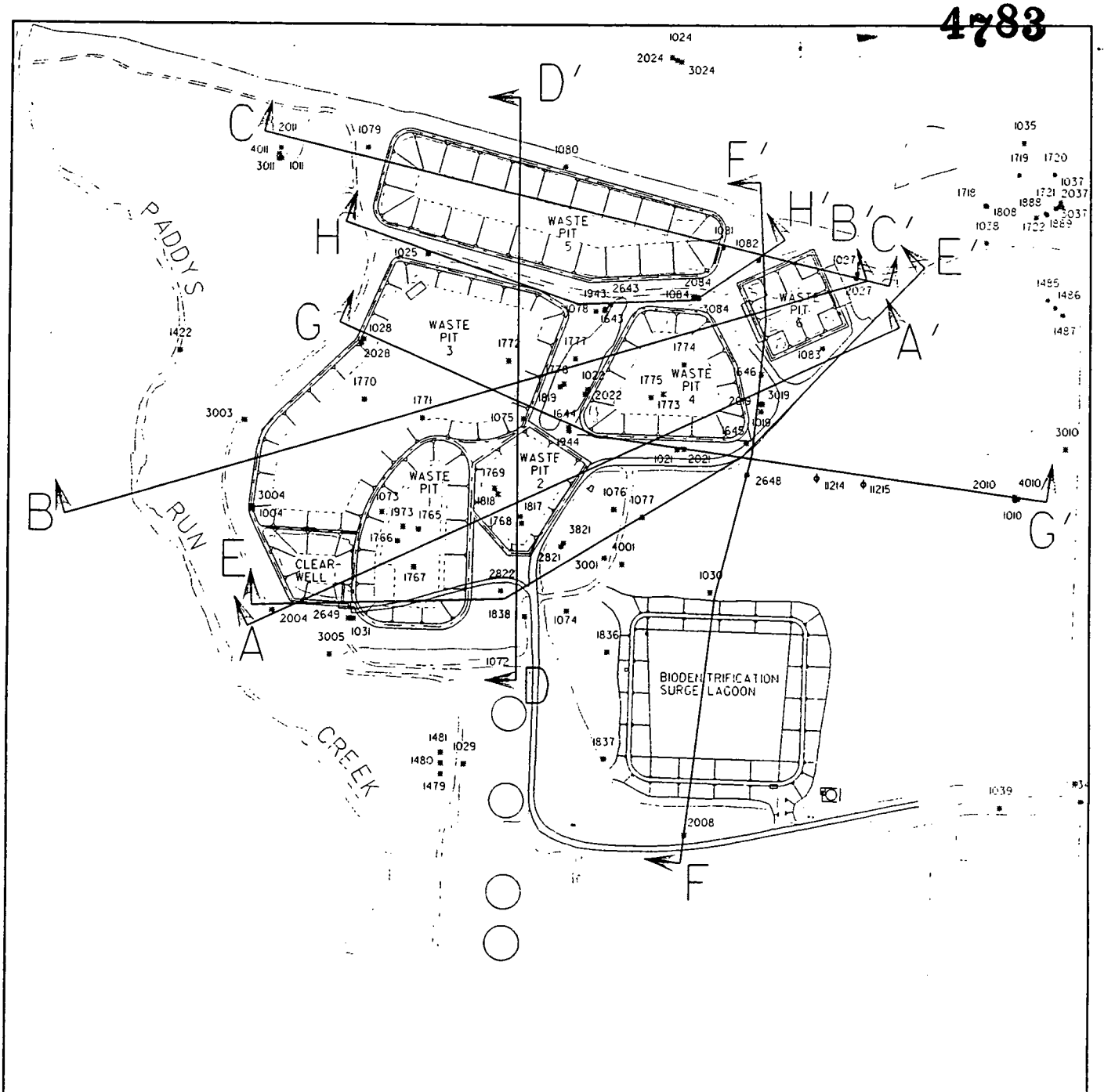


FIGURE 3-22. CLAY INTERBED ISOPACH



NOTE:

1. SOURCE-ASI DWG ASI DETAIL. M. 12-92.

LEGEND:

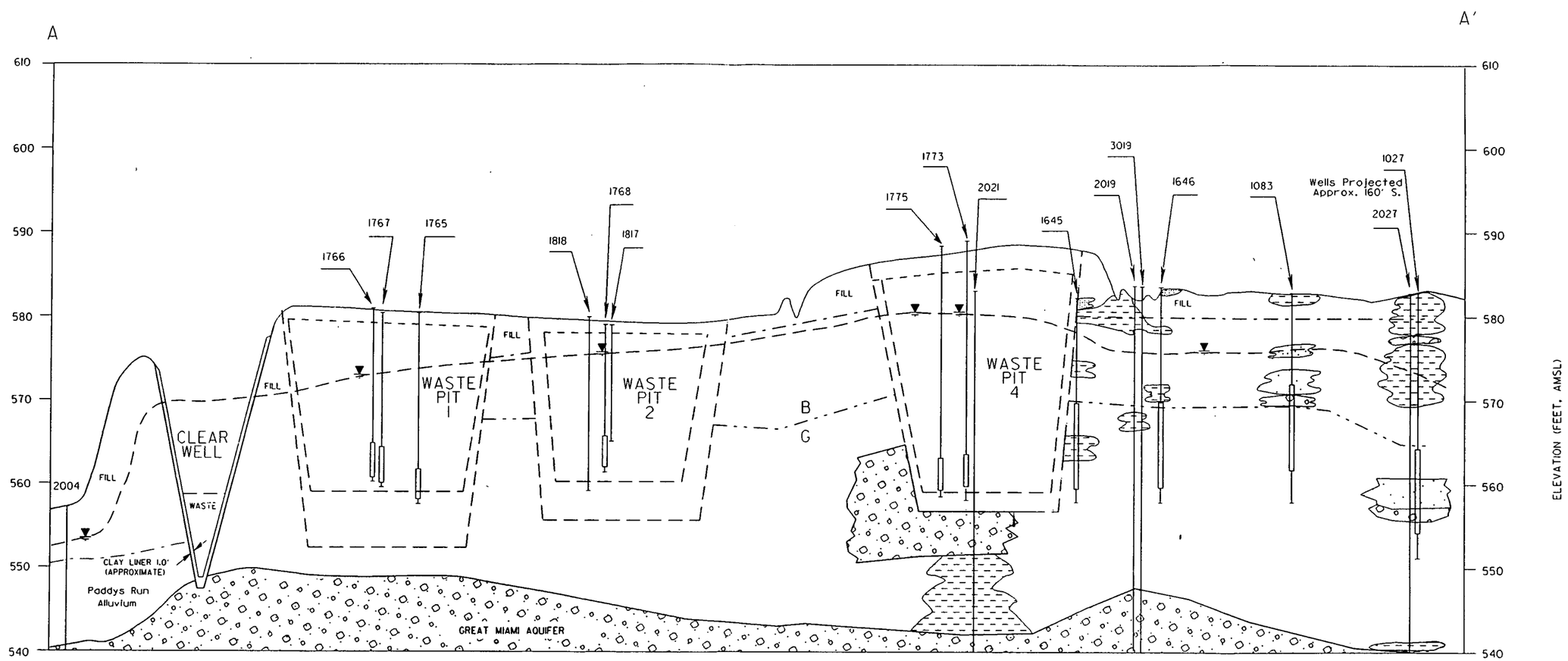
DRAINAGE WAYS
CSX RAIL LINE
PAVED ROADWAY
GRAVEL ROADWAY
F——F' SECTION (SEE FIGURES 3-24 TO 3-31)

SCALE:

0 200 400 600 FT

server1: /gis/itbase.dgn

FIGURE 3-23. CROSS SECTIONS INDEX MAP OF OPERABLE UNIT I



CROSS SECTION A-A'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

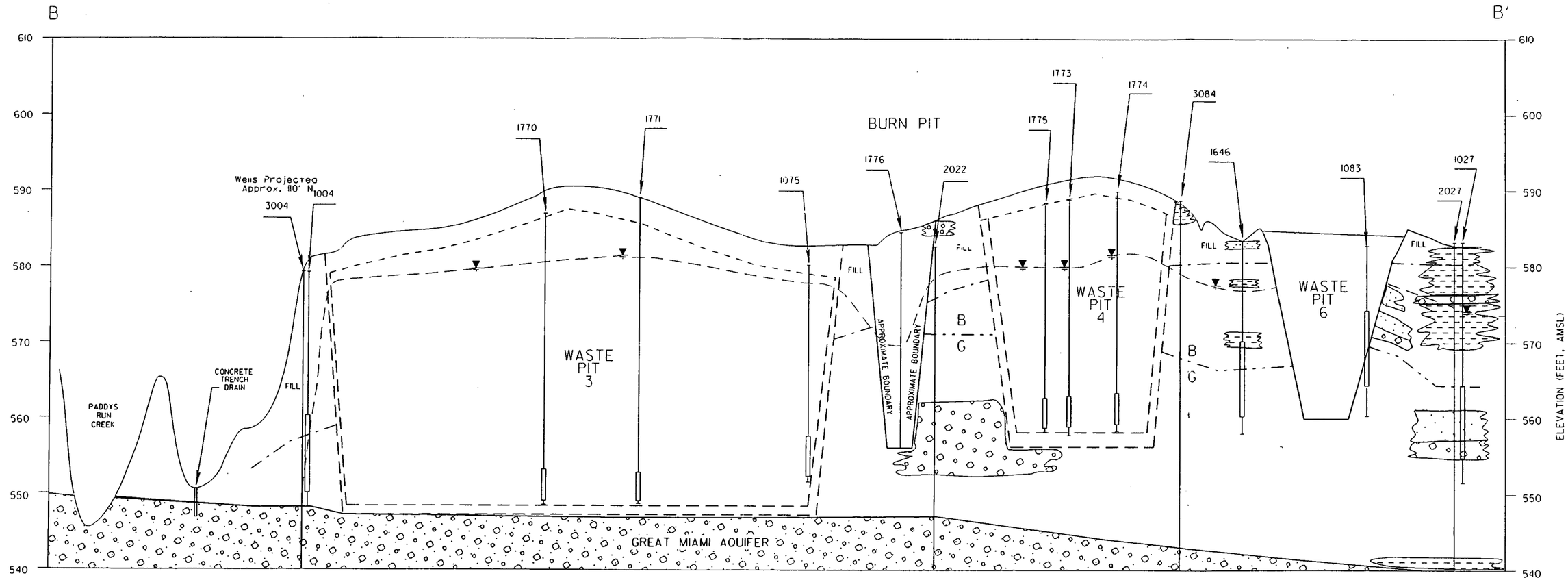
SAND

GRAVEL

SAND & GRAVEL

SERVER1: /RES/RES2187/CRUISECTA2.DGN

FIGURE 3-24 CROSS SECTION A-A'



CROSS SECTION B-B'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

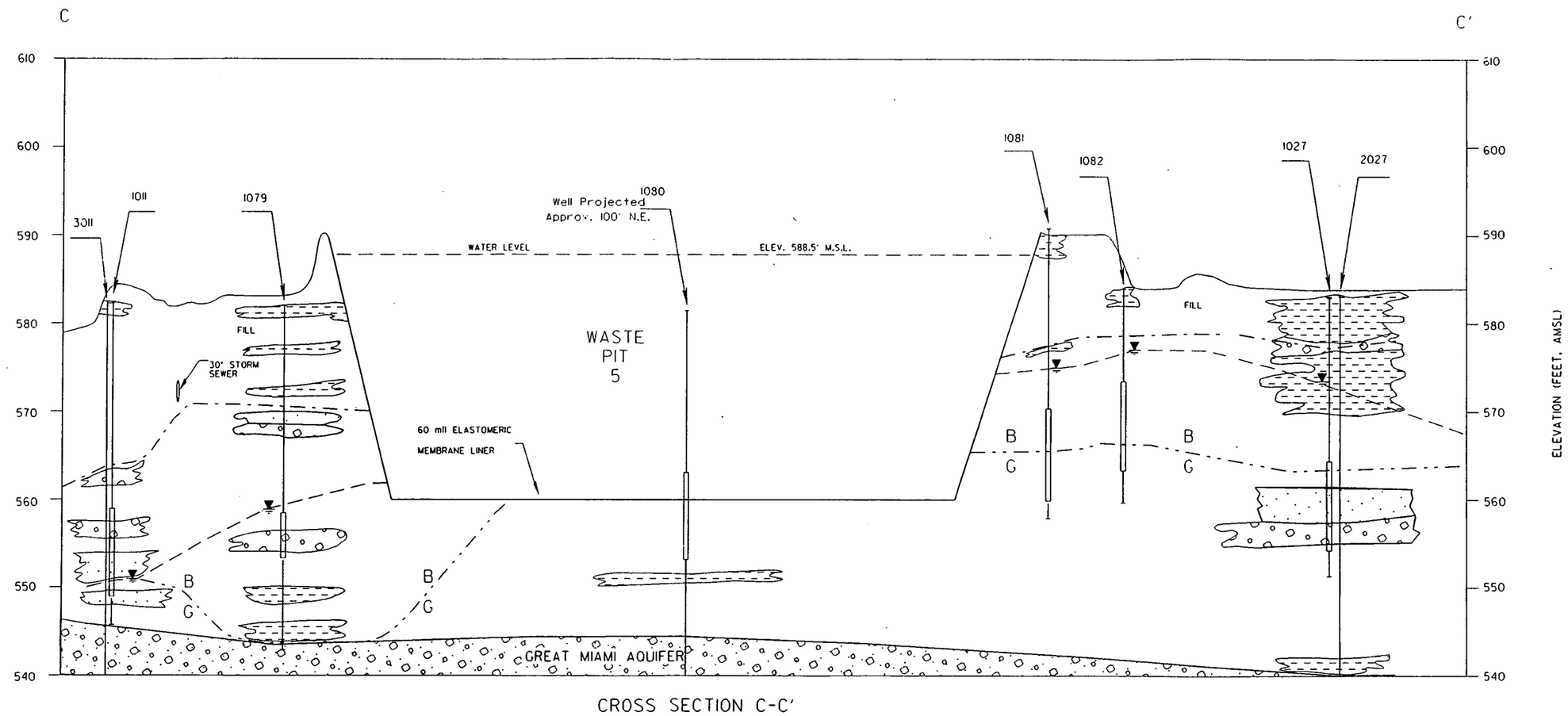
GRAVEL

SAND & GRAVEL

320

SERVER1: /RES/RES2187/CRUISECTB2.DGN

FIGURE 3-25 CROSS SECTION B-B'



CROSS SECTION C-C'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

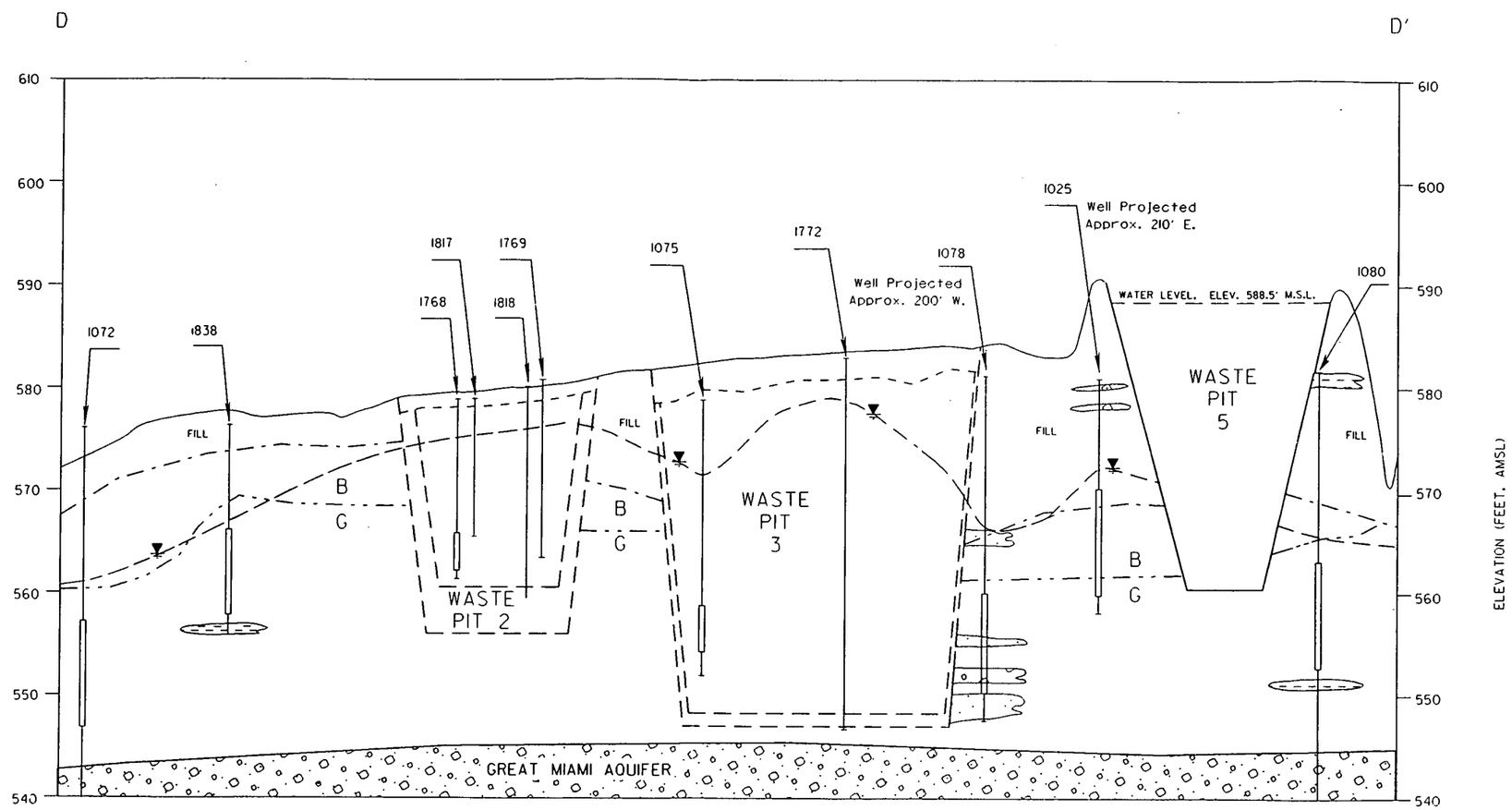
GRAVEL

SAND & GRAVEL

321

SERVER1: /RES/RES2187/CRUISECTC2.DGN

FIGURE 3-26 CROSS SECTION C-C'



CROSS SECTION D-D'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

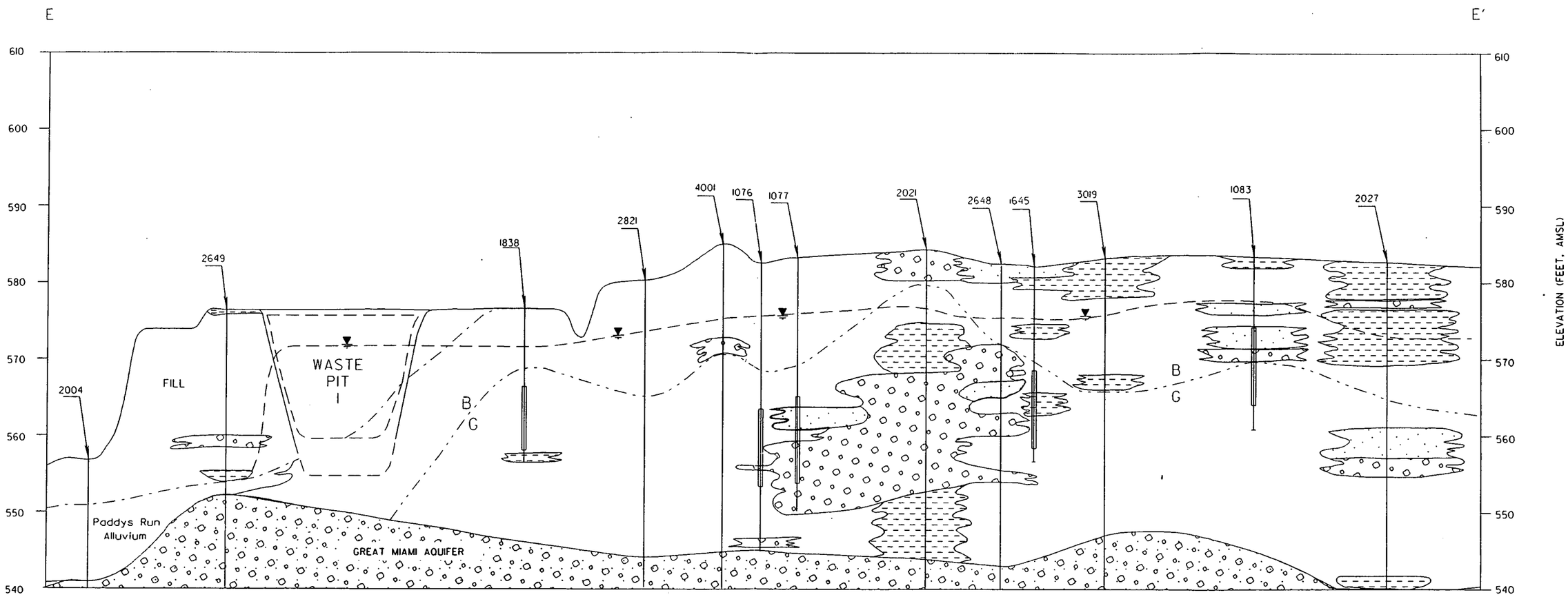
GRAVEL

SAND & GRAVEL

SERVER1: /RES/RES2187/CRUSECT02.DGN

322

FIGURE 3-27 CROSS SECTION D-D'



CROSS SECTION E-E'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

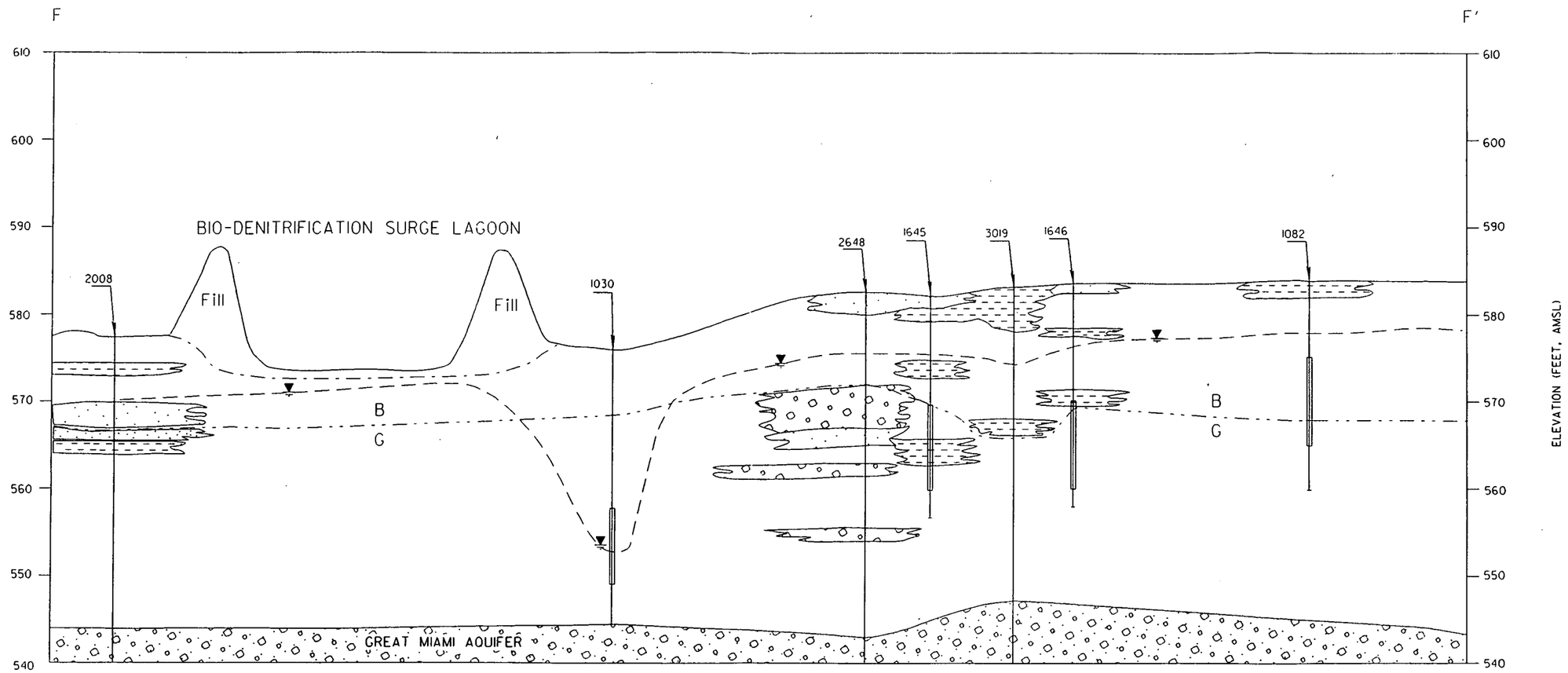
GRAVEL

SAND & GRAVEL

323

SERVER1: /RES/RES2187/CRUISECTE2.DGN

FIGURE 3-28 CROSS SECTION E-E'



CROSS SECTION F-F'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

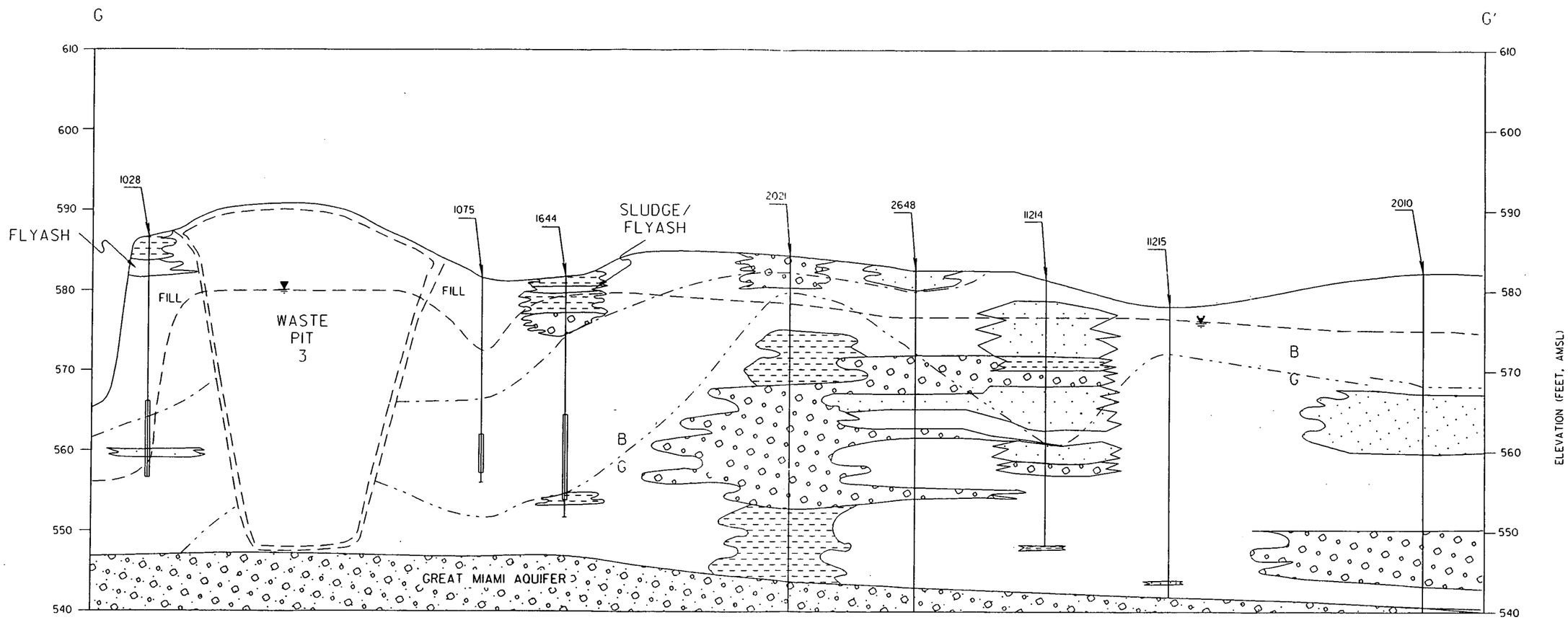
GRAVEL

SAND & GRAVEL

324

SERVER: /RES/RES2187/CRUISECTF2.DGN

FIGURE 3-29 CROSS SECTION F-F'



CROSS SECTION G-G'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

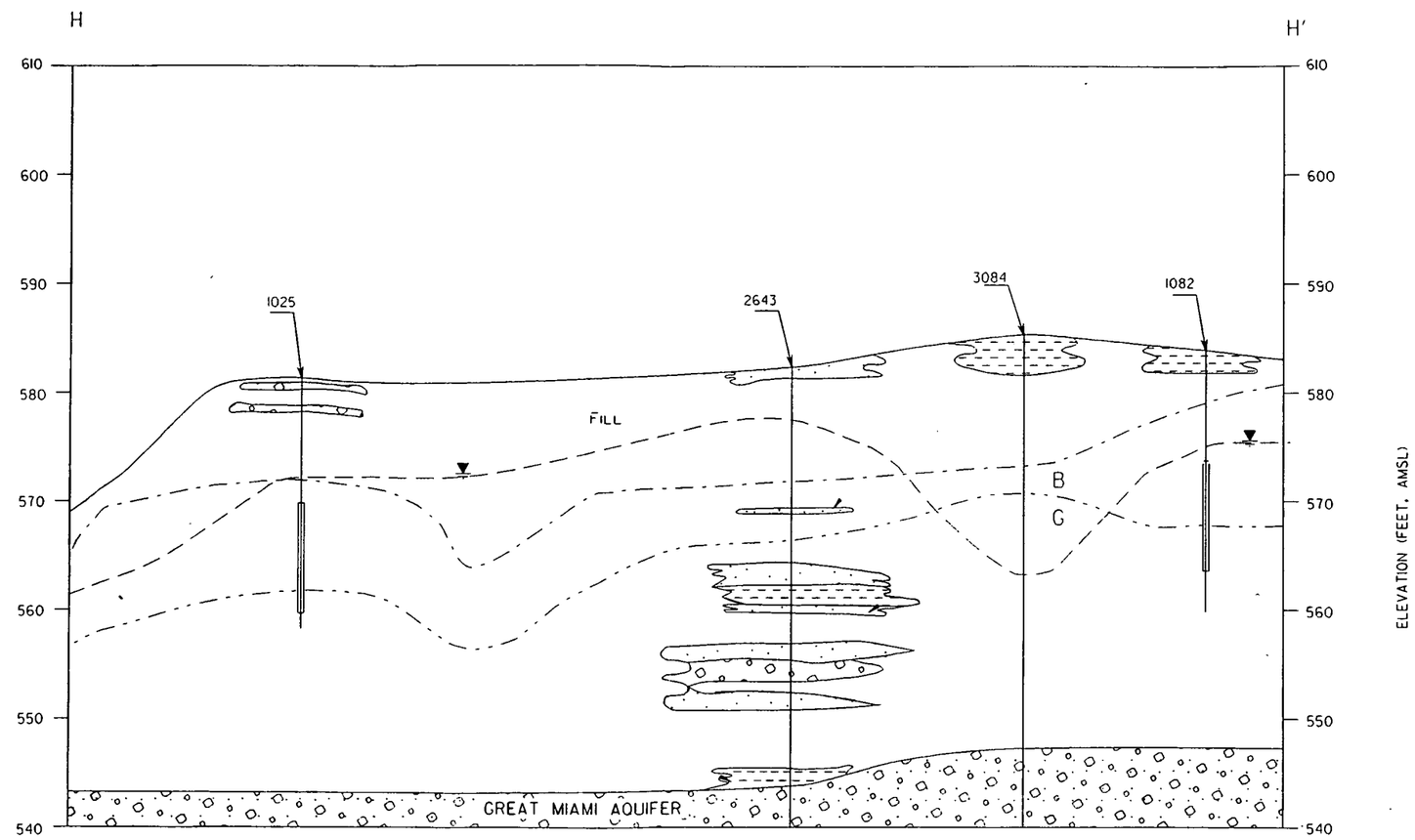
GRAVEL

SAND & GRAVEL

325

SERVER: /RES/RES2187/CRUISECTG2.DGN

FIGURE 3-30 CROSS SECTION G-G'



CROSS SECTION H-H'

HORIZONTAL SCALE

0 100 200 FEET

VERTICAL EXAGGERATION 10X

LEGEND:

SCREENED INTERVAL

PERCHED WATER LEVEL (AUTUMN 1991)

1771 MONITORING WELL NUMBER

PRE-PIT CONSTRUCTION GROUND SURFACE

B G BASE OF WEATHERED HORIZON

CLAY

SILT

SAND

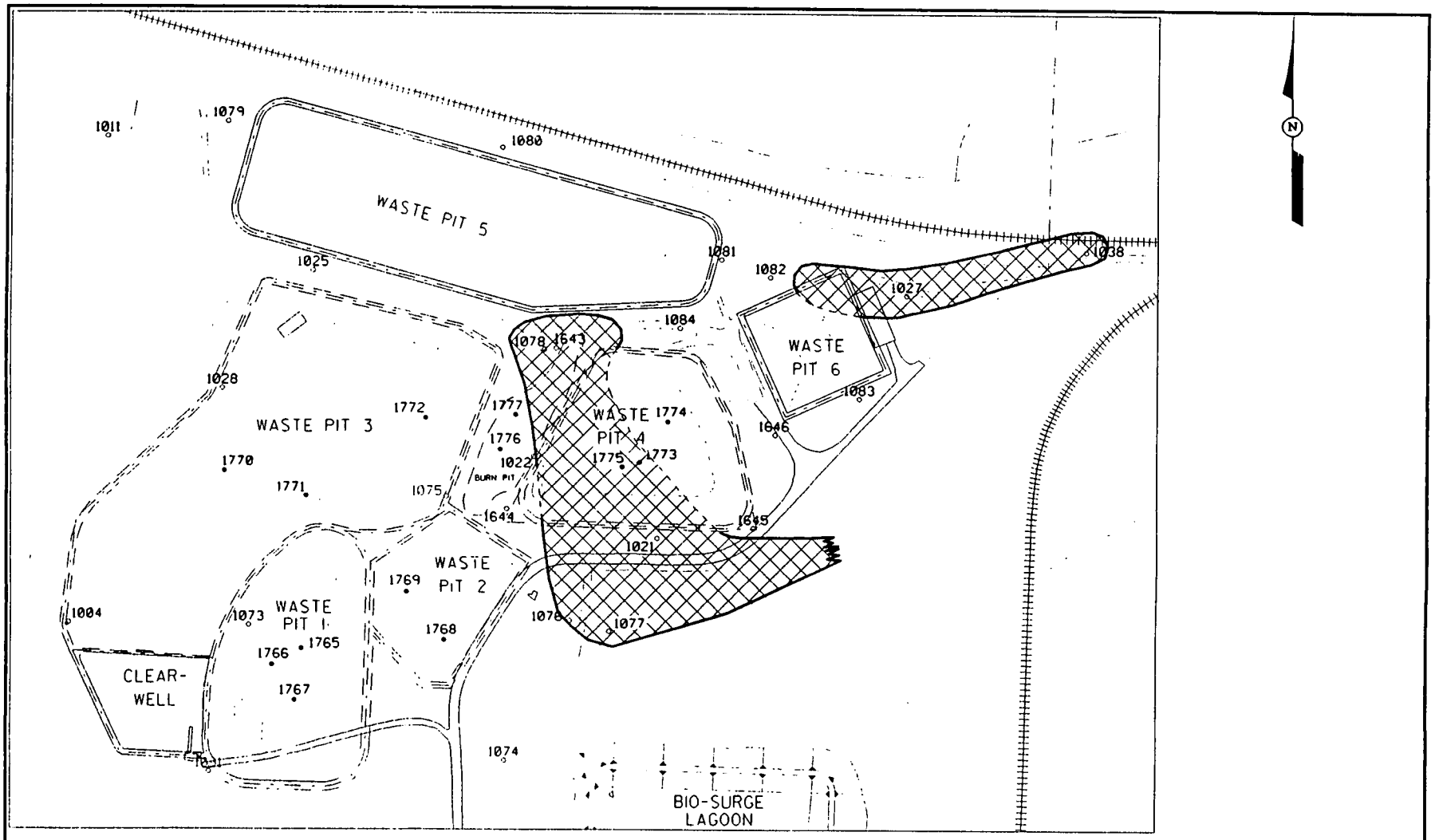
GRAVEL

SAND & GRAVEL

SERVER: /RES/RES2187/CRUISECTH2.DGN

326

FIGURE 3-31 CROSS SECTION H-H'



NOTE:

1. SOURCE - FERMCO CADD DRAWING NO. SANDS.DGN

SCALE:

100' 0' 100' 200' 300'

LEGEND:

SAND AND GRAVEL LENSES (DASHED WHERE INFERRED)

OPEN WASTE PIT OUTLINE

COVERED WASTE PIT OUTLINE

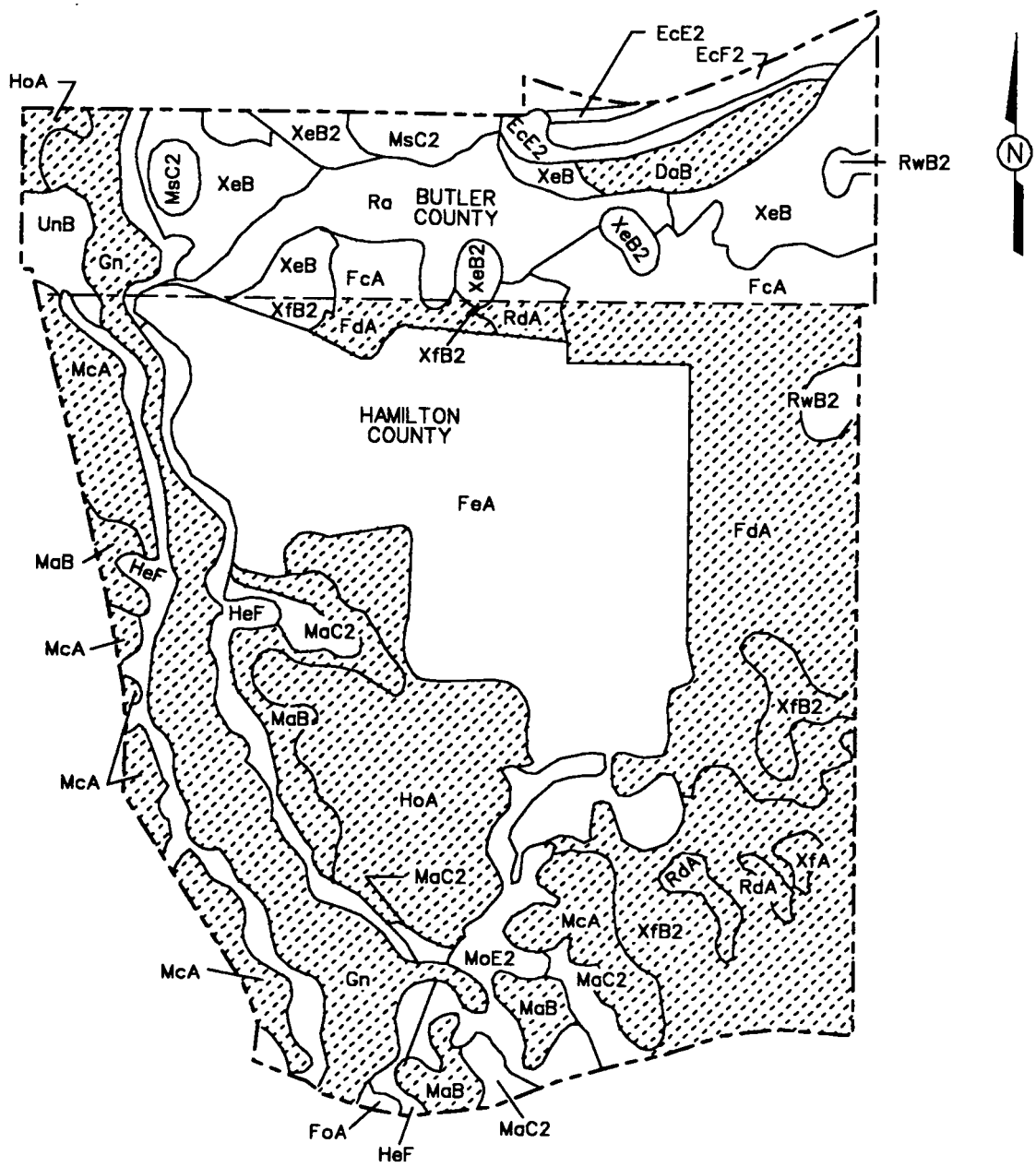
1646 GLACIAL OVERBURDEN WELLS

1775 WASTE PIT MONITORING WELLS

ROADWAY

RAIL LINES

FIGURE 3-32. PLANAR VIEW OF LATERAL EXTENT OF WASTE PITS 4 AND 6 GLACIAL OVERBURDEN SAND AND GRAVEL LENSES



SOIL SYMBOL BY COUNTY:

SOIL NAME	BUTLER COUNTY	HAMILTON COUNTY
DANA	DaB	N/A
EDEN	EcE2, EcF2	N/A
FINCASTLE	FcA	FdA, FeA
FOX	N/A	FoA
GENESEE	Gn	Gn
HENNEPIN	N/A	HeF
HESHAW	HoA	HoA
MARKLAND	N/A	MaB, MaC2
MARTINSVILLE	N/A	McA
MIAMIAN-HENNEPIN	N/A	MoE2
MIAMIAN-RUSSEL	MaC2	N/A
RAGSDALE	Ra	N/A
RAUB	N/A	RdA
RUSSELL	RwB2	RwB2
UNIONTOWN	UnB	N/A
XENIA	XeB, XeB2	XfA, XfB2

LEGEND:

- PRIME AGRICULTURAL LAND
- COUNTY LINE
- FEMP PROPERTY BOUNDARY
- SOIL TYPE LIMITS

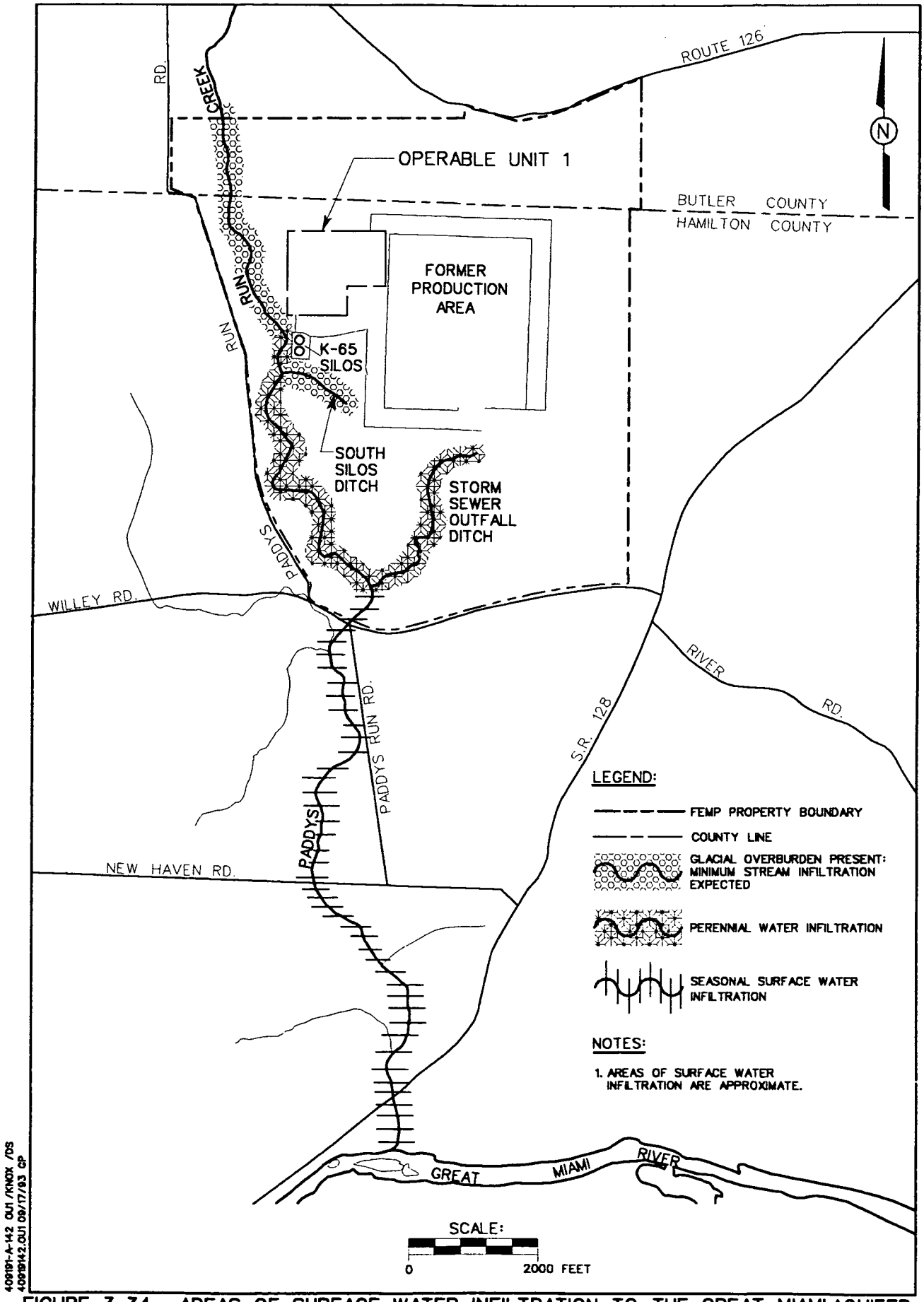
NOTES:

1. SEE TABLE 4-3 AND 4-4 FOR SOIL CLASSIFICATIONS.
2. SOURCE - OHIO DEPARTMENT OF NATURAL RESOURCES.

SCALE: 0 — 1300 FEET

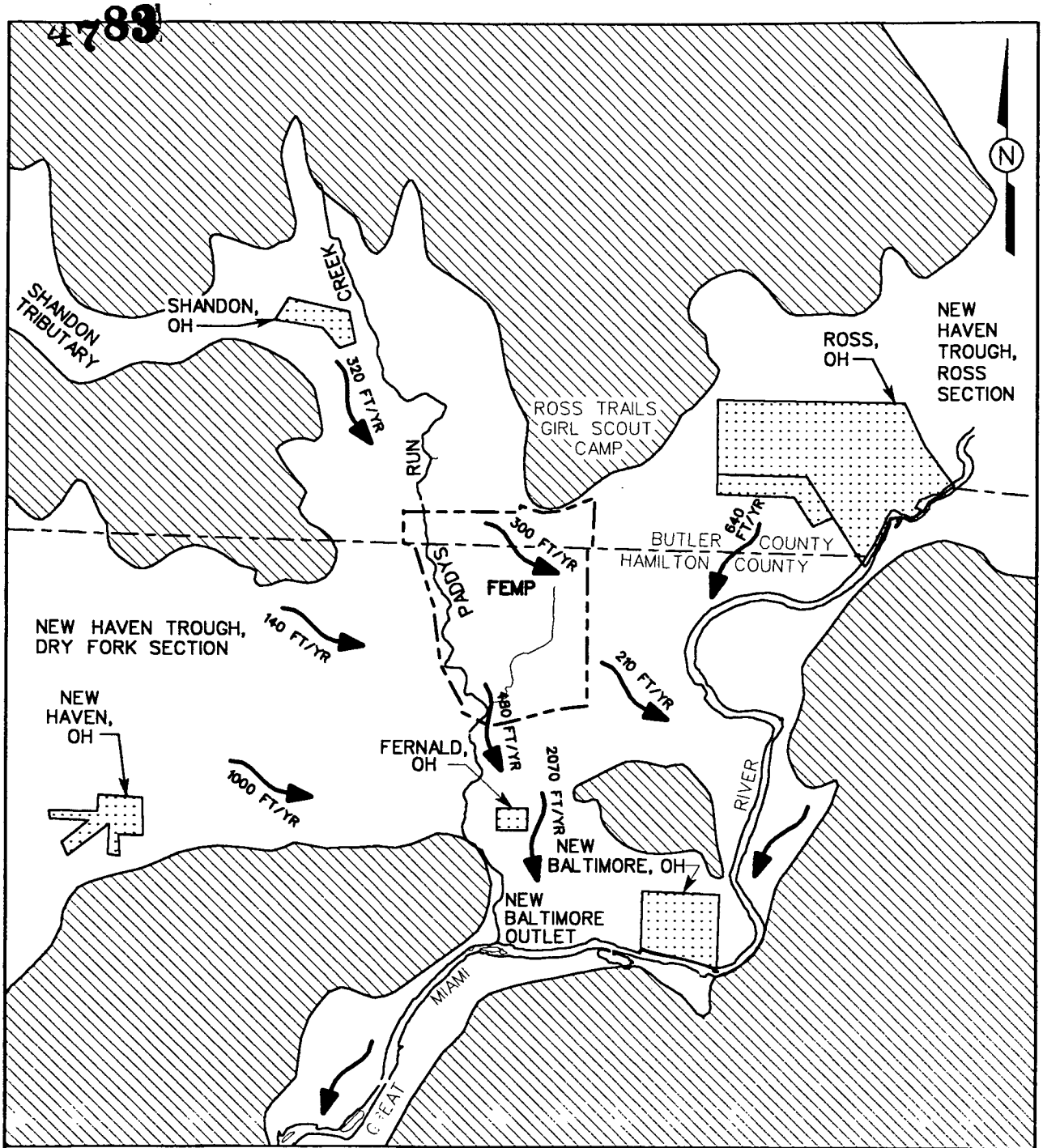
409191-A-176 /OU1 /KNOX /DS
4091917S.OU1 07/07/93 DAA

FIGURE 3-33. SOIL CLASSIFICATIONS AND PRIME AGRICULTURAL LAND AT THE FEMP



409191-A-H2 OU1 /KNOX /DS
4099142.OU1 09/17/93 GP

FIGURE 3-34. AREAS OF SURFACE WATER INFILTRATION TO THE GREAT MIAMI AQUIFER ALONG PADDYS RUN CREEK AND THE STORM SEWER OUTFALL DITCH



NOTES:

1. DIRECTION OF GROUNDWATER FLOW BASED ON APRIL 1986 WATER LEVEL CONTOURS AND GROUNDWATER MODELING OUTPUT (3DPART07.OUT).
2. VELOCITIES CALCULATED FROM GRDIENTS ON SEVERAL POTENTIOMETRIC MAPS, USING HYDRAULIC CONDUCTIVITY EQUAL TO 450 FT/DAY AND EFFECTIVE POROSITY EQUAL TO 0.23.

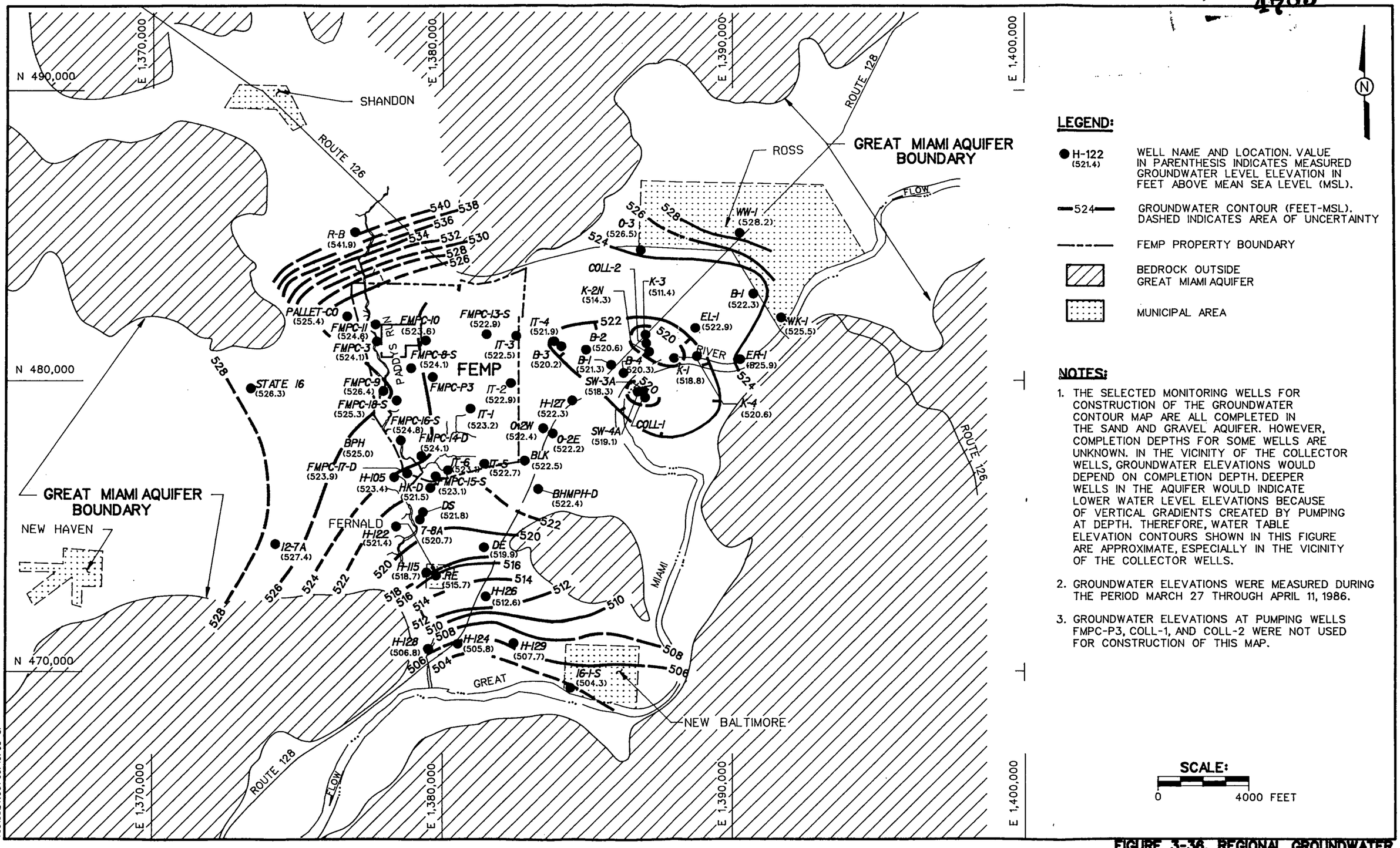
LEGEND:

- COUNTY LINE
- FEMP PROPERTY BOUNDARY
- 340 FT/YR — GENERALIZED GROUNDWATER FLOW DIRECTION, & HORIZONTAL FLOW VELOCITY AT THE 2000-SERIES LEVEL.
- BEDROCK OUTSIDE GREAT MIAMI AQUIFER
- TOWNS AND VILLAGES

SCALE: 0 — 5000 FEET

409191-A-164 /OUT /XXXX /DS
4091984.OUT 09/10/93 GP

FIGURE 3-35. GREAT MIAMI AQUIFER UNDERLYING THE FEMP AND VICINITY



LEGEND:

- ● H-122 (521.4) — WELL NAME AND LOCATION. VALUE IN PARENTHESIS INDICATES MEASURED GROUNDWATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL).
- —524— GROUNDWATER CONTOUR (FEET-MSL). DASHED INDICATES AREA OF UNCERTAINTY
- FEMP PROPERTY BOUNDARY
- BEDROCK OUTSIDE GREAT MIAMI AQUIFER
- MUNICIPAL AREA

NOTES:

1. THE SELECTED MONITORING WELLS FOR CONSTRUCTION OF THE GROUNDWATER CONTOUR MAP ARE ALL COMPLETED IN THE SAND AND GRAVEL AQUIFER. HOWEVER, COMPLETION DEPTHS FOR SOME WELLS ARE UNKNOWN. IN THE VICINITY OF THE COLLECTOR WELLS, GROUNDWATER ELEVATIONS WOULD DEPEND ON COMPLETION DEPTH. DEEPER WELLS IN THE AQUIFER WOULD INDICATE LOWER WATER LEVEL ELEVATIONS BECAUSE OF VERTICAL GRADIENTS CREATED BY PUMPING AT DEPTH. THEREFORE, WATER TABLE ELEVATION CONTOURS SHOWN IN THIS FIGURE ARE APPROXIMATE, ESPECIALLY IN THE VICINITY OF THE COLLECTOR WELLS.
2. GROUNDWATER ELEVATIONS WERE MEASURED DURING THE PERIOD MARCH 27 THROUGH APRIL 11, 1986.
3. GROUNDWATER ELEVATIONS AT PUMPING WELLS FMPC-P3, COLL-1, AND COLL-2 WERE NOT USED FOR CONSTRUCTION OF THIS MAP.

409191-B-324 OU1 KNOX DS
409191324.OU1 09/10/93 GP

FIGURE 3-36. REGIONAL GROUNDWATER ELEVATIONS, APRIL 1986

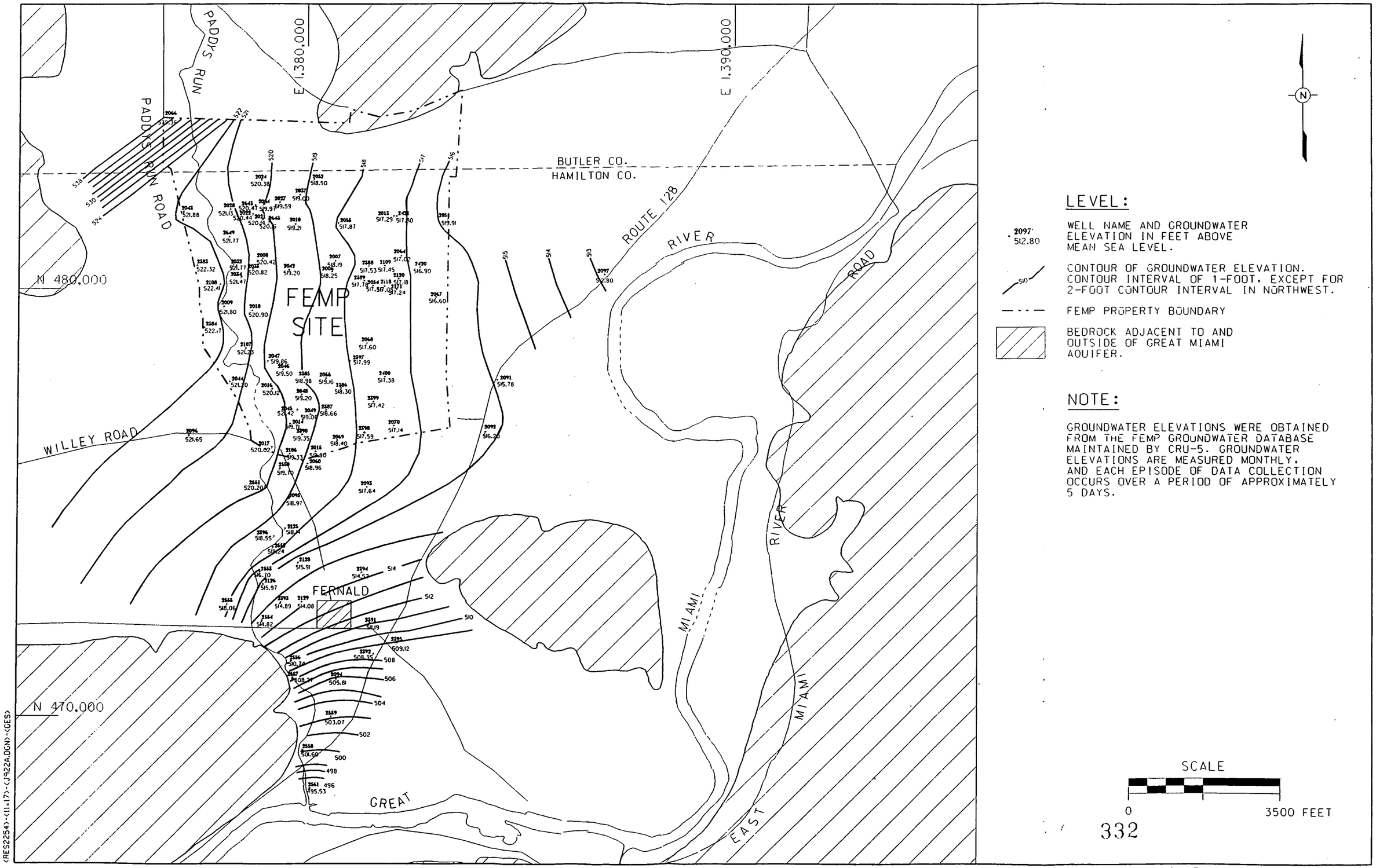
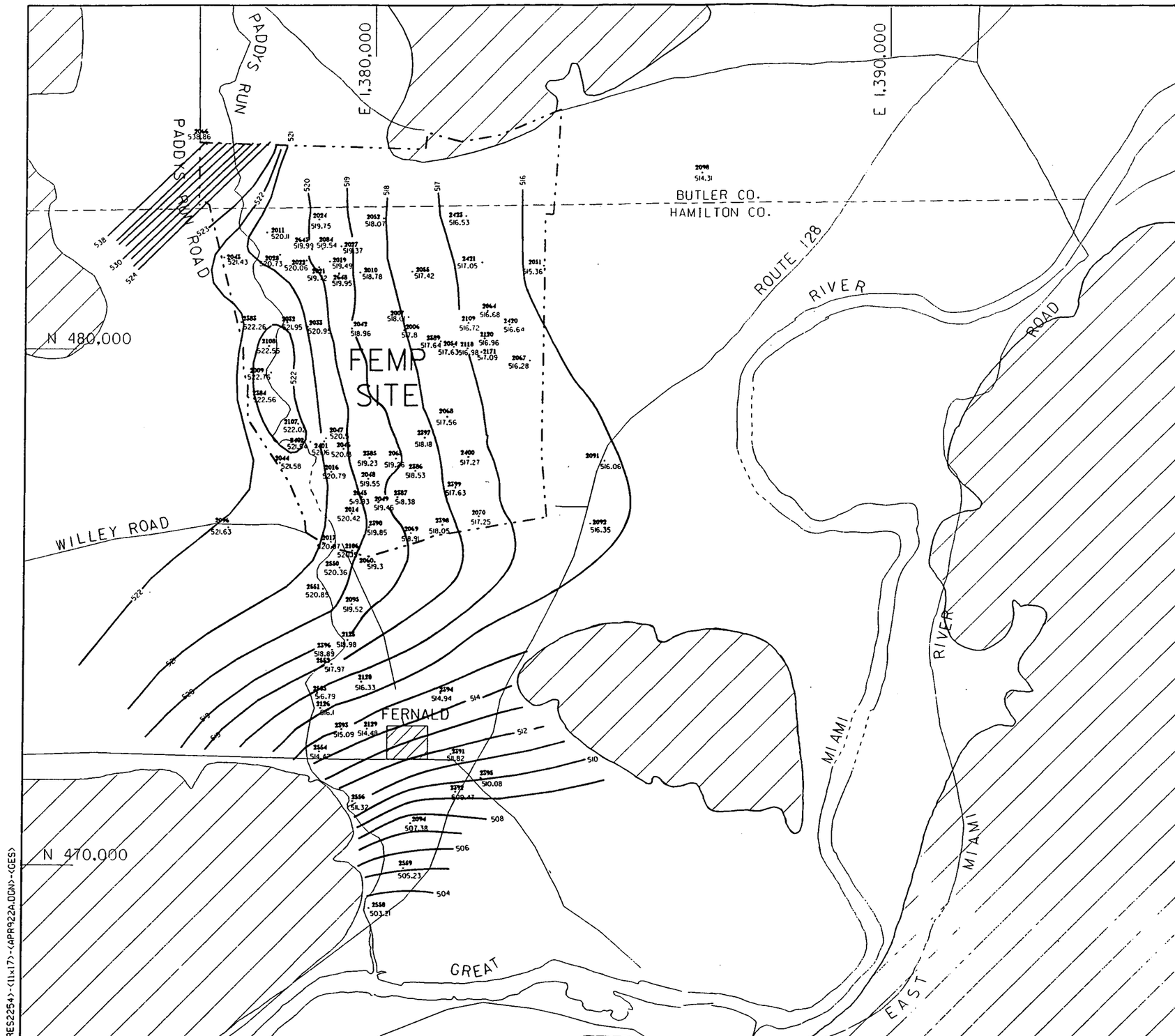


FIGURE 3-37 GROUNDWATER ELEVATIONS FOR 2000 SERIES WELLS JANUARY, 1992



LEVEL:

2097 512.80 — WELL NAME AND GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

510 — CONTOUR OF GROUNDWATER ELEVATION. CONTOUR INTERVAL OF 1-FOOT. EXCEPT FOR 2-FOOT CONTOUR INTERVAL IN NORTHWEST.

FEMP PROPERTY BOUNDARY

BEDROCK ADJACENT TO AND OUTSIDE OF GREAT MIAMI AQUIFER.

NOTE:

GROUNDWATER ELEVATIONS WERE OBTAINED FROM THE FEMP GROUNDWATER DATABASE MAINTAINED BY CRU-5. GROUNDWATER ELEVATIONS ARE MEASURED MONTHLY, AND EACH EPISODE OF DATA COLLECTION OCCURS OVER A PERIOD OF APPROXIMATELY 5 DAYS.

SCALE

0 — 3500 FEET

333

FIGURE 3-38 GROUNDWATER ELEVATIONS FOR 2000 SERIES WELLS APRIL, 1992

(RES2254)-(11x17)-(APR922A.DGN)-(GES)

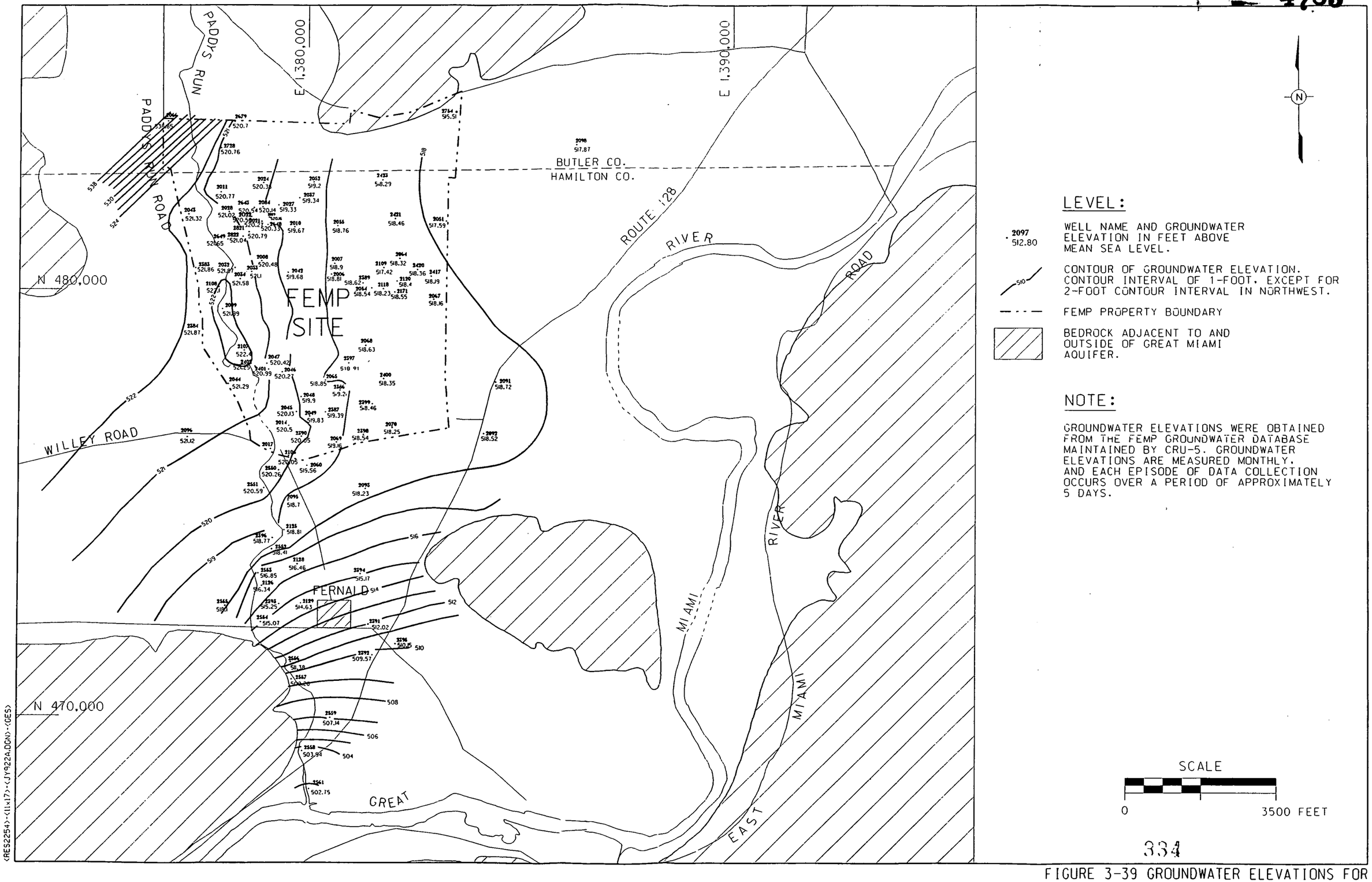


FIGURE 3-39 GROUNDWATER ELEVATIONS FOR 2000 SERIES WELLS JULY, 1992

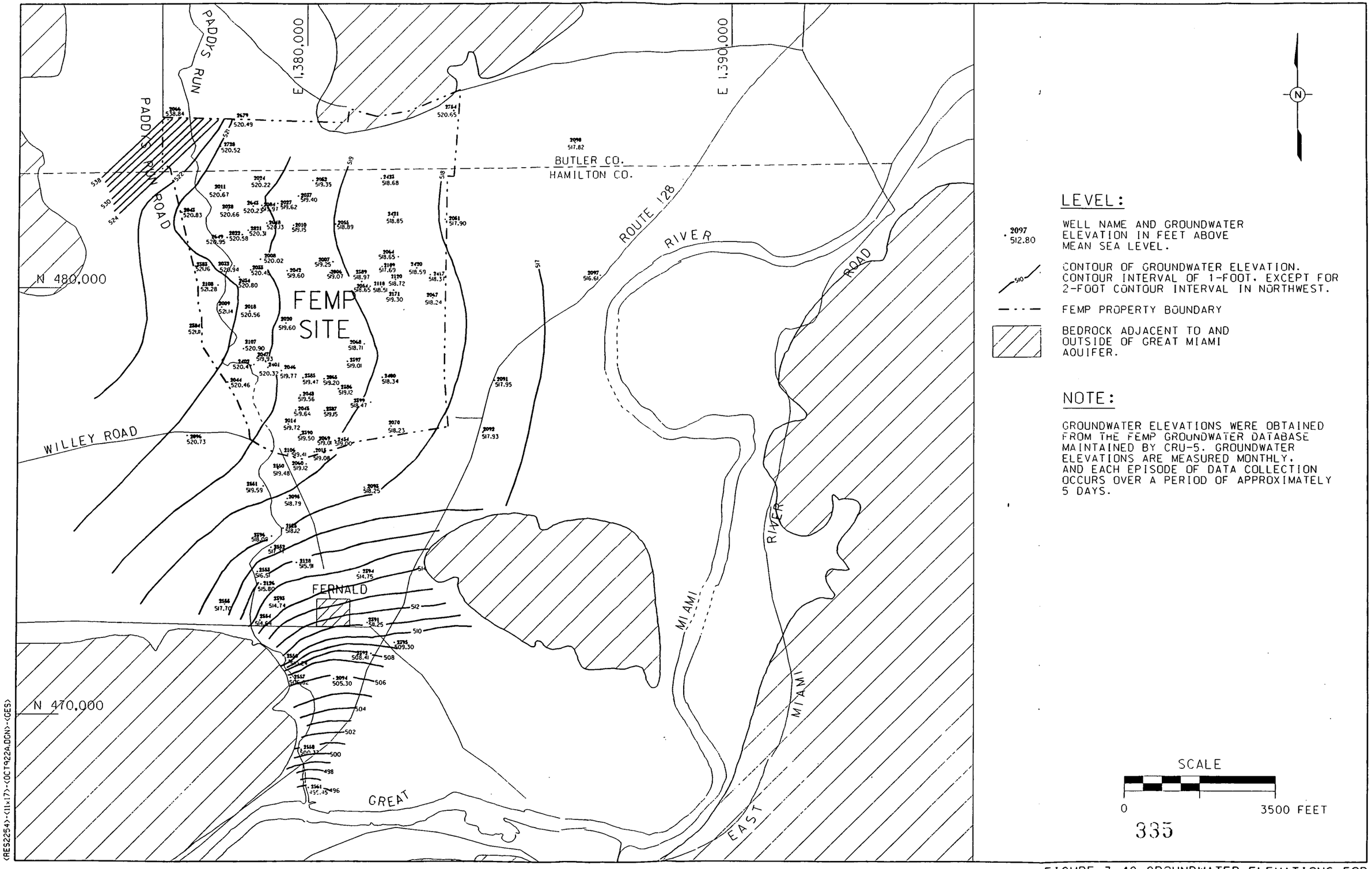


FIGURE 3-40 GROUNDWATER ELEVATIONS FOR 2000 SERIES WELLS OCTOBER, 1992

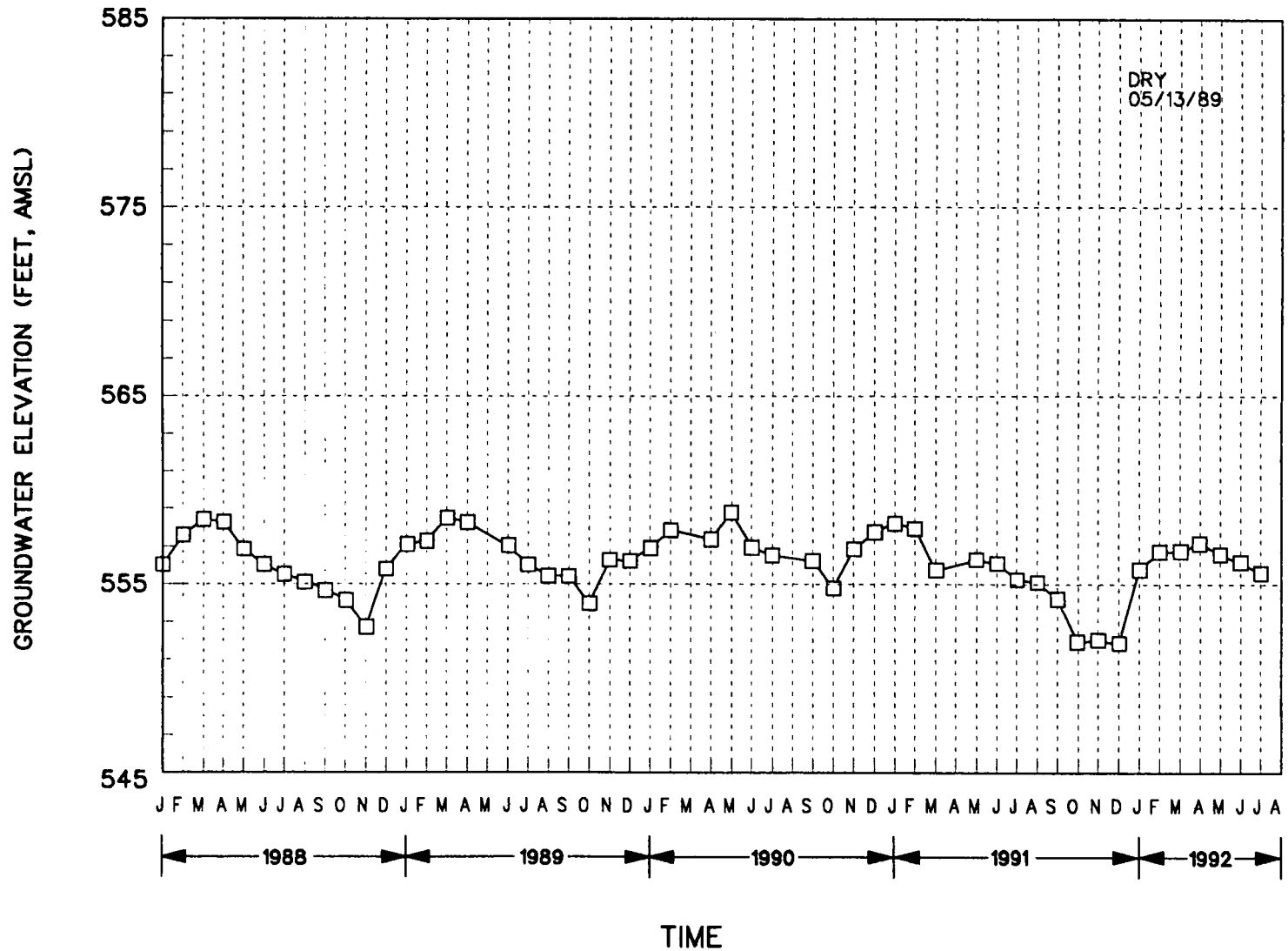


FIGURE 3-41. HYDROGRAPH FOR MONITORING WELL 1011

409191-A-241 /OUT /KNOX //DS
409192-241.OUT 09/21/93 GP

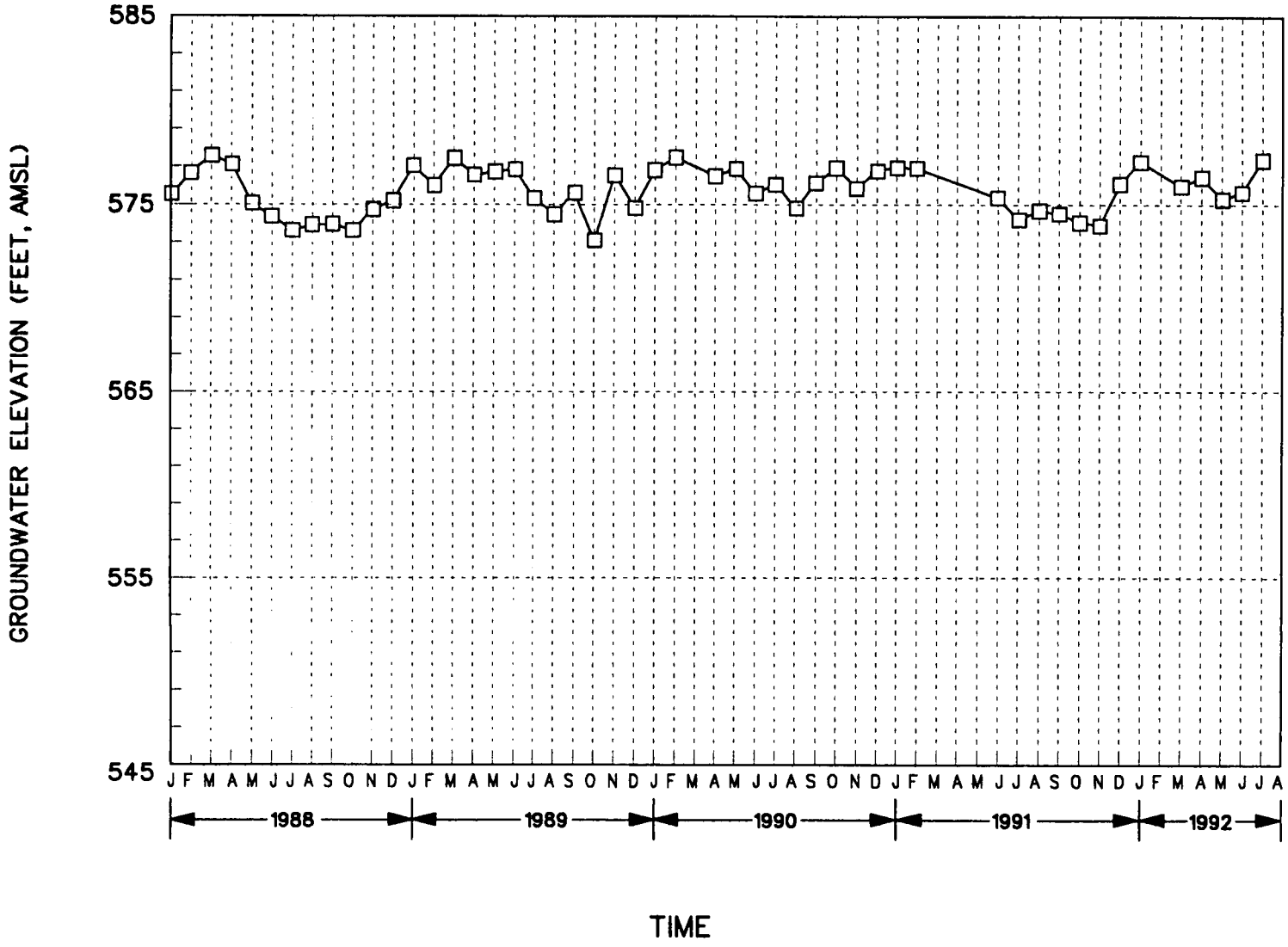


FIGURE 3-42. HYDROGRAPH FOR MONITORING WELL 1027

409191-A-242 /OU1 /KNOX //DS
40919242.OU1 09/20/93 GP

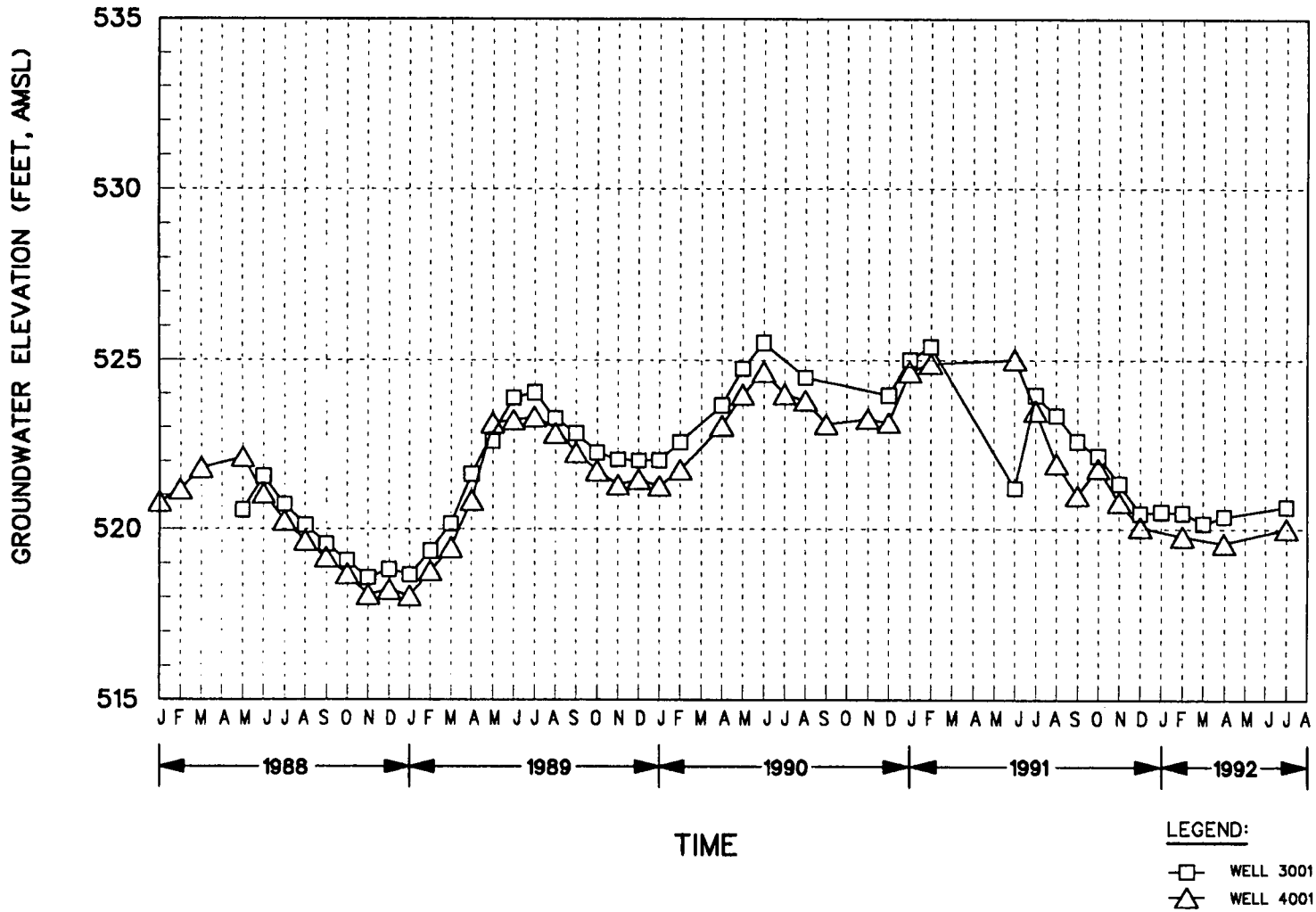


FIGURE 3-43. HYDROGRAPH FOR WELL CLUSTER 001

4083924.3 /OUT /IONOX /DS
4083924.3.DJ 09/20/93 GP

4783

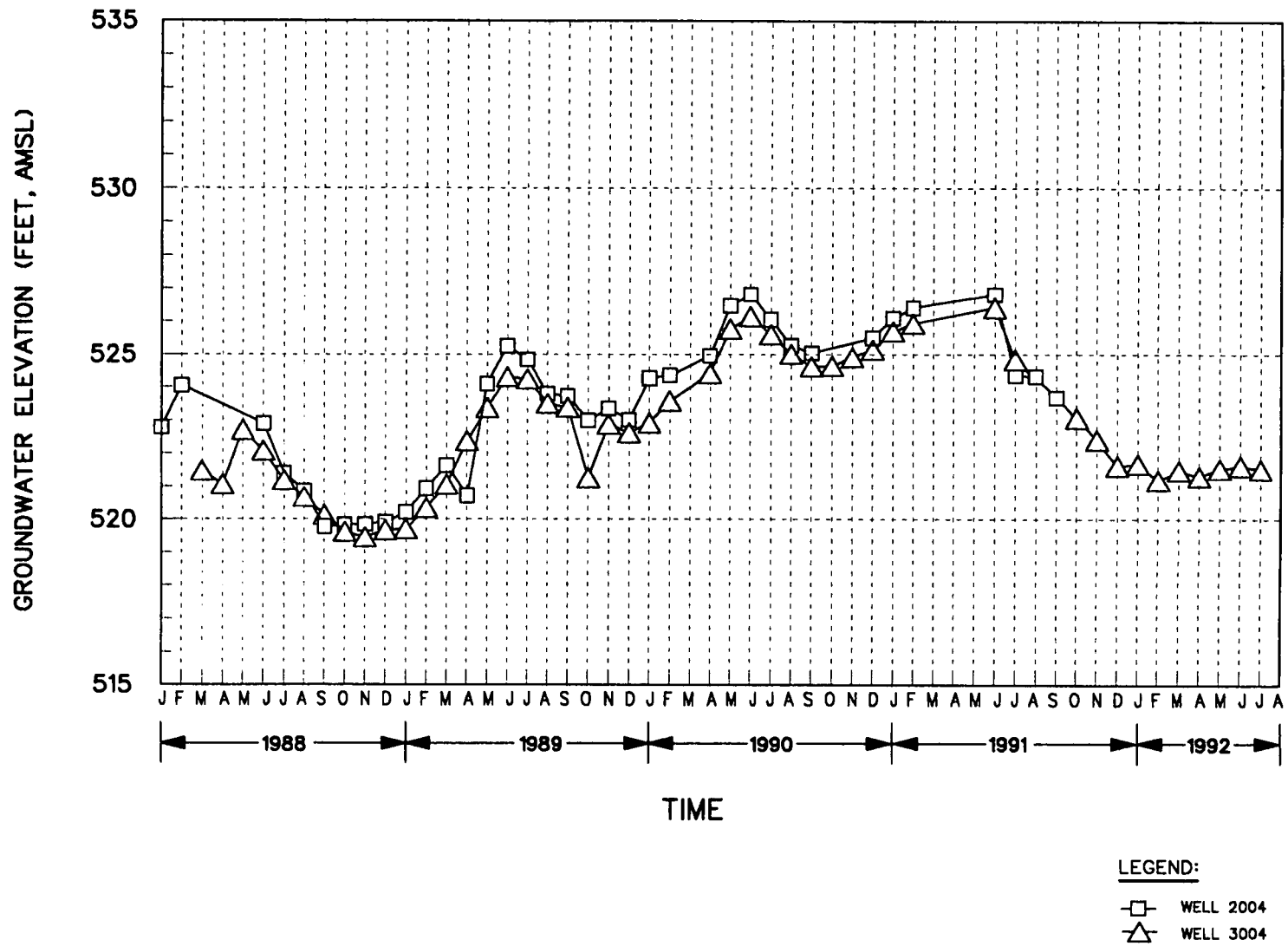


FIGURE 3-44. HYDROGRAPH FOR WELL CLUSTER 004

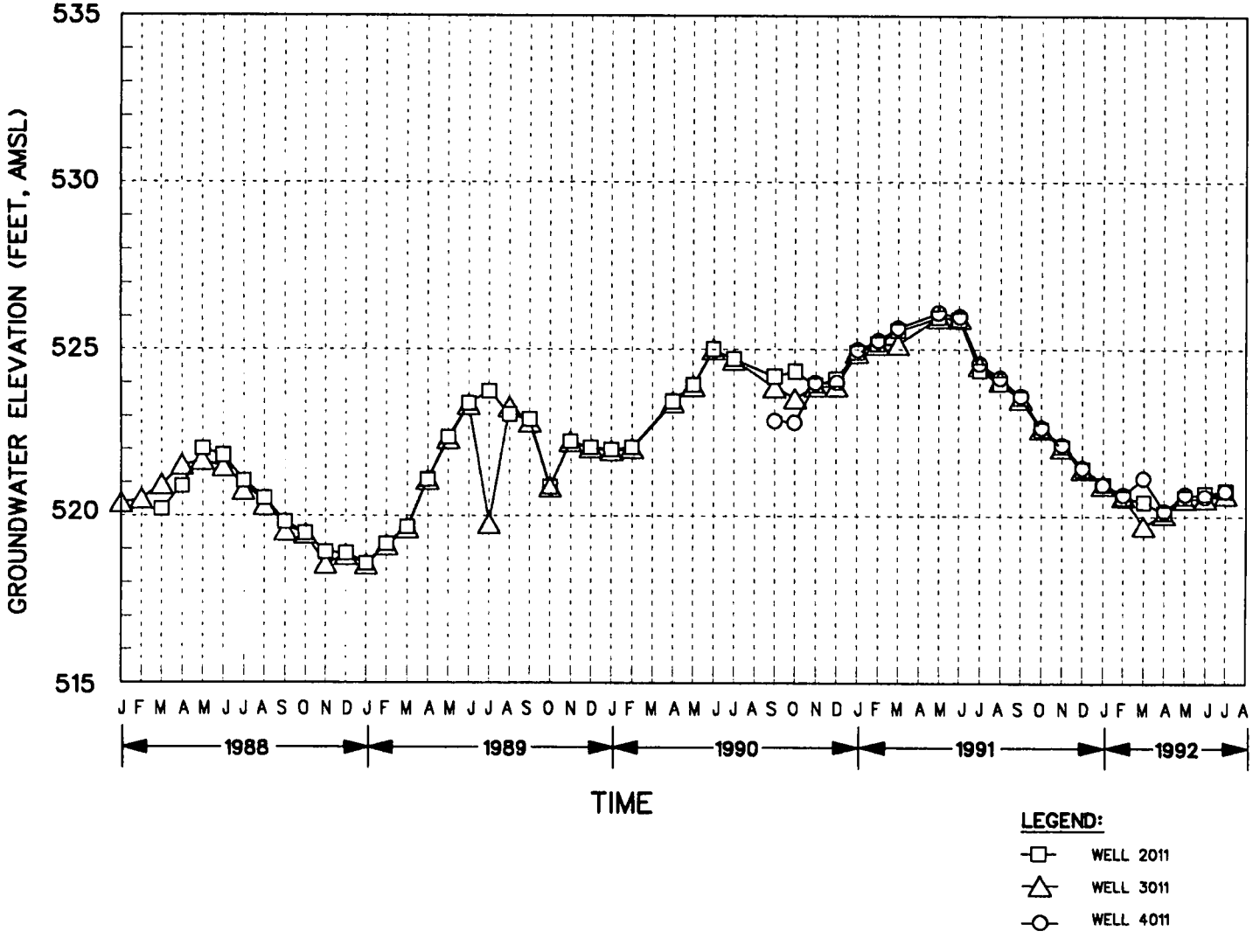


FIGURE 3-45. HYDROGRAPH FOR WELL CLUSTER 011

340

4788

409192A5.OU1 09/21/93 GP
409191-A-245.OU1 /KNOX /DS

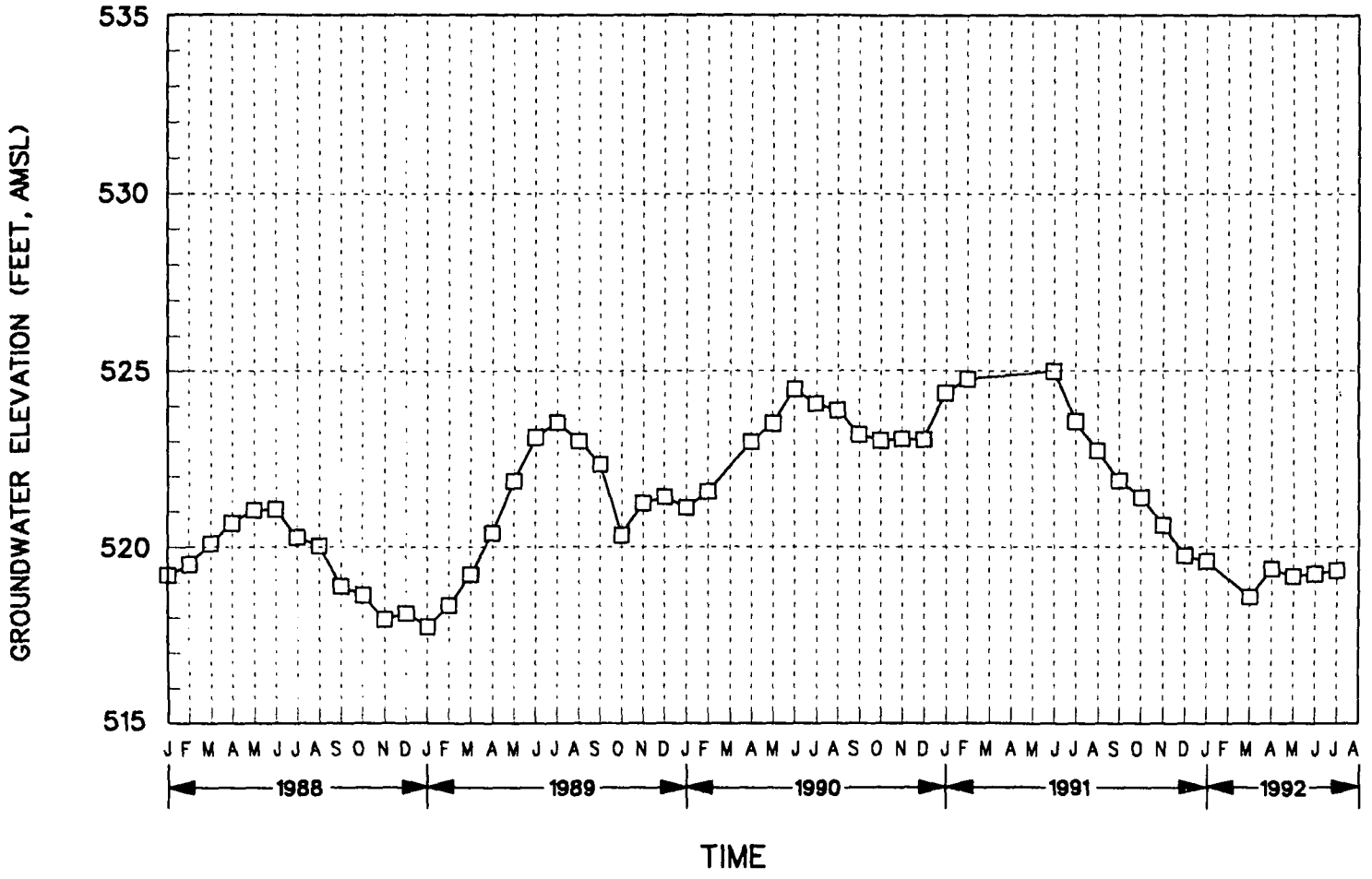
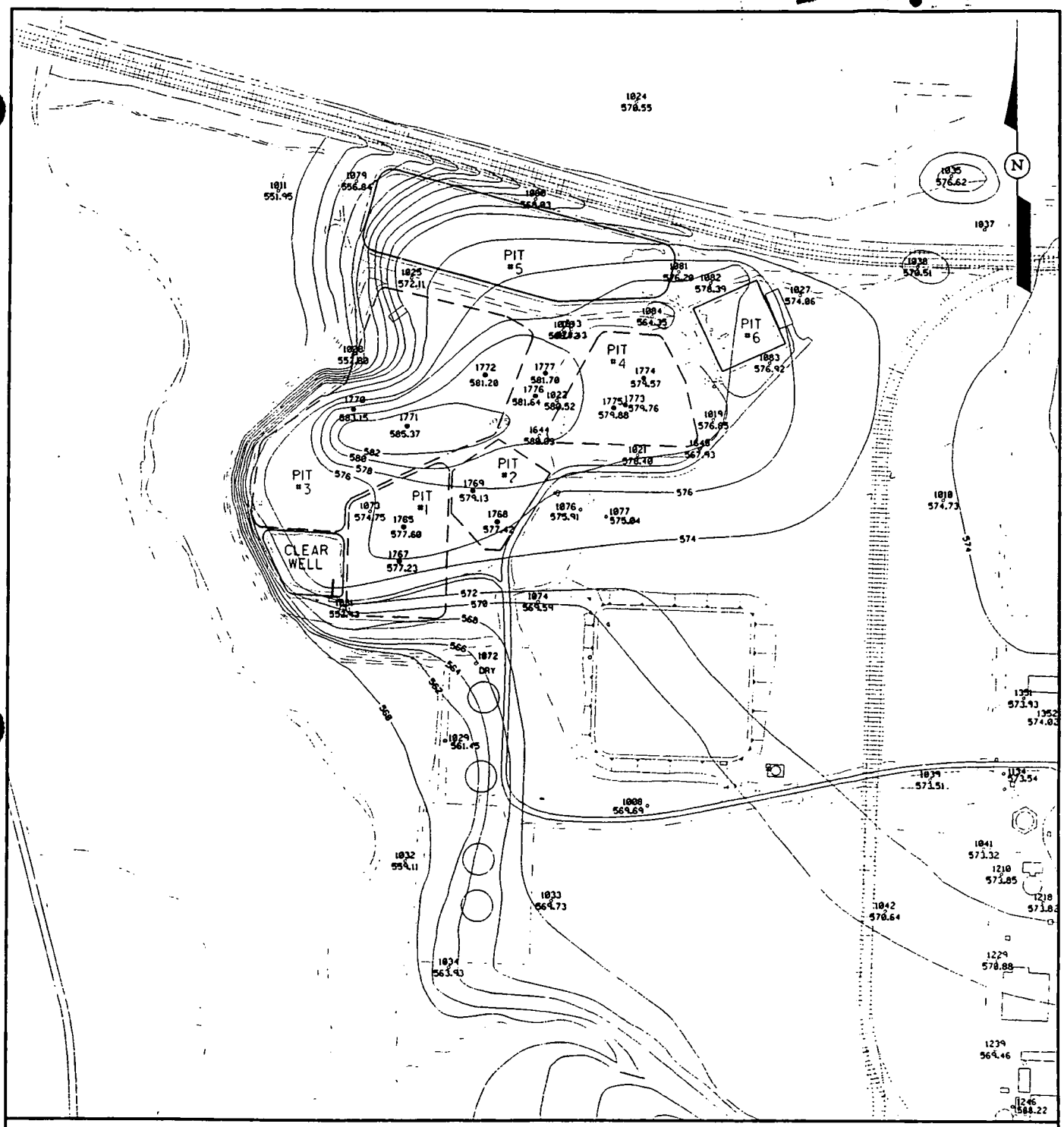


FIGURE 3-46. HYDROGRAPH FOR WELL 2027

409191-A-246 /OU1 /KNOX /DS
409119248.OU1 09/21/93 GP



NOTE:

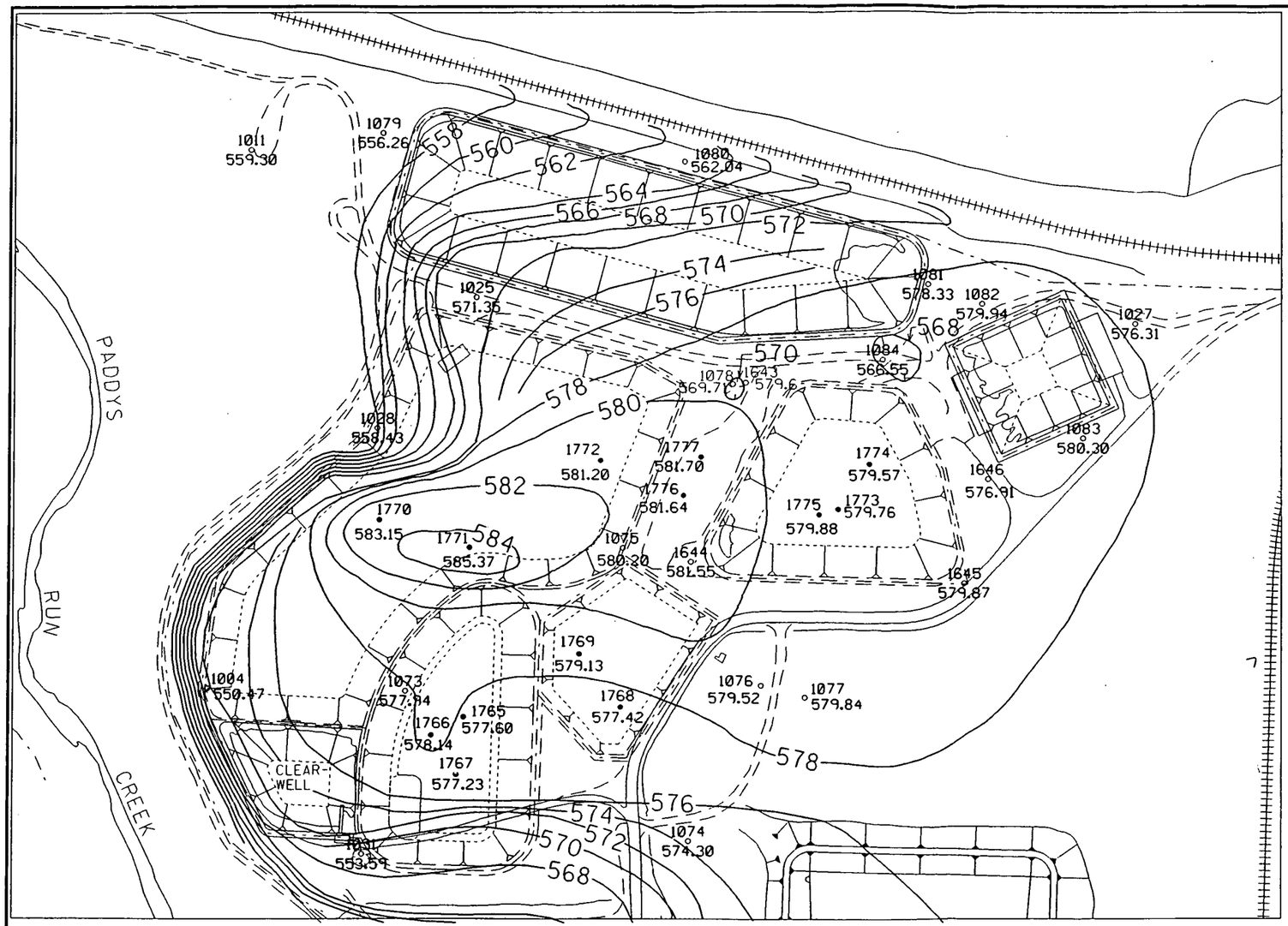
1. SOURCE - FERMCO CADD DRAWING NO. 0911DRY.DGN

LEGEND:

- OPEN WASTE PIT OUTLINE
- CLOSED WASTE PIT OUTLINE
- GLACIAL OVERBURDEN WELL W/WATER LEVEL ELEVATION
- WASTE PIT WELL W/WATER LEVEL ELEVATION
- FENCE LINES
- ROADWAY

SCALE: 100' 0' 100' 200' 300'

FIGURE 3-47. WATER LEVEL ELEVATIONS IN WASTE PITS AND GLACIAL OVERBURDEN, AUTUMN 1991



NOTE:

1. SOURCE - FERMCO CADD DRAWING NO. MY93IDRY.DGN.

SCALE:

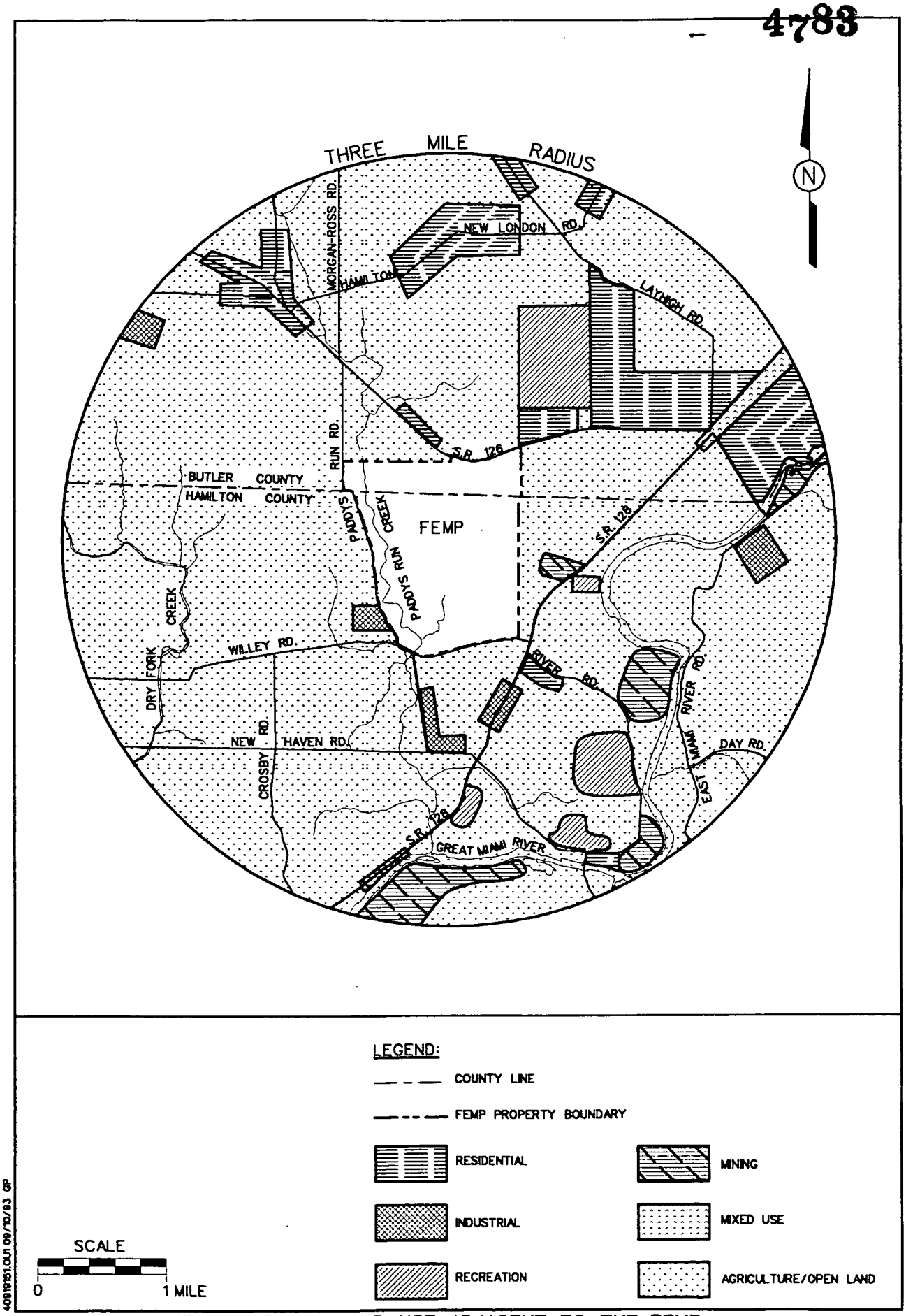
100' 0' 100' 200' 300'

LEGEND:

- OPEN WASTE PIT OUTLINE
- COVERED WASTE PIT OUTLINE
- 1645 579.87 ○ GLACIAL OVERBURDEN WELL W/WATER LEVEL ELEVATION FOR MAY 1993
- 1776 581.64 ● WASTE PIT WELL W/WATER LEVEL ELEVATION FOR MAY 1993
- ROADWAY
- RAIL LINES

server1:/gis/my93idry.dgn

FIGURE 3-48. WATER LEVEL ELEVATIONS IN WASTE PITS AND GLACIAL OVERBURDEN, MAY 1993



409191-A-151 /OU1 /KNOX /DS
40919151.OU1 09/10/93 GP

FIGURE 3-49. LAND USE ADJACENT TO THE FEMP

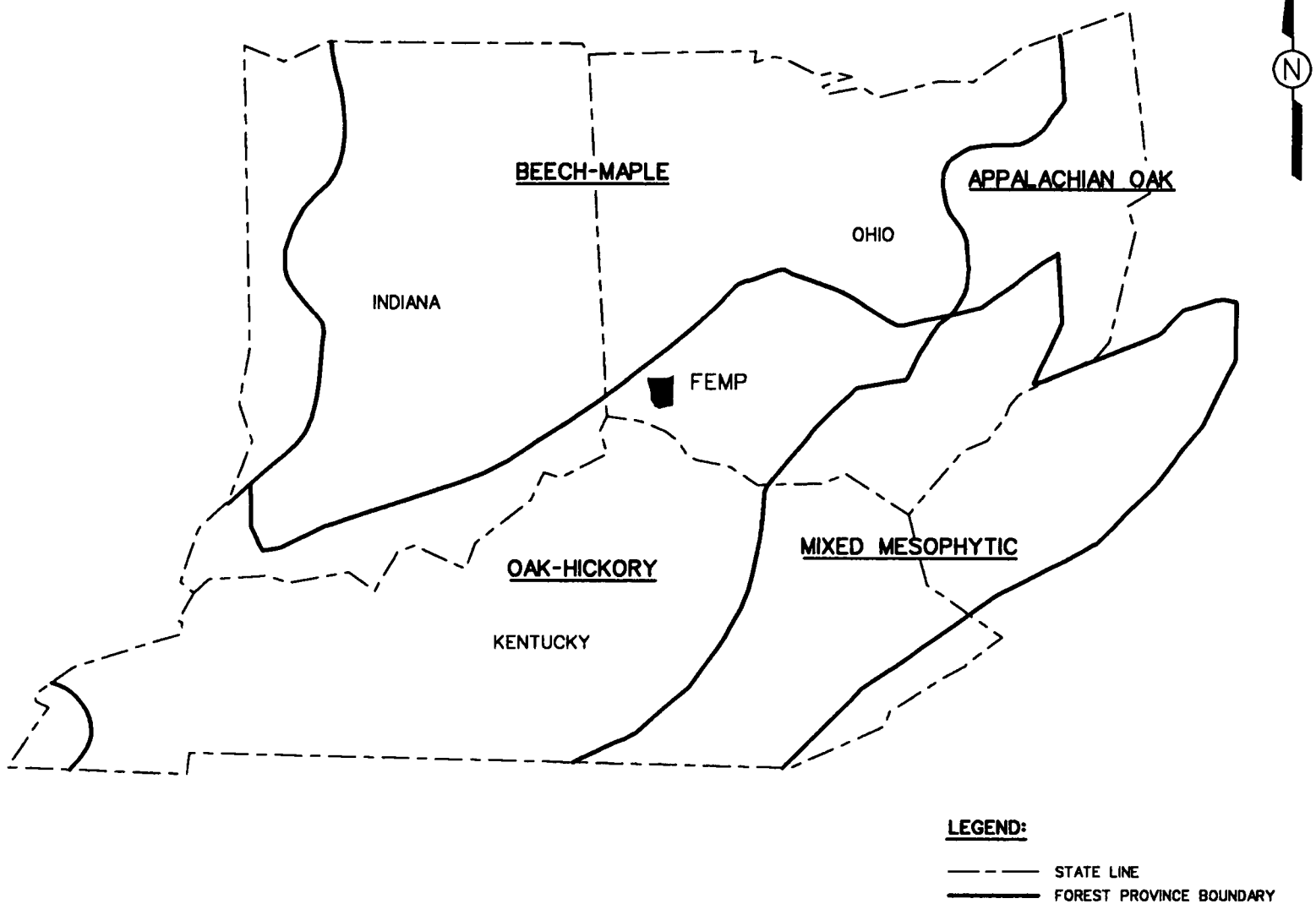
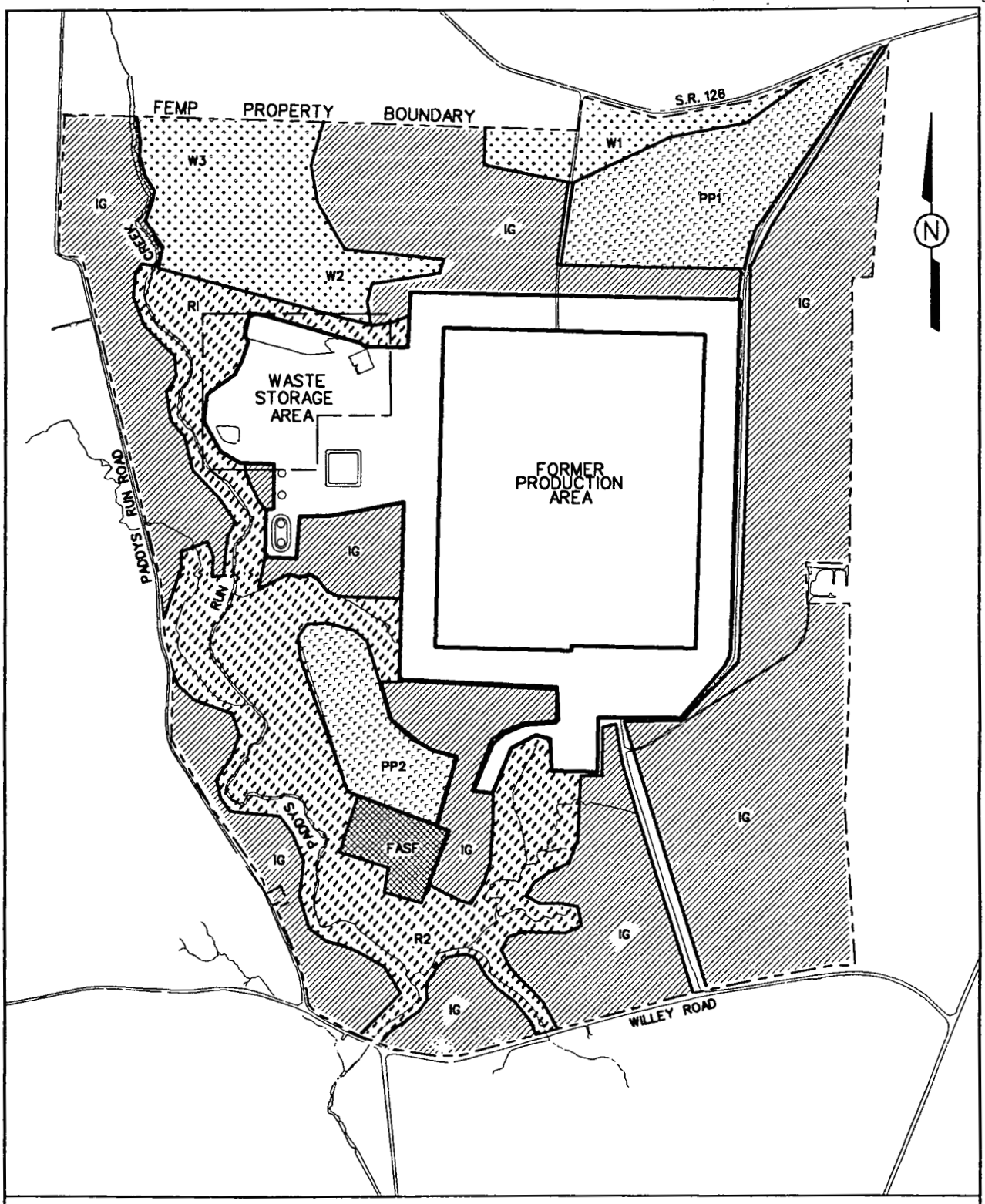


FIGURE 3-50. SECTIONS OF THE EASTERN DECIDUOUS FOREST PROVINCE IN THE REGION OF THE FEMP

409191-A-152 /OUT /KNOX /DS
40919152.OUT 09/10/93 GP

345

4788



NOTES:

1. HABITAT BOUNDARIES ARE APPROXIMATE.
2. SOURCE - FACEMIRE ET AL. (1990).

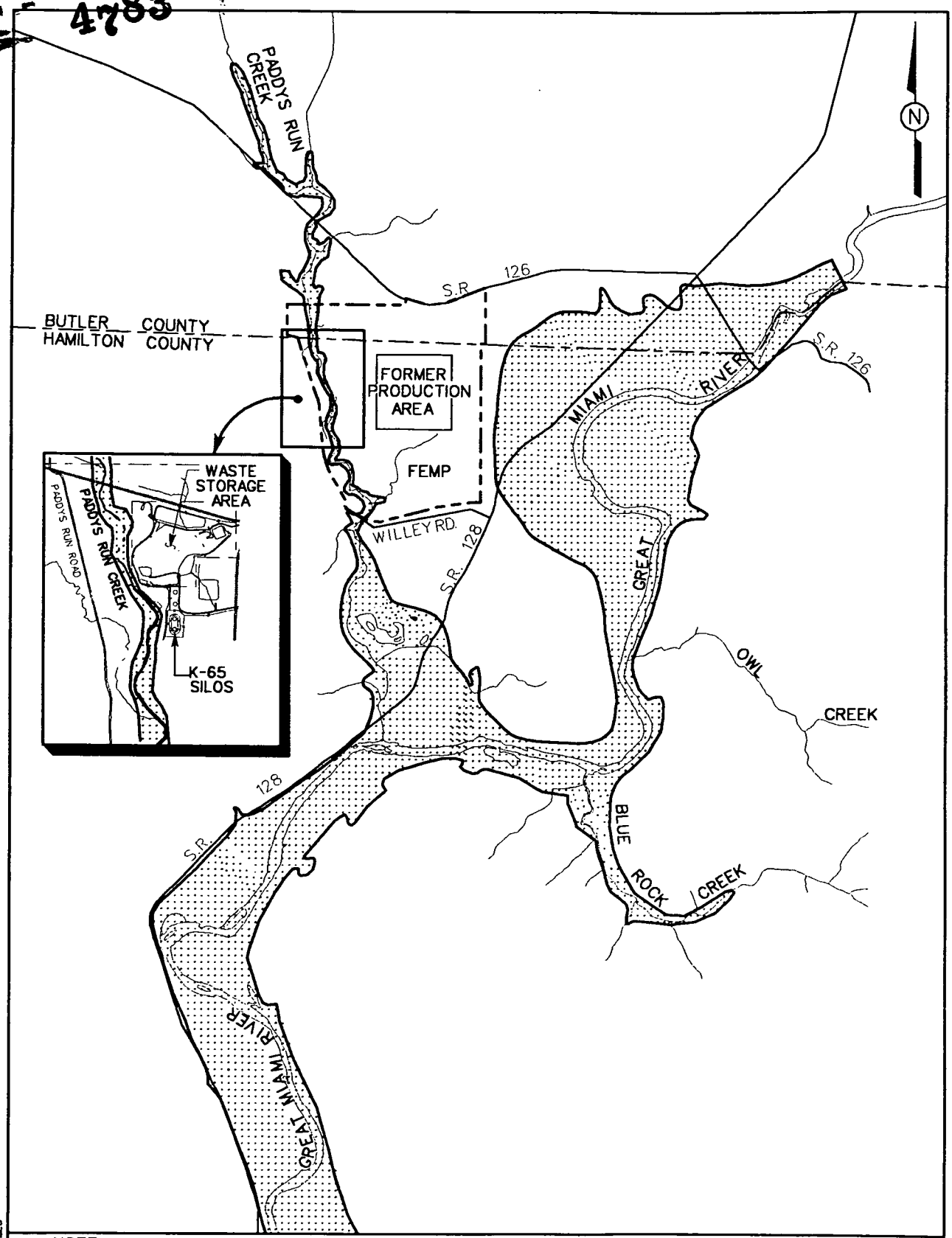
LEGEND:

- INTRODUCED GRASSLAND (IG)
- FLYASH/SOUTH FIELD (FASF)
- PLANTED PINE PP1, PP2
- WOODLANDS W1 - INTERMEDIATE, W2 - YOUNG, W3 - MATURE
- RIPARIAN R1, R2
- DISTURBED
- FEMP PROPERTY BOUNDARY
- OPERABLE UNIT 1 OUTLINE

SCALE: 0 — 1200 FEET

409191-A-153/OU1/KNOX/DS
40919153.OU1/ 07/07/93 DAA

FIGURE 3-51. HABITAT TYPES PRESENT ON THE FEMP



NOTE:

1. SOURCE - FEDERAL EMERGENCY MANAGEMENT AGENCY, 1982.

SCALE: 0 — 5000 FEET

LEGEND:

- FEMP PROPERTY BOUNDARY
- COUNTY LINE
- 100-YEAR FLOODPLAIN

409191-A-156/OU1/KNOX/DS
40919156.OU1 09/22/93 LLS

FIGURE 3-52. GREAT MIAMI RIVER AND PADDYS RUN CREEK 100-YEAR FLOODPLAIN

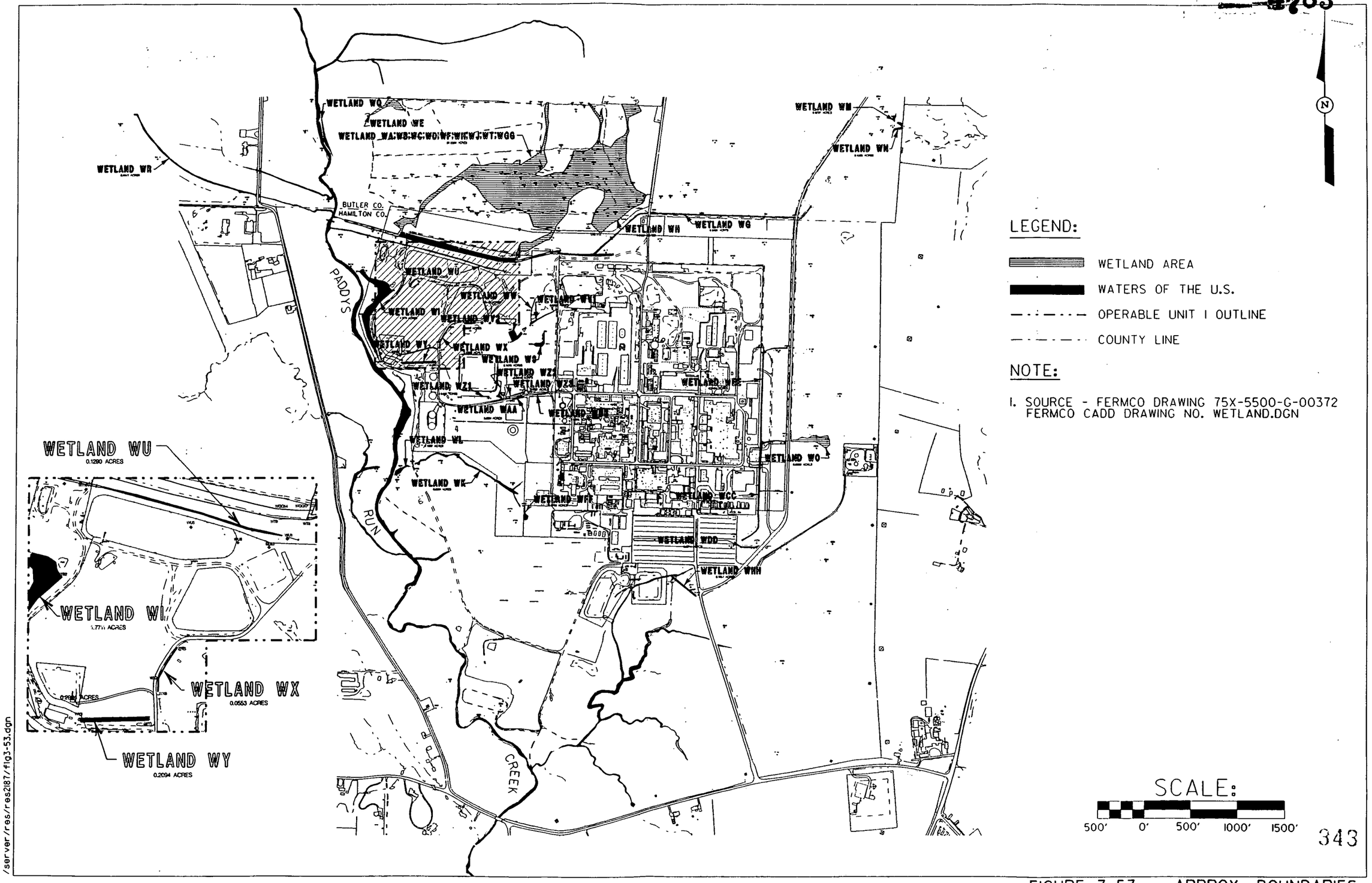


FIGURE 3-53. APPROX. BOUNDARIES OF JURISDICTIONAL WETLANDS AT THE FEMP

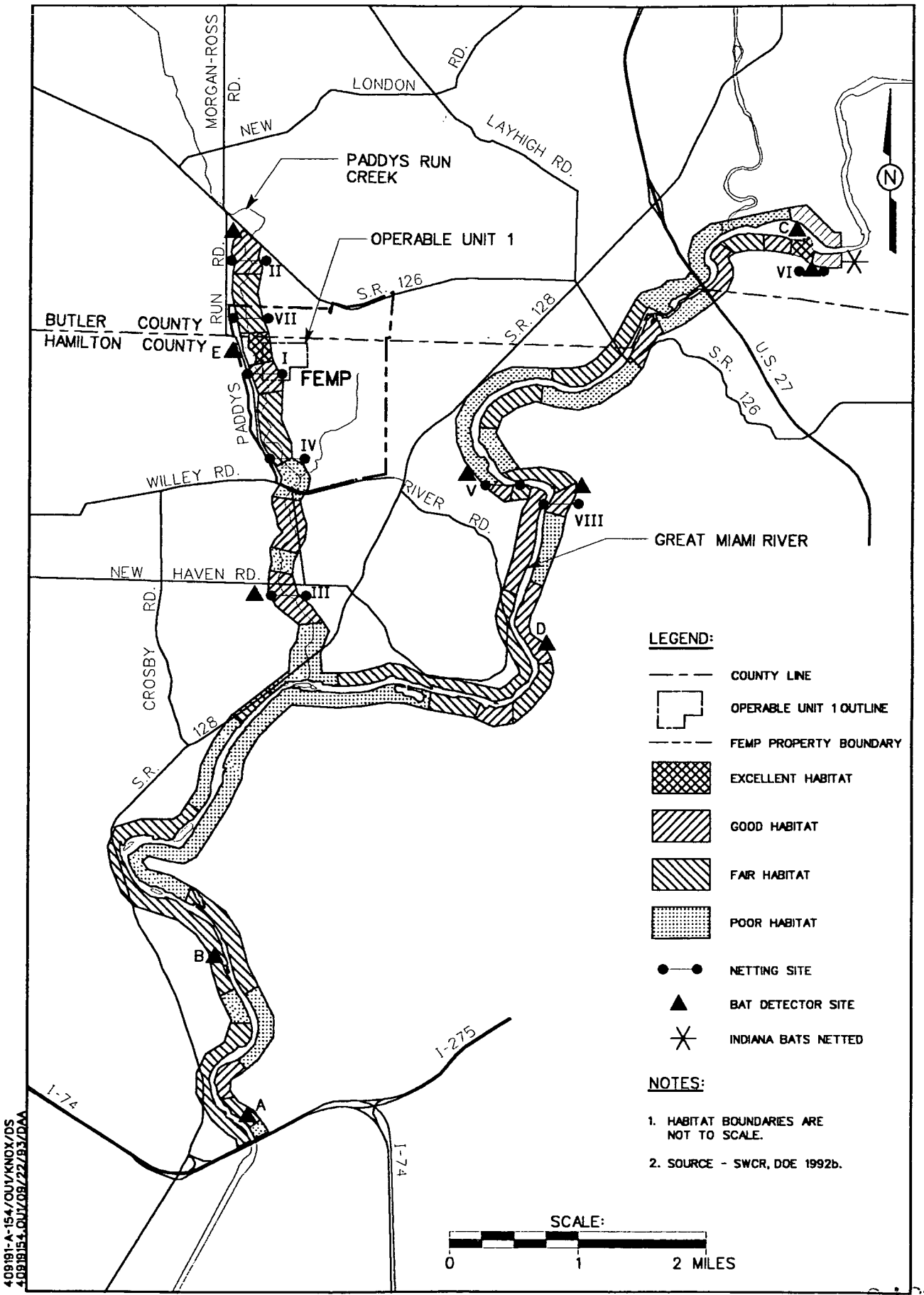


FIGURE 3-54. INDIANA BAT SAMPLING SITES AND HABITAT EVALUATION AT THE FEMP AND VICINITY

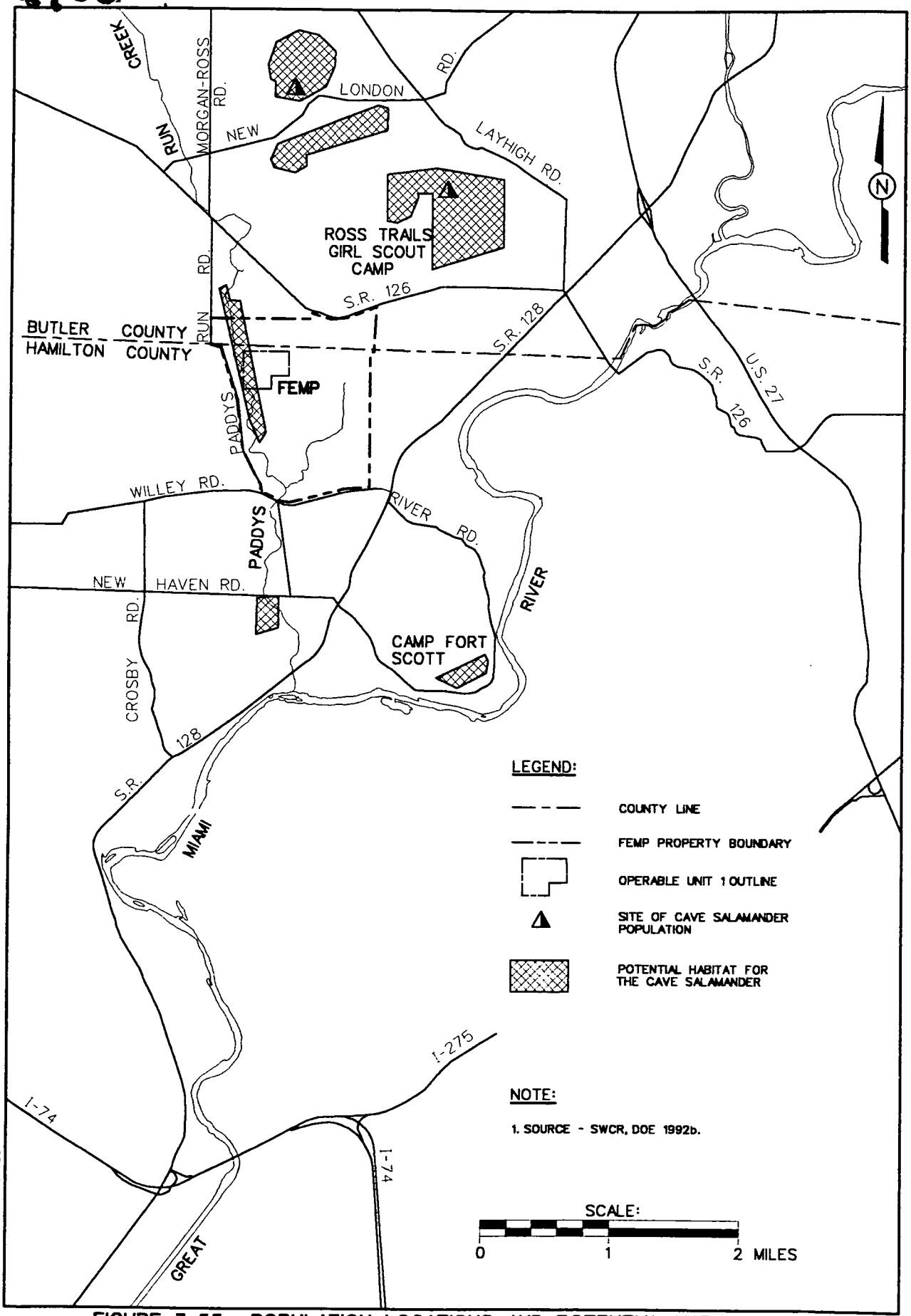


FIGURE 3-55. POPULATION LOCATIONS AND POTENTIAL HABITAT FOR THE CAVE SALAMANDER IN THE VICINITY OF THE FEMP

4.0 NATURE AND EXTENT OF CONTAMINATION

This section presents data that define the nature and extent of constituents of potential concern (CPC) identified in the Operable Unit 1 Study Area. Section 4 provides a detailed, pit-by-pit analysis of radiological and chemical constituents in groundwater, surface water, soils and air in Operable Unit 1. Also included are ecological characterization, and source and background information. This section includes a high volume of data in tables, most notably pit profile tables (Tables 4-1.1.A through 4-1.8.C) and summary tables that roll up data presented in Appendices A, B, and C. The pit profile tables (which deviate from the table numbering scheme used throughout the rest of this RI) are designed to provide an accessible cross-reference to radiological, metals, and organic data for each pit. For example, Table 4-1.1.A, Table 4-1.1.B, and Table 4-1.1.C provide radiological, metals and organic profiles, respectively, for Pit 1. Tables 4-1.2.A, B, and C provide comparable data for Pit 2, and so on.

The primary objectives of the RI are to collect and summarize data sufficient to 1) perform a baseline risk assessment and 2) develop and evaluate remedial action alternatives. Data acquisition and evaluations presented herein focus on the quality and quantity of data necessary to meet the two RI objectives.

The nature and extent of both radiological and chemical constituents within Operable Unit 1 are reviewed in this section, based on the data collected during the RI and previous studies. The processes which generated the waste contained in Operable Unit 1 are well known. Thus, in terms of sampling the source units (Waste Pits 1 through 6, the Burn Pit and the Clearwell), the RI should confirm the presence of known constituents and detect the presence of other potential constituents of concern which may have been disposed of in the waste pits. Section 1.1 provides an overview of those processes performed at the FEMP and provides a general description of the wastes transferred to Operable Unit 1. Tables 4-1.1-A through 4-1.8-C are summaries of the types of the constituents of potential concern and the estimated quantities of material placed into each of the pits based on the average concentration.

The primary radiological constituents of Operable Unit 1, based on process knowledge, are uranium isotopes (U-238, U-234, U-235) and daughter products (Ra-226, Th-230, Rn-222, Po-210, Pb-210, Pa-231, and Ac-227). Operable Unit 1 also contains thorium (Th-232) and its daughter products (Ra-228, Th-228, Ra-224, Rn-220, and Pb-208). Due to the fact that the FEMP also processed recycled uranium from the Hanford facility during the 1970's, Waste Pits 2 through 6, the Burn Pit and the Clearwell also contain uranium fission products including technetium (Tc-99), strontium (Sr-90), and cesium (Cs-127).

Examining the ratios of the isotopes of uranium as well as the ratio between the members of the U-238 decay chain is a good method for determining the likelihood that contaminants found in the environmental media are associated with Operable Unit 1. In nature, the activity concentration ratio between U-238 and U-234 is unity (1). This ratio is generally true for the members of the decay chain down to Rn-222, which is a gas and easily transported. Much of the material process at the FEMP did not have the natural U-238/U-234 ratio, but rather was depleted in the isotopes of U-235 and U-234 (as part of prior processing for nuclear fuel). If an environment media does not exhibit the natural uranium activity ratio, it can be assumed that Operable Unit 1 waste was a likely contributor. If an environmental media sample does exhibit the natural uranium ratio, the uranium may be naturally occurring or it may have originated from Operable Unit 1. To determine the origin, we would need to evaluate the sample for other radiological constituents which are present in the waste in different ratios than those which occur naturally and also search for the presence of radionuclides (fission products for example) in concentration higher than would normally be found in the environmental media. Because process knowledge is less definitive for chemical constituents, analyses were completed for organic and inorganic parameters. Analytical results were compared with background concentrations of the same constituents to determine the presence of chemical contaminants. Chemical constituents likely to be encountered in the waste pits based upon process knowledge include tributyl phosphate, a mobilizing agent used in the extraction of uranium; polychlorinated biphenyls (PCBs); polynuclear aromatics (PAHs) from fly ash or fuel oils; common solvents such as acetone, 2-butanone (MEK), and methylene chloride; chlorinated phenoxy acid herbicides (used for weed control) and their degradation products;chlorinated solvents used as degreasers or paint solvents; and various inorganic species (such as calcium, magnesium, fluoride, and heavy metals).

Table 2-2 presents the primary data sources which were reviewed for relevant environmental sampling information to support the evaluation of the nature and extent of contamination associated with Operable Unit 1. Section 2.0, Study Area Investigations, provides specific details describing the objectives, methods, sampling, and analysis of each media. That section also includes a discussion of the Quality Assurance status of each data set employed in this report.

4.1 BACKGROUND DATA

This section summarizes support data regarding the potential constituents of concern in Operable Unit 1. This background material provides points-of-comparison which will aid the reader in understanding the significance of data collected under the RI. These supporting data include 1) an overview of the radioactive decay process and those physical properties which can help to identify the origin of the potential constituents of concern, and 2) a summary of the processes which generated the waste stored in Operable Unit 1 and the nature of the materials which are known and should be confirmed through the RI, and 3) the results of environmental media background studies performed in the vicinity of the FEMP. These background data can be used to distinguish FEMP-generated constituents from those which are naturally occurring in soil and groundwater.

The upper 95 percent tolerance limit (UTL) for background concentrations of selected analytes in the environmental media (e.g. surface soil, subsurface soil, glacial overburden groundwater, and Great Miami Aquifer groundwater) were used in this section to distinguish waste-related contaminants from naturally occurring or other non-site related levels of radiological or chemical constituents (Table 4-2). In brief, radiological or inorganic constituents in the environmental media sampled were considered to be non-waste related if all site related concentration data were less than the 95 percent UTL of the background concentration data. Organic compounds in the soil and groundwater were considered to be waste-related regardless of their concentration. The full range of statistical tests applied to identify constituents of potential concern (CPC) are presented in Section 6.0.

Table 4-2 presents the UTLs for background concentrations of radiological and inorganic constituents in surface soil, subsurface soil, perched groundwater, and Great Miami Aquifer groundwater. The values presented for surface and subsurface soil correspond to the statistics presented for the 0 to 6 inch sample set and the 48 to 54 inch samples set, respectively, in the CERCLA/RCRA Background Soil Study (US DOE 1993D). The values presented for groundwater were taken for the Characterization of Background Water Quality for Streams and Groundwater (US DOE 1993). With the exception of the following, all data are as-reported in the background studies.

- The background studies did not obtain adequate frequencies of detection for Ac-227 and Pr-231 to generate summary statistics. Because the background studies sampled uncontaminated soil and groundwater in which isotopes are assumed to be in secular equilibrium, the activity of the analyzed parent, U-235/236, is substituted as the activity of the daughters, Ac-227 and Pa-231.

- The background soil study did not analyze samples for Po-210, Bi-210, and Bi-214. Similar to the case above, Bi-210 and Po-210 are assumed to have activities identical to the parent, Pb-210, which was analyzed and had adequate detection in the background soil study. Bi-214 in soil can not be estimated from the concentration of its analyzed parent, Ra-226, as there is a gaseous daughter product (Rn-222) in the decay path from Ra-226 to Bi-210. Consequently, Bi-214 is assumed to have the same activity as the analyzed daughter, Pb-210.

- Four non-naturally occurring radionuclides were examined during the background soil study; Cs-137, Ru-106, Sr-90, and Tc-99. These isotopes are fission products and their presence in the background soil study area could only be due to fallout from atmospheric releases of radiation such as weapons testing. They would only be expected to be present at detectable levels in surface soils. Cs-137 was detected only in the surface soil set. Sr-90 was detected only once in the 81 soil samples collected. Ru-106 and Tc-99 were not detected in any background soil study samples. Summary statistics are presented for Cs-137 in the surface soil. In all other cases, the surface soil background concentrations of the fission products are

below levels of detection used in the study (lower than RI/FS levels of detection) and are assumed to have concentrations of 0.

4.1.1 Radioactive Decay Process

The majority of the radioactive materials present at the FEMP are naturally occurring and have only been concentrated through processing at the site. The exception to the naturally occurring constituents are the four fission related isotopes Cs-137, Tc-99, Sr-90 and Ru-106 which have originated primarily from irradiated uranium concentrates.

One unique characteristic of radioactive materials in nature is that the radioactive isotopes normally occur in specific ratios relative to one another. Scientists and engineers can use the relative concentrations of radioactive isotopes in a medium, soil for example, to determine whether the radioactive material present in the medium has been processed or is naturally occurring. Thus, the source of radioactive contamination can be determined, in many instances, based upon the relative concentrations of radiological constituents in a sample.

All elements found in nature with an atomic number greater than 83 (bismuth) possess unstable nuclei and thus are radioactive. Through radioactive decay (i.e., emission of an alpha particle, beta particle, or gamma ray) these elements transform into other elements which decay once again to form yet other elements. The succession of radioactive decays forms what is called a decay chain, which continues until the resulting element is stable and will decay no further.

All radioactive elements belong to a decay chain, and all isotopes in one such chain form a radioactive decay family or series. Three of these radioactive decay families include all naturally occurring radioactive elements in this portion of the periodic chart. One family has U-238 as the parent isotope and after 14 successive radioactive decay events (8 by alpha particle emission and 6 by beta-particle emission) reaches its stable daughter product, Pb-206. This is known as the uranium series and includes radium and its decay products. Figure 4-1 shows all members of the uranium series and the transformations which they under-go.

The actinium series, shown in Figure 4-2, has U-235 as its parent. The name of this series comes from the original name given to U-235 following its discovery. The actinium series reaches its stable end product, Pb-207, through 11 successive radioactive decay events (7 by alpha particle emission and 4 by beta particle emission).

The final series of interest is the thorium series, Figure 4-3. The thorium series has Th-232 as its parent and reaches its stable end product, Pb-208, through 10 successive radioactive decay events (6 by alpha particle emission and 4 by beta particle emission).

Radioactive elements are typically measured by their activity, or number of decay events per unit time. If the elements in a radioactive decay series are not subject to chemical or physical separation processes, the members of a radioactive decay series attain a state of equilibrium. When in equilibrium, the rate of radioactive decay, or activity, for each nuclide in the series is essentially equal to the activity of the parent of that series. Thus, given a specific activity concentration of U-238 in nature, one would expect to find the same activity concentration of U-234, Th-230, or Ra-226. This is always the case on a global basis for each series. However, local activity concentrations can vary widely when natural chemical forces separate members of the series.

As found in nature, the activity concentration of U-235 is approximately 1/20 that of U-238. Combining this information with the prior discussion, we would expect to see U-238/U-234 and U-238/U-235 ratios of 1 and 20, respectively, in naturally occurring uranium. Further, in the absence of chemical separation, we would expect the ratio of any isotope in the uranium series to any isotope in the actinium series to be 20. Variations in these ratios provide information regarding the manner in which the materials have been processed.

4.1.2 Process and Waste Summary

The processes which generated the waste contained in Operable Unit 1 are well known. Thus, in terms of sampling the source units (Waste Pits 1 through 6, the Burn Pit, and the Clearwell) the purpose of the RI is to confirm the presence of known constituents and to detect the presence of other potential constituents of concern which may have been disposed of in the waste pits during their 30-plus year operating life.

Section 1.1 provides an overview of those processes performed at the FEMP and a general description of the wastes transferred to Operable Unit 1. The major portion of materials disposed of in the waste pits included depleted magnesium fluoride (MgF_2) slag, trailer cake, neutralized slag leach slurry, neutralized raffinate, depleted sump cake, general sump sludge, and dust collector residues. Each of these materials are described in Section 1.1. Other solid materials disposed of in the waste pits included asbestos, graphite from broken uranium molds, contaminated furnace brick, scrap metals, non-burnable contaminated trash, fly ash, uranium oxides, uranium tetrafluoride, pyrophoric metals (including uranium chips), reactive chemicals, oils, combustible waste, tin cans, ashes, and gravel. Table 1-3 provides a summary of the types of material placed in each of the pits.

4.1.3 Statistics

Because many of the key constituents contributing to risk at the FEMP also occur naturally in the environment, statistical analyses must be used to distinguish waste-related contamination from naturally occurring or other non-site related levels of radiological or chemical constituents. Therefore, summary statistics were generated for analytical data gathered and reported here-in. A discussion of the statistics applied to the data presented in the summary tables is necessary. The Summary Tables

were designed to present the data in Section 4 in the same manner as Section 6 (Baseline Risk Assessment). The risk assessment treatment of data calculates averages from all numerical values in a data set, even for those concentrations for which the detection limit has been reported (non-detect). If all the values within a data set are below the detection limit, then the entire set is considered undetected ("U"). However, if any one numerical value for the set is a positive hit (reported above the detection limit), then all the values associated with the data set are used to determine the average. All positive hits concentrations are used as the numerical value, but the numerical value for all nondetects is one-half the reported detection limit. Therefore, if a set of numbers with hits includes nondetects reported at the detection limit of 5 µg/L, 2.5 µg/L would be the concentration value used in the statistical determination of the mean.

4.1.4 Primary Data Sources

Section 2.0 identifies the primary information sources which were reviewed for relevant environmental sampling data to support evaluation of the nature and extent of contamination associated with Operable Unit 1. A matrix showing these and other data resources and those portions of the report where the data were used is presented as Table 4-3. The studies cited in Table 4-3 are fully described in Section 2.0. CIS sampling locations have been provided in Figure 4-4; RI/FS in Figure 4-5, and 1992 RI/FS in Figure 4-6.

Section 2.0, Study Area Investigations, provides specific details describing the objectives, methods, sampling and analysis of each media. The section also includes a discussion of the Quality Assurance status of each data set employed in this report.

In the waste pit discussions, a physical description of a conceptualized cross-sectional of the pit material will be included. Figure 4-8 provides the locations and viewing direction upon which the cross-sections have been created.

4.2 SOURCES

4.2.0 Source Characterization

The contents of Operable Unit 1 waste pits were characterized under the CIS, the 1991 RI/FS sampling event, and the 1992 RI/FS treatability study sampling event.

The CIS included:

- Geophysical surveys of Waste Pits 1 through 4 and the Burn Pit
- Waste material samples from Waste Pits 1 through 6, the Burn Pit, and the Clearwell; and
- Surface water samples from Waste Pits 4, 5, 6, and the Clearwell

Geophysical surveys were not performed for Waste Pits 5 and 6 and the Clearwell because the pits were filled with water.

The 1991 RI/FS waste pit sampling program included:

- Waste material samples from Waste Pits 1 through 4 and the Burn Pit
- Leachate samples from Waste Pits 1 through 4 and the Burn Pit

The 1992 RI/FS treatability study sampling program included:

- Waste material samples from Waste Pits 5 and 6 and the Clearwell

This section, 4.2.0, provides a summary of the characterization of the waste pits in Operable Unit 1 as potential sources of contamination, and an overview of the approach which was used to characterize the waste pits. General information is also provided regarding the history of the refining process, the description of the waste streams, and pertinent literature as they relate to the characterization of the waste pits.

4.2.0.1 Historical Evidence of Contaminants

Section 1 of this RI report details the operational history of the waste pit area. The purpose of reviewing the site history of the FEMP is to develop an understanding of the waste pits with regard to the origin, distribution, and identity of the contaminants which were contained within the disposed media. The plant refining process of the FEMP was well documented, and it was possible to account for much of the filled volume of the pits. The records emphasized the inventory of the major process waste streams of the FEMP, and adequate data are available to approximate the distribution of radiological and inorganic chemical constituents. Organic constituents of the waste pit area were incidental by-products of the refining processes used at the FEMP and were not used directly in the manufacture of uranium metal.

Radiological Constituents

Consistent with the historical purpose of the FEMP, the predominant radiological contaminant of the waste pits is uranium which was disposed as a result of the uranium refining process. Thorium is another important constituent of the pit materials. It was refined at the FEMP and was a component of uranium ores and a constituent of wastes from other DOE facilities which were disposed at the Fernald site. Several fission by-products of the nuclear decay of uranium were expected contaminants of some of the pits as a result of reprocessing irradiated materials.

Inorganic Chemical Constituents

Inorganic chemicals were integral to the manufacturing process at the FEMP. The most important inorganic chemicals used in the uranium refining process at the FEMP were nitric acid, hydrofluoric

acid, magnesium metal, calcium hydroxide (lime), and calcium-magnesium carbonate (dolomite). Table 1-12 identifies magnesium fluoride, dolomite, and lime as principle additives to the uranium refinement process. Waste Pits 1, 2, 3, 4, and 5 were expected to contain lime from neutralization of acidic slurries. Dolomite, which was used to form the C-liner, was disposed in Waste Pits 1 or 2. All of the pits were expected to contain magnesium fluoride. Waste Pits 3 and 5 were expected to contain large amounts of nitrate ion as a result of the disposal of raffinates in these pits.

Organic Chemical Constituents

Organic chemicals were not primary agents in the uranium refining process used at the FEMP and plant Material Control and Accountablility (MC&A) records account for only those chemicals that were directly related to the mass balance of uranium production. Therefore, with the exception of interviews with knowledgeable plant personnel, which were documented in the Operable Unit 3 Work Plan Addendum and further used in this document, a quantifiable account of organic constituents that were disposed at the FEMP was unattainable. However, several other possible routes of entry of organic materials to the waste pits have been identified. A mixture of kerosene and tributyl phosphate was used as the solvent for the extraction of uranyl nitrate following the nitration of uranium ores and recoverable wastes. Some amount of this organic solvent mixture might be expected to enter the raffinate waste stream. Tributyl phosphate would represent a signature compound which would be found wherever raffinates were disposed. Other organic constituents that have been identified in the pits include chlorinated dibenzo-p-dioxins/dibensofurins (CDD/CDF), polychlorinated biphenyls (PCB), and polynuclear aromatic hydrocarbons (PAH), phenols, and miscellaneous volatile organic compounds (VOC). All except the VOCs were possibly present in the ash from miscellaneous wastes. In general, the VOCs were used in support functions such as maintenance activities, or were progeny of parent chemicals which were used at the site.

Incinerator Ash

Waste that had sufficient content of uranium was recycled through the refining process for secondary recovery, even miscellaneous combustible wastes that had very low uranium content. To increase the percentage of uranium in the waste material to be processed, these combustibles were usually burned to reduce the total waste volume before entering the uranium production stream. The percentage of uranium content of the ash was higher than that of the original waste materials. The reduction of waste material volume by burning, followed by reclamation of the uranium contained in the ash, gave a route of entry into the production process to several combustion products (Tables 1-1 and 4-1; Figure 1-9). Miscellaneous wastes were burned in three incinerators, the Oil Burner, the Graphite Burner or the Burn Pit. The ash was collected, analyzed for uranium, and if above the EDL of 0.2 to 0.42 percent uranium, it was sent to Plant 8 for reprocessing. The ash was treated with nitric acid to dissolve the recoverable uranium. Most of the metals which were present in the ash dissolved in the nitric acid, but the organic matter would not. The organic material would include any carbon contained in the ash, PAHs, CDD/CDFs, PCBs, phenols, or any other organic material which was

insoluble in nitric acid. Organic bases would dissolve in the nitric acid. All insoluble matter, including emulsified kerosene/tributyl phosphate solvent which contained organic constituents of ash, would have been filtered out following the extraction and enter the waste stream as a component of raffinate. Some raffinate was calcined and disposed as yellow cake in Waste Pit 2 in 1958 and 1959. Later in the process history, raffinate was pumped to Waste Pits 3 and 5 as a slurry. Ash that was below the EDL was not recycled for secondary recovery of uranium but was directly disposed in Waste Pits 1, 2, or 4 (Table 1-1, Figure 1-9). This ash would contain the same general distribution of organic material as the ash from which uranium was recovered.

When the FEMP was built in the early 1950s, an incinerator was provided near the Sewage Treatment Plant on the east side of the site property. The incinerator was in operation from 1952 through 1979 to burn combustibles (i.e., paper, rags, wood, etc.) that were generated at the site. A second smaller incinerator, located in the Security Building, was in operation from 1952 through 1979 and was used to destroy classified documents. A third incinerator, the Trane incinerator located in Building 39, was in operation from 1980 to 1986. This incinerator was intended for uncontaminated combustibles, but it was also used to burn contaminated materials. The Oil Burner was used to burn waste oils which may have been contaminated with PCBs in some instances, and the Graphite Burner was used to burn discarded or broken graphite molds. The disposition of the ash from these sources was decided as previously described. Finally, on some occasions, ash from the Burn Pit was analyzed for uranium content and processed for uranium recovery if above the EDL.

PCBs

No direct dumping of waste oils into the waste pits has been documented. Electric capacitors, transformers, and fluorescent light ballasts (which may contain PCBs as dielectric fluids) were used at the FEMP, and some quantities of these items were collected and sent off-site for incineration in the late 1970s and early 1980s because they contained PCBs. However, no records have been located which describe how the PCB oils from any source were disposed prior to this time. Records indicate that Aroclor 1254 was used as a hydraulic fluid during the early days of the site activities. PBCs may have been introduced into the waste pits by leakage from the heavy equipment used to handle the waste in the vicinity of the pit. PCB-contaminated hydraulic fluid also may have been disposed directly into the waste pits without clear records, although it is more likely that such oils were burned in the Oil Burner.

The waste pits were used for a variety of different disposals, and the historical data suggest the pit contents vary widely, because each waste pit had a unique purpose. As the process and feed materials changed over time, the by-products in process-specific waste streams could only be disposed in waste pits that were contemporary with their creation. The distribution of constituents between the pits was consistent with process records. Events which were unique to each waste pit gave another basis for the distinct identities of the individual waste pits.

4.2.0.2 Sample Physical Description

A review of the boring logs was conducted to improve the link between the site history and the analytical results. Based primarily on accumulated experience of FEMP employees who were familiar with the plant processes, visual descriptions of the principle process waste streams were obtained. These descriptions were compared with the boring logs and indications of the overall pit contents were noted. The appearance of distinct regions of the pits which appeared to contain observable amounts of specific process wastes were noted and comparisons to the known history of disposal actions in the waste pits were made. This approach was especially useful in explaining the observed analytical results in the light of plant process history. The principle process waste streams which were characterized included depleted magnesium fluoride slag, trailer cake, neutralized raffinate, general sump sludge, flyash, graphite, water treatment sludge, and green salt. A detailed discussion of each waste stream is presented in Section 1.0 and Appendix F.6.

Depleted (low uranium content) magnesium fluoride (MgF_2) slag was described as white to black (most often dark) material which was granular in nature, having particle sizes from 0.03 to 1 inch. MgF_2 slag (from the processing of normal and enriched uranium) which was not depleted in uranium content was milled for extraction of the recoverable uranium and screened to mill specifications of 50 microns to 0.03 inch. Trailer cake was generated by extracting the milled MgF_2 with hydrochloric acid (HCl) to dissolve the uranium and filtering out the insoluble impurities, primarily MgF_2. It was described as white to dark grey, sandy textured material, having particle sizes ranging between 50 microns and 0.03 inch. The color varied according to the impurities in the MgF_2 and the oxidation state of the magnesium salts. Because the trailer cake was not neutralized prior to disposal, periodically lime would be added to the pit to maintain a high pH. Slag leach was similar in origin to the trailer cake in that it consisted MgF_2 which had been milled, extracted with nitric acid to recover uranium, then separated from the nitric acid solution by filtration. The filter cake was slurried, neutralized with lime, and pumped to the waste pits. After disposal in the waste pits, the solids in the slurry would disperse and settle. The slag leach cake waste appeared in the waste pits as a white to grey mixture of sandy particles and clay-like material (from lime). Refer to Section 1.0 and Appendix F.6.

Neutralized raffinate was characterized by a pasty texture with high plasticity, having almost any color from red to blue. Red, brown, orange, and yellow were the predominant colors of the raffinate, depending on the primary impurities in the refinery feed materials.

General sump sludge was a slurry having 2.5 to 10 percent solids (primarily lime) which appeared in the pits as a white to grey pasty material having high plasticity. Water treatment sludge had the same appearance as the general sump sludge.

360

Flyash from the coal-fired boiler was a grey to black material that was fine in texture. Cinders, or bottom ash, was dark grey to black material up to 1 inch in size. Other ash, from waste volume reduction processes, could exhibit a variety of colors, depending on its metallic content. Ash would be expected to form friable layers in the pits. Graphite was disposed as broken molds. The graphite would appear as a black, charcoal-like powdery substance or as pieces up to 12 inches long.

Green salt was composed of uranium tetrafluoride (UF_4) which was off-specification and appeared in the pit materials as green layers.

4.2.0.3 Geophysical Characterization

Geophysical surveys of Waste Pits 1, 2, 3, 4, and the Burn Pit were conducted during the CIS to establish the location of any buried anomalous materials within the pits. This study utilized magnetic, electromagnetic (EM) and ground penetrating radar (GPR) data to estimate the location of ferrous materials, conductive materials and dense objects, respectively.

Magnetic anomalies indicated the presence of ferrous metal. Where sharp highs and lows in the magnetic signature were observed, the presence of ferrous material at shallow depths was postulated. The presence of sharp edges in the magnetic signature is directly correlated with shallow depth from surface.

EM anomalies indicate the presence of electrically conductive materials, such as metal, graphite, flyash. High dissolved solids in the pit leachate also may exhibit EM anomalies. The strength of the EM signature is an indication of the conductivity of the underground region and its proximity to the surface. The EM signature is more intense for conductive material when the conductive species are close to the surface.

GPR is used to locate buried objects of all types within the pits. Ferrous objects give strong signatures, as do nonferrous metals, large pieces of graphite, concrete, or buried debris.

Concurrent signatures from the three surveys enhance the interpretive value of the information. The concurrence of signatures for EM and GPR surveys indicated buried conductive, nonferrous objects such as graphite (from broken graphite molds) or aluminum, uranium, or other metal objects which may have been disposed in the pits. The concurrence of signatures for magnetic, EM, and GPR signatures provided indications of buried objects which contain ferrous materials.

Signatures from these techniques which are not concurrent with either of the other techniques provided special interpretations as well. EM anomalies which occurred in the absence of magnetic or GPR anomalies indicated the possible presence of ash or pit leachate which contained high concentrations of

dissolved solids. GPR anomalies which occurred in the absence of magnetic or EM anomalies provided indications of buried debris which was nonmetallic, such as brick, concrete, glass, or wood.

The geophysical surveys gave indications of buried ferrous metallic objects in all of the waste pits that were surveyed. The magnetic anomalies reported for Waste Pit 3 were broad and weak and may not be the result of buried ferrous materials. Drums were indicated as possible pit contents in Waste Pit 2 and Waste Pit 4. Nonferrous conductive materials were suspected to reside in Waste Pit 1, Waste Pit 4, and the Burn Pit. Debris was postulated to be buried in Waste Pits 3 and 4. Broad, weak EM signatures having no anomalies were noted for Waste Pit 3, and flyash or dissolved solids were suspected to be the source of the EM signature.

These findings are in general agreement with the site history, with the following exceptions. Non-ferrous conductive materials were suspected to reside in Waste Pits 2 and 6, according to plant history, but were not detected due to ferrous material interference. Debris was located in the Burn Pit, but was not defined by the geophysical data because of the large amount of ferrous debris associated with the Burn Pit.

4.2.0.4 Radiological Characterization

Waste materials in Waste Pits 1 through 4 and the Burn Pit were sampled for radiological characterization under the CIS and the 1991 RI/FS waste pit sampling program. Waste materials in Waste Pits 5 and 6 and the Clearwell were sampled under the CIS and the 1992 RI/FS treatability study. CIS radiological analytical results are presented in Table 4-4 and Figure 4-11. RI/FS results from both the 1991 and 1992 sampling events are combined in Table 4-5 and Figure 4-12. In addition, the radiological profiles for all of the waste pits, including the estimated radionuclide quantity in the pits for all radiological CPCs, are given in Tables 4-1.1.A through 4-1.8.A.

The predominant radiological constituents in all pits, in terms of activity concentrations, include the principle members of the uranium decay series: U-238, U-234, Th-230, and Ra-226. Results of both the CIS and the RI/FS confirm that the enrichment level of uranium in the pits ranges from natural to depleted. This is consistent with process knowledge, since only limited amounts of enriched uranium were processed at the FEMP. The highest uranium concentrations were found in Waste Pit 6 at 17,000 pCi/g. The lowest average concentrations (less than 1000 pCi/g U-238) were found in Waste Pits 3 and 5, the Clearwell and the Burn Pit. A comparison of Table 1-12, Summary of Waste Pit Constituents, to the radiological profiles of the pits given in Table 4-1, showed that generally the uranium values calculated from U-total analytical concentration averages were greater than the values predicted by the review of site history. The uranium values for Waste Pits 5 and 6 were lower when calculated from the analytical data than when calculated from the site records.

Waste Pits 3 and 5 showed elevated Th-230 activity concentrations, confirming that these pits received raffinate from the FEMP Refinery (Plant 2/3). The 1991 RI/FS sampling program revealed elevated Th-230 activity concentrations in a portion of Waste Pit 2. Historical records show that raffinate was disposed in Waste Pit 2 during 1958 and 1959, prior to the opening of Waste Pit 3. Operational records also show that approximately 2300 55-gallon drums of cold metal oxides from another AEC facility were placed in Waste Pit 2. Waste Pit 2 also was used as a test pit for above-grade storage of raffinate filter cake in 1975. These raffinate pathways possibly would account for elevated Th-230 levels in Waste Pit 2.

The waste pits also contain elevated concentrations of radionuclides in the thorium decay series (Th-232, Ra-228, and Th-228). Detected thorium levels are greatest in Waste Pits 2 and 4 (220 to 235 pCi/g Th-232), but are closely followed by Waste Pits 1 and 3 (170 to 185 pCi/g Th-232). The estimated amount of thorium which was disposed in the waste pits was obtained from Table 1-12. When compared to the thorium quantities derived from analytical results which were presented in table 4-1, the analytical values were much higher.

Fission products (Tc-99, Sr-90, Cs-137) were noted in lower concentrations, primarily in Waste Pit 5 and the Clearwell. Tc-99 was the most prevalent fission product. It was found at an average activity concentration of 1300 pCi/g in Waste Pit 5 and 300 pCi/g in the Clearwell. Site inventories of fission by-products could not be estimated, so comparison to the analytical results could not be made.

4.2.0.5 Chemical Characterization

Waste material and pit leachate in Waste Pits 1 through 4 and the Burn Pit were sampled for inorganic and organic parameters under the CIS and the 1991 RI/FS waste pit sampling program. Waste material and surface water in Waste Pits 5 and 6 and the Clearwell were sampled under the CIS and the 1992 RI/FS treatability study. However, because the samples exceeded holding time and were not properly preserved, the organic results obtained during the 1992 RI/FS treatability study were rejected during the validation process. Since poor preservation of samples for organics analysis can lead to loss of some constituents and the formation of new constituents, the data for organics were very suspect. It was determined that the method of preservation did not meet the requirements for Analytical Support Level II data quality. Therefore, the data were not considered for the evaluation of nature and extent of contamination. The CIS inorganic parameter results are presented in Table 4-6 and Figure 4-6. The inorganic parameter results from the 1991 and 1992 RI/FS sampling events are combined and presented in Table 4-7 and Figure 4-7.

High detection limits have been noted when comparing the CIS organic chemical results to the RI/FS results. High detection limits for CIS VOCs resulted when VOCs were extracted from the pit materials with methanol prior to purge-and-trap sampling and analysis. As a result of these higher detection limits, volatile organic constituents of lower concentration than the elevated detection limits

may have been undetected. Detection limits for semivolatile organic constituents of the "wet" pits, Pit 5, Pit 6, and the Clearwell, were elevated because the moisture content of the pit material samples was very high. Correction to dry weight concentrations led to elevated detection limits. When a constituent was never detected in a particular pit as a result of elevated detection limits, a value of "U" (nondetect) was entered into the summary table (Table 4-9). If even one detection was made, then the statistical average which was calculated may reflect a high bias to the result, by averaging all detected values with one-half the detection limit of each of the nondetect values.

The distribution of metallic parameters in the pits is consistent between the CIS and RI/FS data sets. For both data sets, arsenic, barium, chromium, cobalt, copper, lead, magnesium, and vanadium are the prominent species. Waste Pits 1 and 6 and the Burn Pit contain the lowest levels of inorganics. Waste Pits 3, 4, 5, and the Clearwell contain the highest concentration of inorganics. All of the pits contain high levels of magnesium, consistent with the disposal of large quantities of magnesium fluoride slag.

Waste Pit 1 is characterized by reduced levels of cadmium, chromium, and magnesium from the other pits. Waste Pit 2 is characterized by significant levels of arsenic, cobalt, copper, lead, manganese and nickel. Waste Pit 3 has the highest levels of arsenic and manganese, but the CIS values are much lower than the RI/FS 1991 values. Waste Pit 4 is characterized by significant levels of manganese and barium. Waste Pit 5 is characterized by high levels of arsenic, barium, copper, manganese, nickel, selenium, thallium, and vanadium. Waste Pit 6 is relatively free of metals contamination. The Burn Pit is also of lower metals contamination than the other pits, but has significant levels of barium, copper, lead and silver. The Clearwell contains significant amounts of barium, copper, manganese, and vanadium. This mirrors the concentrations in Waste Pit 5 in accordance with its use as a collection pit for supernatant liquid from Waste Pit 5.

The CIS organic results are presented in Table 4-8 and Figure 4-8. The RI/FS organic parameter results are combined and presented in Table 4-9 and Figure 4-9. Polynuclear aromatic hydrocarbons (from coal tars, flyash, ash or kerosene) were concentrated in Waste Pit 2. PCBs are generally distributed throughout the pits but were present in only small amounts in Waste Pit 6 and the Clearwell. Tributyl phosphate exhibits significant concentrations in Waste Pits 1, 2, and 4. Polychlorinated benzo-p-dioxins and dibenzofurans are problematic even at low concentration and have been reported in Waste Pits 1, 2, 3, 4 and the Burn Pit. The presence of CDD/CDFs in the Waste Pit Area may be linked to various products of combustion and PCBs. Waste Pits 5 and 6 and the Clearwell were not analyzed for dibenzofurans. No link between combustion products or PCBs has been established for Waste Pit 6 or the Clearwell, and PCB analytical values for these pits are low. For these reasons CDD/CDF concentrations are possibly much lower for Waste Pit 6 and the Clearwell than for the other pits. VOCs were widespread at low concentration in the pits. Solvent materials have been linked to general plant maintenance activities (Operable Unit 3 Work Plan Addendum).

364

Volatile aromatic compounds may have originated in the Burn Pit or through very minor, undocumented loss of gasoline related to the use of gasoline powered equipment.

The most likely sources of CDD/CDFs in the Waste Pit Area were ash or PCBs. CDD/CDFs have been frequently identified as products of combustion from solid waste incinerators (Exner 1987, Acharya 1991, Buser 1979, Commoner 1985, Czuczwa 1984, Wong 1984). The combustion of a wide variety of organic materials (even as simple as methane) in the presence of a chlorine source has been shown to form CDDs and CDFs (Acharya 1991, Eklund 1988, Wong 1984, Gullet 1990, Commoner 1985). Bleached and unbleached paper, as would have been burned in the Security Incinerator, has been identified as a major source of chlorine in solid waste incinerators (Exner 1987). This indicates that ash from the Security Incinerator may be a major source of dioxins in the process waste streams. However, coal-fired power units are not major sources of CDDs (Wong 1984). CDD/CDFs have been identified as impurities in PCBs, and as combustion by-products of the uncontrolled burning of PCBs (Buser 1979). CDDs and CDFs have been identified as impurities or oxidation products of pentachlorophenol (Exner 1987, Pereira 1984, Esposito 1980, Bridle 1984, Dickson 1989). Dioxins are also undesirable by-products of 2,4,5-trichlorophenol production, and are usually present in technical mixtures (as opposed to highly purified mixtures) of the chlorophenoxy herbicide 2,4,5-T. 2,4,5-Trichlorophenol is a precursor used for 2,4,5-T manufacture (EPA 1980c, Exner 1987, Tschirley 1986, PSAC 1971), and the CDD/CDFs remain in the technical product when 2,4,5-T is manufactured from 2,4,5-trichlorophenol.

Polynuclear aromatic hydrocarbons were generally distributed in the waste pits. Coal tar contains high concentrations of aromatic organic compounds including polynuclear aromatics (EPRI 1990). PAHs are also constituents of flyash, from the combustion of coal or miscellaneous carbonaceous materials (Wild 1992, Harrison 1985, Howes 1986, Bjorseth 1985). Ash from waste incinerators may be expected to contain PAHs. PAHs are also formed during the generation of mineral oils (petroleum) and are constituents of diesel oils and fuel oils (Bjorseth 1985). PAHs may also form when complex hydrocarbon mixtures are pyrolyzed or heated (Song 1992).

Some common VOCs were generally reported in the waste pits, including acetone, 2-butanone (methyl ethyl ketone) and methylene chloride (all common solvents); di-n-butyl phthalate, di-n-octyl phthalate and bis-(2-ethylhexyl)phthalate (all common plasticizers). These compounds have been associated with the process at the FEMP (Operable Unit 3 Work Plan Addendum). Their occurrence in the waste pits is possibly the result of plant maintenance activities or the undocumented disposal of liquid wastes. These constituents also are common as laboratory contaminants and are considered as such for the purposes of data validation (EPA Functional Guidelines for Data Review). Furthermore, bis-(2-ethylhexyl) phthalate has been frequently detected in the emissions from coal fired utility boilers (Lucas). Although these constituents are often laboratory contaminants, the data validation process did

not reject the data, even though the blank contamination assessment criteria are more stringent for common compounds than other compounds.

Plant records indicate that tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform and methylene chloride were used as solvents or degreasers at the site (Operable Unit 3 Work Plan Addendum). Chloroform also may result from the exhaustive chlorination of organic materials by chlorinating reagents such as sodium hypochlorite. The other chlorinated VOCs may be present in the pit as progeny from a parent contaminant. For instance, tetrachloroethane degrades by reductive dehalogenation under anaerobic conditions to form trichloroethene and the dehalogenation process continues until vinyl chloride or methane is formed (Baugh, Fathepure, Barrio-Lage).

The pit materials also contained small amounts of volatile aromatic compounds (VOA). It is likely that small amounts of gasoline or solvents entered the waste stream during liquid waste incineration, from contaminated oil storage drums, by the disposal of small amounts of gasoline or solvents, or by leakage of gasoline from gasoline-powered equipment, Historical records of such occurrences have not been located.

4.2.1 Waste Pit 1

4.2.1.1 Historical Characterization of Waste Pit 1

Historical records indicate that Waste Pit 1 received radioactive wastes such as slag leach filter cake, general sump sludge, depleted magnesium fluoride slag, scrap graphite (from broken graphite molds) and contaminated brick (Section 1.0). The chemical and radiological constituents of these wastes are summarized in Table 1-12. Uranium isotopes would be expected to be present in the slag leach filter cake, general sump sludge, and depleted magnesium fluoride, scrap graphite, and contaminated brick. Calcium and magnesium would be expected to be major components of the waste streams. Calcium entered the waste stream in the form of lime which was used to neutralize acidic slurries and to precipitate uranium in the general sump and magnesium entered the waste stream as magnesium fluoride slag. Other metals would be present in the ore, and would enter the waste stream primarily through the general sump.

There is no record of the disposal of organic materials in Waste Pit 1, but several possible routes of entry of organic materials have been identified in Section 4.2.0.1. Ash from several sources was disposed in Waste Pit 1 (Section 4.2.0.1, Table 1-1, Figure 1-9). PCBs may have been introduced into Waste Pit 1 by leakage from the heavy equipment which was used to handle the waste in the vicinity of the pit. Furthermore, PCB contaminated hydraulic fluid may have been disposed in Waste Pit 1 or other pits directly without clear records. Waste Pit 1 was closed in 1959, and the international awareness of the risks of PCB contamination that exist today did not exist at that time.

4.2.1.2 Sample Physical Description of Waste Pit 1

The conceptual cross section of Waste Pit 1 has been provided in Figure 4-9. The material encountered was predominantly dark grey or white in color, although localized stratification was evident. There was no consistent color of material at any depth exhibited by the samples from the borings of Waste Pit 1. Visual descriptions of the pit material obtained from the borings in Waste Pit 1 cited strata of varying color, including green, greenish yellow or yellow, reddish or brownish shades, and occasional thin layers of black material. The material was predominantly comprised of clay sized particles, with high plasticity when moist. Where ash-like appearance was cited, the samples exhibited low plasticity and a waxy texture. When dry, the clay-like pit material exhibited low plasticity; when very moist, it exhibited very high plasticity and a gelatinous appearance. Many of the samples were described as greasy when moist; drier samples were often described as waxy in appearance. Depleted magnesium fluoride slag, trailer cake, and slag leach cake were three waste streams consisting primarily of magnesium fluoride which may have exhibited colors ranging from white to dark grey. When moist, these magnesium fluoride rich pit materials would have exhibited high plasticity. Many of the descriptions of grey clay-like material of high plasticity may refer to magnesium fluoride wastes. During normal plant operations, acidic media were neutralized by the addition of lime in the general sump to precipitate recoverable uranium. After settling of most of the solids had occurred, the supernatant liquid was retreated with lime, and the resulting slurry was pumped to the pits. The lime neutralization yielded a slurry that was 2.5 to 10 percent solids, consisting primarily of lime. Settling of the disposed slurry could have led to the deposition of white to grey strata of high plasticity which was depicted in the boring logs. The appearance of localized green strata may be an indication that green salt (UF_4) was disposed in Waste Pit 1 on a batch basis. The pit materials exhibiting the highest levels of uranium contained green or greenish strata. The boring logs, especially for borings 01-01 (CIS), 01-05 (CIS), 1765 (RI/FS) and 1767 (RI/FS), also cited the appearance of black to reddish brown ash-like material during both the CIS and the RI/FS studies which may indicate that flyash from waste incinerators was disposed in Waste Pit 1. The deposition of flyash from coal-fired boilers on-site has only been documented for Waste Pit 3. It is likely that any ash which was disposed in Waste Pit 1 originated from incinerators used to reduce waste volume prior to uranium recovery and was disposed in the pit. It is apparent from the boring logs that localized stratification has occurred within Waste Pit 1. The observance of varying strata suggests a scattered distribution of process and production wastes. Wide distributions in the data obtained from the analysis of the pit material from Waste Pit 1 would, therefore, be expected.

4.2.1.3 Geophysical Characterization of Waste Pit 1

The anomaly map resulting from the integration of Waste Pit 1 geophysical data is represented in Figure 4-10. Magnetic anomalies were indicated across 60 percent of the pit, denoted as Areas A, B, C, and D. Sharp magnetic highs and lows in the southeastern quarter (A) indicate a substantial volume of buried ferrous metal or other magnetically susceptible debris at relatively shallow depths. Magnetic anomalies in the northern and western edge (B, C, and D) indicate smaller volumes of buried

ferrous debris at greater depths. EM data were extremely elevated in the southern quadrant (A) of the pit indicating the presence of electrically conductive material such as metal, graphite, or flyash. The northern section (B and C) yielded less elevated EM results indicating lesser amounts, but still considerable, conductive material. GPR data indicates that Waste Pit 1 contains the largest concentration of buried objects within the waste storage area. Both southern and northern sections (A, B, and C) contain a high density of buried objects.

Concurrent signatures by magnetic, EM, and GPR in the southern section (A) indicate a large volume of buried objects, consisting predominantly of ferrous metal debris. Anomaly B gives a strong indication of EM and GPR, but the magnetic anomaly is weak. Anomaly B probably consists of a large quantity of conductive materials which are less ferromagnetic than those materials in anomaly A (such as graphite or nonferrous metal). Anomalies C and D display weak to moderate signatures for all three techniques indicating fewer buried objects in these areas, with the presence of some buried ferrous material having been indicated.

4.2.1.4 Radiological Characterization of Waste Pit 1

Waste Material

Radionuclide analytical results from the CIS and RI/FS sampling efforts are summarized in Tables 4-4 and 4-5, respectively. The data are presented graphically in Figures 4-11 and 4-12. Complete analytical results are provided in Appendix A. The summary information for pit contents is provided in Table 4-1.1.A.

Predominant radiological constituents in terms of activity concentrations include U-238, U-234, Th-228, Th-230, and Th-232. Other radionuclides with elevated activity concentrations include Ra-226, Ra-228, and U-235. The results of both the CIS and RI/FS studies reveal that the mean U-238/U-234 activity concentration ratio is approximately 3 to 8 and that the mean U-238/U-235 ratio ranges from of 35 to 46. This indicates that the enrichment level of uranium deposited in Waste Pit 1 is depleted. However, the error (standard deviation) for the previously mentioned components is approximately equal to the mean and the ranges which indicates that most likely the uranium exists as a mixture of both natural and depleted. Radium-226 activity concentrations are not in secular equilibrium with U-238, indicating the source of uranium is from concentrated ore.

Total uranium concentrations for the two RI/FS samples obtained from boring 1767 were consistent (approximately 45,000 µg/g), but in comparing the concentrations for the four samples from borings 1765 and 1766, a factor of 10 less (3000 µg/g) is observed. This is consistent with process knowledge, since this RI/FS boring 1767 lies within the area reserved for depleted material which would be higher in total uranium. The location of boring 1765 is within the section of Pit 1 that was reserved for scrap, brick, graphite, and other miscellaneous solids, while 1766 lies in the section of

Waste Pit 1 which was reserved for filter cakes, etc. from the recovery plant. The scrap area and these filter cakes would be low in uranium concentration following the recovery operation.

Additionally, CIS results for uranium, reflect the same variation with respect to boring location. CIS boring 5 which is located in the scrap disposal section (northern section) reported the lowest CIS uranium concentration while boring 2 and 3 from the depleted waste section reported the highest concentrations.

Waste Pit 1 also contains elevated concentrations of the thorium decay series (Th-232, Ra-228, and Th-228). As shown in Tables 4-4 and 4-5, Th-232 and Th-228 are, within limits of uncertainty, in secular equilibrium. Ra-228, however, is present in concentrations approximately one-tenth (1/10) that of Th-232 and Th-228.

Technetium-99 was detected at a relatively high concentration (15 pCi/g) in one of the CIS samples (boring 3) but just above the detection limit of 0.9 pCi/g (1.1 pCi/g) in one of the RI/FS samples (1766 in the 7-14 foot depth). All other Pit 1 borings reported undetected results ("U"). Process knowledge indicates that no fission materials were presented to the process system until after Waste Pit 1 was closed. The CIS sampling location resulting in the high Tc-99 hit was located directly along side the road which traverses the pit covering.

Leachate

Four leachate samples were collected from the RI/FS sampling locations and analyzed for radionuclides. Table 4-6 presents the activity concentrations. Radionuclide activity concentrations detected in Waste Pit 1 leachate are generally consistent with those of the waste material and consistent with knowledge of waste disposal in pit 1. The form of uranium present in 1766 (12,100 µg/L) was more extractable (probably the more soluble hexavalent species) than the uranium form (either UO2 or the tetravalent species like green salt) found in 1765 (5.06 µg/L) and 1767 (16.6 µg/L) with the exception of the second leachate obtained from 1765 (1780 µg/L). The mean of the U-238/U-234 activity ratio is approximately 1 and the U-238/U-235 activity ratio is approximately 20, indicating that the leachable uranium detected in Waste Pit 1 is consistent naturally-occurring uranium.

4.2.1.5 Chemical Characterization of Waste Pit 1

Waste Material

Composite metals profile for waste pit is provided in Table 4-1.1.B. Composite samples were collected from five boreholes installed in Waste Pit 1 as part of the CIS program and from three boreholes installed under the RI/FS program. Two samples were provided from each of the three RI/FS borings to provide six discrete samples. The samples were analyzed for the Inorganic Hazardous Substance List (HSL). The CIS boring samples were within RCRA established limits for

corrosivity (pH), reactivity, ignitability, and EP toxicity. Inorganic results of the CIS study (shown in Table 4-7 and Figure 4-13) indicate that concentration averages for cadmium, lead, and manganese exceed subsurface soil background concentration levels. The levels of magnesium present in the pit are probably due to the deposition of depleted slag and filter cakes into Waste Pit 1, whereas the calcium, being the main constituent of lime, would have been deposited via the depleted sump cake and the magnesium source wastes.

Results of the RI/FS data set are summarized in Table 4-8 and Figure 4-14. The predominant inorganic constituents detected in Pit 1 from the RI/FS samples from boring 1767 located near the center of the pit included calcium and magnesium. In addition, the reported concentrations of chromium cobalt, molybdenum, and vanadium for boring 1767 are approximately 10 times greater than the corresponding data from sample from borings 1765 and 1766 located near the northern boundary. Boring 1766 is characterized by elevated concentrations of barium (400 mg/kg) throughout the entire boring and manganese (3720 mg/kg) in the 14 to 25.5 foot depth, with respect to the other boring samples from Pit 1. Concentrations of barium, calcium, and magnesium increase dramatically, from the upper composite sample to the lower segment by factors of 2.5, 25, and 26, respectively. Results of the RI/FS program reveal that the concentration average for boron (564 mg/kg) is greater the boron concentration average for any other Operable Unit 1 waste average.

The CIS obtained data for Waste Pit 1 by drilling five borings into the pit (Table 4-9 and Figure 4-15). From these borings, seven samples were taken for CLP semivolatile organics, six samples were taken for CLP chlorinated pesticides and PCBs, and five samples were taken for CLP volatile organics (Table 4-9). The RI/FS program supplemented the organic data for Waste Pit 1. Three borings were drilled into Waste Pit 1 during the RI/FS. From these borings, ten samples were taken for CLP semivolatile organics, six samples were taken for CLP chlorinated pesticides and PCBs, and nine samples were taken for CLP volatile organics. In addition, seven samples were analyzed for herbicides and seven samples were analyzed for organophosphate pesticides. The results of these analyses are presented in Appendix A. Statistical summaries are presented in Table 4-10. The quantities of CPCs for Waste Pit 1 have been calculated, and are presented in Table 4-1.1.C. The contaminants which are most problematic include CDD/CDFs, PAHs, PCBs, VOCs and miscellaneous semivolatile compounds including tributyl phosphate.

Chlorinated dibenzo-p-dioxins and dibenzofurans were determined for five of the six boring samples that were analyzed for CDD/CDF. CDD/CDF data were not obtained during the CIS. Low levels of CDD/CDF were detected in Waste Pit 1. A total quantity of 0.3 kg of CDD and 1.3 kg CDF has been estimated for Waste Pit 1 (Table 4-1.1.C). Ash has been identified as a possible waste in the visual classification of the pit material samples, and is a likely source of CDD/CDF in Waste Pit 1. Ash from the volume reduction process by which site wastes were burned to recover uranium has been shown to have pathways into the pits (Section 4.2.0.5). PCBs have also been identified as constituents

of the pit materials in Waste Pit 1, and are another likely source of CDD/CDF in the pit. Although pentachlorophenol was used to treat the wood of the cooling tower it was not detected in the pit materials from Waste Pit 1 in either the CIS or the RI/FS. For this reason pentachlorophenol is not suspected as a likely source of CDD/CDF in the pit. In Waste Pit 1, 2,4,5-T and related compounds are not likely sources of dioxins, although their inclusion as a possible source is dictated by the literature regarding CDD/CDFs. Positive values for 2,4,5-trichlorophenol are absent from the pit material analytical results, although positive 2,4,5-T concentrations have been reported in groundwater samples. Site records indicate that 2,4,5-T was not used at the FEMP from 1974 to the present. Earlier records have not been located. The herbicide 2,4-D and analogues have been used at the FEMP, but a link between 2,4-D and CDD/CDFs has not been established. The presence of CDD/CDFs is possibly the result of the disposal of PCBs, the by-products of incomplete combustion of PCB oils or flyash from on-site waste incinerators. The presence of CDD/CDF contamination is consistent with FEMP process activities.

HSL organic analyses performed under the CIS (Table 4-9 and Figure 4-5) detected PCBs in all five borings. The only PCB mixture reported for all borings in Waste Pit 1 during the CIS data is Aroclor 1254. The reported concentration values range from 720 to 12,000 µg/kg. HSL organics analyses detected PCBs in all of the six samples which were analyzed for PCBs. The PCBs were analyzed as Aroclor mixtures, and the analytical results included positive detection of Aroclor 1221, Aroclor 1248, and Aroclor 1254, which are mixtures of PCBs. The reported analytical values of these Aroclors ranged from 480 to 12,000 µg/kg. The data are consistent with the CIS results. A estimated total of 1450 kg of PCB has been calculated to be present in Waste Pit 1 (Table 4-1.1.C). There is no record of PCB disposal in Waste Pit 1, but direct disposal of PCBs may have occurred. Also, PCBs may have entered the waste stream by disposal of ash from the burning of miscellaneous oils which may have included PCBs, or by leakage of hydraulic fluid from heavy equipment which were used to move waste into the pit.

The pesticide 4,4'-DDT was found in Waste Pit 1 at an average concentration of 650 µ/kg (Table 4-9). Use of 4,4'-DDT for mosquito control was common practice in the 1950s and 1960s, but no evidence of its purchase and application at the FEMP has been found. There is no reason, based on a review of the literature, to link the presence of 4,4'-DDT with the presence of CDD/CDF.

The results for all borings of Waste Pit 1 indicate the presence of polynuclear aromatic compounds. Based on the statistical summary, the CIS reported an average total concentration of 3750 µg/kg for total PAHs. The RI/FS reported an average concentration of 1565 µg/kg for total PAHs. The estimated quantity of PAHs in Waste Pit 1 was calculated to be 415 kg (Table 4-1.1.C). The description of the samples in the boring logs includes direct references to material which appeared to be ash. The pit materials from CIS boring 01-01 twice were described in the boring log as having an ash-like appearance, and the composite sample analytical results for this boring included PAHs.

However, although high PAHs were reported for RI/FS boring for a composite sample ranging from 7 to 14 feet in depth, ash-like appearance of the samples was not reported until a depth of 17.5 feet or deeper. Ash is a potential source of PAH contamination in the waste pits.

Several phenolic compounds were detected among the semivolatile organics which were detected in Waste Pit 1. The average concentrations of phenols which were reported include phenol (650 µg/kg) and 3-methylphenol (230 µg/kg). The highest values of phenols which were reported in the analytical results for Waste Pit 1 were reported for the pit materials from boring 1767 at a depths ranging from 12 to 20.7 feet. Ash-like pit materials were described for this boring at depths ranging from 3.5 to 6.5 feet. It is possible that phenols, which are water soluble in a basic environment, may have migrated to lower depths with time. Phenols are often combustion products, and are found in flyash (Roy 1984). Phenols are also precursors of CDD/CDFs in combustion processes (Wong 1984). Ash is a potential source of phenols.

Some common VOCs were reported for Waste Pit 1, including acetone, 2-butanone (methyl ethyl ketone) and methylene chloride. The plasticizers di-n-butyl phthalate, di-n-octyl phthalate and bis-(2-ethylhexyl)phthalate also were reported for Waste Pit 1. The reporting of acetone, 2-butanone and methylene chloride in the RI/FS data is consistent with the CIS data. The RI/FS study (Table 4-10, Figure 4-16) detected significant concentrations of di-n-butyl phthalate and bis-(2-ethylhexyl) phthalate. These compounds have been associated with the process at the FEMP (Operable Unit 3 Work Plan Addendum). Their occurrence in Waste Pit 1 is possibly the result of plant maintenance activities or the undocumented disposal of liquid wastes. The result obtained for 2-butanone in boring 03 of Waste Pit 1, 3800 µg/kg, is probably not related to its use during maintenance activities at the FEMP. Furthermore, bis-(2-ethylhexyl) phthalate has been frequently detected in the emissions from coal fired utility boilers (Lucas 1985). The presence of common solvents in Waste Pit 1 is consistent with their use at the site, and the presence of phthalate plasticizers is consistent with their wide variety of applications and link to combustion by-products.

Several other chlorinated VOCs were detected during the CIS. The average concentrations of chlorinated solvents in Waste Pit 1 include 1,1,1-trichloroethane (190 µg/kg), chloroform (180 µg/kg), and tetrachloroethene (220 µg/kg). The average concentrations of chlorinated solvents in Waste Pit 1 for which positive values were reported in the RI/FS data include 1,1-dichloroethane (6 µg/kg), 1,1-dichloroethene (4.5 µg/kg), 1,1,1-trichloroethane (19 µg/kg), chloroform (99 µg/kg), carbon tetrachloride (3 µg/kg), dichlorodifluoromethane (15,000 µg/kg), trichloroethene (6 µg/kg), and tetrachloroethene (120 µg/kg). The high average of concentration for dichlorodifluoromethane is the result of one very high value (29,600 µg/kg), which may not be resresentative of the sample.

The extreme magnitude of the one positive result for dichlorodifluoromethane (29,600 µg/kg) may be the result of poor instrument performance in the analysis of this one constituent. The daily relative

response factor (RRF) for dichlorodifluoromethane was very low as a result of poor recovery of this analyte during the acquisition of data from the daily continuing calibration standard. The response factors were below CLP criteria (RRF must be ≥0.05) for all 3 days on which the sample was analyzed. The second analysis was rerun at dilution and the result was nondetect at a detection level of 1300 µg/kg. This value was rejected because EPA data validation guidelines require rejection of non-detects when the RRF criteria are not met. A third analysis was rerun with a result of 300 µg/kg, but this value was rejected because holding time requirements were not met. It is more likely that the true concentration value of dichlorodifluoromethane is approximately 300 µg/kg than the higher value, especially because this is an isolated detection of this constituent. The concentration value of 29,600 µg/kg for dichlorodifluoromethane which survived the data validation process is probably not the correct answer. Correct application of the data validation guidelines apparently rejected the best answers.

Plant records indicate that tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform and methylene chloride were used as solvents or degreasers at the site (Operable Unit 3 Work Plan Addendum). Chloroform may also result from the exhaustive chlorination of organic materials. The other chlorinated solvents may be present in the pit as progeny from a parent contaminant such as tetrachlorethene (Section 4.2.0.5).

The pit materials also contained small amounts of volatile aromatic compounds. The average concentrations for Waste Pit 1 based on the CIS include ethyl benzene (140 µg/kg) and toluene (150 µg/kg). The average concentrations for Waste Pit 1 based on the RI/FS include ethyl benzene (35 µg/kg), toluene (9 µg/kg), and xylenes (180 µg/kg), which are indicators of gasoline or solvent contamination. Benzene was not detected in the pit materials from Waste Pit 1. It is likely that small amounts of gasoline or solvents entered the waste stream during liquid waste incineration, from contaminated oil storage drums, by the disposal of small amounts of gasoline or solvents, or by leakage of gasoline from gasoline-powered equipment, Historical records of such occurrences have not been located.

An average concentration of tributyl phosphate (14,000 µg/kg) was also detected in the Waste Pit 1 pit material analysis and may have entered the pit in the general sump sludge.

Leachate

During the RI/FS, eight leachate samples were collected from Waste Pit 1 and analyzed for HSL organics and inorganics. The data are summarized in Tables 4-11 and 4-12. Elevated average concentrations of calcium were reported for the leachate samples and were fairly consistent for all samples (2,000,000 to 3,000,000 µg/L), except for both leachate samples from boring 1766 and one leachate from boring 1767 (200,000 µg/L). Barium resident in boring 1765 was reported at approximately 2000 µg/L for each of the four leachates performed for that boring, which is 4 to 20

times greater than for all other waste pit samples. Apparently the barium is from the mixture used to precipitate the Ra-226 found in the general sump sludges and deposited in the pit. The calcium and magnesium maintain the same source as reported for the waste material. Chromium was leached fairly consistently from all the borings at approximately 140 µg/L with the exception of leachates from boring 1766 which were reported out as slightly more elevated (200 µg/L). Manganese was reported for the leachates at low concentrations (approximately 20 µg/L), except for the two leachate samples from boring 1766, which revealed approximately 320,000 µg/L. Beryllium was reported in the leachate at less than 10 µg/L for all samples except for both leachates from boring 1766, which reported 100 µg/L. Vanadium was detected at about 100 µg/L in each of the leachate samples.

During the RI/FS, eight leachate samples were analyzed for organic parameters. The organic constituents which were detected in the Waste Pit 1 leachate generally reflected the contents of the pit materials. The presence of acetonitrile, acrolein, and acrylonitrile in the leachate but not in the pit materials was an indication of the aqueous solubility of these materials. These materials are associated with polymerization reactions or paint contents and may be the result of general maintenance activities at the FEMP. Vinyl chloride and benzene were not detected in the pit leachate.

4.2.1.6 Characterization Summary of Waste Pit 1

The history of disposal activities for Waste Pit 1, the geophysical data, the visual appearance of the samples and the range of experimental results for radiological and chemical parameters (Appendix A, Tables 4-4 through 4-12) all demonstrate that the pit materials are very heterogeneous. Composite sampling of the borings allowed the samples which were submitted for analysis to best represent the pit material at the boring location.

Geophysical characterization data indicate that Waste Pit 1 has the highest density of buried objects of Waste Pits 1 through 4 and the Burn Pit. Elevated EM levels across the southern quadrant of the pit indicate the presence of highly conductive material, such as graphite, which were known to have been disposed of in the pit.

Predominant radiological constituents include U-238, U-234, Th-230, and Ra-226, all of which come from the uranium decay series. Other radionuclides with elevated activity concentrations include Th-232, Ra-228, and Th-228, from the thorium decay series, and U-235. Results of both the CIS and RI/FS reveal that the enrichment level of uranium in Waste Pit 1 is, on average, consistent with depleted uranium.

All Waste Pit 1 waste material samples were within RCRA established limits for corrosivity, reactivity, ignitability, and EP toxicity. All inorganic analytes were detected at above background levels in at least one sample. In general, the RI/FS inorganic results were different than those measured under the CIS. The differences are attributed to the different methods used in obtaining composite samples.

The Waste Pit 1 materials contained polychlorinated dioxins and dibenzofurans, PCBs, PAHs, phthalates, phenols, chlorinated solvents, and benzene, toulene, ethel benzene, an zylene (BTEX) compounds. These findings are consistent with known or suspected plant activities, and the visual classification of the pit materials. Combustion by-products were disposed in the pits as evidenced by the appearance of flyash in some of the borings. CDD/CDFs, PAHs, and phenols all are linked by their common occurrence in flyash from municipal/industrial incinerators. The use of PCBs at the FEMP is well known and the presence of PCBs in Waste Pit 1 is consistent with plant activities. PCBs could have entered the waste stream by leakage from equipment, direct disposal, or disposal of PCB contaminated combustion by-products. The presence of polychlorinated dioxins and dibenzofurans is possibly the result of the disposal of PCBs, the by-products of combustion of PCBs or flyash. Miscellaneous solvents and volatile organic constituents of the pit may have origins in plant maintenance activities, including the use of hydrocarbon mixtures as fuels and solvents, paints, degreasers, glues, and other light industrial activities. Some chlorinated volatile organic compounds were detected in Waste Pit 1 pit materials or pit leachate. These constituents have their origins in the use of chlorinated solvents during plant activities. Dichloroethenes and vinyl chloride were possibly the progeny of tetrachloroethene or trichloroethene.

4.2.2 Waste Pit 2

4.2.2.1 Historical Characterization of Waste Pit 2

Historical records indicate that Waste Pit 2 received radioactive wastes such as trailer cake, general sump sludge, C-liner and UAP filtrate. The history and description of Waste Pit 2 has been presented in Section 1.2.2.2. Waste Pit 2 was also used as a settling pit for neutralized, concentrated refinery raffinate during 1958 and 1959. The chemical and radiological constituents of these wastes are summarized in Table 1-12. Uranium isotopes would be expected to be present in the trailer cake, C-liner, general sump sludge, and UAP filtrate. Calcium and magnesium would be expected to be major components of the waste streams. Calcium entered the waste stream in the form of lime ($Ca[OH]_2$) which was used to neutralize acidic slurries, and to precipitate uranium, in the general sump and as dolomite ($Ca\text{-}MgCO_3$). Dolomite was used to prepare the C-liner and is the major component of the C-liner. Magnesium entered Waste Pit 2 in the trailer cake and C-Liner as magnesium fluoride slag. The most significant sources of the uranium are the UAP Filtrate, depleted residues, and disposed UF_4. Small amounts of impurities, including radium and thorium isotopes would have entered Waste Pit 2 as components of the raffinate which was disposed in 1958 and 1959. This raffinate would contain radium because it was mixture of the raffinate by-products of refining pitchblende ore, from which the radium was not extracted prior to shipment to the FEMP, and uranium concentrates, from which radium was extracted. Additionally, in 1975, raffinate filter cake was deposited in an above-grade storage area located in the southern part of Waste Pit 2. Two-hundred seventy-five tons of raffinate filter cake having 70 percent moisture was deposited in this area for air drying. The drying experiment did not succeed, and all of the raffinate material used for the test was transferred to Waste

Pit 3. Some small amount of residue from this raffinate experiment may have remained in Waste Pit 2 contents and would appear in the radiological data as uranium contamination with impurities from ore. Other metals would be present in the ore, and would enter the waste stream primarily through the general sump.

There is no direct record of the disposal of organic materials in Waste Pit 2, but several possible routes of entry of organic materials have been identified. Ash from miscellaneous wastes that were incinerated to reduce the waste volume prior to uranium recovery may have entered the waste streams as described in Section 4.2.0.1. No direct dumping of waste oils into Waste Pit 2 has been documented, but waste oils may have entered the pit as has been described in Section 4.2.0.1.

4.2.2.2 Sample Physical Description of Waste Pit 2

The material encountered was predominantly brown in color, although localized stratification was evident. The pattern of deposition of waste in Waste Pit 2 is demonstrated in Figure 4-17. The location of the cross section is shown as the connecting line between points B and B' on Figure 4-8. Visual descriptions of the borings cited strata of varying color, including yellowish brown, pale brown, white, olive brown, olive yellow and layers of coarse black material which was suggestive of flyash to the field investigators. Layers of black, greasy materials are cited in the boring logs, especially in RI/FS boring logs. The pit materials in Waste Pit 2 were much coarser than those of Waste Pit 1, because numerous references are made in the boring logs of dark colored sand or gravel. The dark sand-like coarse material is probably disposed trailer cake, which was milled and re-extracted to recover uranium prior to disposal. Dark gravel is probably disposed depleted magnesium slag, which was not ground prior to disposal. The lighter colored strata are usually associated with clay sized particles, and when moist has good plasticity. In addition, the appearance of bits of concrete, brick, wood and charred material implied that wastes other than refinery wastes were disposed in Waste Pit 2.

During normal plant operations, acidic media were neutralized in the general sump by the addition of lime to precipitate recoverable uranium (Sections 4.2.0.2 and 4.2.1.2). Settling of this general sump sludge would have led to the deposition of white to grey strata of high plasticity which was depicted in the boring logs. Also, lime was added to the pit to neutralize raffinate cake, which had been disposed in the pit. High uranium and radium values may be associated with these strata, which would exhibit a range of colors based upon the impurities which were present in the original ore. In CIS boring 02-01, white clayey material found at 6 to 8 feet was associated with field readings of 20,000 cpm. In CIS boring 02-02, lime green material which may be associated with green salt was field measured at 30,000 cpm. The appearance of localized green strata may be an indication that green salt (UF_4) was disposed in Waste Pit 2 on a batch basis. The pit materials exhibiting the highest levels of uranium contained green or greenish strata.

The deposition of flyash from coal-fired boilers on-site has only been documented for Waste Pit 3. As for Waste Pit 1, it is most likely that any ash which was disposed in Waste Pit 2 originated from incinerators which were used to reduce waste volume prior to uranium recovery.

It is apparent from the boring logs that localized stratification has occurred within Waste Pit 2. The observance of varying strata suggests a scattered distribution of process and production wastes. Wide distributions in the data obtained from the analysis of the pit material from Waste Pit 2 would, therefore, be expected.

4.2.2.3 Geophysical Characterization of Waste Pit 2

An anomaly map resulting from the integration of Waste Pit 2 geophysical data is presented in Figure 4-18. Magnetic anomalies were noted across 35 percent of the pit, denoted as Areas A, B, and C, indicating the possible presence of buried ferrous metal in these areas. EM data were elevated over more than 70 percent of the pit. The high apparent conductivity values can result from the presence of highly conductive material disposed in the pit or high concentrations of dissolved solids in the pit leachate. Metal debris, graphite, and flyash all represent highly conductive material disposed in Waste Pit 2.

GPR data indicate that Pit 2 has the lowest density of buried objects of Waste Pits 1 through 4 and the Burn Pit. A small area, within Area A as designated on the map, directly west of the pit center was interpreted as containing low to moderate densities of buried objects. The remaining area within Waste Pit 2 produced little evidence of buried objects on the GPR profiles.

The concurrent occurrence of magnetic, EM, and GPR anomalies within Area A, just west of the pit center, indicates a high probability for the presence of buried metal such as metal debris or drums. The absence of GPR anomalies coincident with the magnetic data throughout the remainder of the pit could be caused by deeper burial of ferrous or other magnetically susceptible material. Elevated EM levels throughout most of the pit are likely due to the presence of highly conductive material such as graphite or flyash which were disposed of in the pit. High concentrations of dissolved solids within the pit leachate may also contribute to elevated EM levels.

4.2.2.4 Radiological Characterization of Waste Pit 2

Nine borings were completed in Waste Pit 2 as part of the CIS and RI/FS (Figures 4-4, 4-5, and 4-6) programs; five during the CIS and four during the RI/FS.

Waste Material

Radionuclide analytical results from the CIS and RI/FS sampling efforts are summarized in Tables 4-4 and 4-5, respectively. The data are presented graphically in Figures 4-11 and 4-12. Complete

analytical results are provided in Appendix A. The radiological profile of Waste Pit 2 is presented in Table 4-1.2.A.

Predominant radiological constituents in terms of activity concentrations include U-238, U-234, Th-230, and Ra-226, all of which come from the uranium decay series. Other radionuclides with elevated activity concentrations include Th-232, Ra-228, and Th-228, from the thorium decay series, and U-235. This is consistent with process knowledge that material deposited in Waste Pit 2 contained primarily U-238 and its decay products. The RI/FS average activity concentrations reported for Ra-226 and Ra-228 in Waste Pit 2 were the highest reported for any waste area reported (437 and 177 pCi/g, respectively).

The results of both the CIS and the RI/FS reveal that the U-238/U-234 activity concentration ratio is approximately 1.0. Moreover, RI/FS data show a U-238/U-235/U-236 ratio of approximately 20. These statistics indicate that the enrichment level of uranium deposited in Waste Pit 2 is, on average, consistent with natural uranium. The average activity concentrations reported for U-234 (3,867 pCi/g) and U-235 (1,793 pCi/g) were the highest averages reported for CIS pit data.

A wide variation exists with respect to the Thorium-230 concentrations within Waste Pit 2. The RI/FS boring 1768 in the 7 to 14 ft segment reported the highest activity concentration within the Operable Unit 1 waste pit area (18,400 pCi/g). This is a six-fold elevation of concentration compared to the 14 to 17.5 ft segment of the same boring (2630 pCi/g). The activity concentration from the lower segment compares well with the concentrations of CIS borings 2 (3,980 pCi/g) and 3 (2,040 pCi/g), which are located within the same general vicinity of the waste pit. The average RI/FS concentration for total thorium is 2,600 µg/g, which is the highest Th-total concentration within the waste pit area. These three boreholes located in the east central section of Waste Pit 2 surpass the Th-230 concentrations of the remaining boreholes for the waste pit by more than an order of magnitude. Process knowledge indicates that sometime during the late fifties or early sixties, several thousand drums of mixed oxide raffinate ("cold raffinate") were buried in Waste Pit 2. The raffinate which is very high in Th-230, was thought to have originated from MCW. This cold raffinate is most probably the source of the elevated radium reported for the waste pit from the RI/FS program.

Waste Pit 2 also contains elevated concentrations of radionuclides in the thorium decay series (Th-232, Ra-228, and Th-228). As shown in Tables 4-4 and 4-5, Th-232 and Ra-228 are, within the limits of uncertainty, in secular equilibrium. Th-228, however, is present in concentrations approximately three times that of Ra-228. This is not possible since the Th-228 has passed through at least 10 half-lives since being placed in the pit and would have thus achieved secular equilibrium with Ra-228 and Th-232. The value listed for Th-228 in Table 4-5, therefore, is considered to be an anomalous analytical result.

3 1 8

Technetium-99 was reported at an elevated concentration for CIS boring 2 (618 pCi/g) and at considerable concentrations (11 and 14 pCi/g) for two other CIS borings (1 and 3, respectively). The four RI/FS samples from two boreholes did not confirm the presence of Tc-99.

Leachate

Two leachate collection wells, 1768 and 1769, were installed in Waste Pit 2 during the RI/FS. Table 4-6 presents the concentrations of radionuclides detected at least once.

The radiological constituents (Ra-226, Ra-228, Tc-99, and U-Total) detected in 1768 were approximately five times greater than the results from the leachate of 1769. The uranium leachate concentrations are compatible with respect to the analysis of waste material analysis from the same borehole for the bottom section material. The average activity concentration for Ra-226 (176 pCi/L) was the highest average reported for RI/FS leachate. The U-238/U-234 activity ratio is approximately 1.0 and the U-238/U-235 activity ratio is approximately 20, indicating that the uranium in Waste Pit 2 is, on average, natural uranium. Although Tc-99 was not detected in any of the RI/FS pit material samples, it was detected in the leachate at 91 pCi/L from boring 1768. This is consistent with known chemistry regarding the solubility of Tc-99 (tendency to be in solution rather than agglomerated to solids).

4.2.2.5 Chemical Characterization of Waste Pit 2

Waste Material

The inorganic chemical profile for Waste Pit 2 is shown in Table 4-1.2.B. Composite samples were collected from four of the five borings installed in Waste Pit 2 as part of the CIS program. The four samples were analyzed for RCRA characteristics, HSL inorganics, and HSL organics. Four composite samples were created from the two borings installed as part of the RI/FS (two composites per boring) and were analyzed for the inorganic HSL.

All CIS borehole samples were within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Results of HSL inorganic analyses are presented in Table 4-7 and Figure 4-13. The average CIS concentrations for cobalt (140 mg/kg), iron (20,000 mg/kg), nickel (200 mg/kg), and zinc (880 mg/kg) are the highest reported averages for any waste pit area. The metals concentrations reported for both studies appear to indicate the disposal of raffinate from ore concentrations.

The inorganic data reported for the RI/FS are presented in Table 4-8 and presented graphically in Figure 14. In general, the RI/FS inorganic results were from 2 to 10 times higher than those measured under the CIS. This, in part, is attributed to differences in preparing composite samples under the two studies. CIS composite samples were taken from the entire length of the borings (0 to 10 feet),

including the dirt cover over the waste material. RI/FS composite samples were collected from the middle one-third and lower one-third of the borings. Thus, the RI/FS results would be expected to be higher and possibly more representative of the pit contents with respect to the RI/FS data. The average concentrations reported for beryllium (16 mg/kg), chromium (180 mg/kg), cobalt (650 mg/kg), iron 22,000 mg/kg), lead (490 mg/kg), magnesium (47,000 mg/kg), nickel (780 mg/kg) and zinc (270 mg/kg) were the average concentration averages reported for all the waste pit area.

Many heavy metals (cobalt at 1470 mg/kg, copper at 1340 mg/kg, lead at 758 mg/kg, nickel at 1740 mg/kg, and vanadium at 594 mg/kg) reported in the 7 to 14 foot composite, for the RI/FS boring 1768, generally surpassed the concentrations reported for the bottom composite of the same boring (14 to 17.5 feet) and both composite of boring 1769 by factors of 2 to 3. Boring 1768 is the same borehole from which the high thorium concentrations were reported and it is most likely these elevated levels of heavy metals are from the cold raffinate disposed of into Waste Pit 2. In general, this data is supported by the CIS boring 4, which was sampled in the same general vicinity as RI/FS boring 1768, due to the reported elevated concentrations of the same analytes mentioned previously, but at lower concentrations. Arsenic (423 mg/kg) and barium (1500 mg/kg) were also reported at levels two to three times higher in boring 1768, than other samples in Waste Pit 2.

The CIS obtained data for Waste Pit 2 by drilling five borings into the pit. From these borings, five samples were taken for CLP semivolatile organics, five samples were taken for CLP chlorinated pesticides and PCBs, and four samples were taken for CLP volatile organics. The RI/FS program supplemented the organic data for Waste Pit 2. Three borings were drilled into Waste Pit 2 during the RI/FS. From these borings, eight samples were taken for CLP semivolatile organics, four samples were taken for CLP chlorinated pesticides and PCBs, and ten samples were taken for CLP volatile organics. In addition, two samples were analyzed for herbicides, two samples were analyzed for organophosphate pesticides and four samples were analyzed for CDD/CDF. The results of these analyses are presented in Appendix A. Statistical summaries are presented in Table 4-10. The quantities of CPCs for Waste Pit 2 have been calculated, and are presented in Table 4-1.2.C. In Waste Pit 2, the contaminants which are most problematic include CDD/CDF, PAHs, PCBs, miscellaneous semivolatile compounds including tributyl phosphate, and several volatile compounds.

Low levels of CDD/CDF were detected in Waste Pit 2. A total quantity of 0.3 kg of CDD and 0.1 kg CDF has been estimated for Waste Pit 2 (Table 4-1.2.C). Flyash has been identified as a possible waste in the visual classification of the pit material samples, and ash is a likely source of CDD/CDF in Waste Pit 2. Ash from the volume reduction process by which site wastes were burned to recover uranium has been shown to have pathways into the pits (Section 4.2.0.1). PCBs have also been identified as constituents of the pit materials in Waste Pit 2, and are another possible source of CDD/CDF in the pit. Pentachlorophenol was detected in the pit materials from Waste Pit 2 during the RI/FS. For this reason pentachlorophenol must be considered a potential source of CDD/CDF in the

pit. 2,4,5-T and related compounds are not likely sources of dioxins in Waste Pit 2. Positive values for 2,4,5-trichlorophenol are absent from the pit material analytical results for Waste Pit 2. As has been discussed in Section 4.2.1.5, the use of 2,4,5-T at the FEMP has not been established by the review of site records. The presence of CDD/CDFs is possibly the result of the disposal of ash-contaminated raffinate cakes, PCBs, the by-products of incomplete combustion of PCB oils, or ash from on-site solid waste incinerators.

HSL organic analyses performed under the CIS (Table 4-9 and Figure 4-9) detected PCBs in one Waste Pit 2 boring. The only PCBs reported for boring 02-04 during the CIS was a mixture of Aroclor 1248 and Aroclor 1254. The reported concentration values average 1500 µg/kg and 2800 µg/kg for Aroclor 1248 and Aroclor 1254, respectively (Table 4-9). Review of Appendix A reveals that this statistical average is skewed by the inclusion of high nondetect values, and the true value may be lower. HSL organics analyses during the RI/FS detected PCBs in one of the four samples which were analyzed for PCBs, and both were located in boring 1768. The PCBs were analyzed as Aroclor mixtures, and the analytical results included positive detection of Aroclor 1248. The reported analytical value of this Aroclor averaged 2200 µg/kg. An estimated total of 88 kg of PCB has been calculated to be present in Waste Pit 2 (Table 4-1.2.C). The use of PCBs at the FEMP has been described in Section 4.2.0.5. As for Waste Pit 1, there is no record of PCB disposal in Waste Pit 2, but direct disposal of PCBs may have occurred. Also, PCBs may have entered the waste stream by the reprocessing of ash from the burning of miscellaneous oils which may have included PCBs to recover uranium, or the disposal of PCB-contaminated ash which was below the EDL for uranium.

The pesticide 4,4'-DDT was found in Waste Pit 2 at an average concentration of 620 µg/kg. This may have been used for mosquito control (Section 4.2.1.5.)

The results for all borings of Waste Pit 2 indicate the presence of PAH. Based on the statistical summary, the CIS reported an average concentration of 3750 µg/kg for total PAHs. The RI/FS reported an average concentration of 1565 µg/kg for total PAHs. The estimated quantity of PAHs in Waste Pit 2 was calculated to be 8983 kg (Table 4-1.2.C). The quantity of PAHs is greater in Pit 2 than in any other pit for Operable Unit 1.

PAHs are important constituents of coal tars and products, flyash and mineral oils or petroleum products, as has been described in Section 4.2.0.5. The description of the samples in the boring logs includes direct references to material which appeared to be flyash in only one boring. The boring logs indicate that black streaking within layers of white or lightly colored material reside at depths below eight feet in several borings. The occurrence of this black, tarry material is coincident with very high analytical results for PAHs (concentrations in excess of 1,000,000 µg/kg). This material may originate as ash or the products of incomplete combustion of oils. The absence of the visual appearance of ash, and of poor plasticity, is very different from the ash-like materials described in the boring logs for

Waste Pit 1. If ash is the source of the black, pasty material most often reported in Waste Pit 2, the ash must have been processed during uranium recovery as described in Section 4.2.0.1. Another explanation is that the black material is the by-product of kerosene used in the process of uranium extraction (Section 4.2.0.1). The kerosene was mixed with tributyl phosphate to extract uranyl nitrate from nitric acid after nitrification of recycled materials and process wastes. Insoluble material was filtered from the raffinate solution, which was the aqueous by-product of dilution of the acid with distilled water. This material would contain residues of the organic extraction solvent. The raffinates that were disposed in Waste Pit 2 were heat dried at high temperature. It is likely that PAHs were concentrated or formed in the raffinate cake as pyrolysis products (Song, et. al. 1992). When the raffinate cake was disposed in Waste Pit 2, PAHs and tributyl phosphate would have been disposed together under this scenario. The presence of tributyl phosphate is coincident with the presence of high PAH analytical result values in many cases. Ash is a minimally likely source of the PAHs found in Waste Pit 2. The disposal of raffinate cake is a likely source of PAHs in the pit.

Several phenolic compounds were detected among the semivolatile organics which were detected in Waste Pit 2. The average concentrations of phenols which were reported include phenol (650 µg/kg) and 4-chloro-3-methylphenol (700 µg/kg), 4-methyl phenol (710 µg/kg), 4-nitrophenol (3,200 µg/kg). Phenols are often combustion products, and are found in ash (Roy 1984). It is likely that a pyrolysis process that would form PAHs would also form phenols. Neutralized raffinate cake is a potential source of phenols.

Some common organic compounds reported in the Waste Pit 2 pit material analytical results include the common solvents acetone, 2-butanone (methyl ethyl ketone), and methylene chloride. The common plasticizers di-n-butyl phthalate, di-n-octyl phthalate and bis-(2-ethylhexyl)phthalate were also reported. The reporting of acetone, 2-butanone and methylene chloride in the RI/FS data is generally consistent with the CIS data. The RI/FS study detected concentrations of di-n-butyl phthalate and bis-(2-ethylhexyl) phthalate. These compounds have been associated with the process at the FEMP (Operable Unit 3 Work Plan Addendum). Their occurrence in Waste Pit 2 is possibly the result of plant maintenance activities or the undocumented disposal of liquid wastes.

Several other chlorinated VOCs were detected during the CIS. The average concentrations of chlorinated solvents in Waste Pit 2 include 1,1,1-trichloroethane (260 µg/kg) and vinyl chloride (620 µg/kg). The average concentrations of chlorinated solvents in Waste Pit 1 for which positive values were reported in the RI/FS data include 1,1-dichloroethane (9 µg/kg), 1,1-dichloroethene (29 µg/kg), 1,1,1-trichloroethane (90 µg/kg), chloroform (27 µg/kg), trichloroethene (7.8 µg/kg), and tetrachloroethane (14 µg/kg). Plant records indicate that tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform and methylene chloride were used as solvents or degreasers at the site (Operable Unit 3 Work Plan Addendum). The other chlorinated solvents may be present in the pit as progeny from a parent contaminant (Section 4.2.0.5).

The pit materials from Waste Pit 2 also contained small amounts of VOAs. The average concentrations for Waste Pit 2 based on the CIS include ethyl benzene (240 µg/kg) and xylenes (260 µg/kg). The average concentrations for Waste Pit 2 based on the RI/FS include benzene (8.2 µg/kg), ethyl benzene (8.2 µg/kg), and xylenes (8.2 µg/kg) which are indicators of gasoline or solvent contamination. As in Waste Pit 1, it is likely that small amounts of gasoline or solvents entered the waste stream during liquid waste incineration, from contaminated oil storage drums, by the disposal of small amounts of gasoline or solvents, or by leakage of gasoline from gasoline-powered equipment. Historical records of such occurrences have not been located.

An average concentration of tributyl phosphate (22,000 µg/kg) (a solvent which was used as an extractant of uranyl nitrate and was a known constituent of the general sump sludge and raffinate) was also detected in the Waste Pit 2 pit material analysis. It is likely that the tributyl phosphate entered the waste stream in the raffinate cake which was disposed in Waste Pit 2.

Leachate

During the RI/FS, two leachate wells were installed and leachate samples analyzed from Waste Pit 2. RI/FS leachate samples were analyzed for HSL inorganics and HSL organics. The analytical results are summarized in Tables 4-11 and 4-12.

Since the overall inorganic concentrations found in the Waste Pit 2 leachate are not as high as other leachates, the reported analytes in this waste material are not very soluble. The leachate data were generally in proportion with the waste pit data, and no new substances were revealed.

The organic constituents which were detected in the Waste Pit 2 leachate generally reflected the contents of the pit materials. The presence of acetonitrile and acrolein in the leachate but not in the pit materials was an indication of the aqueous solubility of these materials. Vinyl chloride was detected in the pit leachate (statistical average concentration, 81 µg/L) at a lower concentration than in the pit materials. Vinyl chloride is a potential anaerobic degradation product of tetrachloroethene and trichloroethene, which were present in the pit materials, and are relatively water soluble. 2,4,5-T and 2,4,5-TP were detected in the pit leachate. Some of the PAH compounds were detected in small quantities in the pit leachate. The appearance of these compounds is consistent with those found in the pit materials.

4.2.2.6 Characterization Summary of Waste Pit 2

The composition of materials present in Waste Pit 2 is generally consistent with the historical record of materials disposed in the pit. The anomalous physical/chemical characterization data reported for Waste Pit 2 are not consistent with the historical record, but are plausible when considered relative to other activities that were ongoing at the site during the time frame Waste Pit 2 was in service. The primary waste streams disposed in Waste Pit 2, according to historical records, included trailer cake,

C-liner, general sump sludge, UAP filtrate, and neutralized refinery raffinates. Other probable, but undocumented, waste streams included flyash, waste oils, green salt (UF_4), miscellaneous construction debris and drummed materials.

The presence of the primary waste streams in Waste Pit 2 is well supported by the RI/FS findings which include:

- Elevated EM readings across more than 70 percent of the pit indicating the presence of high concentrations of dissolved solids.
- Visual observation of stratified layers of dark, coarse material resembling disposed trailer cake.
- Visual observation of white to grey strata of high plasticity indicative of lime-neutralized slurries.
- The presence of radionuclides that are, based on process knowledge, characteristic of the waste streams documented as having been disposed in Waste Pit 2.

These findings and observations are consistent with process knowledge of the waste streams historically documented as having been disposed in Waste Pit 2.

The predominant radiological constituents present in Waste Pit 2 include U-238, U-234, Th-230, and Ra-226, all of which come from the uranium decay series. Other radionuclides with elevated activity concentrations include Th-232, Ra-228, and Th-228, from the thorium decay series, and U-235. Results of both the CIS and RI/FS reveal that the enrichment level of uranium disposed of in Waste Pit 2 was, on average, consistent with natural uranium.

Waste Pit 2 content samples were determined not to exceed RCRA hazardous waste criteria for corrosivity, reactivity, ignitability, and EP toxicity. All inorganic analytes were detected above UTL background levels in at least one sample. In general, the RI/FS inorganic results were 2 to 10 times higher than those measured during the CIS. The differences are attributable to differences in the sample compositing strategies applied in the two investigations.

The organic chemical analysis results were the principal source of inconsistency between the wastes that were reportedly disposed in Waste Pit 2 and the wastes that are indicated to be present based on physical and chemical characterization of the wastes. Process knowledge of the wastes historically reported to have been disposed in Waste Pit 2 would indicate that organic chemical species would be few and their concentrations relatively low. Some unexpected organic chemical analysis results were obtained that support the assumption that undocumented waste streams from other site activities were also disposed in Waste Pit 2. These results include:

- Low levels of CDD/CDF were detected in Waste Pit 2. The likely source of CDD/CDF is flyash that was visually observed in the pit.

- PCBs, which were used throughout the plant in lubricants and cutting oils, were present in pit materials. The use of PCBs at the site is well documented; however, no record of their disposal in Waste Pit 2 exists. The CDD/CDF discussed above may have been a by-product of the combustion of PCB-laden oils.

- PAHs were present in all borings from Waste Pit 2. Their presence is attributable to several sources including flyash, incompletely combusted oils, and kerosene present in the refinery raffinate. Because the raffinates were documented as having been disposed in the pit, and because the raffinates were subjected to high-temperature drying which is conducive to the formation of PAHs, the raffinates are the likely source of PAHs in Waste Pit 2.

- Phenols are also by-products of combustion of complex organics (e.g. kerosene). Their presence in the pit is likely attributable to the same source as the PAHs.

- Chlorinated and aromatic solvents were detected in pit materials. Although their presence is not consistent with Waste Pit 2 disposal records, they are consistent with documented plant activities including equipment maintenance and degreasing.

Leachate samples were also collected from the pit. The results of these samples were consistent with the data generated by analyzing the pit materials.

4.2.3 Waste Pit 3

4.2.3.1 Historical Characterization of Waste Pit 3

Waste Pit 3 is the largest of the waste pits in the waste pit area. It was the first pit built specifically for settling solids from liquid waste streams. The historical use of Waste Pit 3 has been summarized in Section 1.2.2.3. From 1958 to 1968, the pit was used primarily as a wet pit. Liquid wastes, including contaminated storm water from the Burn Pit, were pumped to Waste Pit 3. After Waste Pit 2 was filled in 1964, dry residues also were disposed in Waste Pit 3.

Historical records indicate that Waste Pit 3 received radioactive wastes, the majority of which included neutralized raffinate, general sump sludge and trailer cake. All of these wastes were pumped to Waste Pit 3 in the form of slurries. Solid materials were used to stabilize the pit during the late 1960's. The materials which were added to the pit included broken concrete, native fill material, and wooden pallets. Section 1.2.2.3 describes the addition of soil from Waste Pits 1 and 2 in 1972. In addition, wet raffinate which had been deposited above grade in the Waste Pit 2 area during a drying experiment was removed from Waste Pit 2 and added to Waste Pit 3 in 1975. Slag leach residue, filter cake, lime sludge, and coal flyash were added to the pit from 1975 to 1977.

The chemical and radiological constituents of these wastes are summarized in Table 1-12. Uranium isotopes would be expected to be present in the general sump sludge, neutralized raffinate, and trailer cake. Calcium and magnesium would be expected to be major components of the pit contents in Waste Pit 3. Calcium entered the waste stream in the form of lime which was used to neutralize liquids in the general sump after precipitation of uranium and as a major component of the neutralized raffinate. Magnesium fluoride entered the waste stream in the form of trailer cake. Miscellaneous radiological and inorganic chemical components of uranium ore were separated from the uranium during refining and entered Waste Pit 3 when neutralized raffinate slurries were disposed. The raffinate would be expected to contain a mixture of radionuclides and inorganic chemical materials.

Uranium was a principle component of neutralized raffinate and trailer cake. Small amounts of uranium would be expected in the general sump sludge, consisting of that uranium which was not successfully precipitated with lime before the liquid was sent to the general sump. Thorium wastes were also disposed in Waste Pit 3, and it contains the highest total quantity of thorium of all the waste pits.

The disposal of organic materials in Waste Pit 3 has been documented in Section 1.2.2.3. A major source of organic chemicals in Waste Pit 3 was the large amount of coal flyash which was disposed. Also, ash from the incineration of miscellaneous wastes may have entered the raffinate as previously described in Section 4.2.0.5. Organic materials may have contaminated not only the raffinate but the general sump slurries. The organic materials entering the pit through the plant process waste streams would contain the products of combustion, but would not possess the appearance of ash. If PCB oils were burned in the oil burner, followed by recovery of uranium from the ash, both PCBs and their most prominent combustion by-products, chlorinated dibenzo-p-dioxins and dibenzofurans, would be introduced into the pit.

It is apparent from the history of Waste Pit 3 that a variety of low level or uncontaminated wastes have been disposed in the pit. The resulting variation in materials may be expected to be manifested in varied sample appearance and the analytical results.

4.2.3.2 Sample Physical Description of Waste Pit 3

A conceptual cross section of Waste Pit 3, based on the RI/FS boring logs, is presented in Figure 4-19. The cross section extends from points C to C', which are shown in Figure 4-8. The material encountered was predominantly brown in color, although the material exhibited many large regions of variation. Consistent with the historical use of the pit, the pit materials in Waste Pit 3 were characterized in the boring logs by thick strata of varying colors, including yellowish brown, pale brown, white, olive brown, lime green. Layers of coarse black material were identified as flyash by the field investigators, and probably were composed of the coal flyash that was used to stabilized the pit. The presence of thick layers of black sand sized material (with occasional black gravel) was

possibly related to the deposition of flyash or slag leach residue in Waste Pit 3. Magnesium fluoride slag was milled prior to extraction and a sandy consistency was described. Dark grey or black colors were described for magnesium fluoride slag and were coincident with its disposal. Layers of yellow-green or lime-green material, consistent with the occasional batch disposal of green salt (UF_4), were observed in CIS boring 03-07. Very thick regions of reddish brown clay-like material may be related to the disposal of neutralized raffinate. In addition, the appearance of thick layers of wood in boring 1772 gave evidence that wooden pallets were disposed in Waste Pit 3, as discussed in Sections 1.2.2.3 and 4.2.3.1. Acidic fluids from the general sump were neutralized by the addition of excess lime to form slurries which, when pumped to Waste Pit 3, may have formed the white or pale yellow strata in the pit. It is apparent from the boring logs that the strata described in the Waste Pit 3 boring logs are much thicker than the strata described for other pits. The occurrence of these thick strata were an indication of the bulk disposal of miscellaneous wastes such as coal flyash, broken concrete and wood which were described in Section 1.2.2.3. The heterogeneity of the appearance of the pit materials is consistent with the pit history and partially accounts for wide distributions in the analytical results.

4.2.3.3 Geophysical Characterization of Waste Pit 3

The anomaly map resulting from the integration of Waste Pit 3 geophysical data is presented in Figure 4-12. Magnetic anomalies were indicated across more than 40 percent of the pit (eleven areas), denoted as A, B1, B2, C, D, E, F, G, H, I, and J, consisting of relatively broad and weak magnetic highs. The weak magnetic highs might indicate ferrous or other magnetically susceptible material buried at a considerable depth. EM conductivity anomalies, indicating solid materials of high electrical conductivity, were not present in the Waste Pit 3 survey. Rather, the conductivities increased toward the center of the pit and probably result from either flyash, high dissolved solids in the pit leachate or both. GPR results indicate low to moderate densities of buried materials present at shallower depths than found in Waste Pits 1 or 2.

Anomalies A, B1, and B2 show low to moderate densities of shallow buried objects. Moderate magnetic readings in anomaly A with low apparent EM readings indicate the presence of buried ferrous material. GPR indicates the presence of buried objects in anomaly C, but the absence of EM supportive data indicates buried ferrous debris is not the source of the anomaly. Since Waste Pit 3 has been primarily characterized by low to moderate densities of buried objects, the volume of buried waste debris in this pit appears to be less than the other pits in the waste storage area.

4.2.3.4 Radiological Characterization of Waste Pit 3

Seven boreholes were completed as part of the CIS program and three boreholes were sampled for the RI/FS program. For each of the three RI/FS borings, two discrete samples were prepared for a total of six RI/FS samples.

Waste Material

Radionuclide analytical results from the CIS and RI/FS sampling efforts are summarized in Tables 4-4 and 4-5, respectively. The results are presented graphically in Figures 4-11 and 4-12. Complete analytical results are provided in Appendix A. Radiological profile is presented in Table 4-1.3.A.

Trace quantities of Neptunium-237 (0.8, 0.3, and 2.1 pCi/g) were reported for three of the seven CIS samples (boring 2, 3, and 5, respectively). Plutonium-238 and Pu-239/240 were reported for three of the seven boreholes (borings 2, 3 and 4). Additionally, Tc-99 was reported for all the CIS borings except boring 1. Strontium-90 was detected in only one of the CIS borings and at a low quantity, 5.2 pCi/g. This indicates that Waste Pit 3 received waste associated with the processing of irradiated uranium received from the Hanford site.

Predominant radiological constituents in terms of activity concentrations include U-238, U-234, and Th-230, all of which come from the uranium decay series. The mean Th-230 activity reported from the CIS program was the highest Th-230 average activities (4,636 pCi/g) reported for the CIS program. This is high relative to the U-238 average activity concentration (442 pCi/g), which is the second lowest average activity concentration reported for the waste pit area. This is consistent with process knowledge in that the material deposited into Waste Pit 3 included refinery raffinates which contained elevated levels of Th-230 and reduced levels of uranium.

All six samples generated from the three RI/FS boreholes reported average activity concentrations of Ra-226 (172 pCi/g) and Ra-228 (123 pCi/g) which were second highest overall next to Waste Pit 2 activity concentration average. The results of both the CIS and RI/FS programs reveal that the U-238/U-234 activity concentration ratio is 1.5 to 2.0 and the U-238/U-235 ratio is approximately 20 to 40. These statistics indicate that the enrichment level of uranium deposited into Waste Pit 3 is, on average, from natural to depleted.

Waste Pit 3 also contains concentrations of radionuclides in the thorium decay series (Th-232, Ra-228, and Th-228) which are, within the limits of uncertainty, in secular equilibrium.

Leachate

Three leachate samples were collected under RI/FS program and analyzed for select radionuclides except Pu-238, Pu-239/240, and Sr-90 for which only one leachate was sampled and analyzed for these components. Neither thorium nor radium data were reported for these leachate samples. Technetium was reported for each of three leachate samples and the average activity concentration was the highest for all pit leachate samples determined. The U-238/U-234 activity ratio is approximately 1 and the U-238/U-235 activity ratio is approximately 20, indicating that the uranium found in the leachate from Waste Pit 3 is, on average, natural uranium. This is consistent with the activities presented for the waste material. The data are presented in Table 4-6.

4.2.3.5 Chemical Characterization of Waste Pit 3

Waste Material

Composite samples were analyzed from seven borings installed in Waste Pit 3 as part of the CIS program and from six samples (three borings) installed in the pit under the RI/FS program. The samples were analyzed for the Inorganic HSL. The CIS boring samples were within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Results of the CIS data are summarized in Table 4-7 and Figure 4-13. Although the predominant analytes within Pit 3 are aluminum, calcium, magnesium, and iron, the average CIS results for Waste Pit 3 for arsenic, chromium, lead, manganese, thallium and vanadium are the highest average concentrations levels reported for CIS data. The high levels of arsenic (1100 mg/kg), chromium (77 mg/kg), lead (230 mg/kg) and vanadium (3000 mg/kg) are from the neutralized raffinate consisting of both the water soluble nitrates and the insoluble metal species. An additional source of the arsenic in Pit 3 could be the ash from coal-fired furnace which was deposited into the pit during the time period when the pit was being filled. Nickel (160 mg/kg), copper (1100 mg/kg), barium (4700 mg/kg), and beryllium (9.8 mg/kg) were reported for Waste Pit 3 at the second highest concentrations for all CIS waste pit determinations.

Results of the RI/FS data set are summarized in Table 4-8 and Figure 4-14. Results of the RI/FS program indicate that concentration averages for arsenic (9000 mg/kg), cadmium (13 mg/kg), copper (1100 mg/kg), and manganese (9400 mg/kg) were reported at the highest average concentration levels present during the RI/FS. The main constituents concentrations are identical for both sampling programs. Many of the additional analytes are suspected to have been present as the soluble nitrate generated by neutralized raffinate.

A comparison of the CIS and RI/FS inorganic results indicates that the absolute values do not compare, but the trends do. Sample result inconsistency can be associated to actual sampling point differences, compositing differences, and pit contents heterogeneity. The inorganic metals profile can be found in Table 4-1.3.B.

The CIS obtained data for Waste Pit 3 by drilling seven borings into the pit. From these borings, 6 samples were taken for CLP semivolatile organics, seven samples were taken for CLP chlorinated pesticides and PCBs, and six samples were taken for CLP volatile organics. The RI/FS program supplemented the organic data for Waste Pit 3. Three borings were drilled into Waste Pit 3 during the RI/FS. From these borings, eight samples were taken for CLP semivolatile organics, six samples were taken for CLP chlorinated pesticides and PCBs, and ten samples were taken for CLP volatile organics. In addition, four samples were analyzed for herbicides and four samples were analyzed for organophosphate pesticides. The results of these analyses are presented in Appendix A. Statistical summaries are presented in Table 4-10. The quantities of CPCs for Waste Pit 3 have been calculated,

and are presented in Table 4-1.3.C. In Waste Pit 3, the contaminants which are most problematic include CDD/CDF, PAH, PCB, and miscellaneous semivolatile compounds, including tributyl phosphate.

CDD/CDFs were determined for samples during the RI/FS. Low levels of CDD/CDF were detected in Waste Pit 3. A total quantity of 2.2 kg of CDD and 0.2 kg CDF has been estimated for Waste Pit 3 (Table 4-1.3.C). The presence of CDD/CDF contamination is consistent with FEMP process activities. Literature review has defined several sources by which CDD/CDFs enter the general environment (Section 4.2.0.5). Coal flyash has been identified as a waste which was disposed in Waste Pit 3 and is a likely source of CDD/CDF in Waste Pit 2. Ash by-products from the volume reduction process by which site wastes were burned to recover uranium also has been shown to enter the pit in the raffinate. PCBs have also been identified as constituents of the pit materials in Waste Pit 3, and are another potential source of CDD/CDF in the pit. Pentachlorophenol was detected in the pit materials from Waste Pit 3. For this reason, pentachlorophenol is a potential source of CDD/CDFs in the pit. 2,4,5-T and related compounds are not likely sources of dioxins in Waste Pit 3 because 2,4,5-T was not detected in Waste Pit 3. The presence of CDD/CDFs is possibly the result of the disposal of raffinate, PCBs, the by-products of incomplete combustion of PCB oils, flyash from coal-fired incinerators, or as an impurity in pentachlorophenol.

HSL organic analyses performed under the CIS (Table 4-9 and Figure 4-15) detected PCBs in two borings. The only PCB mixture reported for the Waste Pit 3 borings during the CIS is Aroclor 1254. The reported average analytical concentration value was 370 µg/kg. HSL organics analyses detected PCBs in three samples which were analyzed for PCBs. The PCBs were analyzed as Aroclor mixtures, and the analytical results included positive detection of Aroclor 1248 and Aroclor 1254, which are mixtures of PCBs. The reported average RI/FS analytical values of these Aroclors were 1200 µg/kg and 1000 µg/kg for Aroclor 1248 and 1254, respectively. The data are consistent with the CIS results. A estimated total of 517 kg of PCB has been calculated to be present in Waste Pit 3 (Table 4-1.3.C). The use of PCBs at the FEMP has been documented in Section 4.2.0.5. There is no record of PCB disposal in Waste Pit 3, but direct disposal of PCBs may have occurred. Also, PCBs may have entered the waste stream by disposal of raffinate which was contaminated by ash by-products from the burning of miscellaneous oils which may have included PCBs.

The results for three borings of Waste Pit 3 indicate the presence of PAHs. Based on the statistical summary, the CIS reported an average concentration of 4310 µg/kg for total PAHs. The RI/FS reported an average concentration of 2990 µg/kg for total PAHs. The estimated quantity of PAHs in Waste Pit 3 was calculated to be 1200 kg (Table 4-1.3.C). These are estimates that are exaggerated by high nondetect values. PAHs are constituents of flyash, from the combustion of coal or miscellaneous carbonaceous materials. The history of Waste Pit 3 indicates that large quantities of coal flyash were disposed in Waste Pit 3. The description of the samples in the boring logs includes direct references

4783

to material which appeared to be flyash. Not all borings from Waste Pit 3 which PAHs were described as having are ash-like appearance. The pit materials from CIS boring 01-01 twice were described in the boring log as having an ash-like appearance. Flyash is a potential source of PAH contamination in the waste pits. Also, raffinate slurries were disposed in Waste Pit 3. Although more dilute with respect to PAHs than heated raffinate filter cake, these materials would be expected to contain some kerosene, and possibly PAHs.

Several phenolic compounds were detected among the semivolatile organics which were detected in Waste Pit 3. The average concentrations of phenols which were reported include pentachlorophenol (2000 µg/kg). Phenols are potential combustion products, and are often found in flyash (Roy 1984). Nitrification of phenols may have occurred during the nitric acid extraction of depleted scrap or magnesium fluoride slag. Phenols, especially pentachlorophenol, are also precursors of CDD/CDFs in combustion processes (Wong 1984). Flyash is a potential source of phenols. The use of pentachlorophenol at the site may have resulted in incidental contamination of the pit.

Some common VOCs which were reported in the Waste Pit 3 material include acetone, 2-butanone (methyl ethyl ketone) and methylene chloride. The common plasticizers di-n-butyl phthalate, and bis-(2-ethylhexyl)phthalate were also reported. The reporting of acetone, 2-butanone and methylene chloride in the RI/FS data is consistent with the CIS data. The RI/FS study detected concentrations of di-n-butyl phthalate and bis-(2-ethylhexyl) phthalate. These compounds have been associated with the process at the FEMP (Operable Unit 3 Work Plan Addendum). Their occurrence in Waste Pit 3 is possibly the result of plant maintenance activities or the undocumented disposal of liquid wastes. Furthermore, bis-(2-ethylhexyl) phthalate has been frequently detected in the emissions from coal fired utility boilers (Lucas). The presence of common solvents in Waste Pit 3 is consistent with their use at the site, and the presence of phthalate plasticizers is consistent with their wide variety of applications and link to combustion by-products.

Several other chlorinated VOCs were detected during the RI/FS (Table 4-10 and Figure 4-16). The average concentrations of chlorinated solvents in Waste Pit 3 for which positive values were reported in the RI/FS data include 1,1,1-trichloroethane (24 µg/kg), chloroform (26 µg/kg), trichloroethene (5 µg/kg), and tetrachloroethene (7.6 µg/kg). Plant records indicate that tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform and methylene chloride were used as solvents or degreasers at the site (Operable Unit 3 Work Plan Addendum). Chloroform may also result from the exhaustive chlorination of organic materials by chlorinating reagents. The other chlorinated solvents may be present in the pit as progeny from a parent contaminant (Section 4.2.0.5).

Tributyl phosphate was not detected in the pit material from Waste Pit 3. Tributyl phosphate was possibly linked to raffinate disposal in Waste Pit 2. Although raffinates were disposed in Waste Pit 3, the raffinates were pumped to the pits in the form of lime neutralized slurries. The absence of tributyl

phosphate in the analytical results for Waste Pit 3 is an indication that either only a small amount tributyl phosphate contaminated raffinate was pumped to the pit or the tributyl phosphate was degraded with time in the environment.

Leachate

During the RI/FS, six leachate samples were collected from the three Waste Pit 3 boreholes (two leachates per borehole) and analyzed for HSL inorganic and general chemistry parameters. The data are summarized in Tables 4-11 and 4-12. Arsenic (427 µg/L), boron (5360 µg/L), cadmium (344 µg/L), molybdenum (2458 µg/L), selenium (61 µg/L), and vanadium (576 µg/L) were reported as the highest leachate concentrations for the all the RI/FS leachates. The constituents reported for the leachate are consistent with the constituents found in the waste pit material, meaning most of the raffinate waste is generally water soluble.

During the RI/FS, 3 leachate samples were analyzed for organic parameters. The organic constituents which were detected in the Waste Pit 3 leachate generally reflected the contents of the pit materials. The presence of acetonitrile, isobutyl alcohol, 2-hexanone, acrylonitrile and methacrylonitrile in the leachate but not in the pit materials was an indication of the aqueous solubility of these materials. These materials are associated with polymerization reactions or paint contents and may be the result of general maintenance activities at the FEMP. Vinyl chloride and benzene were not detected in the pit leachate from Waste Pit 3.

4.2.3.6 Characterization Summary of Waste Pit 3

Originally, Waste Pit 3 was first built for settling solids from liquid waste streams, and was used as such for nearly 10 years. Liquid wastes and contaminated storm water from the Burn Pit were pumped into the north end of Pit 3 so that suspended solids could settle out as the liquid flowed toward the spillway at the other end. However, solid waste residues were also added to this pit after Pit 2 was full. These included radioactively contaminated materials such as slag leach filter cake, general sump sludge, neutralized raffinate, trailer cake, slag leach cake, and water treatment sludge. Details have been presented in Table 1-3. Although no direct dumping of waste oils into Waste Pit 3 has been documented, a number of organic materials may have entered through the other waste streams which were accumulated in it. Sample borings show that there are areas of thick, localized stratification, not extending across the entire pit. The strata of the different borings suggest that heterogeneity is a feature of Waste Pit 3, so that variation in the sample results from different borings would be expected.

Geophysical characterization data indicate magnetic anomalies. Weak magnetic highs were common in the pit, covering about 40 percent of the area. These could indicate ferrous or other magnetically susceptible material dispersed across the pit or at a considerable depth. There were a few stronger magnetic readings which indicate the presence of discrete buried ferrous material. The EM

conductivity data showed increasing conductivities toward the center of the pit, which can result from flyash or high dissolved solids. GPR results indicate low to moderate densities of buried materials. Waste Pit 3 is primarily characterized by low to moderate densities of buried objects, so the volume of such debris appears less than in other pits of this area.

The predominant radioactivity concentrations were found for U-238, U-234, and Th-230, all of which come from the uranium decay series. In fact, the mean Th-230 activity was the highest found in the CIS sampling program, even though U-238 showed a very low activity concentration compared to other waste pits. This observation is, however, consistent with process knowledge of the refinery raffinates accumulated in this pit. The concentrations of radionuclides in the thorium decay series (Th-232, Ra-228, and Th-228) were all, within the limits of uncertainty, in secular equilibrium. The radium nuclides from these two series were present in the second highest overall radium activity concentration among the waste pits of this site. Much lower amounts of radioactivity were found from Np-237, Pu-238, Pu-239/240, Tc-99, and Sr-90. These indicate that Pit 3 had received waste associated with the processing of irradiated uranium, probably from the Hanford site. The makeup of the uranium in this pit is indicated to be, on the average, from natural to depleted.

Analysis of leachate samples show that contamination from radionuclides has occurred. Of note is the fact that the technetium concentration was the highest for all pit leachate samples. Occurrence of uranium isotopic ratios is consistent with natural uranium, which is a major component of the material within the pit wastes.

Inorganic hazardous substances were analyzed in both the CIS program and the RI/FS program. Composite samples were analyzed from borings taken under each of the programs. The samples were within RCRA limits for corrosivity, reactivity, ignitability, and EP toxicity. Comparison of CIS and RI/FS inorganic results indicates that, while the absolute values do not agree, the trends among the analytes do. Inconsistencies in the sample results can be associated with actual differences from sampling points, differences from methods of compositing, and the heterogeneity of the pit contents, noted previously.

While the predominant analytes from Pit 3 are, as might be expected were aluminum, calcium, magnesium, and iron, the CIS results for arsenic, chromium, lead, manganese, thallium, and vanadium are the highest average concentrations reported in this study. Moreover, nickel, copper, barium, and beryllium were found at the second highest concentration for all CIS waste pit data. The high levels for many of these analytes may be attributed to the neutralized raffinate, including both water soluble nitrates and insoluble metal compounds. Arsenic also could also have originated from coal ashes which were deposited at one stage of the pit history.

Elevated amounts of inorganic compounds of concern were also found during the RI/FS studies. Arsenic, cadmium, copper, and manganese were found at the highest average levels present during the RI/FS. The concentrations of the main inorganic constituents are in agreement between the two sampling and analysis programs.

Chlorinated dibenzo-p-dioxins, dibenzofurans, PCBs, pentachlorophenol, other phenols, and polynuclear aromatics were found during the investigations of organic contaminants in Waste Pit 3. The dioxin and furan derivatives may originate in the coal flyash which is known to be present from site history or from raffinate, as well as from PCBs and pentachlorophenol which are also present. The PCBs have a history of use on the site, and may also have been a component of ash from burning of miscellaneous oils which were reprocessed in the refinery. The reprocessing of ash to recover uranium may account for the occurrence of polynuclear aromatic compounds and phenol derivatives. The use of pentachlorophenol as a wood preservative at the site may have resulted in incidental contamination of the pit.

Some common organic compounds found in Waste Pit 3 include acetone, 2-butanone, methylene chloride, di-n-butyl phthalate, and bis-(2-ethylhexyl) phthalate. The presence of the common solvents in Waste Pit 3 is consistent with their use at the site. The presence of phthalates is consistent with their wide variety of applications as plasticizers and their link to combustion by-products.

Volatile chlorinated organics included small amounts of 1,1,1-trichloroethane, chloroform, trichloroethene, and tetrachloroethene. These constituents were used as solvents or degreasers at the site.

Leachate samples which were collected during the RI/FS were found, in general, to contain soluble inorganic constituents of the waste materials, including arsenic, boron, cadmium, molybdenum, selenium, and vanadium. Similarly, organic materials in the leachate generally reflected the contents of the pit materials. However, acetonitrile, isobutyl alcohol, 2-hexanone, acrylonitrile, and methacrylonitrile were not in the pit materials and indicate the their aqueous solubility. They are associated with polymerization reactions or paint contents, probably from the general maintenance activities at the FEMP.

4.2.4 Waste Pit 4

4.2.4.1 Historical Characterization of Waste Pit 4

Historical records indicate that Waste Pit 4 received radioactive wastes such as depleted slag, depleted residues, broken concrete, barium chloride and uncontaminated trash (Section 1.2.2.4). This material included the uncontaminated trash, cans, concrete, asbestos, and construction rubble, as well as crucible molds and materials with sharp edges. Lime was occasionally added to Waste Pit 4 while it

was operated as a open pit to maintain a pH suitable for uranium precipitation. In 1975, some of the filter cake from the dredging of Waste Pit 5 was placed in Waste Pit 4. The chemical and radiological constituents of these wastes are summarized in Table 1-3. Uranium isotopes would be expected to be present in the depleted residue and depleted slag. Thorium wastes were also disposed in Waste Pit 4. Calcium and magnesium would be expected to be major components of Waste Pit 4. Calcium entered the pit in the form of lime which was used to neutralize the pit when it was open and magnesium entered the waste stream as magnesium fluoride slag. Other metals would be present in the ore, and would enter the waste stream primarily through the general sump.

There is no direct record of the disposal of organic materials in Waste Pit 4, but several possible routes of entry of organic materials have been identified. Miscellaneous wastes were placed into the pit to fill it prior to capping. Construction rubble was disposed in Waste Pit 4 and may have contained roofing products such as coal tar. Miscellaneous organic constituents, including PAHs, CDD/CDFs, PCBs, phenols, or other organic material may have been present in ash which was not radionuclide-contaminated and was disposed in Waste Pit 4.

No direct dumping of waste oils into Waste Pit 4 has been documented. PCBs may have been introduced into Waste Pit 4 by leakage from the heavy equipment which was used to handle the waste in the vicinity of the pit. Ash from solid waste incinerators or the oil burner may have contained PCB residues.

4.2.4.2 Sample Physical Description of Waste Pit 4

The conceptual cross sectional drawing for Waste Pit 4 is presented in Figure 4-21. The material encountered was predominantly gray in color, although the material in some borings contained little gray material. The presence of gray clayey or silty material may indicate the disposal of magnesium fluoride slag. There was no consistent color of material at any depth exhibited by the samples from the borings of Waste Pit 4, although localized stratification was evident. Visual descriptions of the borings cited strata of varying colors and grain sizes, including brown and red tinted gray, pale brown, dark brown and other colors. Frequently, the field investigators encountered trash in the samples, including paper, sheets of clear plastic, stringy material like mop yarn and other varied debris. A large amount of the pit material was reported as fluid in consistency, sometimes flowing like jello or old motor oil. Some borings contained material which was so liquid that sample recovery was not possible. Thin layers of yellow-green material may indicate occasional dumping of green salt. The boring logs verify that a variety of materials have been disposed in Waste Pit 4, leading to thick, localized stratification of the pit material. Wide variation in the sample results from different borings would be expected as a result of the heterogeneous nature of the pit materials.

4.2.4.3 Geophysical Characterization of Waste Pit 4

The anomaly map resulting from the integration of Waste Pit 4 geophysical data is presented in Figure 4-13. Magnetic anomalies were noted across more than 50 percent of the pit, denoted as areas A and B along the southern boundary of the pit and C in the northwest section which strongly indicate the presence of buried ferrous material. Additionally, during the magnetic survey, it was noted that an extensive amount of metal strapping, wire, cans, rebar, and other scrap were present over much of the pit's surface. EM anomalies are located throughout the southern half of the pit area. One anomaly is located within section B, as indicated in the figure. This anomaly indicates the presence of buried conductive debris such as metal, graphite, or flyash of either greater quantities or buried at a shallower depth than the anomaly in the southwest corner (Section A). The gradual increase of EM conductivity in the southwest corner might be indicative of the presence of dissolved solids in water near the surface of the pit.

GPR data were limited to the northern half of the pit due to accessibility problems preventing data acquisition. Anomalous areas consistent with the northern section of the magnetic anomaly A and anomaly C were detected. These anomalies indicated several areas of moderate to high buried object densities at shallow depths relative to the pit depth.

Anomaly A was characterized by concurrent high magnetic intensities, EM, and moderate to high GPR signatures indicating buried ferrous material at least in the northern section. The EM signature indicates the existence of nonferrous and possibly nonmetallic wastes are also present. Anomaly B is characterized by magnetic and EM highs. High volumes of ferrous metal debris is supported by the magnetic data and nonferrous/nonmetallic material supported by the EM. High conductivity readings to the north of this anomaly may be indicative of either flyash or high dissolved solids in water at shallow depths. A large volume of buried ferrous metal debris is supported by the concurrence of magnetic and GPR data in anomaly C. Anomalies D and E have been characterized by GPR data only, indicating buried nonmetallic waste as the source of the anomaly.

4.2.4.4 Radiological Characterization of Waste Pit 4

Four boreholes were sampled as part of the CIS program (Figure 4-4) and three boreholes were sampled as part of the RI/FS program (Figure 4-5). The three RI/FS samples were subsampled which resulted in six composite samples, two from each of the original RI/FS boreholes which were composited according to depth.

Waste Material

Radionuclide analytical results from the CIS and RI/FS sampling efforts are summarized in Tables 4-4 and 4-5 and graphically in Figure 4-11 and 4-12, respectively. The radiological profile of Waste Pit 4 is presented in Table 4-1.4.A. Complete analytical results are provided in Appendix A.

Predominant radiological constituents in terms of activity concentrations include U-238, U-234, Th-230, and Ra-226, all of which come from the uranium decay series. The average U-238 activity concentration levels in Waste Pit 4 are some of the highest found in the entire waste storage area. The average CIS results for three boreholes reported the third highest average concentration value (4644 pCi/g) and the average of the six RI/FS results were the highest RI/FS results reported for both U-238 (19,025 pCi/g) and Total-U (51,863 µg/g). Neptunium-237, Sr-90, and Tc-99 were detected in many of the Waste Pit 4 samples indicating the disposal of process waste associated with the processing of irradiated uranium (nuclear fuel/Hanford site). The Sr-90 reported average concentration (44 pCi/g) for Waste Pit 4 was the highest RI/FS Sr-90 value reported.

The results of both the CIS and the RI/FS surveys reveal that the U-238/U-234 activity concentration ratio greatly exceeds 1 (6 or 7). Also, the U-238/U-235 activity concentration ratio exceeds 20 (30 to 1000). These statistics indicate the enrichment level of uranium deposited in Waste Pit 4 is depleted.

Waste Pit 4 also contains moderate concentrations of Ra-226 (23 pCi/g) and Ra-228 (59 pCi/g) with respect to the other waste pits. The RI/FS data, as shown in Table 4-5, reports Ra-228 and Th-228 in secular equilibrium for RI/FS boring 1775. But the data for boring 1774 are incomplete to determine secular equilibrium, and the data for Boring 1773 indicate little about the equilibrium. Generally the RI/FS data revealed consistent results when comparing the upper composite sample with the lower for all radiological results except Total-U. The Total-U results for the upper section of boring 1773 and 1774 were approximately two times greater than the lower section. However, for boring 1775, the Total-U found in the upper section was five times greater than the lower section.

Leachate

Three leachate samples were collected during the RI/FS, one from each of three boreholes. Table 4-6 presents the activity concentrations of the radionuclides detected. Radionuclide activity concentrations present in Waste Pit 4 are consistent with those constituents reported for the waste material. The uranium ratios indicate the enrichment level is depleted. The leachate concentrations for all forms of uranium were the highest of all the leachate results. Uranium-238 (226,350 pCi/L) and Total-U (203,433 pCi/L) exceed all other leachate results by approximately two orders of magnitude indicating the presence of the more soluble uranium species from uranyl nitrate or UF_6 hydrolysis.

Surface Water

A single surface water sample was collected under the CIS program for the determination of radionuclides. The results are summarized in Table 4-13. The surface water portrayed elevated activity concentrations for U-238, U-235, U-234, and Tc-99. The isotopic ratios indicate the uranium enrichment level is depleted in the surface water sample.

4.2.4.5 Chemical Characterization of Waste Pit 4

Waste Material

Composite samples were collected from four borings installed in Waste Pit 4 as part of the CIS program and from three borings installed in the pit under the RI/FS program. The RI/FS borings were subsampled to create six composites, two composites from each borehole. The samples were analyzed for the Inorganic HSL. The CIS boring samples were within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Results of the CIS data are summarized in Table 4-7 and Figure 4-13. Results of the CIS program indicate that concentration averages for barium (2,400 mg/kg), cadmium (8.3 mg/kg), lead (43 mg/kg), and manganese (2,700 mg/kg) are present in concentrations which exceed comparative concentrations levels within the waste pit area. The reported concentrations for cadmium and manganese are among the highest average concentration values reported for the CIS. CIS boring 4 generally reported concentration values for most of the analytes at levels five to ten times higher than other CIS borings. This elevated concentrations statement holds true for barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc. However, the calcium and manganese concentrations for CIS boring 4 were less than or equal to other CIS boring results. Boring 4 is located in the south-central section of Waste Pit 4.

Results of the RI/FS data set are summarized in Table 4-8 and Figure 4-14. Results of the RI/FS program indicate that elevated concentration averages reported are consistent with the CIS program. The concentration average for beryllium (17 mg/kg) was the highest average reported for Be during the RI/FS. The main analytes reported at elevated concentrations are identical for both sampling programs indicating comparable data. Boring 1773, which is located in the same general vicinity as CIS boring 4 portrays the same elevated concentration trends. Concentration averages for barium (2,470 mg/kg), boron (1,000 mg/kg), chromium (1,500 mg/kg), cobalt (180 mg/kg), copper (480 mg/kg), molybdenum (96 mg/kg), nickel (220 mg/kg), and vanadium (560 mg/kg) are representative of the two to ten fold enhancement. Additionally the manganese reported for Boring 1773 is reduced with reference to the other RI/FS samples by an approximate factor of five.

The CIS obtained data for Waste Pit 4 by drilling four borings into the pit (Table 4-9, Figure 4-15). From these borings, four samples were taken for CLP semivolatile organics, four samples were taken for CLP chlorinated pesticides and PCBs, and four samples were taken for CLP volatile organics. The RI/FS program supplemented the organic data for Waste Pit 4 (Table 4-10 and Figure 4-16). Three borings were drilled into Waste Pit 4 during the RI/FS. From these borings, nine samples were taken for CLP semivolatile organics, six samples were taken for CLP chlorinated pesticides and PCBs, and nine samples were taken for CLP volatile organics. In addition, six samples were analyzed for herbicides, six samples were analyzed for organophosphate pesticides, and six samples were analyzed for chlorinated dioxins and furans. The results of these analyses are presented in Appendix A. Statistical summaries are presented in Table 4-10. The quantities of CPCs for Waste Pit 4 have been

calculated, and are presented in Table 4-1.4.C. The contaminants which are most problematic include CDD/CDFs, PAHs, PCBs, and miscellaneous semivolatile compounds including tributyl phosphate.

Chlorinated dibenzo-p-dioxins and dibenzofurans were analyzed for six boring samples during the RI/FS. CDD/CDF data were not obtained during the CIS. Low levels of CDD/CDF were detected in Waste Pit 4. A total quantity of 0.7 kg of CDD and 2.7 kg CDF has been estimated for Waste Pit 4 (Table 4-1.4.C). The presence of CDD/CDF contamination is consistent with FEMP process activities. General sources of CDD/CDFs have been discussed in Sections 4.2.0.1 and 4.2.0.5. Ash was not identified as a possible waste in the visual classification of the pit material samples but is still a possible source of CDD/CDF in Waste Pit 4. PCBs have also been identified as constituents of the pit materials in Waste Pit 4, and are a likely source of CDD/CDF in the pit. Although pentachlorophenol was used at the FEMP site, it was not detected in the pit materials from Waste Pit 4 in either the CIS or the RI/FS. For this reason pentachlorophenol is not suspected as a likely source of CDD/CDF in the pit. 2,4,5-T and related compounds are not likely sources of dioxins in Waste Pit 4 because positive analytical results for 2,4,5-trichlorophenol are absent from the pit material analytical results. The presence of CDD/CDFs is possibly the result of the incidental disposal of PCBs or the by-products of incomplete combustion of PCB oils which may have been present in disposed ash (Section 4.2.0.1).

HSL organic analyses performed under the CIS (Table 4-9 and Figure 4-9) detected PCBs in three borings. The PCB mixtures reported for the borings in Waste Pit 4 during the CIS are Aroclor 1242, Aroclor 1248, and Aroclor 1254. The reported concentration values average 616 µg/kg. HSL organics analyses detected PCBs in two samples which were analyzed for PCBs. The RI/FS analytical results included positive detection of Aroclor 1254 only. The reported average analytical value of this Aroclors was 2300 µg/kg. An estimated total of 604 kg of PCB has been calculated to be present in Waste Pit 4 (Table 4-1.4.C). There is no record of PCB disposal in Waste Pit 4, but incidental disposal of PCBs may have occurred during the disposal of ash from the burning of miscellaneous wastes.

The results for all borings of Waste Pit 4 indicate the presence of polynuclear aromatic compounds (PAH). Based on the statistical summary, the CIS reported an average concentration of 7520 µg/kg for total PAHs. The RI/FS reported an average concentration of 4940 µg/kg for total PAHs. The estimated quantity of PAHs in Waste Pit 4 was calculated to be 3095 kg (Table 4-1.4.C). Coal tar contains high concentrations of aromatic organic compounds including polynuclear aromatics (EPRI), but there is no indication in the site records to indicate that coal products were disposed in Waste Pit 4. However, miscellaneous construction wastes were disposed in Waste Pit 4, and coal tar or asphalt may have entered the pit in this manner. Incidental disposal of oils may have occurred. The exact source of the PAH contamination of Waste Pit 4 is not known, but coal or petroleum products, possibly as ash, are potential sources due to incidental disposal.

Some common organic compounds reported in the Waste Pit 4 material include acetone, 2-butanone (methyl ethyl ketone) and methylene chloride (all common solvents); di-n-butyl phthalate, di-n-octyl phthalate and bis-(2-ethylhexyl)phthalate (all common plasticizers). The reporting of acetone, 2-butanone and methylene chloride in the RI/FS data is consistent with the CIS data. The RI/FS study detected significant concentrations of di-n-butyl phthalate and bis-(2-ethylhexyl) phthalate. The origins of these constituents have been discussed in Section 4.2.0.5.

The presence of common solvents in Waste Pit 4 is consistent with their use at the site, and the presence of phthalate plasticizers is consistent with their wide variety of applications and link to combustion by-products.

Several chlorinated VOCs were detected during the CIS. The average concentrations of chlorinated solvents in Waste Pit 4 included 1,1,1-trichloroethane (260 µg/kg), chloroform (460 µg/kg), and tetrachloroethane (390 µg/kg). The average concentrations of chlorinated solvents in Waste Pit 4 for which positive values were reported in the RI/FS data include 1,1-dichloroethane (46 µg/kg), 1,1-dichloroethene (3.7 µg/kg), 1,1,1-trichloroethane (30 µg/kg), chloroform (140 µg/kg), and trichloroethene (80 µg/L). As discussed in Section 4.2.0.5, plant records indicate that tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform and methylene chloride were used as solvents or degreasers at the site (Operable Unit 3 Work Plan Addendum). Chloroform may also result from the exhaustive chlorination of organic materials by chlorinating reagents. The other chlorinated solvents may be present in the pit as progeny from a parent contaminant.

The pit materials also contained small amounts of VOAs. The average concentration of toluene for Waste Pit 4 was 180 µg/kg. The average concentrations for Waste Pit 4 based on the RI/FS include ethyl benzene (6.4 µg/kg), toluene (8.6 µg/kg) and xylenes (38 µg/kg) which are indicators of gasoline or solvent contamination. Benzene was not detected in the pit materials from Waste Pit 4. It is likely that small amounts of gasoline or solvents entered the waste stream during liquid waste incineration, from contaminated oil storage drums, by the disposal of small amounts of gasoline or solvents, or by leakage of gasoline from gasoline-powered equipment, Historical records of such occurrences have not been located.

Leachate

During the RI/FS, three leachate samples were collected from Waste Pit 4 and analyzed for HSL inorganic and general chemistry parameters. The data are summarized in Table 4-11. Chromium (1,100 4 µg/L) and manganese (250,000 µg/L) were reported at the highest concentrations levels for leachate concentrations. Generally the leachate analytes mirror the constituents reported for the pit material.

Five leachate samples were analyzed for organic parameters. The organic constituents which were detected in the Waste Pit 4 leachate generally reflected the contents of the pit materials. The presence of acrolein and acrylonitrile in the leachate but not in the pit materials was an indication of the aqueous solubility of these materials. Vinyl chloride was not detected in the pit leachate. Benzene was detected in the leachate (statistical average concentration, 2.7 µg/L). The presence of benzene in the pit leachate resulted from the historical origins of the pit materials, and was consistent with the observed constituents of the pit materials.

4.2.4.6 Characterization Summary of Waste Pit 4

Waste Pit 4 has been shown through the historical records to have received radioactive wastes such as depleted slag, filter cake, and residues, as well as broken concrete, barium chloride, lime, and trash. The trash included cans, concrete, asbestos, construction rubble, and crucible molds. The variety of materials which have been disposed in this pit has lead to thick, localized stratification of the material within it. Thus, a wide variation in results from different borings would be expected. The chemical and radiological constituents of these wastes are summarized in Table 1-3.

The contents of Pit 4 are variable, as shown by the fact that magnetic anomalies were noted across more than 50 percent of the area. Actual pieces of metal rubble were seen in much of the pit surface. EM anomalies were found in half of the pit area, which coincides with the probable presence of conductive debris such as metal, graphite, and flyash. Dissolved solids in water may also be indicated by the EM data. GPR observations over a portion of the pit indicated the presence of dense objects at shallow burial depths.

As is typical of the FEMP site, the uranium decay series is represented by significant amounts of U-238, U-234, Th-230, and Ra-226. The average U-238 concentration levels in Waste Pit 4 are some of the highest to be found in the area. Irradiated uranium, probably from nuclear fuel from the Hanford site, is indicated by the presence of Np-237, Sr-90, and Tc-99. The isotopic ratios of uranium found in the waste material indicate that in this pit it is depleted. Radium-226 and Ra-228 are present in more moderate concentrations than in other waste pits. The uranium isotopes and decay-chain nuclides are to be expected in this pit because of the introduction of depleted residue and slag. Thorium wastes were also deposited in the pit.

Radiological investigation of leachate samples show that the uranium-bearing compounds in Pit 4 must be more soluble than in the other pits, since concentrations are significantly higher. The relative activity concentrations of the various nuclides are, however, consistent with those reported in the waste material itself.

Samples from borings into the waste material were analyzed for inorganic components under both the CIS and RI/FS programs. The CIS samples were within RCRA limits for corrosivity, reactivity,

ignitability, and EP toxicity. The predominant constituents in Pit 4 included calcium and magnesium. This is expected from the process knowledge that lime (calcium hydroxide) was used formerly for neutralization of the open pit, and the slag consisted primarily of magnesium fluoride. The CIS study reported barium, cadmium, lead, and manganese above subsurface soil background levels. Furthermore, the RI/FS data showed barium, beryllium, chromium, cobalt, copper, molybdenum, nickel, and vanadium.

Among the organic analytes, low levels of chlorinated dibenzo-p-dioxins and dibenzofurans were detected in Waste Pit 4. Since flyash was not identified as a possible waste in this pit, the most likely source is the presence of PCBs. While there is no formal record of PCB disposal in this pit, the Aroclors which were found in the chemical studies of the waste may have been from direct disposal during disposal of miscellaneous wastes. All borings of the pit indicated the presence of polynuclear aromatic compounds. The exact source of the PAH contamination is not known, but coal or petroleum products such as roofing asphalt or fuels are potential sources.

Some common organic compounds found in Waste Pit 4 include acetone, 2-butanone, methylene chloride, di-n-butyl phthalate, di-n-octyl phthalate, and bis-(2-ethylhexyl) phthalate. The presence of the common solvents in Waste Pit 4 is consistent with their use at the site. The presence of phthalates is consistent with their wide variety of applications as plasticizers and their link to combustion by-products.

Volatile chlorinated organics included small amounts of 1,1-dichloroethane, 1,1-dichlorethene, 1,1,1-trichloroethane, chloroform, thrichlorethene, and tetrachloroethane. Most of these were used as solvents or degreasers at the site, and others may be present as progeny from a parent contaminant. Volatile aromatic compounds in the pit included ethyl benzene, xylenes, and toluene. These are indicators of gasoline or solvent contamination, although historical records of such materials in Pit 4 have not been located.

Leachate samples were collected from Waste Pit 4. The inorganic analyses showed calcium, copper, beryllium, boron, molybdenum, silver, chloride, and sulfate at above background levels. Organic constituents included acrolein and acrylonitrile which were not found in the pit materials, and indicates their aqueous solubility. Benzene was also detected in small quantities in the leachate. In general, however, the organic constituents in the leachate reflected the contents of the pit materials.

Surface water samples were also collected from Waste Pit 4. The radionuclide sample showed elevated activity for U-238, U-235, U-234, and Tc-99. The analyses for chemical constituents of the surface water showed each component to be either less than or equal to the same component in the waste material. Inorganics were low and generally of normal concentrations for surface water.

4.2.5 Waste Pit 5

4.2.5.1 Historical Characterization of Waste Pit 5

Waste Pit 5 is classified as a "wet pit" since the materials placed into this pit were liquids and slurries. Six borings were completed in Waste Pit 5 as part of the CIS program and in two borings as part of the 1992 RI/FS treatability study program. The two RI/FS borings were composited into two additional samples per boring for a total of four RI/FS samples.

Waste Pit 5 was placed into service as a settling basin in 1968 and began receiving slurried materials from the Refinery and Plant 8. At this time, the refinery was also used to process recycled tails containing trace quantities of fission products and transuranic isotopes, such as Pu-239 and Tc-99. Thorium was processed at the site during the years Waste Pit 5 was in operation. Thorium wastes were segregated and co-precipitated with barium carbonate and aluminum sulfate to reduce the activity of Ra-228 (Parsons 1993). Filtrates were sent to the general sump and precipitated a second time before the remaining slurry was sent to Waste Pit 5.

As discussed in Section 1.0, process knowledge and historical information indicate that general sump sludge comprises 50 percent of the pit's total volume with neutralized raffinate comprising over 40 percent of the pit volume. Both streams used lime ($Ca[OH]_2$) to precipitate radioactive materials, and calcium is expected to be a major waste stream component. Approximately 5 percent of the material in Waste Pit 5 is neutralized slag leach slurry containing MgF_2 slag from the reduction of normal and enriched UF_4.

Overflow from Waste Pit 5 went to the Clearwell through a line between the two pits. Although no direct investigation of the integrity of lines between the general sump, Waste Pit 5, and the Clearwell was performed, normal plant operations did not detect any loss of material from these lines. Excavation and maintenance activities near the lines did not reveal any contamination.

No direct dumping of waste organics, including PCBs or solvents, into Waste Pit 5 has been documented; however, since all process wastewater was collected, neutralized, and filtered at each plant before being sent to the general sump, it is possible that organic contaminants found in Waste Pit 5 came from spills or improper disposal of organics in the floor drains.

4.2.5.2 Sample Physical Description

Visual descriptions of pit material obtained from CIS borings of Waste Pit 5 were consistent with non-homogeneous deposition of pit contents. Sample texture was described as "pudding like" and "semi-solid." Some intervals contained traces of sand or grit. Sample colors changed between intervals in a single borehole and between boreholes at a given depth; there was no consistent color of material at any depth. Many sample intervals were described as one main color streaked with one or more

4788

secondary colors. Visual descriptions of Waste Pit 5 Pit Material, located in Appendix A.5.1.1, cited strata of varying color, including yellow, red, brown, gray, and creamy white. As described in Section 4.2.0.2, these descriptions are consistent with the disposal of neutralized raffinate and slag leach slurries.

4.2.5.3 Geophysical Characterization

Since Waste Pit 5 is a "wet" pit, no geophysical characterization was performed.

4.2.5.4 Radiological Characterization

Waste Material

Radionuclide analytical results from the CIS and RI/FS treatability study efforts are summarized in Tables 4-4 and 4-5, respectively. The data are presented graphically in Figures 4-11 and 4-12. Complete analytical results are provided in Appendix A. The radiological profile of Waste Pit 5 is presented in Table 4-1.5.A.

The mean activity concentrations of both data sets reveal that the data are consistent, based upon the range of values and the confidence interval of the mean, with the exception of Th-230 data. The CIS data for Th-230 is approximately 10 times that reported under the 1992 RI/FS. The differences in analytical results are attributed to difference in sample locations and the heterogeneity of the pit contents. The average CIS results for Tc-99 (1,275 pCi/g), Sr-90 (10.0 pCi/g), and Th-232 (30.5 pCi/g) were the highest averages reported for CIS data. The average Th-230 reported at 4,475 pCi/g was the second highest CIS average reported.

Predominant RI/FS radiological constituents in terms of activity concentrations include U-238, U-234, Th-230, and Ra 226, all of which come from the uranium decay series. Other radionuclides with elevated activity concentrations include Ra-226 (84 pCi/g), which was the third highest RI/FS results reported for the waste pit area under RI/FS. The lowest detected total thorium (23 µg/g) and the third lowest total uranium (2108 µg/g).

The results of both the CIS and RI/FS treatability study surveys reveal that the U-238 /U-234 activity concentration ratio is approximately 1 and the U-238/U-235 ratio is approximately 20. These statistics indicate that the enrichment level of uranium deposited in Waste Pit 5 is, on average, compatible with natural uranium. Additionally the CIS survey indicated one of the highest activity concentration of Th-230 found in the waste storage area. This is consistent with the use of Waste Pit 5, considering that the neutralized raffinates solids, slag leach slurry, sump slurries, and lime sludge were deposited here. The uranium and thorium containing solids settled out and remained in the pit while the supernatant liquor overflowed through an effluent tower to the Clearwell. Moreover, the activity concentration of Tc-99 (1,528 pCi/g) is reported as the highest throughout the entire waste storage

area. Cs-137 (23 pCi/g), Np-237 (40 pCi/g) and Tc-99 (1528 µg/g) was detected in all nine samples. This would have resulted from the disposal of raffinates from the processing of recycled uranium which occurred during the 1970's.

Waste Pit 5 also contains elevated levels of radionuclides in the thorium decay series. (Th-232, Ra-228, and Th-228). The activities are, within the limits of uncertainty, in secular equilibrium for all three decay products.

Surface Water

Two samples were collected in support of the radiological characterization during the CIS survey and two were collected during the RI/FS treatability study investigation. The results are summarized in Table 4-13. Both the CIS and RI/FS treatability study generally support each other and generally support the waste material data. However, the RI/FS treatability study results for uranium are one tenth (1/10) the activity concentrations compared to the CIS results. The U-238/U-234 and U-238/U-235 activity ratios indicate the enrichment level of uranium found in the surface waters sampled for both surveys are indicative of natural uranium. Elevated activity concentrations of Cs-137, Sr-90, and Tc-99 were reported for both surface water samples collected under the CIS program.

4.2.5.5 Chemical Characterization of Waste Pit 5

Waste Material

Composite samples were collected from six locations in Waste Pit 5 as part of the CIS program and from eight locations (consisting of nine samples) in the pit under the RI/FS treatability study. The samples were analyzed for the Inorganic HSL. The CIS boring samples were within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Results of the CIS data are summarized in Table 4-7 and Figure 4-13. Results of the CIS program reveal that concentration averages for barium (23,000 mg/kg), copper (5,000 mg/kg), and beryllium (9.2 mg/kg) were the highest averages reported for under the CIS program for waste pit contents.

Results of the 1992 RI/FS Treatability Study (Table 4-8 and Figure 4-14) reveal concentration averages for barium (11,000 mg/kg), copper (3000 mg/kg), molybdenum (390 mg/kg), and vanadium (1700 mg/kg) were reported at concentrations which were the highest averages reported for any pit during the RI/FS. The excessive levels of magnesium are probably due to the deposition of filter cakes into Waste Pit 5, whereas the calcium, being the main constituent of lime, would have been deposited via the neutralized raffinate and slag leach filter cake. Lead enhancement is always expected in association with uranium wastes, since lead is the final stable product of the radioactive decay series.

Fourteen samples were taken from within Waste Pit 5, as shown in Figures 4-4 and 4-6. Six boreholes were drilled during the CIS, and eight clamshell samples were taken during the 1992 RI/FS Treatability Study. CIS boring samples were analyzed for HSL organics, including volatiles, semivolatiles, and pesticides/PCBs. 1992 RI/FS samples were analyzed for extended HSL organics; however, all organic sample results from the 1992 RI/FS program were qualified as rejected when the data was validated because sample holding time and preservation requirements were exceeded.

Neither the CIS (Table 4-9 and Figure 4-15) or the 1992 RI/FS treatability study (Table 4-10 and Figure 4-16) requested dioxin or furan analyses for Waste Pit 5. Based on process knowledge, since Waste Pit 5 was a "wet" pit used for settling solids, it is unlikely that materials containing dioxins or furans were placed in the pit. However, neutralized raffinate was also disposed in Waste Pit 3, and general sump sludge was also disposed in Waste Pits 1, 2, and 3. All of these pits show detectable quantities of CDD/CDF, but these pits were used for the disposal of other materials which may have contained dioxins and furans.

Table 4-9 is a statistical summary of CIS pit material organic results. PCBs were detected in four of the six composited boring samples. Aroclor 1254 was found in borings one and three on the east side of the pit, and Aroclor 1248 was found in borings five and six on the west side of the pit. Concentration ranges were 330 to 6,200 µg/kg for Aroclor 1254 and 330 to 3100 µg/kg for Aroclor 1248. A total estimated quantity of 388 kg PCBs was estimated for Waste Pit 5 (Table 4-1.5.C).

Bis(2-ethylhexyl) phthalate was detected in borings two through five at an average concentration of 950 µg/kg, and di-n-butyl phthalate was detected in borings one and two at an average concentration of 670 µg/kg. Phenol was detected in the composited boring two sample at 200 µg/kg.

Volatile compounds detected in Waste Pit 5 included acetone and methylene chloride. The highest acetone concentration was 6,300 µg/kg. Levels of methylene chloride were less than 50 µg/kg in two borings at the west end of the pit.

Surface Water

Two surface water samples were collected for the CIS survey. Both total and dissolved constituents were reported for the metals determinations. Statistically, the dissolved results were equivalent (within 10 percent) to the total results. The inorganics results are summarized in Table 4-14. The inorganic results for the surface water samples displayed the following analytes at the highest average concentration reported for the analyzed pit surface water: antimony (4.2 µg/L), barium (106 µg/L), copper (21 µg/L), lead (2.2 µg/L), magnesium (386,000 µg/L), nickel (20 µg/L), and zinc (49 µg/L).

Two surface water samples were collected from Waste Pit 5 during the CIS and were analyzed for HSL organics (Table 4-15). Trace amounts of volatile compounds were detected in both samples.

Benzene and toluene were detected in one sample at results of 11 µg/L and 5 µg/L, respectively. Methylene chloride was detected in both samples at levels less than or equal to 2 µg/L. These detected compounds are constituents of common industrial solvents which were used at the FEMP (Operable Unit 3 Work Plan Addendum). It is possible that these organic contaminants found in Waste Pit 5 came from improper disposal of organic materials with process wastewater.

Leachate

Ten pit material samples collected during the 1992 RI/FS sampling program were extracted according to the Toxicity Characteristic Leaching Procedure (TCLP) method and analyzed for extended HSL volatiles and semivolatiles. Results were rejected during data validation because sample holding times and preservation requirements exceeded EPA Contract Laboratory Program (CLP) requirements.

4.2.5.6 Characterization Summary of Waste Pit 5

The historical information, the visual appearance of the samples (color stratification) and the results of the radiological and chemical sampling investigations (Appendix A, Tables 4-4, 4-5, 4,7, 4-8, 4-9B, 4-13, 4-14) all indicate that the materials in Waste Pit 5 are nonhomogeneous, but not as heterogeneous as materials in Waste Pit 1. Composite sampling of the borings allowed the samples that were submitted for analysis to best represent the pit material at the boring locations.

Predominant radiological constituents (activity concentrations) detected in the waste materials include U-238, U-234, Th-230 and Ra-226, which come from the uranium decay series, and Th-232, Ra-228, and Th-228 from the thorium decay series. Results of both the CIS and RI/FS investigations reveal that the enrichment level of uranium in Waste Pit 5 is compatible with natural uranium, indicative of wastes received from the reprocessing of enriched uranium. Other radionuclides with elevated activity concentrations include Tc-99, Cs-137, Np-237, and Sr-90, which result from disposal of raffinates from the processing of recycled uranium. Results of surface water sampling are generally consistent with results of waste material sampling.

The Waste Pit 5 CIS boring material samples were within RCRA established limits for corrosivity (Ph), reactivity, ignitability, and EP toxicity. Inorganic analytes detected above background levels included barium, copper and beryllium from the CIS program, and barium, copper, molybdenum, magnesium, calcium, lead, and vanadium from the RI/FS data set. Concentrations of barium, copper, molybdenum, and vanadium were the highest RI/FS samples reported for any waste pit. Surface water (CIS) samples also contained high levels of antimony, nickel and zinc.

A data limitation regarding organic compounds in the waste material in Waste Pit 5 arises from failure to meet holding time and sample preservation protocols for the RI/FS samples, and by failure to request dioxin and furan analysis of the CIS or RI/FS samples. The only suspected source of CDD/CDF contamination in Waste Pit 5 was neutralized raffinate slurry. Organic materials identified

in Waste Pit 6 samples include Aroclor-1254, Aroclor-1248, bis(2-ethylhexyl) phthalate, di-n-butyl phthalate, acetone and methylene chloride. Trace levels of benzene and toluene, and low levels of methylene chloride were identified in surface water CIS samples.

4.2.6 Waste Pit 6

4.2.6.1 Historical Characterization of Waste Pit 6

Waste Pit 6 is an open, lined pit which received extrusion residue, depleted sump filter cake, fine depleted slag, green salt, filter cakes, and process residues.

Waste Pit 6 was used from 1979 though 1985. Generally, the pit received only noncourse, nonpyrophoric materials to protect the pit liner. These materials included depleted slag (69 percent of pit volume) and depleted residues (25 percent of pit volume). Approximately 70 percent of the estimated mass in Waste Pit 6 is magnesium fluoride from the depleted slag. Depleted residues, which also include oily sludges, account for 75 percent of the depleted uranium in the pit. As noted in Section 1.0, historical records indicate that scrap metal and asbestos-containing materials were also disposed in the pit. Rain water collected in Waste Pit 6 was pumped to Waste Pit 5 for settling and discharged to the Clearwell (Weston 1986a).

4.2.6.2 Sample Physical Description

Appendix A.6.1.1 contains the pit material visual classification forms. Yellow was the predominant color noted in the visual classification of pit material, which is consistent with disposal of depleted residues in the pit. Black, white, and dark olive gray strata were also present. Pit contents were heterogeneous. Pit material must have appeared appetizing because the consistency of the pit contents was described as "cake icing," "spaghetti sauce," "pudding," and "soupy." Several intervals noted the presence of pieces of plastic, and one interval was described as having an oily sheen.

4.2.6.3 Geophysical Characterization of Waste Pit 6

No geophysical characterization was performed on Waste Pit 6 because of the physical limitations of dealing with a wet pit.

4.2.6.4 Radiological Characterization of Waste Pit 6

Twelve samples were completed from Waste Pit 6 (Figure 4-4) as part of the CIS and RI/FS treatability studies (Figure 4-6); four in support of the CIS and eight in support of the 1992 RI/FS treatability study.

Waste Material

Radionuclide analytical results from the CIS and RI/FS (treatability) sampling efforts are summarized in Tables 4-4 and 4-5, respectively. The data are presented graphically in Figures 4-11 and 4-12.

Complete analytical results are provided in Appendix A. The radiological profile for Waste Pit 6 is presented in Table 4-1.6.A.

Predominant CIS radiological constituents in terms of activity concentrations include U-238 and U-234, which come from the uranium decay series. Sr-90, Tc-99, Np-237, and Cs-137 were present in nearly all the CIS borings indicating the presence of fission material from reprocessing uranium core rods. Plutonium-239/240 was detected at 8.7 pCi/g, which was the highest average Pu 238/240 value reported for the CIS. The levels of average U-238 (16,975 pCi/g) and average U-234 (3418 pCi/g) reported for Waste Pit 6 were the highest and second highest activities respectively identified in the waste storage area.

Radium-226 and Ra-228 were reported as "hits" for all eight borings from the 1992 RI/FS program. Pu 239/240 was reported as the highest average concentrations for the waste pit area as determined during the 1992 RI/FS. Additionally the fission products Cs-137, Tc-99 and Sr-90 were identified in nearly all eight borings.

The results of both the CIS and RI/FS treatability study programs reveal that the activity concentration ratios for U-238/U-234 and U-238/U-235 statistically indicated the enrichment level of uranium deposited in Waste Pit 6 is depleted which is consistent with process knowledge regarding the use of Waste Pit 6. Additionally Pu-239/240 was reported at the highest average concentration reported throughout the waste pit area. Waste Pit 6 contains lower level activity concentrations of radionuclides in the thorium decay series (Th-232, Ra-228, and Th-228). Within the limits of uncertainty, Th-232 and Th-228 are in secular equilibrium.

Surface Water

Five surface water samples were collected from Waste Pit 6 as part of the CIS programs. The data are summarized in Table 4-13.

Radionuclide activity concentrations present in the surface water from Waste Pit 6 are consistent with those of the pit waste material. The U-238/U-234 and U-238/U-235 activity concentration ratios indicate the enrichment level of the uranium found in the pit surface water is depleted. Average concentration levels of Cs-137 (12 pCi/L), Np-237 (5.4 pCi/L), Ru-106 (82 pCi/L) were reported on Waste Pit 6 at the highest reported average concentrations found in the surface waters. Tc-99 was present in considerable amounts (1581 pCi/L) in the surface water, second only to the concentration average reported for the Clearwell.

4.2.6.5 Chemical Characterization

Waste Material

A composite sample was collected from one boring sample location in Waste Pit 6 as part of the CIS program and from eight pit locations as part of the 1992 RI/FS treatability study program. The samples were analyzed for the Inorganic HSL. The CIS boring sample was within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Results of the CIS data have been summarized in Table 4-7 and are shown graphically in Figure 4-13. Results of the CIS sample indicates that concentration averages for silver (160 mg/kg) and lead (60 mg/kg) have been reported at elevated concentrations levels, with the silver average results being the highest average silver results reported for all the Operable Unit 1 waste pit area.

Results of the 1992 RI/FS treatability study data set (Table 4-8 and Figure 4-14) reveal elevated concentration values for selenium (199 mg/kg) and thallium (46 mg/kg). These two analytes were reported at average concentration levels which were the highest reported for selenium and thallium during the 1992 RI/FS throughout the entire Operable Unit 1 waste pit area. In general, the concentration of measured inorganic constituents in Waste Pit 6 was lower, on average, than in any other pit in Operable Unit 1.

Twelve samples were located within Waste Pit 6 as shown in Figure 4-4 and Figure 4-6. Four boreholes were drilled during the CIS, and composited samples from each borehole were analyzed for HSL organics. Organic data is not available for the composited samples from the eight 1992 RI/FS program because CLP holding time protocols were not met, and all organic results were qualified as rejected.

Dioxin and furan analyses were not requested for any sample from Waste Pit 6. As was discussed in Section 4.2.5.5, waste streams disposed in Waste Pit 5 are similar to waste streams disposed in Waste Pits 1, 2, and 3. These pits show detectable quantities of CDD/CDF, but the waste streams that were suspected CDD/CDF sources were not disposed in Waste Pit 6 according to historical records. Lack of dioxin and furan data for Waste Pit 6 is a data limitation which affects the analysis of alternatives for the FS because the absence of dioxins and furans has not been confirmed.

As shown in Table 4-9 (Figure 4-15), Aroclor 1254 was the only compound in the pesticide/PCB fraction detected in any of the CIS samples. It was detected at 81 µg/kg in boring four near the southeast corner of Waste Pit 6. Bis(2-ethylhexyl) phthalate, a common plasticizer, was detected at 410 µg/kg and 910 µg/kg in two borings. These results are consistent with the pieces of plastic observed in the visual classification of pit material. The visual classification for boring 4 also noted a "petrol sheen" in one interval. Sample results for this boring had the highest tetrachloroethene concentration found in the pit (29,000 µg/kg). The remaining three borings also had detectable

concentrations of tetrachloroethene. The average concentration of this compound in the Waste Pit 6 samples was over 16,000 µg/kg. A tentatively identified compound, butanoic acid, methyl ester, was observed in two borings at levels less than 10 µg/L. The source of these hydrocarbons is suspected to be depleted residues, which included oily sludges.

Surface Water

During the CIS, five surface water samples were collected from Waste Pit 6 and analyzed for HSL inorganic and general chemistry parameters. The data are summarized in Table 4-14. Generally, the only constituents reported for the surface waters collected were aluminum, calcium, iron, magnesium, potassium, and sodium. All the detected analytes are normally occurring minerals, not hazardous waste substances.

Five surface water samples were collected from Waste Pit 6 during the CIS and analyzed for HSL organics. Table 4-15 is a summary of Waste Pit 6 CIS organic results. Chloroform and toluene were detected in the same four out of five samples. All chloroform results were less than 5 µg/L. The highest toluene sample concentration was 6 µg/L. Tetrachloroethene was detected in all samples at concentrations less than or equal to 2 µg/L. The source of these compounds is suspected to be the residue remaining in "empty" containers that were disposed in the pit, the use of contaminated drums for transfer of material to the pit, or depleted residue oily waste.

Leachate

Nine pit material samples collected during the 1992 RI/FS sampling program were extracted according to the TCLP method and analyzed for pesticides/PCBs and extended HSL volatiles and semivolatiles. Results were rejected during data validation because sample holding times and sample preservation techniques exceeded EPA CLP requirements.

4.2.6.6 Characterization Summary of Waste Pit 6

The historical information, the visual appearance of the samples and the results of the radiological and chemical sampling investigations (Appendix A, Tables 4-4, 4-5, 4,7, 4-9B, 4-13, 4-14, 4-15) all indicate that the materials in Waste Pit 6 are heterogeneous, but not as heterogeneous as materials in Waste Pit 1. Composite sampling of the borings allowed the samples that were submitted for analysis to best represent the pit material at the boring locations.

Predominant radiological constituents (activity concentrations) detected in the waste materials include U-238, U-234, and Ra-226 from the uranium decay series. Other radionuclides with elevated activity concentrations include Pu-239/240, and the fission products Tc-99, Np-237, Sr-90 and Cs-137. Activity concentrations of Pu-239/240, U-238 and U-234 were particularly high. Relatively lower activity concentrations of radionuclides in the thorium decay series (Th-232, Ra-228, Th-228) were present in Waste Pit 6. Results of both the CIS and RI/FS investigations reveal that the enrichment

level of uranium in Waste Pit 6 is compatible with depleted uranium, which is consistent with process knowledge regarding the use of Waste Pit 6. Results of surface water sampling are generally consistent with results of waste material sampling.

All Waste Pit 6 CIS boring material samples were within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Inorganic analytes detected above-background levels include silver and lead from the CIS program, and selenium and thallium from the RI/FS data set. Levels of silver, selenium, and thallium were higher than at any other waste pit in Operable Unit 1. Generally, concentrations of other measured inorganic constituents in Waste Pit 6 were lower than concentrations in any other pit in Operable Unit 1. Surface water CIS samples generally revealed only aluminum, calcium, iron, magnesium potassium and sodium, which are not usually considered hazardous waste substances.

A data limitation regarding organic compounds in the waste material in Waste Pit 6 arises from failure to meet holding time and sample preservation protocols for the RI/FS samples, and by failure to request dioxin and furan analysis of the CIS samples. Organic materials identified in Waste Pit 6 CIS samples include Aroclor-1254, bis(2-ethylhexyl)phthalate and tetrachloroethene (24,000 µg/kg in one sample). Tetrachloroethene (not greater than 2 µg/L), chloroform and toluene were identified in surface water CIS samples.

4.2.7 Burn Pit

4.2.7.1 Historical Characterization of the Burn Pit

The Burn Pit began as an excavation to provide clay for the construction of Waste Pits 1 and 2. The area was used to burn materials such as laboratory chemicals, oils, refuse from the cafeteria, and low level contaminated combustible waste (including pyrophoric and reactive chemicals). The Burn Pit was used from before 1957 to 1968. The actual inventory of materials disposed in the Burn Pit is unknown. Boring logs indicate debris, such as glass, ceramics, metal, and wood down to an elevation of 558 feet.

4.2.7.2 Sample Physical Description of the Burn Pit

The material encountered was predominately dark brown or yellow brown in color, although some localized stratification was evident. There was a consistent brown material at many depths exhibited by the samples from the borings of Waste Pit 7. Visual descriptions of the pit material did cite some strata of varying color, including black, white, and grey. The pit material was predominately comprised of clay sized particles, although sand, gravel, wood, and glass particles were frequently encountered. When dry, the clay like pit material exhibited low plasticity and cohesion. When wet the clay material varied in cohesion and plasticity. Organic materials were noted as being present in boring 07-02 (CIS). Boring 07-03 (CIS) indicated the presence of wood, glass, aluminum, or gravel at

the majority of depths. Borings 1776 and 1777 indicated debris such as glass, ceramics, metal and wood. The observance of varying debris suggests a scattered distribution of process and production wastes. Wide distributions in the data obtained from the analysis of the pit material from the Burn Pit would therefore be expected.

4.2.7.3 Geophysical Characterization of the Burn Pit

The anomaly map resulting from the integration of Burn Pit geophysical data is presented in Figure 4-14. A single magnetic anomaly, labeled A, characterizes nearly 50 percent of the area referred to as the Burn Pit. The source of the anomaly is considered to be a wide range of ferrous material and possibly buried steel drums. The EM anomaly, marked as B, in the southwestern portion of the Burn Pit indicates buried conductive waste material such as graphite, flyash, and other nonferrous materials. GPR data were characterized as supporting little evidence of buried objects. Rough terrain and standing water limited acquisition of GPR data to the southwestern half of the Burn Pit.

Strong magnetic response for the southeastern half (anomaly A) of the Burn Pit characterizes this section as containing large quantities of buried ferrous metal debris, with knowledge indicating the presence of at least one drum. Anomaly B is characterized by the presence of high conductivity EM readings indicating the presence of flyash, graphite or nonferrous conductive materials. In addition, the high apparent conductivity readings could emanate from highly conductive dissolved solids in the pit leachate.

4.2.7.4 Radiological Characterization of the Burn Pit

Eight borings were completed in the Burn Pit as part of the CIS and RI/FS: six during the CIS and two during the RI/FS.

Waste Material

Radionuclide analytical results from the CIS and RI/FS sampling efforts are summarized in Tables 4-4 and 4-5, respectively. The data are presented graphically in Figures 4-11 and 4-12. Complete analytical results are provided in Appendix A. The radiological profile for the Burn Pit is presented in Table 4-1.7.A. Overall, the Burn Pit has the lowest concentration of radionuclides within the waste area in Operable Unit 1.

In general, the analytical results from the CIS samples are approximately ten times lower than those from the RI/FS samples. The sampling locations shown in Figure 4-4 indicate that the samples collected during CIS for the Burn Pit were taken from the peripheral area of the pit and the RI/FS samples were closer to the center of the Burn Pit area. Predominant radiological constituents in terms of activity concentrations include U-238, U-234, and Th-230, all of which come from the uranium decay series. The U-238 activity concentrations range from 22 to 454 pCi/g with the majority of the

results less than approximately 200 pCi/g. Thorium-230 concentrations were also extremely low (5 - 200 pCi/g). Technetium-99 was detected in four of the six CIS composites from 18 to 64 pCi/g (29 pCi/g average).

The results of both the CIS and RI/FS reveal that the activity concentration ratios for U-238/U-234 and U-238/U-235 are approximately 1 and 20, respectively. These statistics indicate that the enrichment level of uranium deposited in the Burn Pit is, on average, compatible with natural uranium. This is consistent with process knowledge regarding the use of the Burn Pit, especially with respect to the burning the pyrophoric uranium. The RI/FS data for these uranium isotopic ratios have too great a range of values to be useful in this comparison.

In general, the lower sections of each of the RI/FS samples is higher in activity concentrations than the corresponding lower section of the boring, especially with reference to all the thorium and uranium isotopes. Low levels of Tc-99 were also detected in all four of the RI/FS samples (0.79 to 3.47 pCi/g). Radium-226 and Ra-228 were detected in all four of the RI/FS samples analyzed.

The Burn Pit also contains elevated activity concentrations of radionuclides from the thorium decay series (Th-232, Ra-228, and Th-228). The Th-232 and Th-228 are, within the limits of uncertainty, in secular equilibrium.

Leachate

Two leachate samples were collected from the Burn Pit during the RI/FS program and the data are summarized in Table 4-6. Radionuclide activity concentrations present in Burn Pit leachate are generally consistent with those of the Burn Pit waste material, in that the uranium species are consistent with natural uranium. Radium-226 was reported for Leachate 1777 at 72.5 µg/L. The total uranium concentrations varied widely between the samples collected. Leachate 1776 was reported at 1 U µg/L and Leachate 1777 at 2870 µg/L, indicating the possibility that the form of uranium associated with borehole 1777, is more soluble than the uranium form associated with borehole 1776.

4.2.7.5 Chemical Characterization of the Burn Pit

Waste Material

Composite samples were collected from six borings installed in the Burn Pit as part of the CIS and from two borings installed in the pit under the RI/FS. The samples were analyzed for the Inorganic HSL. The CIS boring samples were within RCRA established limits for corrosivity (pH), reactivity, ignitability, and EP toxicity. Results of the CIS data are summarized in Table 4-7 and Figure 4-13. Results indicate that concentration averages for cadmium, and lead exceed normal abundance concentrations levels. However, boring 4 (which appears to exist almost in Waste Pit 3) reveals concentrations generally two to ten times greater than the other five CIS borings. Barium (7,100

mg/kg), cadmium (35 mg/kg), chromium (88 mg/kg), cobalt (104 mg/kg), copper (166 mg/kg), lead (53 mg/kg), manganese (1720 mg/kg), nickel (60 mg/kg), silver (506 mg/kg), and vanadium (290 mg/kg) were analytes reported in boring 4 at elevated concentrations.

Results of the RI/FS data set are summarized in Table 4-8 and Figure 4-14. Results of the RI/FS program indicate that concentration averages for inorganic constituents are generally lower than the other waste areas within Operable Unit 1. Boring 1776 reported elevated concentrations versus boring 1777 for many of the same analytes which had been reported high for CIS boring 4, but at lower elevated levels (copper, lead, manganese and nickel).

The Burn Pit was analyzed for HSL organic analyses under the CIS and under the RI/FS. The CIS data are presented are shown in Table 4-9 and the RI/FS data are presented in Table 4-10. The data are represented pictorially in Figures 4-16 and 4-17. Six borings were installed under the CIS and three borings were installed under the RI/FS. During the RI/FS, nine samples were analyzed for volatile organics, three samples were analyzed for semivolatile organics, six samples were analyzed for organochlorine pesticides and PCBs, three samples were analyzed for chlorophenoxy herbicides, three samples were analyzed for organophosphate pesticides, and six samples were analyzed for chlorinated benzo-p-dioxins and dibenzofurans. In addition to the statistical summaries, the data are presented in Appendix A. The total quantities of the CPCs are reported in Table 4-1.7.C.

CDD/CDFs were found in the pit contents of the Burn Pit. As discussed in Section 4.1.0.5, there are many ways that CDD/CDFs may be formed by relatively ordinary means. The total estimated quantity of CCDs in the Burn Pit was calculated to be 0.02 kg, and the total estimated quantity of CDFs was calculated to be 0.2 kg (Table 4-1.7.C). These values are much lower than those for Waste Pits 1-4. This document has presented arguments which postulate that combustion by-products at the FEMP are possible sources for the CCD/CDFs. The much lower CDD/CDF values for the Burn Pit serve to deny that the Burn Pit may be a major source of CCD/CDF for the rest of the Waste Pit Area. It is known from plant history that miscellaneous oils and chemicals were burned in the Burn Pit. Since miscellaneous oils were combusted in the Burn Pit, the possibility that PCB oils were burned in the pit cannot be discounted. Further, the presence of pentachlorophenol in the Burn Pit contents suggests that pentachlorophenol may a precursor of CDD/CDF in the pit, by direct contamination (because pentachlorophenol contains impurities of CDD/CDF), or by combustion (because pentachlorophenol oxidizes to form CDD/CDF when burned). There is no record of ash disposal in the Burn Pit, and raffinates were not disposed in the pit. Therefore, these pathways are not likely to have contributed to the presence of CDD/CDF in the Burn Pit.

Both the CIS and the RI/FS analytical results reported positive values for the PCB mixture Aroclor 1254. No other Aroclor was detected in the Burn Pit. The highest average concentration of Aroclor 1254 (2400 µg/kg) was reported in the RI/FS data. Waste oils were burned in the Burn Pit, along

with miscellaneous laboratory chemicals, but the combustion of PCBs anywhere on site has not been documented. These are potential routes of entry of PCBs to the Burn Pit. An estimated total of 163 kg of PCBs was calculated to reside in the Burn Pit (Table 4-1.7.C).

The analytical results for the Burn Pit indicate a total average concentration of total PAHs to be 24,600 µg/kg. The total quantity of PAH in the Burn Pit was estimated to be 1672 kg (Table 4-1.7.C). This value is much lower than that exhibited by Waste Pit 2. The origin of these contaminants is most likely the deposition of wastes including oils into the Burn Pit prior to burning them. The PAHs are suspected to have been present in the oil which was disposed in the Burn Pit, not the products of combustion. It is also possible, but not documented, that roofing products or asphalt which often contain high levels of PAHs were disposed in the Burn Pit. Without regard to whether these potential contaminants were burned in the pit or simply discarded, PAH contamination would result from their disposal. Railroad ties which were treated with creosote were disposed and burned in the pit, and are a likely source of PAHs.

Some common solvents were found in the Burn Pit. These included acetone, 2-butanone and methylene chloride. Bis-(2-ethylhexyl)phthalate, di-n-butyl phthalate and di-n-octyl phthalate were also found in the Burn Pit. Site records indicate the use of these constituents and it is suspected that these contaminants result from the disposal of laboratory waste in the Burn Pit.

Chlorinated VOCs which were detected in the Burn Pit include tetrachloroethene (210 µg/kg), 1,1,1-trichloroethane (3.3 µg/kg), 1,1-dichloroethane (27 µg/kg), chlorobenzene (3.1 µg/kg) and vinyl chloride (6.1 µg/kg). Based on site records and history of the maintenance activities at the site, tetrachoroethene, 1,1,1-trichloroethane and chlorobenzene have certainly been used at the site either as common solvents or as laboratory chemicals (Operable Unit 3 Work Plan Addendum). The remaining organochlorine solvents were probably the progeny of these site chemicals (Section 4.2.0.5). Considering the history of the Burn Pit, these constituents are expected in the pit.

A similar situation existed for explanation of the observance of VOAs in the pit. Since a variety of waste oils and laboratory chemicals were disposed in the pit and combusted, one would expect to find ethyl benzene (220 µg/kg), toluene (180 µg/kg) and xylenes (330 µg/kg). The average values are taken from the CIS data (Table 4-9) and are higher than the corresponding RI/FS values. The suspected explanation for the difference in the magnitude of the concentrations between the CIS and the RI/FS is that the historical use and general contents of the pit are heterogeneous.

Additional organic chemicals which are to numerous to detail were found in the Burn Pit and are presented in Tables 4-9 and 4-10. Principle among these were a large number of phenols which are possibly residues from fuel oils or railroad ties which were burned in the pit. Railroad ties are commonly treated with creosote, a coal-based wood preservative which is high in PAH and phenol

content. Many miscellaneous organics such as carbon disulfide, various ethers, isophorone, etc., have been detected in the Burn Pit, and may be attributed to the historical activities at the pit. Clearly, a wide variety of chemicals, ranging from fuel oils to laboratory waste, were disposed in the Burn Pit. The combustion process has certainly increased the complexity of the mixture of organics by including numerous products of combustion.

Leachate

During the RI/FS, two leachate samples were collected from the Burn Pit and analyzed for HSL inorganic and general chemistry parameters. The data are summarized in Table 4-11. The data indicate the leachable constituents from the two boreholes vary considerably. Leachate from 1776 shows a ten-fold increase in the concentration of barium compared to 1777 (2,400 µg/L and 148 µg/L, respectively). Leachate from 1777 displays elevated concentrations in comparison to 1776 for boron (2,120 vs. 369 µg/L), manganese (2,960 vs. 25 µg/L), and molybdenum (1050 vs. 289 µg/L).

During the RI/FS, 3 leachate samples were analyzed for organic parameters. The organic constituents which were detected in the Burn Pit leachate generally reflected the contents of the pit materials. Several volatile aromatic organic compounds like toluene (92 µg/L), ethylbenzene (13 µg/L), and xylenes (73 µg/L) were found in the Burn Pit leachate, and reflect the pit material constituents. These compounds are common constituents in combustibles such as gasoline, which was added to the pit as a starter fluid for burning waste. The volatile organic compounds 1,1,1-trichloroethane (420,000 µg/L), 1,1-dichloroethane (250,000 µg/L) methylene chloride (100 µg/L), acetone (1900 µg/L), and chloroform (56 µg/L) were also found in the Burn Pit leachate. The presence of 1,1,1-trichloroethane (1,1,1-TCA) is likely to originate from disposal of this solvent in the pit. Because 1,1,1-TCA is very dense, it would be expected to rapidly sink into the perched water of the pit and contaminate the pit leachate. 1,1-Dichloroethane (1,1-DCA) is most likely a daughter product of 1,1,1-TCA. Vinyl chloride is probably progeny of tetrachloroethene or trichloroethene (Section 4.2.0.5). Also found in the leachate were the PAHs 2-methylnaphthalene (18 µg/L) and naphthalene (10.5 µg/L). The organic compounds found in the Burn Pit are consistent with the compounds detected in the Burn Pit materials, with the exception of 1,1,1-TCA and 1,1-DCA. Tributylphosphate was also detected in the pit leachate.

4.2.7.6 Characterization Summary of the Burn Pit

Although the Burn Pit was originally a "borrow pit" to provide clay for other construction activities, it was used for over 10 years to burn a wide variety of chemicals, oils, refuse, low level waste and pyrophoric metals. A wide variety of contaminants is thus possible.

During geophysical characterization, a large magnetic anomaly was present in about one-half of the pit area. Many ferrous materials and drums would account for this anomaly. The EM data can be

interpreted as the presence of flyash, graphite, or other nonferrous conductive materials or dissolved solids.

Both the CIS and RI/FS sampling events analyzed materials for radioactive contents. Overall, the Burn Pit has the lowest concentration of radionuclides from all the pits in Operable Unit 1. In general, the analytical results from the RI/FS samples show concentrations ten times greater than those from the CIS samples. Predominant radiological constituents in terms of activity concentrations include U-238, U-234, Th-230, and Ra-226, all of which come from the uranium decay series. Th-232, Ra-228 and Th-228, from the thorium decay series, U-235, and Tc-99 were also found at much lower concentrations. Other nuclides were detected at still lower concentrations. The concentration ratios of uranium isotopes reveal that the uranium in the Burn Pit is consistent with natural uranium. This, in turn, agrees with process knowledge regarding the use of the pit, especially for the burning of pyrophoric uranium.

Leachate samples were collected from the Burn Pit. Radionuclide activity concentrations present are generally consistent with those in the pit waste material.

Sampling for chemical characterization was accomplished under both the CIS and RI/FS programs. The CIS samples were found to be within RCRA limits for corrosivity, reactivity, ignitability, and EP toxicity. For the inorganic constituents, those which, in either program, exceeded normal abundances were cadmium, calcium, lead, magnesium, arsenic, and silver.

Organic analyses were also performed under both sampling programs. Compounds to be noted which were found in one or both of these studies include PCBs, pentachlorophenol, polynuclear aromatic compounds, and low levels of polychlorinated dibenzo-p-dioxins and dibenzofurans.

Some common organic compounds found in the Burn Pit include acetone, 2-butanone, methylene chloride, di-n-butyl phthalate, di-n-octyl phthalate, and bis-(2-ethylhexyl) phthalate. The presence of the common solvents is consistent with their use at the site. The presence of phthalates is consistent with their wide variety of applications as plasticizers and their link to combustion by-products.

Volatile chlorinated organics included small amounts of 1,1-dichloroethane, 1,1-dichlorethene, 1,2-dichloroethane, 1,1,1-trichloroethane, chloroform, trichloroethene, chlorobenzene, and vinyl chloride. Most of these were used as solvents or degreasers at the site, and others may be present as progeny from a parent contaminant. Volatile aromatic compounds in the pit included ethyl benzene, xylenes, and toluene. These are indicators of gasoline or solvent contamination.

Leachate samples were collected from the Burn Pit. The inorganic analyses showed calcium, magnesium and sodium in excess concentrations. Organic constituents included acrolein and

acrylonitrile which were not found in the pit materials, and indicates their aqueous solubility. Benzene, toluene, ethylbenzene, and xylenes were also detected in the leachate. They are common constituents in combustibles such as gasoline. Also found in the leachate were PAHs which are common constituents of oils. In summary, the organic compounds found in the leachate are consistent with compounds commonly disposed of in the Burn Pit.

4.2.8 Clearwell

4.2.8.1 Historical Characterization the Clearwell

The Clearwell was a final settling basin for waste pit area effluent pumped to the Great Miami River. It was constructed in 1959 and was dredged once in the late 1960s or early 1970s.

On the north side of the Clearwell, a spillway was constructed to drain supernatant from Waste Pit 3. Historic photographs show a pipe connection between Waste Pit 5 and the Clearwell for Waste Pit 5 overflow. The Clearwell also received liquid wastes from other pits and surface water runoff from the waste pit area.

Because of the direct connection between the Clearwell and Waste Pits 3 and 5, soluble contaminants and suspended solids from major plant process waste streams are expected to be found in the Clearwell. As discussed in Section 1.0, liquids from neutralized slag leach slurry, neutralized raffinate, and general sump sludge originated from both of these pits. Waste Pit 3 was also used for the disposal of trailer cake and depleted magnesium fluoride slag. Other wastes disposed in Waste Pit 3 and discussed in Section 4.2.3.1 included water treatment sludge, a source of calcium; dust collector residues, a source of arsenic, barium, cadmium, chromium, and silver; and flyash from coal-fired boilers, a source of PAHs. Contents of these secondary waste streams, once mixed with the primary waste stream slurries, had the potential to reach the Clearwell, settle, and be deposited in the Clearwell sediments.

Clearwell contaminant sources also included the pumping of water between pits, surface water runoff, and the movement of soil and pit material within the entire waste pit area. Historical records show that contaminated rain water from the Burn Pit was pumped into Waste Pit 3 with a portable pump; effluent from Waste Pit 3 could then flow over the spillway and into the Clearwell. Water which had collected in Waste Pit 4 was routinely pumped directly to the Clearwell. In the early 1970's, Operable Unit 1 drainage patterns were changed to channel surface waters from Waste Pits 1, 2, and 3 to flow into Waste Pit 4 and the Clearwell. Surface water from Waste Pit 4 was pumped into Waste Pit 5 to settle suspended solids during the drainage change; overflow from Waste Pit 5 went directly to the Clearwell. Plant records show Waste Pit 4 received depleted uranium residues, low-grade thorium residues, contaminated ceramics, and general refuse. As part of the closure process for Waste Pit 3, soil from Waste Pits 1 and 2 was pushed into Waste Pit 3 when Waste Pit 3 could no longer be used

4783

as a settling basin. Displaced liquids in contact with this material would have been sent to the Clearwell (Parsons 1993).

Basically, because of its direct connection to Waste Pits 3 and 5 and the movement of liquids between pits, the Clearwell was the final repository of residue from all process and production wastes which did not settle in any of the other pits. Its primary constituents were liquid wastes from Waste Pits 3 and 5, but it had the potential to contain wastes from Waste Pits 1, 2, 4, and the Burn Pit. Based on process knowledge, the contaminant profile in the Clearwell should resemble the profiles for Waste Pits 3 and 5 with contaminants from other pits present at lower levels. This profile agrees with the analytical results.

4.2.8.2 Sample Physical Description of the Clearwell

Visual classification of soils was not performed because the Clearwell was sampled with a stainless steel ponar dredge during the CIS and a clamshell crane during the 1992 RI/FS treatability study. Clearwell sediments are expected to be less heterogeneous and finer than material in other pits because the Clearwell was the final settling basin.

4.2.8.3 Geophysical Characterization of the Clearwell

Since the Clearwell is a "wet" pit, no geophysical characterization was performed.

4.2.8.4 Radiological Characterization of the Clearwell

Waste Material

Four samples were collected from Clearwell sediment during the CIS, and six Clearwell sediment samples were collected during the 1992 RI/FS. Results are presented in Appendix A.8. Tables 4-4 and 4-5 (Figures 4-11 and 4-12) present statistical summaries of CIS and RI/FS pit material radiological data. Radiological results are consistent with disposal activities discussed in the historical characterization.

The radiological profile for the Clearwell is presented in Table 4-1.8.A.

Consistent with its use as an overflow settling basin for Waste Pit 5, CIS results indicate that the Clearwell had elevated levels of Cs-137 (450 pCi/g), Sr-90 (26 pCi/g), Tc-99 (278 pCi/g), Th-230 (5,600 pCi/g), and U-238 (670 pCi/g). The enrichment level of uranium in the Clearwell, on average, is consistent with unenriched uranium which has been mixed with processed or recycled material. The Clearwell also contains elevated levels of two radionuclides in the thorium decay series, Th-232 (39 pCi/g) and Th-228 (56 pCi/g).

420

Results for the 1992 RI/FS are comparable to the CIS. Levels of Cs-137, Ra-226, Ruthenium (Ru)-106, Th-228, Sr-90, and Tc-99 in the Clearwell are similar to levels found in Waste Pit 5. Average concentrations of all radiological parameters in the Clearwell are less than those detected for the same analytes in Waste Pit 3. Average Th-230 (142 pCi/g) and Th-232 (5.3 pCi/g) concentrations were less than those found in the other pits. Uranium-238 concentrations (812 pCi/g) were higher than those detected for Waste Pit 5 (588 pCi/g) and the Burn Pit (53 pCi/g) but not as high as average levels in other pits (15,000 pCi/g in Waste Pit 6).

Surface Water

Two Clearwell surface water samples were collected as part of the CIS. A statistical summary of results is shown in Table 4-13. Uranium-238 (5,800 pCi/L), U-234 (1,900 pCi/L), and U-235 (110 pCi/L) concentrations are indicative of depleted uranium. Elevated concentrations of Ra-228 (12 pCi/L) and Tc-99 (3,005 pCi/L) were reported for both surface water samples collected under the CIS program.

4.2.8.5 Chemical Characterization of the Clearwell

Waste Material

Four sediment samples were collected in the Clearwell during the CIS. Six sediment samples were collected in the Clearwell during the 1992 RI/FS. Analytical results are consistent with disposal activities discussed in the historical characterization.

A review of CIS inorganic data presented in Tables 4-7 and 4-8 (Figures 4-13 and 4-14) shows that levels of arsenic, cobalt, and silver in the Clearwell were comparable to background soil concentrations in Table 4-2. Levels of iron and manganese were less than background soil levels. All other inorganic parameters measured from Clearwell sediment samples were above background levels. Concentrations of barium, copper, lead, mercury, and selenium were less than levels found in Waste Pits 3 and 5 but were comparable to or greater than levels of these analytes in the other pits. CIS samples were within RCRA established limits for corrosivity, reactivity, ignitability, and EP toxicity.

1992 RI/FS inorganic samples from the Clearwell show elevated levels of arsenic, chromium, vanadium, molybdenum, and lead. Lead is an end-product of the uranium decay series. Aluminum, calcium, magnesium, and iron concentrations were also above background levels which is consistent with expectations based on process knowledge.

CIS organic samples were analyzed for HSL volatiles, semivolatiles, and pesticides/PCBs (Table 4-9 and Figure 4-15). The 1992 RI/FS treatability study samples were analyzed for extended HSL organics; however, all organic sample results from the study were qualified rejected during data validation because sample holding times and preservation requirements were exceeded.

Multiple PAHs were detected in CIS pit material samples at levels up to 1,400 µg/kg. The total estimated quantity of PAHs in the Clearwell was calculated to be 32 kg (Table 4-1.8.C). None of these compounds were found in Waste Pit 5 samples, but some were found in Waste Pit 3 samples. The majority of these compounds were found in samples from Waste Pits 1, 2, 4, and the Burn Pit. Flyash in Waste Pit 3, contaminated rain water from the Burn Pit, and surface water from Waste Pit 4 may account for the presence of PAHs in the Clearwell. The average concentration of PAHs in the other pits was 200 to 400 µg/kg versus an average PAH concentration of 1,100 µg/kg in the Clearwell. 1991 RI/FS concentrations of PAHs in Waste Pits 1, 3, 4, and the Burn Pit (400 to 2600 µg/kg) are comparable to average CIS Clearwell PAH concentrations.

Samples from the Clearwell were not analyzed for dioxins and furans. Dioxins and furans were found in Waste Pits 1 through 4 and the Burn Pit. The historical characterization discussion has shown that liquid wastes and contaminated soil from these pits can be traced through to the Clearwell. Accounting for dilution from Waste Pits 5 and 6, levels of dioxins and furans in the Clearwell should be less than levels found in the other pits. Based on process knowledge, lack of dioxin and furan data for the Clearwell is a data limitation because the presence or absence of these compounds cannot be confirmed.

Three different PCBs were found in the Clearwell. PCB contamination may have come from Waste Pits 3 and 5; Aroclor 1248 and Aroclor 1254 were detected in these pits and the Clearwell. The total estimated quantity of PCB in the Clearwell was estimated to be 2 kg (Table 4-1.8.C). Average Waste Pits 3 and 5 PCB concentrations were 1200 to 2100 µg/kg versus average Clearwell PCB concentrations of approximately 300 µg/kg. Aroclor 1242 was detected in the Clearwell at an average concentration of 180 µg/kg but not found in Waste Pits 3 or 5. However, it was detected in Waste Pit 4 at an average concentration of 640 µg/kg. Waste Pit 4 surface water disposal and overflow from Waste Pits 3 and 5 may account for the presence of PCBs.

An average concentration of 6100 µg/kg of 2,4,5-trichlorophenol was found in the Clearwell but none was detected in any of the other waste pits. The origin of the 2,4,5,-trichlorophenol is unknown. Other phenolic compounds, such as pentachlorophenol, 2-chlorophenol, and 2,4-dinitrophenol were detected in Waste Pits 2, 4, and the Burn Pit at levels up to 13,000 µg/kg. Average acetone concentrations in the Clearwell (1600 µg/kg) were less than concentrations in Waste Pit 5 (2800 µg/kg) but greater than acetone concentrations in the other pits.

Surface Water

During the CIS, two surface water samples were collected from the Clearwell and analyzed for HSL inorganic and general chemistry parameters. Data are summarized in Table 4-14. High average concentrations of the following analytes were reported: chlorides, calcium, magnesium, and sodium.

422

Clearwell average concentrations of arsenic, barium, calcium, copper, lead, magnesium, manganese, and molybdenum were above average background abundance levels.

CIS organic data, summarized in Table 4-15, reported low levels of acetone, methylene chloride, di-n-butyl phthalate, and bis(2-ethylhexyl) phthalate. Chloroform and 2-nitrophenol were also reported at values near the detection limit.

Leachate

Eight sediment samples collected during the 1992 RI/FS treatability study sampling program were extracted using the TCLP method and analyzed for extended HSL volatiles and semivolatiles. Results were rejected during data validation because sample holding times exceeded EPA CLP requirements.

4.2.8.6 Characterization Summary of the Clearwell

The Clearwell served as a final settling basin for effluent from the waste pit area, before it could be pumped to the Great Miami River. Supernatant liquids from Waste Pits 3 and 5 were directed to it, by direct connections. It also received liquids from other pits and local surface water runoff. Because of these interrelations with all of the waste area pits, the Clearwell acted as a repository of residues from all processes and production wastes which did not settle out elsewhere. Thus, the contaminant profile of the Clearwell should be expected to resemble those of Pits 3 and 5, but with contaminants from all other pits at lower levels. This expectation was borne out by the analytical results.

The Clearwell is still an open liquid pit, with sludge which has accumulated at the bottom on the liner. Sludge samples were taken for radiological characterization in both the CIS and RI/FS sampling programs. Elevated levels were found for Cs-137, Sr-90, Ru-106, and Tc-99, as well as U-238, Th-230, and Ra-226 from the uranium series, and Th-232 and Th-228 from the thorium series. The isotopic ratio for uranium is consistent with unenriched material which has been mixed with been processed or recycled material. The radiological concentrations are less than for the same nuclides in Pit 3, but U-238 is higher than in Pit 5 or the Burn Pit, while lower than in Pit 6.

4788

Analysis of the water covering the surface of the Clearwell shows U-238, U-235, and U-234 in a ratio indicative of depleted uranium. Elevated amounts of Ra-228 and Tc-99 were also found in the surface water.

The results of chemical analysis of the sediment are consistent with historical activities at the site. CIS samples were within RCRA limits for corrosivity, reactivity, ignitability, and EP toxicity. Elevated levels of inorganic constituents found in the studies included barium, copper, lead, mercury, selenium, arsenic, chromium, vanadium, and molybdenum. Aluminum, calcium, magnesium, and iron were also above background levels, as would be expected.

PAHs were detected in the pit material. PCBs were also found, along with phenolic compounds. All of these materials occur in one or more of the other pits, so it is not unexpected that they would be detected in the Clearwell.

The surface water of the Clearwell was found to contain high levels of chlorides, calcium, magnesium, and sodium. Other inorganics which were above background levels included arsenic, barium, copper, lead, manganese, and molybdenum. Organic data disclose low levels of acetone, methylene chloride, di-n-butyl phthalate, and bis(2-ethylhexyl)phthalate. As before, all of these materials have been found in one or more of the other waste pits, so their occurrence in the Clearwell is understandable.

4.3 SURFACE AND SUBSURFACE SOIL

Radiological and chemical constituents in the surface and vadose zone (subsurface) soil have been characterized as part of the CIS, RI/FS, and Waste Pit Area-Stormwater Runoff Control Removal Action environmental investigations. Characterization results are addressed in the following sections.

4.3.1 Surface Soil

Radiological and chemical constituents in the surface soil, which is defined as the soil layer from 0 to 24 inches below grade, were investigated as part of the CIS, RI/FS, and Waste Pit Area-Stormwater Runoff Control Removal Action environmental investigations. CIS efforts consisted of FIDLER (Field Instrument for Detection of Low Energy Radiation) surveys, Geiger Mueller beta-gamma dose rate measurements, on-site gamma spectrometry analyses, and off-site radiochemical analyses. The RI/FS investigation of surface soil included radiological analysis of surface soil samples collected from the north and north-west portions of Operable Unit 1, as well as surface soil samples collected during installation of monitoring wells throughout the Operable Unit area. The Waste Pit Area-Stormwater Runoff Control Removal Action also collected and analyzed surface soil samples to characterize the concentrations of HSL constituents prior to and during the storm water removal action. Details of these investigations and the results are discussed below.

424

4.3.1.1 CIS FIDLER and Geiger Mueller Beta-Gamma Dose Rate Measurements

FIDLER Measurements

During the course of the CIS, FIDLER surveys were performed throughout Operable Unit 1, with the exception of areas covered by water (e.g., Waste Pit 5 and 6 and the Clearwell). A FIDLER survey instrument detects low energy gamma radiation (approximately 10 Kev) such as that emitted by U-238. The instrument is capable of detecting low levels of uranium (i.e., as low as 35 pCi/g) in the upper 2 inches of surface soil. Survey methods are presented in Section 2.0.

The response of the FIDLER to radioactivity in soil is site-specific and governed by several variables. FIDLER measurements represent approximations of the activity concentration of U-238 in surface soil appropriate for generalized interpretation in locating areas for soil sampling. The principal purpose of the FIDLER surveys was to provide a screening mechanism for the distribution of surface deposits of radioactivity. Also the FIDLER measurements would determine a count rate that, when correlated to the concentration of U-238 in the upper 2 inches of soil, would guide the soil sampling to locations where U-238 concentrations exceeded 35 pCi/g.

Figure 4-26 shows FIDLER measurement contours within the boundaries of Operable Unit 1. The distribution of radioactivity in surface deposits, as revealed by the FIDLER measurement, indicate a wide area distribution of surface radioactivity near the south end of Waste Pit 2 and along a roadway between Waste Pits 4 and 6. There are several areas with localized anomalous radioactivity. These appear in two places along the western edge of the Waste Pit 1 cover and one place near the eastern edge of the same pit. One anomaly lies near the northwestern edge of Waste Pit 2 and extends to the southeastern edge of Waste Pit 3. Three anomalies lie along a line extending southwest to northeast on the Waste Pit 3 cover. On the cover of Waste Pit 4, one localized anomaly lies near the southwestern edge and extends toward the Burn Pit. A second anomaly covers most of the southeastern corner of Waste Pit 4.

Geiger Mueller Beta-Gamma Dose Rate Measurements

Beta-gamma dose rate measurements were taken with the HP-210T Geiger Mueller detector. The beta-gamma dose rate measurements were used to provide supplemental radiation data to verify the presence of anomalous radiation determination during the FIDLER grid measurements.

As shown in Figure 4-27, the highest Geiger-Mueller dose rate of approximately 35 mrad/hr was found near the southwestern perimeter of Waste Pit 6. Soil samples from this location contained elevated concentrations of uranium. The surveys also indicate anomalous dose rates on the covers of Waste Pits 3 and 4 and at several locations immediately east of the waste pit area. Radiological analysis results of soil samples collected at or near these locations indicated that uranium is the principal radionuclide.

425

4.3.1.2 Radiological Characterization

Surface soil samples collected within the boundaries of Operable Unit 1 were analyzed for radiological constituents during the CIS, RI/FS, and WPA-SRCRA programs. The complete laboratory results for the radiological analyses under the CIS, RI/FS, and Waste Pit Area-Stormwater Runoff Control Removal Action programs are presented in Appendix C. Details of these sampling programs and results are presented and discussed in the following sections.

CIS Program and Results

During the CIS program, a number of samples were collected at near-surface (0- to 2-inch and 2- to 6-inch) and intermediate (6- to 12-inch and 12- to 18-inch) depths below grade at locations where FIDLER count rate measurements correlated to field estimates of U-238 activity concentrations exceeding 35 pCi/g. In a few cases, deep (18- to 24-inch) samples were collected. Samples identified by the prefix SS (SS-series) were collected from 0 to 6 inches below the surface. Samples identified by the prefix SL (SL-series) were collected at depths greater than 6 inches (soil layers of 6- to 12-inches, 12- to 18-inches, and, in a few cases, 18- to 24-inches).

The 0- to 2-inch samples were taken to develop the field correlation of U-238 activity concentrations to FIDLER count rates. The 0- to 2-inch and 2- to 6-inch activity concentration results were mathematically composited to give a 0- to 6-inch sample interval for data presentation purposes. The samples were analyzed by an on-site gamma spectrometry laboratory and selected samples that showed elevated radionuclide concentrations were sent to a qualified off-site laboratory for radiochemical analysis. Radiological data collected from the on-site laboratory were used to assess the areal extent of radioactivity, to screen the samples for off-site radiochemical analysis, and to provide data needed to ship the samples chosen for radiochemical analysis off-site. Locations of the CIS surface soil sampling points by on-site gamma spectrometry are shown in Figure 2-8 of this report. Locations of the CIS surface soil sampling points for off-site radiochemistry analysis, as well as surface soil sampling points under other programs, are shown in Figure 2-9.

An on-site gamma spectrometry laboratory was used to determine the activity concentrations of gamma-ray emitting radioisotopes in the surface soil samples. These radioisotopes included U-238, Ra-226, Th-232, and Cs-137. Results from the on-site gamma spectrometry are summarized below:

- Several areas within the Operable Unit 1 boundary showed U-238 activity concentrations in the surface soils (0- to 6-inch layer) greater than 35 pCi/g. U-238 activity concentrations in the surface soils (0- to 6-inch layer), were elevated around the perimeter of Waste Pit 6 and east of Waste Pits 1 and 2.

- U-238 activity concentrations in the intermediate soils, i.e., 6- to 12-inch and 12- to 18-inch layers, decreased to below 35 pCi/g as a function of depth except at one location on the southwestern corner of Waste Pit 6. At the 18-inch depth, only three locations near the southeastern periphery of Waste Pit 1 have U-238 activity concentrations greater than 35 pCi/g.

- There is an association between elevated FIDLER readings and horizontal dipole apparent conductivity contours in the area south of Waste Pit 2 and east of the southeastern corner of Waste Pit 1.

- The areal extent of above background activity concentrations of Ra-226 in the surface soil (0- to 6-inch layer) is relatively small. Only one sample within the Operable Unit 1 boundary, located 50 feet east of Waste Pit 1, showed Ra-226 in excess of 15 pCi/g.

- Several areas have Ra-226 activity concentrations in the surface soils (0- to 6-inch layer) between 5 and 15 pCi/g. These areas correlate well with areas having significant activity concentrations of U-238 in the surface soils.

- Ra-226 activity concentrations drop significantly with depth. This correlates with the U-238 activity concentrations in the 6- to 12-inch and 12- to 18-inch layers.

- While the majority of the surface soils show Th-232 activity concentrations in the range of 1 to 5 pCi/g, several locations, including the periphery of Waste Pit 6 and east of Waste Pit 2, have Th-232 activity concentrations ranging from 5 to 15 pCi/g. These locations correlate with elevated U-238 activity areas.

- Several locations, including an area south of Waste Pit 6 and an area east of Waste Pit 2, have Th-232 activity concentrations exceeding 15 pCi/g.

- The area adjacent to the southern and eastern edges of Waste Pit 1 have detectable Th-232 activity concentrations in the 6- to 12-inch layer ranging from 5 to 15 pCi/g. A location south of Waste Pit 1 showed an activity concentration of Th-232 at 16 pCi/g, while U-238 was 133 pCi/g as measured by the on-site laboratory.

- One location south of Waste Pit 1 showed Th-232 activity concentrations in the 12- to 18-inch layer at 170 pCi/g. This result suggests the presence of elevated Th-232 at greater depths.

- Within the soil depth of 6- to 12-inches, locations where Cs-137 was observed correspond to locations with elevated U-238 activity concentrations.

Surface soil samples that showed elevated radionuclide concentrations from the on-site gamma spectroscopy laboratory were elected for radiochemical analysis by an off-site laboratory. Radiochemical parameters that were analyzed by the off-site radiochemical laboratory included the isotopes of uranium, thorium, and plutonium, as well as the specific radionuclides Sr-90, Tc-99, and Np-237. As shown on Figure 2-9, more than 30 soil samples collected and analyzed for radiochemical parameters during the CIS program were located within and near the boundaries of Operable Unit 1. Upon completion of validation, surface soil samples that contain useable results were reported in Table 4-16.

A number of samples from the area surrounding Waste Pit 6 were subject to radiochemical analysis. This area has some of the highest FIDLER and beta-gamma dose rate measurements. North of Waste Pit 6, three samples contained depleted uranium and their U-238 activity concentrations ranged from

95 pCi/g (SS-46-446) to 238 pCi/g (SS-46-444). One sampling location (SS-46-623) located immediately east of Waste Pit 5 showed activity characteristic of the residue found in Waste Pit 5. The uranium was elevated, with the U-238 activity concentration at 157 pCi/g. Th-232 was detected at 281 pCi/g, and Tc-99 was detected at 58 pCi/g. Several samples were taken from the southern perimeter of Waste Pit 6. The uranium was characterized as depleted and had activity concentrations of U-238 ranging from approximately 15 pCi/g (SS-46-434) to 1500 pCi/g (SS-46-504).

U-238 activity concentrations were detected in the sampling locations throughout Operable Unit 1. Isopleths of U-238 activity concentrations detected in the CIS and RI/FS programs are presented in Figure 4-25.

Except for sampling locations SS-46-434 and SS-46-623, activity concentrations of thorium isotopes reported in Table 4-16 were low when compared to the uranium. Thorium-232 was detected at near or above background concentration in some of the sampling locations with useable results (Figure 4-28). The highest Th-232 activity concentration (31 pCi/g) occurred at sampling location SS-46-623. Other sampling locations that showed elevated Th-232 activity concentrations are located south of Waste Pit 6 and east of Waste Pit 4. Th-228 and Th-230 were also detected at these locations at activity concentrations exceeding background. A few of the sampling locations showed detectable Tc-99 activity concentrations. The highest Tc-99 activity concentration was measured at 58 pCi/g in sample SS-46-623 located just north of Pit 6. Sr-90 was also detected at 1.5 pCi/g in this location.

RI/FS Program and Results

For radiological characterization of surface soil by the RI/FS program, a total of 13 sets of analytical data were validated and reported in Table 4-17. Of those sampling points, 5 samples were collected and analyzed as a part of the RI/FS groundwater monitoring efforts and 8 samples were completed under the RI/FS surface soil sampling program. Sampling locations utilized during the RI/FS program which fell within Operable Unit 1 are presented in Figure 2-9.

Results of the surface soil radiological analyses indicate that uranium is the predominant radioactive constituent in the surface soils of Operable Unit 1. Uranium isotopes were detected at above background concentrations in all sampled locations within the Operable Unit 1 study area. Thorium and radium were also detected at above background concentrations in a comparatively limited number of sampling locations. The radiological contamination present in these surface soils could possibly have been caused by sporadic spills of waste material prior to disposal, overland storm water drainage flow, or airborne deposition from adjoining contaminant source areas.

Elevated U-234 and U-238 concentrations in the surface soil were detected at near or above background in all samples analyzed and accepted. Concentrations of U-234 and U-238 ranged from 1 to 28.5 pCi/g and 1.5 to 103.7 pCi/g, respectively. Concentrations of U-total were reported in the

range of 3 to 413.5 µg/g for the results accepted. The highest concentrations for uranium isotopes occurred at borings 1645, 1646, and 2643, located east of Waste Pit 4, between Waste Pits 4 and 6, and between Waste Pit 5 and the Burn Pit, respectively. The ratios of U-238/235 and U-238/234 cover a wide range and are indicative of the heterogeneous nature of the uranium contamination in the surface soil within the Operable Unit 1 study area.

Except for Boring 1025, Th-232 was not detected at above background concentration in the sampling locations with useable results. Th-230 was detected at near or above background concentrations in most sample locations. Activity concentrations of Th-230 ranged from 1.6 to 6.1 pCi/g. The highest concentrations were detected at sampling locations 005635 and 005638, located north of Waste Pit 6.

Ra-226 and Ra-228 were detected at above background concentrations in borings 1025 and 1646, located between Waste Pit 3 and 5 and Waste Pits 4 and 6, respectively. In addition, Sr-90 and Tc-99 were detected in insignificant concentrations in some of the sampling locations with acceptable results.

4.3.1.3 Chemical Characterization

Chemical contamination, i.e. organic and inorganic hazardous substance, in the surface soils within the Operable Unit 1 boundary is characterized under the Waste Pit Area-Stormwater Runoff Control Removal Action program. Results of chemical characterization are discussed below.

Waste Pit Area Stormwater Runoff Control Removal Action Program and Results

As a part of the Stormwater Runoff Control Removal Action, a total of 16 surface soil samples that were collected from 0 to 6 inches below the surface were analyzed for HSL constituents. The analytical results are summarized in Table 4-18 for inorganic constituents and Table 4-19 for organic constituents.

A review of the inorganic data indicate that antimony, calcium, cadmium, magnesium, molybdenum, silver, and sodium are consistently above background levels in the surface soils. Sampling locations WPA-3 and WPA-4, located west of Waste Pit 5, showed elevated metal concentrations in the surface soils. Sampling locations WPA-9 and WPA-13, located south of Clearwell and Waste Pit 1, respectively, also showed elevated metal concentrations. In addition, results of samples from WPA-16 and WPA-38 which are located far south of Waste Pit 2 and far north of Waste Pit 6, respectively, indicated that elevated concentrations of the aforementioned metals and other metals exist.

Analyses of volatile organics and semivolatile organics were performed in the Waste Pit Area-Stormwater Runoff Control Removal Action program, but data were not available for evaluation. Pesticides were detected at very low levels in the surface soil sample WPA-2, located at the northwest corner of the Operable Unit 1 area. It has been reported that pesticides/herbicides were used in the

waste pits for control of insects and weeds. The pesticides that were detected in the surface soils may be resulted from spills, surface runoff, or residues from the past application of pesticides.

PCBs (Aroclor 1254 and Aroclor 1260) were detected in samples WPA-4, WPA-7, WPA-38, and WPA-43. These sampling locations are located east and west of the Operable Unit 1 area. PCBs were detected in the waste pit materials, due to the disposal of PCB-containing wastes. Therefore, similar to the pesticides, PCBs in the surface soils may be resulted from spills or indirect disposition mechanism, e.g., surface runoff.

4.3.2 Subsurface Soil

Radiological and chemical contamination in the subsurface soil zone, i.e., subsurface soil at depths below 24 inches from surface, were investigated as part of the RI/FS soil boring and groundwater monitoring programs. RI/FS investigation of subsurface soil contamination included radiological analysis of surface soil samples collected during installation of monitoring wells throughout the Operable Unit 1 area. Details of these investigations and results are discussed below.

4.3.2.1 Radiological Characterization

As part of the RI/FS program, subsurface soil samples within Operable Unit 1 were collected in distinct subsurface geological units during the installation of monitoring wells and soil borings. Subsurface soil sampling locations are shown in Figure 2-9. Upon completion of each boring, subsurface soil samples were submitted to the on-site gamma spectrometry laboratory for analysis of radiological constituents. Based on the radiological screening results, the subsurface soil samples with the highest counts from each geologic unit were submitted to an off-site laboratory for analysis of specific radiological parameters. Results of the off-site laboratory analysis are presented in Appendix C. Radiological constituents in the subsurface soil that were detected at above background concentrations are summarized in Table 4-20.

Based on the available site geologic information from subsurface boring logs Appendix C, geologic units in the Operable Unit 1 area can be generalized into four zones:

- Zone 1 - Glacial overburden, bottom depth at 31.5 feet to 37.5 feet below grade
- Zone 2 - Upper saturated sand and gravel layer (weathered sand and gravel above the clay interbed), bottom depth at 61 feet to 90 feet below grade
- Zone 3 - Lower saturated sand and gravel layer (unweathered sand and gravel below the clay interbed), bottom depth at approximately 120 feet below grade where clay interbed exists
- Zone 4 - Deep sand and gravel layer (sand and gravel below the clay interbed and above bedrock), bottom elevation at approximately 340 feet MSL where the bedrock formation was encountered

430

These zones were developed based on the knowledge of hydrogeologic characteristics of the subsurface conditions at the FEMP. Zone designation of the subsurface soil samples is determined by the USCS soil classification as described in the subsurface soil boring logs.

A total of 35 subsurface soil samples were collected in these zones. Twenty-five samples were obtained from Zone 1 and seven were obtained from Zone 2. Two samples were obtained from Zone 3 from Monitoring Wells 3004 and 3084. A sample from Zone 4 was obtained from Monitoring Well 4011.

Activity concentrations of U-238 that were detected at above background concentrations ranged from 2.12 to 4682 pCi/g in 13 subsurface soil samples in Zone 1 at depths ranging from 1.5 feet to 16.5 feet below grade. The highest activity concentration of U-238 (4682 pCi/g) was found at a depth interval of 1.5 feet to 3 feet in Boring 1644, located immediately southeast of the Burn Pit. In Boring 1973 located immediate north of Waste Pit 1, the U-238 activity concentration was 1404 pCi/g at a depth interval of 21.5 feet to 22.5 feet below grade. Other subsurface soil samples from Zone 1 showed much lower U-238 activity concentrations in the range of 2.12 pCi/g to 178 pCi/g. Samples from Borings 1944, 1643, and 1073 showed U-238 activity concentrations exceeding 100 pCi/g. Borings 1944 and 1643 are located in the center of the waste pit area and Boring 1073 is located immediately northwest of Waste Pit 1.

Figure 4-29 shows the distribution of U-238 in the subsurface soil of Zone 1 within Operable Unit 1. the depth interval for Zone 1 ranges from 1 to 38 feet below ground surface. Soils of the lower zones 2, 3, and 4 have negligible amounts of uranium to be plotted. As shown in the figure, the data do not exhibit any discernible trends worthy to be plotted as isoconcentration contours. The maximum concentration of U-238 was detected in Boring 1644 located between the Burn Pit and Pit 4. However, Boring 1944, located just a few feet away, does not exhibit high uranium concentrations. Therefore, the high uranium concentration in Boring 1644 is considered a localized hot spot with very limited extent. Also, a cluster of borings between the Burn Pit and Pit 5 exhibit relatively higher uranium concentrations. This area is within the pathway of a drainageway south of Pit 5. It is possible that contamination from Pit 5 and the Burn Pit have accumulated in this area over a period of time.

The uranium contamination may be attributed to spills during disposal of radiological waste materials, if at shallow depth, or horizontal and downward migration of pit contents, if at deeper intervals. The detected U-238 and U-234 activity concentrations represent the highest concentrations in the individual boring due to the sample collection scheme. Therefore, they should be regarded as localized points within Zone 1.

Thorium-232 was detected at above background activity concentrations in five subsurface soil samples in Zone 1. Activity concentrations of Th-232 ranged from 1.5 pCi/g to 761 pCi/g. The highest activity concentrations were 761 pCi/g detected 22.5 feet below grade in Boring 1973 located on the north border of Waste Pit 1, and 33.1 pCi/g at 135 feet below grade in Boring 1073 located on the south border of Waste Pit 3. The other three samples were collected between a depth of 3.0 to 4.5 feet below grade in Borings 1078, 1644, and 1028. Distribution of Th-232 activity concentrations in Zone 1 is significantly different from those for U-238 and U-234. This observation may be attributed to the characteristics of the radiological constituents.

Activity concentrations of Ra-226 were detected at above background concentration in six samples from Zone 1, ranging from 1.4 pCi/g to 1210 pCi/g. The highest activity concentrations for Ra-226 were 1210 pCi/g and 1180 pCi/g and were detected in Boring 1076 and Boring 1973, respectively. Sample from Boring 1076, located east of Waste Pit 2, was obtained from a depth interval of 16.5 feet to 18.0 feet below grade. The sample from Boring 1973 was obtained from a depth of 22.5 feet below grade on the northwest boundary of Waste Pit 1. The samples form Borings 1028, 1073, 1643, and 1644 indicate a wide distribution of Ra-226 within Operable Unit 1 area.

In addition to the four radionuclides discussed above, six less significant radionuclides, including Ra-228, Sr-90, Tc-99, Th-228, Th-230, and U-235/236, were detected at above their background concentrations in at least four samples from Zone 1.

In Zone 2, radiological constituents were detected at levels significantly lower than those in Zone 1. Three of the seven subsurface soil samples contain useable results for radionuclides detected at above background concentrations. A detection of 9.5 pCi/g for Ra-226 and 3.8 pCi/g for U-238 were reported from a sample obtained at a depth of 35.0 feet below grade in Boring 3004, located southwest corner of Waste Pit 3. The same sample also detected a concentration of 6.9 pCi/g for Sr-90 and 4.1 pCi/g for U-234. A sample obtained from a depth of 66.5 feet below grade in Boring 2028, located on the west boundary of Waste Pit 3, detected Sr-90 activity concentration at 1.03 pCi/g and U-234 activity concentration at 1.24 pCi/g. Thorium-230 was detected at a concentration of 3.1 pCi/g in a sample from Boring 3084, located in an area surrounded by Waste Pits 4, 5, and 6, at a depth of 61.5 feet below grade. No detections above background were reported for Ra-228, Tc-99, Th-228, Th-232, and U-235/236 in Zone 2. The radiological contamination in Zone 2 may be attributed by migration from the pit contents.

In Zone 3 and Zone 4, no radiological constituents were reported exceeding background concentrations in any of the samples analyzed.

432

4.3.2.2 Chemical Characterization

All of the subsurface soil samples were field screened for volatile organic compounds (VOCs) using an OVA. If VOCs were detected, the subsurface soil sample was submitted to an off-site laboratory for a full HSL analysis. Five samples were submitted for HSL organic analysis. Only one sample revealed the presence of some volatile organic compounds. Complete analytical data for the samples are presented in Appendix C.

The sample with detection of organic compounds was collected from Boring 1078, located between the Burn Pit and Waste Pit 5, at depth interval of 4.5 feet to 6.0 feet. The organic compounds detected included 2-butanone, acetone, and carbon disulfide at concentrations of 0.001 mg/kg, 0.016 mg/kg, and 0.004 mg/kg, respectively. 2-Butanone may be attributed by migration from pit contents. However, acetone and carbon disulfide are common laboratory chemicals and, therefore, may be detected in samples due to laboratory cross-contamination.

4.3.3 Soil Characterization Summary

The results of the surface soil radiological analyses by CIS and RI/FS programs indicate that uranium is the predominant radionuclide contaminant in the surface soils within Operable Unit 1. The radiological contamination detected in surface soils may be the result of sporadic spills of waste material prior to disposal, overland storm water drainage flow, or airborne deposition.

Uranium-238 occurs above background concentrations at all sample locations with useable data throughout the Operable Unit 1 study area. As shown in Figure 4-25, the isopleths of U-238 activity concentrations show a peak concentration of 1500 pCi/g south of Waste Pit 6 and east of Waste Pit 4. An area east of Waste Pit 2 shows a smaller peak of U-238 activity concentrations.

In addition, Th-232 activity concentrations were detected at concentrations much lower than those for U-238 and in sampling locations much fewer than locations with uranium isotopes. As can be seen in Figure 4-16, Th-232 activity concentrations were detected at scattered sampling points located mainly in the areas where U-238 activity concentrations were detected. However, the highest Th-232 activity concentration was found in a sampling location located immediately east of Waste Pit 5.

Surface soil chemical analyses indicate that antimony, calcium, cadmium, magnesium, molybdenum, silver, and sodium are the principal inorganic contaminants. By a limited number of samples, pesticides and PCBs were detected in the Waste Pit Area Stormwater Runoff Control Action sampling locations along the east and west boundaries of the Operable Unit 1. Chemical contaminants detected in the surface soils correspond to characteristics of waste materials in the adjacent waste pits. Similar to the radiological contamination, the chemical contamination may have been caused by sporadic spill of waste materials prior to disposal, storm water runoff from the pit areas, or airborne deposition from the waste pits or adjoining contaminant source areas.

Subsurface soil samples were analyzed for radiological constituents from four geologic zones in Operable Unit 1. The principal radiological contaminants in Zone 1 of the subsurface soils included Ra-226, Th-232, U-234, and U-238. Although detected at levels significantly lower than those in Zone 1, radiological contaminants detected in Zone 2 included Ra-226, Sr-90, Th-230, U-234, and U-238. No radiological constituents were reported exceeding background concentrations in any of the samples collected from Zone 3 and Zone 4.

The highest activity concentrations for uranium isotopes were detected at a depth interval of 1.5 feet to 3.0 feet below grade in an area immediately southeast of the Burn Pit and at a depth interval of 21.5 feet and 22.5 feet below grade in an area immediately north of Waste Pit 1. Other areas that revealed contaminated subsurface soil samples, although at much lower concentrations, include the center of the waste pit area and the area immediately northwest of Waste Pit 1. The highest activity concentrations of Th-232 were detected at an area immediately north of Waste Pit 1 at depths between 13.5 feet and 22.5 feet below grade. The highest activity concentrations for Ra-226 were detected in areas to the east of Waste Pit 2 and north of Waste Pit 1 at depths between 16.5 feet and 22.5 feet.

The uranium contamination in Zone 1 may be attributed to spills during disposal of radiological waste materials, if at shallow depth, or horizontal and downward migration of pit contents, if deep in the interval. Distribution of Th-232 and Ra-226 activity concentrations in Zone 1 is significantly different from those for U-238 and U-234. This observation may be attributed to the characteristics of the radiological constituents. Nevertheless, activity concentrations for radiological constituents represented the highest concentrations in the individual boring due to the sample collection scheme. Therefore, they should only be regarded as localized points in the subsurface soils.

In Zone 2, radiological constituents were detected in an area southwest of Waste Pit 3, an area to the west of Waste Pit 3, and an area surrounded by Waste Pits 4, 5, and 6, at depth between 35.0 feet and 66.5 feet below grade. No detection above background were reported for Ra-228, Tc-99, Th-228, Th-232, and U-235/236 in Zone 2. The radiological contamination in Zone 2 may be attributed by migration from the pit contents.

Chemical Characterization

One sample revealed the presence of some volatile organic compounds at very low concentrations. The detected VOCs may be attributed to laboratory cross-contamination or migration from pit contents.

4.4 GROUNDWATER CHARACTERIZATION

Groundwater samples were collected from four groundwater horizons within the Operable Unit 1 study area as part of the RI/FS and supporting RCRA investigations. This subsection discusses the data results of samples collected by the RI/FS quarterly sampling program from 1987 to 1992 and samples collected for the RCRA Groundwater Assessment quarterly sampling program from 1990 to the second

434

quarter of 1993, as discussed in Section 2.0. Within the Operable Unit 1 study area twenty-five 1000-series wells monitor perched groundwater within the glacial overburden in the Operable Unit 1 study area. Thirteen 2000-series wells monitor the upper water table zone of the regional aquifer above the clay layer. Eight 3000-series wells monitor the middle zone of the regional aquifer below the clay layer, and two 4000-series wells monitor the bottom zone of the regional aquifer above bedrock. The locations of the 1000-, 2000-, 3000-, and 4000-series wells within or near the Operable Unit 1 study area are presented on Figures 2-14, 2-15, 2-16, and 2-17, respectively, in Section 2.0. Figures 2-19 and 2-20 in Section 2.0 show the typical well construction schematics for each series of well.

Groundwater samples were analyzed for both radiological and chemical (inorganic and organic) parameters. The sample collection methods and analytical procedures are described in Section 2.0. Results of the groundwater radiological and chemical analyses and the dates each well was sampled are tabulated in Appendix B.2. Data summary Tables 4-21 through 4-32 present the analytical minimum, maximum, and average concentrations, and number of sampling rounds per well (count) for both the RI/FS and RCRA groundwater investigation programs.

Activity concentrations for the glacial overburden and Great Miami Aquifer wells which are upgradient from the FEMP property are very low, near the analytical detection limits for radionuclides. Therefore, any reported radionuclide detection is likely to be considered above background level. Table 4-2 presents the FEMP site-wide background UTL concentrations for radionuclides, inorganic analytes and general chemistry constituents for the perched and regional groundwater. There are no background levels for organic compounds, since they are not naturally occurring in the environment. For reasons of comparison, it should be noted that all nonradiological background data concentrations are presented in mg/L, whereas the environmental data is reported in µg/L for some constituents and mg/L for others. Average groundwater concentrations were compared to background UTL concentrations in order to differentiate site-induced constituents from those naturally occurring in the environment. This is most useful in the instance of inorganic chemical constituents, since most inorganics are naturally occurring at detectable concentrations in groundwater.

The FEMP site-wide groundwater characterization and the nature and extent of contamination of the perched zones and the Great Miami Aquifer will be fully evaluated in detail as part of the Operable Unit 5 Remedial Investigation (RI) Report, which is currently being conducted.

4.4.1 Groundwater within the Glacial Overburden

Water level data for the 1000-series wells (perched groundwater level data) collected during the RI/FS program are presented and discussed in detail in Section 3.0. Although the glacial overburden is composed of sand lenses separated by interbedded silts and clay, a certain amount of the interconnection is assumed for the purposes of groundwater contouring. Groundwater levels indicate

that the perched groundwater generally flows in a westerly and southwesterly direction, towards Paddy's Run. A mounding affect associated with the waste pit area, however, appears to direct the immediate flow radially away from the area (Figures 4-30 and 4-31). Waste Pits 5 and 6, which are lined with a synthetic membrane, do not exhibit this mounding affect.

Waste Pits 1, 2, 3, and 4 and the Burn Pit may be leaking. This is evidenced by the fact that the groundwater elevations outside and within these pits are approximately the same for the time periods monitored. Groundwater elevation data collected in May 1993 showed the following:

Well No.	Water Elevation (ft MSL)	Location
1770	583.15	In Waste Pit 3
1075	580.20	Between Waste Pit 3 and the Burn Pit
1776	581.70	In the Burn Pit
1022	581.14	Between the Burn Pit and Waste Pit 4
1775	579.88	In Waste Pit 4
1646	576.91	Between Waste Pit 4 and Waste Pit 6

Figure 4-30 depicts the perched groundwater elevations for May 1993. Waste Pits 1, 2, and 3 are not lined on the sides and the base is a natural clay liner. A clay liner was added to Waste Pit 4 on the bottom and the sides, but is only 1 to 2 feet thick. Additionally, the elevations of the bases of the waste pits are less than or equal to 560 feet MSL, which is at least 10 feet below the elevation of the groundwater outside the pits.

Waste Pits 5 and 6 have liners and do not appear to be leaking. Evidence of this is that the surface water in these pits is approximately 590 feet MSL and the elevations of the groundwater in the wells adjacent to these pits is less than 580 feet MSL; the 10 foot difference is considered significant.

Figure 4-31 depicts the perched groundwater elevations for the Autumn of 1991. The seasonal variations of the water levels are only a few feet in Waste Pits 1 through 4, but are up to 10 feet in the Burn Pit. The contents of Waste Pits 1 through 4 include mostly clay or clayey material. The Burn Pit, on the other hand, contains sand, gravel, rubbish and other debris. The difference in the permeabilities and hydraulic conductivities of the material may have contributed to the large differences in water levels noted in the Burn Pit between the Autumn of 1991 and May 1993 data. A dry summer in 1991 may have also contributed to the low water levels in the Burn Pit as well. With relatively little recharge, a significantly lower elevation was observed, indicating that the water may

have migrated from the more permeable sand of the Burn Pit more quickly than from other sections of the Waste Pit Area.

A maximum of twenty-five 1000-series wells were used to determine radiological and chemical concentrations in the perched groundwater within Operable Unit 1 for the RI/FS and the RCRA programs. Wells 1004 and 1072 were dry at the times of sampling, therefore, no samples were able to be retrieved from these wells. Also, the Fernald database indicates no samples were collected from Well 1077 as part of the RI/FS program.

4.4.1.1 Radiological Characterization

RI/FS Investigation Analyses

Uranium is the most widespread radioactive contaminant in the perched groundwater. Average concentration contours of total uranium detected in the perched groundwater within Operable Unit 1 are presented in Figure 4-32. Table 4-21 presents the RI/FS 1000-series well radionuclide data and the respective average, minimum and maximum concentrations per well, as well as, the number of samples collected per well (count) for the RI/FS program. The laboratory analytical results and the dates of the respective sampling rounds can be found in Appendix B.2.

The background concentration for total uranium calculated in perched groundwater in the vicinity of the FEMP is 1.23 µg/L. Average concentrations of total uranium in the RI/FS perched groundwater samples collected from wells located within Operable Unit 1 ranged from 0.75 to 11,000 µg/L. The maximum uranium concentration was found in samples collected from Well 1021, located near or within the southern border of Waste Pit 4. In addition, wells 1022, located near or within the eastern border of the Burn Pit, and 1019, located east of Waste Pit 4, showed total uranium concentrations ranging from 210 to 3800 µg/L. Well 1073, located on the northern boundary of Waste Pit 1 had an average total uranium concentration above 3600 µg/L. However, the boring log indicates that the installation of this well may have intersected the Waste Pit 1 waste material, thus, the reason for the high concentrations. In general, Waste Pit 4 appears to be the major contributor of uranium contamination to the perched groundwater zone.

The highest levels of radionuclide contamination present within the perched groundwater within Operable Unit 1 are in the local vicinity of Waste Pit 4 and the Burn Pit, as depicted conceptually in Figure 4-32. The uranium contamination distribution appears to be arranged, more or less, concentrically around Waste Pit 4 with radial flow resulting from mounding controlling the direction of contaminant migration. Also, an elevated area is found at Well 1073, located near or within the border of Waste Pit 1.

Among the four isotopes of uranium, U-238 and U-234 are dominant in the perched groundwater in the vicinity of Operable Unit 1. The observed U-238/U-234 ratios in the perched groundwater are consistently greater than one. Further, U-238/U-235 ratios in the perched groundwater samples are generally greater than 20. This confirms that uranium materials in the groundwater are natural to depleted, consistent with uranium materials contained in the waste pits.

Although confirmed to be present in the waste pits, Th-230 and Ra-226 are conspicuous by their low levels in wells containing elevated concentrations of uranium. Th-230 was detected in 16 of 23 wells and Ra-226 was detected in 8 of 25 wells. Their activity concentrations, however, were typically 2 to 3 orders of magnitude below U-238. Thus, it appears that one or more chemical interactions are preferentially mobilizing uranium in the waste pits.

Waste pit sampling efforts reported in Section 4.2 indicate elevated concentrations of tributyl phosphate in Waste Pits 1, 2 and 4, with the highest concentration reported in Waste Pit 4. Given that tributyl phosphate was the chemical used at the FEMP to extract uranium from raffinate slurry and that the highest measured concentration of uranium in groundwater occur in the vicinity of Waste Pit 4, which also contains the highest concentration of tributyl phosphate, it appears that tributyl phosphate may be complexed with uranium and enhancing its migration from the pit materials to the perched groundwater. In addition, the largest amounts of uranium, by far, were disposed of in Waste Pit 4 (Section 1.0). Thus, it appears that Waste Pit 4 is the primary contributor of uranium to the perched groundwater zone in the area. These data further support the contention that leachate from the waste pits have entered the perched groundwater system.

Tc-99 was detected in average concentrations above background in 12 of 23 wells. Activity concentrations in Well 1073, located near or within Waste Pit 3, were as high as 2805 pCi/L. Sr-90 average concentrations exceeded background in 4 wells, with the highest concentration detected in Well 1643, located north of the Burn Pit.

Other radiological constituents were detected infrequently and at levels near background.

RCRA Investigation Analyses

Twenty-five 1000-series wells were used to characterize the perched groundwater in the vicinity of Operable Unit 1 as part of the RCRA program. The RCRA sampling program included three wells that were not part of the RI/FS program, Wells 1008, located southeast of Operable Unit 1; 1029, located south of Operable Unit 1; 1077, located east of Waste Pit 2, and excluded Well 1028, located west of Waste Pit 3. Table 4-22 presents the RCRA 1000-series well radionuclide data summaries.

As expected, the results of the RCRA program closely reflect the results depicted by the RI/FS program. Again, uranium is the prominent constituent detected in the 1000-series wells. The results

of the average total uranium concentration seemingly follow the same pattern as seen in the RI/FS sampling. The only glaring exceptions are the results from Well 1021, located near or within the southern boundary of Waste Pit 4, and Well 1027, located east of Waste Pit 6. The average total uranium concentration for Well 1021, based on RCRA sampling, was 2,000 µg/L, whereas, the average total uranium concentration from the RI/FS data was 11,000 µg/L. Both concentrations are still the highest for either data set. The major difference in concentrations may be based on the fact that the RCRA samples were collected 1 to 2 years after the majority of the RI/FS samples were collected. This could indicate a decrease of contamination in this well over time, and the migration of the contamination elsewhere. On the other hand, the average total uranium concentrations in Well 1027, located east of Waste Pit 6 (and also the farthest 1000-series well east of the waste pit area) was inversely affected over time. The RI/FS analyses for this well was 0.75 µg/L, whereas, the RCRA data indicated a concentration of 320 µg/L. These data seem to depict an eastward moving trend that may be emanating from Waste Pit 4, based on perched groundwater flow direction. Sampling of Well 1027 during the RI/FS program started in 1987 and ended in 1989, whereas, the RCRA samples were collected from 1990 to 1993, indicating increased contamination over time.

For the most part, thorium and Tc-99 concentrations have decreased over time (from RI/FS sampling dates to RCRA sampling dates) and radium concentrations have remained fairly stable for all 1000-series wells.

4.4.1.2 Chemical Characterization

Inorganic Characterization

RI/FS and RCRA 1000-series well average inorganic concentrations and ranges, as well as number of rounds sampled (count), are presented in Tables 4-23 and 4-24, respectively. Inorganic analytical data for the RI/FS and RCRA perched groundwater samples are presented in Appendix B.2.

RI/FS Investigation Analyses

All 26 metals with reportable background concentrations had average concentrations above their respective background levels in at least one well sample. Background concentrations of hexavalent chromium, osmium, and tin were not available for comparison based on the lack of background data. These constituents were sampled infrequently and were not detected at significant concentrations. Calcium and magnesium were the most predominant inorganic constituents in the perched groundwater. This finding is not unexpected since calcium is the main constituent of lime used to neutralize the raffinate generated by the uranium process and magnesium is a constituent of MgF_2, which was generated by the uranium processing as slag (Section 4.2). Both lime and MgF_2 have been heavily disposed of in all the waste pits. The analyte boron was sampled infrequently, but detected in Well 1645 at 645 µg/L. Antimony was exceeded above background in four wells (1076, 1078, 1643, and 1645). The wells that had the greatest number of inorganics above background levels were 1075,

1645, 1643, 1025 and 1644. Wells 1075, 1643, and 1644 are located in the vicinity of Waste Pit 3 and the Burn Pit, Well 1645 is located southeast of Waste Pit 4, and Well 1025 is located between Waste Pit 3 and Waste Pit 5. Vanadium was exceeded in the most number of wells (15). Manganese was next with 13 wells having exceeded background concentrations. Nickel background concentrations were was exceeded in 12 wells.

The inorganic constituents detected in the pit waste material and leachate samples are very similar to those detected in the majority of the perched groundwater samples. The prominent inorganics calcium, manganese, magnesium, beryllium, lead, cadmium, copper, selenium, molybdenum, nickel and vanadium are consistently elevated in both the perched groundwater samples and the pit waste material and leachate samples (Section 4.2). This direct correlation indicates that the pits are the probable source of the elevated inorganic concentrations in the perched groundwater within Operable Unit 1. Based on the direction of the perched groundwater flow (Figures 4-30 and 4-31) influencing the majority of the contaminated well locations, and the fact that the Waste Pit 3 waste material had the most elevated concentrations of the above mentioned analytes, Waste Pit 3 may be the primary contributor of inorganic contaminants to the perched groundwater zone within Operable Unit 1.

A good indication of this is seen in the instance of vanadium, which can be assumed to be a representative inorganic indicator constituent of the waste pit material, due to its presence within the raffinates from the ore concentrates that were disposed of in the pits (Section 4.2).

The highest average concentrations of vanadium appeared in Wells 1081 (270 µg/L), 1083 (160 µg/L), 1643 (53 µg/L), and 1645 (44 µg/L). All four of these wells are located directly downgradient of the influence of Waste Pit 3. In addition, Waste Pit 3's waste material and leachate contained very high concentrations of vanadium, as discussed in Section 4.2.

RCRA Investigation Analyses

The RCRA inorganic analyses overall showed much lower concentrations of the prominent RI/FS analytes, and at lower frequencies. It should be noted that the RCRA inorganic results were recorded in mg/L, as opposed to the RI/FS inorganic data, which were recorded in µg/L. Calcium and magnesium were still the most prevalent inorganics detected above background concentrations. The dissolved (filtered) inorganic analyses results versus the suspended (unfiltered) inorganic analyses results are very similar. This would indicate that the majority of the inorganics in the perched groundwater system are present in the dissolved and more mobile phase. Calcium concentrations were exceeded in 15 of 21 1000-series RCRA wells, and magnesium was exceeded in all 21 RCRA wells. Vanadium and manganese were the two most prominent heavy metals detected in the RCRA analyses. Vanadium exceeded background in 14 wells and manganese was exceeded in 17 of the 21 wells. The remaining prominent RI/FS heavy metals were exceeded in less than half the wells. The analytes selenium, mercury, and silver were not detected above background in any of the RCRA wells. The

RCRA wells that had the most exceedences of the prominent RI/FS analytes were 1025, located north of Waste Pit 3 (8 analytes), 1021 (8 analytes), 1077 (7 analytes), and 1008, located south of the Operable Unit 1 boundary (13 analytes).

It appears that the inorganic contamination has moved eastward over time, as the majority of the RI/FS inorganic contamination is located in the western portion of the area, near Waste Pit 3, and the RCRA data indicates that the eastern portion of the area is the most inorganically contaminated. The direction of perched groundwater flow emanating from Waste Pit 3 would seem to confirm the assumption that Waste Pit 3 is the primary source of the inorganic contamination in the perched groundwater. To further support this assumption, as previously discussed in Section 1.0, Waste Pit 3 received the greatest amount of inorganic waste material.

Organic Characterization

Organic analytical data for the RI/FS and RCRA perched groundwater samples are presented in Appendix B.2. RI/FS and RCRA 1000-series well organic concentrations are summarized in Tables 4-25 and 4-26, respectively.

RI/FS Investigation Analyses

Organic data for the perched groundwater indicate that organic contamination of the glacial overburden is not as significant a concern when compared to radiological or inorganic contamination. Twenty-six organic constituents were detected in 1000-series well samples. Table 4-25 presents the 1000-series well summary of organic compounds detected and their respective average, minimum and maximum concentrations, as well as, the number of samples collected per well (count). Of the twenty-five 1000-series wells which were analyzed for organic parameters, only Well 1031 (19 detected compounds) located southwest of Waste Pit 1, and hydraulically downgradient of Waste Pit 1, showed significant organic contamination. Most other 1000-Series wells displayed a few organic compounds at low concentrations. The most prominent organic compounds detected in Well 1031 were trichloroethene (540 µg/L), tetrachloroethene (260-290 µg/L), 1,2-dichloroethylene (120 µg/L), and 1,1-dichloroethane (30-31 µg/L). These compounds, which are constituents of solvents and degreasers used on site, were also detected in the Waste Pit 1 material and leachate samples. It would appear that Waste Pit 1 is a potential source of organic contamination to groundwater in the glacial overburden aquifer. (Figures 3-24 through 3-31 show cross sections, hydrographs, and isopleths relative to water elevation data and conceptualized figures.)

Other wells that detected the presence of organic contamination were Well 1073, (1,1-dichloroethane at 76 µg/L), which is located on the southeastern border of Waste Pit 3, and Well 1643, located south of Waste Pit 5 (chloroethane at 5-25 µg/L), and Well 1019, located east of Waste Pit 4 (1,1-dichloroethylene at 25 g/L).

RCRA Investigation Analyses

The RCRA organic data reflects the findings of the RI/FS data. Again, the only 1000-series well to show significant organic contamination is Well 1031. The prominent organic compounds detected with their maximum and average concentrations, respectively, are as follows: 1,1-dichloroethane (37.2 µg/L; 21 µg/L), 1,2-dichloroethene (total) (77.7 µg/L; 42 µg/L), tetrachloroethene (205 µg/L; 170 µg/L), trichloroethene (344 µg/L; 270 µg/L), and vinyl chloride (7 µg/L; 4.3 µg/L). The RCRA data show lower concentrations of the same compounds detected in the RI/FS data, possibly indicating vertical and/or horizontal migration away from the source area assumed to be Waste Pit 1.

Examples of other wells that revealed the presence of organic contaminants at significant concentrations above the minimum detection limit are 1019, located east of Waste Pit 4, (1,2-dichloroethene [total] at 14.5 µg/L), and 1644, located near or within the Burn Pit, (benzene at 4.6 µg/L).

4.4.2 Groundwater Within the Great Miami Aquifer

In 1985, Dames & Moore, under subcontract to NLO, Inc. installed six wells in the vicinity of the waste pit area as part of an investigation to identify the sources responsible for uranium contamination of three off-property wells (Dames & Moore, 1985). Three of these wells were installed at the top of the upper part of the Great Miami Aquifer (wells MW-19s [currently 2019], MW-21s [currently 2021] and MW-22s [currently 2022]) and three were installed in the mid- to lower portion of the aquifer (MW-1s [currently 3001], MW-1d [currently 4001] and MW-19d [currently 3019]). These wells were sampled and analyzed for total uranium. The results of the analyses indicated concentrations of uranium ranging from 2.1 to 15 µg/L in the shallow wells and 0.0 to 24.0 µg/L in the deeper wells located in the vicinity of Operable Unit 1. The findings indicated that above-background levels of uranium were detected in most of the FEMP on-site wells. As a result of these findings, the RI/FS groundwater program was initiated.

Thirteen 2000-series, eight 3000-series and two 4000-series wells were installed in the Great Miami Aquifer in the vicinity of Operable Unit 1 as part of the RI/FS investigation. One or more samples were collected from each well for radiological and chemical analyses. The samples were collected and analyzed per the methods discussed in Section 2.0. A site-wide detailed discussion of the radiological and chemical groundwater quality of the Great Miami Aquifer and the extent of contaminates will be presented in the Operable Unit 5 RI report. Tables 4-27, 4-29, and 4-31 present the radiological, inorganic and organic data summarizes, respectively, depicting the concentration average and ranges per constituent for each individual 2000-, 3000- and 4000-series well, as well as the number of sampling rounds per well (count) for the RI/FS data. Tables 4-28, 4-30, and 4-32 present the same information for the RCRA data. The dates of the individual sampling events and the laboratory analytical data are presented in Appendix B.2.

442

4.4.2.1 2000-Series Well Data

Eleven 2000-series wells for the RI/FS investigation and twelve 2000-series wells for RCRA analyses were used to characterize the nature of the upper regional aquifer within the vicinity of Operable Unit 1 to determine Operable Unit 1 impacts on the aquifer.

Radiological Characterization

Table 4-27 presents the RI/FS 2000-series well summary of radionuclides detected, including the respective average, minimum and maximum concentrations, as well as, the number of samples collected per well (count). Table 4-28 presents the same information for the RCRA 2000-series radionuclide data. Monitoring Wells 2004, 2011, 2019, 2021, 2022, 2027, 2028, 2084, 2643, 2648, and 2649 were used for RI/FS analyses and the same wells, plus 2008 and 2010, were used for RCRA analyses. Well 2028 was not sampled as part of the RCRA investigation. The Fernald database indicates that analyses for radionuclides were not conducted for wells 2821 and 2822, however, chemical analyses were performed for these two wells, depicting conceptual uranium distribution in the upper zone of the Great Miami Aquifer.

RI/FS Investigation Analyses

Uranium concentrations were elevated in all 2000-series wells. The highest concentrations of uranium-238 were detected in Wells 2021, 2027, and 2084. Total uranium concentrations followed the same pattern, as expected. The highest U-total concentration was detected in well 2021 at 78 µg/L, with Well 2027 having a maximum concentration of 46 µg/L and Well 2084 a maximum concentration of 32 µg/L. In addition, Well 2643, located south of Waste Pit 5 and north of the Burn Pit, had a maximum U-total concentration of 27.7 µg/L. Well 2021 was installed near or within the boundary of the Waste Pit 4 waste material, which may account for the elevated levels. Well 2027 is located northeast of Waste Pit 6, and Well 2084 is located between Waste Pits 4, 5, and 6. Figure 4-33 presents the average total uranium concentration contours for the 2000-series wells, depicting the conceptual uranium distribution in the upper zone of the Great Miami Aquifer.

The groundwater flow in the Great Miami Aquifer in the vicinity of Operable Unit 1 is generally in a easterly direction (Figures 3-37 to 3-40), which indicates that Waste Pit 4, and possibly the Burn Pit, may be the major source of the uranium contamination in wells 2027, 2084, 2643 and 2648. Also, the 1000-series wells 1021, 1084, and 1643, which are located adjacent to wells 2021, 2084 and 2643, were some of the most radiologically contaminated perched groundwater wells. Thus, it appears that there may be vertical migration of contamination from the glacial overburden to the regional aquifer below in this area.

In addition to uranium, other radionuclides were detected at low concentrations in the 2000-series wells and were not recurrent in most wells. These constituents are: Th-228 in Well 2028; Th-230 in

Wells 2084 and 2004; Ra-226 in wells 2084 and 2027; Ra-228 in wells 2084 and 2649; and Sr-90 in Wells 2004, 2021, and 2649.

Technetium-99 was detected in five 2000-series wells. These wells are located in the Burn Pit/Waste Pit 4 Area (Wells 2019, 2021, 2022, and 2648) and west of Waste Pit 3 (Well 2028). The highest concentrations were detected in Well 2021 (5510 pCi/L) and Well 2019 (3010 pCi/L). The elevated Tc-99 activity concentrations in Well 2019 correlate with those observed in Well 1019. However, the elevated Tc-99 activity concentration in Well 2021 does not correlate to the low levels detected at Well 1021. The detection of Tc-99 in Well 2021 may be attributable to the migration of the high concentrations of Tc-99 present in the area of Well 1073 west to the area of Well 2021, based on the easterly groundwater flow direction of the Great Miami Aquifer. However, no direct correlation between the concentration of Tc-99 in pit leachate and the concentration in the aquifer is apparent.

The occurrence of Tc-99 in 2000-series wells does not directly correlate to the observed distribution of uranium concentrations. Technetium-99 is very mobile in the environment would be expected to migrate as fast or faster than uranium, migrating at approximately the same rate as groundwater (Salter and Jacobs, 1982).

The majority of the radiological contamination present in the 2000-series wells appears to be localized in the east and northeast portion of the Operable Unit 1 in the vicinity of Waste Pits 4, 5, 6, and the Burn Pit. The total uranium concentration levels are relatively uniform in all the wells located in this area. Groundwater at this depth flows from west to east and the wells located west (upgradient) of the four source areas mentioned above contained significantly lower levels of radionuclides. It appears that one or more of these four source areas, in particular Waste Pit 4, based on 1000-series well data, may be the major contributors of radiological contamination to the upper zone of the Great Miami Aquifer.

RCRA Investigation Analyses

The RCRA radiological data for the 2000-series wells are consistent with what was seen in the RI/FS data. The highest total uranium concentrations were detected in Wells 2022 (35.1 µg/L) 2084 (30.4 µg/L) and 2648 (27 µg/L). All three of these wells are located concentrically around Waste Pit 4.

All other radionuclide concentrations were fairly reflective of the RI/FS data, with the exception of Tc-99. Technetium-99 average concentrations exceeded background in every RCRA well analyzed. The average Tc-99 concentrations in Well 2019, located east of Waste Pit 4, almost doubled from 1500 pCi/L (RI/FS) to 2900 pCi/L (RCRA). This may indicate an eastward migrating radionuclide contaminate plume of Tc-99 emanating from Waste Pit 4, or possibly Waste Pit 3. Waste Pit 3 waste material had very high concentrations of Tc-99 (Section 4.2).

443

Chemical Characterization

Thirteen RI/FS and 14 RCRA 2000-series wells were used to characterize the chemical contamination of the upper zone of the Great Miami Aquifer.

Inorganic Results

Inorganic analytical results for the RI/FS and RCRA 2000-series well samples are presented in Appendix B.2. The RI/FS and RCRA analytical inorganic data summaries are presented in Tables 4-29 and 4-30, respectively.

RI/FS Investigation Analyses

Fifteen principal inorganic constituents were detected above background concentrations in at least one 2000-series RI/FS well. These analytes are: aluminum, antimony, barium, calcium, nickel, selenium, manganese, beryllium, silver, copper, cadmium, chromium, magnesium, molybdenum, and vanadium. Magnesium (52,000-83,000 µg/L) is the most prominent inorganic constituent. It was detected above background concentrations in seven 3000-series RI/FS wells. Selenium concentrations (22-30 µg/L) exceeded background in 6 wells. Aluminum, barium, calcium, and manganese concentrations exceeded background in 5 wells, each. All other inorganic analytes mentioned above exceeded background concentrations in a comparatively limited number of wells.

Well 2649, located south of the Clearwell, had the most number of analytes detected above background concentrations with 12. Wells 2643, located between the Burn Pit and Waste Pit 5, and 2084, located north of Waste Pit 4, had above background concentrations of 9 and 8 analytes, respectively. Well 2648, located east of Waste Pit 4, showed elevated levels of 5 analytes. The remaining RI/FS 2000-series wells revealed a limited number of analytes above background levels. Thus, it is evident that the waste pits are acting as a source of inorganic contamination to the upper region of the Great Miami Aquifer. Based on the 1000-series well data, as well as the presence of elevated concentrations of inorganics in several wells located downgradient of Waste Pit 3, it appears that Waste Pit 3 may be leaching dissolved-phase inorganic contaminants into the aquifer, which are migrating eastward.

RCRA Investigation Analyses

Of the 14 RCRA wells sampled for inorganic parameters, aluminum and barium were detected above background concentrations in 10 and 12 wells, respectively. These two analytes were the most prevalent in the RCRA 2000-series data. Again, the dissolved and total inorganic data results appear to be consistent.

The maximum concentration for aluminum (1.7 mg/L) was detected in Well 2821, located south of Waste Pit 2; and the maximum concentrations of barium were detected in Well 2822, also located south of Waste Pit 2. Wells 2649, located south of Waste Pit 1, and 2084, located north of Waste Pit

4, had the most number of inorganic concentration exceedences above background, each with seven analytes.

Other wells that show a relatively high amount of exceeded analytes are Wells 2084, 2649, 2643 and 2027.

Additional inorganic constituents detected above background include calcium and beryllium (8 of 12 wells each). Also, molybdenum, vanadium, copper, manganese, nickel and magnesium were detected above background levels in a limited number of wells.

It appears that the majority of the inorganic contamination in the 2000-series RCRA wells is present in the eastern half of the area, which is similar to the RI/FS findings. The concentrations and numbers of inorganic constituents detected above background levels do appear, however, to have decreased over time.

Organic Results

Organic analytical results for the RI/FS and RCRA 2000-series well samples are presented in Appendix B.2. The RI/FS and RCRA organic data summaries are presented in Tables 4-31 and 4-32, respectively.

RI/FS Investigation Analyses

A limited number of organic constituents were detected in the 2000-series wells; such as acetone, aldrin, bis(2-ethylhexyl)phthalate, heptachlor, carbon disulfide, methylene chloride, 1,1,1-trichloroethane, toluene, 1,2-dichloroethylene and 1,1-dichloroethane. Samples from Wells 2021 and 2022, both located in the vicinity of the Burn Pit and Waste Pit 4, have shown concentrations of two to three organic constituents each. The presence of organic contamination in these wells, and their absence in the 1000-series wells in the same area may be attributed to the fact that the bottom of the Burn Pit is located below the perched groundwater level and is almost in direct contact with the Great Miami Aquifer. These organic compounds may have leached out from the bottom of the unlined Burn Pit, directly into regional aquifer, without affecting the perched zones in the area. Well 2649, located near Waste Pit 1 and the Clearwell, has detected concentrations of VOCs such as 1,1,1-trichloroethane and 1,1-dichloroethane. The remainder of the 2000-series wells show nondetectable to very low concentrations of organic contaminants. It appears that Waste Pit 1 may be a contributor of organic contamination to the upper zone of the Great Miami Aquifer in the vicinity of Well 2649, based on vertical migration of contamination from the perched zone (as seen in Well 1031) to the aquifer below.

RCRA Investigation Analyses

Similar to the RI/FS data, Well 2649 has detected concentrations of a number of volatile organics based on the RCRA data. The volatile organic compounds 1,1-dichloroethane (0.5-11 µg/L), 1,2-

dichloroethene (total) (0.5-8.3 µg/L) and trichloroethene (190-240 µg/L) were detected in this well. The remainder of the 2000-series wells show nondetectable to very low concentrations (near or estimated below detection limits) of organic compounds.

4.4.2.2 3000-Series Well Data

Eight RI/FS and ten RCRA 3000-series wells were used to characterize the radiological and chemical nature of the middle zone of the regional aquifer within the vicinity of Operable Unit 1.

Radionuclide Characterization

Appendix B.2 presents the RI/FS and RCRA radionuclide laboratory analytical data. Table 4-27 contains the RI/FS 3000-series well summary of radionuclides detected and their respective average, minimum and maximum concentrations, as well as, the number of samples collected per well (count). Table 4-28 presents the same information for the RCRA data.

RI/FS Investigation Analyses

Monitoring Wells 3001, 3003, 3004, 3005, 3011, 3019, and 3084 were sampled for radionuclides under the RI/FS program. The Fernald RI/FS database indicated that analyses for radionuclides were not conducted for Well 3821, however, chemical analyses were conducted on this well. Elevated uranium concentrations were detected in every 3000-series well, except Well 3011, which is located in the northwest corner of Operable Unit 1. This well could be considered upgradient of the waste pit areas, since groundwater flow is from the west to east in this area. Its companion well, 2011, also showed low uranium concentration, generally less than 1 µg/L. With the exception of uranium, no radionuclides were found at above background concentrations.

The highest levels of uranium occurred in wells 3084 and 3019, both located in the northeast corner of Operable Unit 1. Well 3084 exhibited a maximum total uranium concentration of 218 µg/L and Well 3019 had a maximum concentration of 56 µg/L. Figure 4-34 presents the average total uranium concentration contours for the 3000-series wells, depicting the conceptual uranium distribution in the middle zone of the Great Miami Aquifer. Wells 3003 and 3004 are located to the west and hydraulically upgradient of the waste pits, but yielded elevated average concentrations of total uranium ranging from 8.5 to 12 µg/L. Elevated uranium concentrations at these sites may be attributable to the interconnection of Paddy's Run to the aquifer, as discussed earlier in Section 3.4.2.3 of this report. Paddy's Run and the Great Miami Aquifer are interconnected in places where the glacial overburden has been completely or heavily eroded. In these spots, contaminated groundwater flowing in Paddy's Run would easily percolate or infiltrate into the aquifer. The percolated water would then flow eastward after reaching the water table and would result in contamination of wells such as 3003 and 3004.

In addition to total uranium, U-234 was detected above background in Wells 3001 (6.2 pCi/L) and 3004 (4.9 pCi/L). Uranium-238 was exceeded in Well 3001 (5.1 pCi/L) and total thorium was exceeded in Well 3004 (2.5 pCi/L).

It is apparent that the waste pits, in particular Waste Pit 4 are contributing radiological contaminants to the 3000-series horizon of the regional aquifer in the vicinity of Operable Unit 1. It is possible that the radial contaminant flow of uranium seen in the glacial overburden wells emanating from Waste Pit 4 has migrated vertically downward in the vicinity of Waste Pit 4 to contaminate the upper and middle zones of the Great Miami Aquifer in the area, as well. Based on the limited amount of data points in a localized area, it is not possible to fully delineate the contamination associated with the Great Miami Aquifer. The extent of contamination in the Great Miami Aquifer will be fully characterized and defined as part of the Operable Unit 5 RI.

RCRA Investigation Analyses

The RCRA analyses of the 3000-series groundwater samples show a marked increase in uranium concentrations as compared to the RI/FS data. Elevated uranium concentrations were found in six of the ten 3000-series RCRA wells sampled. Wells 3005, 3008, 3011, and 3043 all had total uranium concentrations below background. These wells are located upgradient or away from the general groundwater flow affected by the waste pit area.

Wells 3019 and 3084 had the highest average concentration of total uranium (830 µg/L and 5300 µg/L, respectively). Both of these wells are located near Waste Pit 4. These concentrations are one to two orders of magnitude higher, respectively, as compared to the RI/FS data for the same two wells. Wells 3001, 3003, 3004, and 3010 had elevated concentrations of total uranium ranging from 3.5 to 17 µg/L. Downgradient Well 3010, located near the former production area, had an average concentration of 10 µg/L.

Technetium-99 was found in elevated concentrations in every 3000-series RCRA well analyzed. This radionuclide was not detected in any RI/FS 3000-series wells. It appears that Tc-99 has migrated vertically over time in the area.

Wells 3019 and 3084 also had elevated average concentrations of total thorium (6.7 µg/L and 27 µg/L, respectively). In addition, Well 3019 had elevated average concentrations of U-234 (73 pCi/L) and U-235/236 (28 pCi/L). Well 3004 had elevated average concentrations of U-234 (6.7 pCi/L) and U-238 (5.3 pCi/L).

It appears that the radionuclide contamination present in the source areas within the Operable Unit 1 study area, in particular Waste Pit 4, is steadily migrating downward through the aquifer, as well as, horizontally over time.

Chemical Characterization

Eight 3000-series wells were used to characterize the chemical contamination of the middle zone of the Great Miami Aquifer for both the RI/FS and RCRA investigations.

Inorganic Results

The 3000-series well inorganic laboratory data are presented in Appendix B.2. Tables 4-29 and 4-30 present the inorganic data summaries for the RI/FS and RCRA wells, respectively.

RI/FS Investigation Analyses

Nine inorganic constituents were detected in average concentrations above background concentrations in at least one RI/FS 3000-series well. Selenium, detected in 6 wells with average concentrations ranging from 21 to 51 µg/L, was the most prominent inorganic. Manganese (540-2600 µg/L) and calcium (110,000-260,000 µg/L) were each exceeded in 3 wells. Other inorganics detected in less frequencies were barium, aluminum, vanadium, mercury, antimony, and magnesium.

Well 3084, located north of Waste Pit 4, had the most inorganics detected above background concentrations with seven. Well 3019, located east of Waste Pit 4, had the next highest number of exceedences with five analytes. Both of these wells are located in the same eastern proximity. All remaining RI/FS 3000-series wells had two or fewer analytes detected above background.

Similar to the RI/FS 2000-series well characterization, it appears that the majority of the inorganic contamination in the 3000-series horizon is located in the eastern portion of Operable Unit 1, near Waste Pit 4; however, the contamination possibly could have migrated from Waste Pit 3, based on the easterly groundwater flow regime of the aquifer.

RCRA Investigation Analyses

Six analytes were detected in average concentrations above background in the RCRA 3000-series wells, with barium and manganese being the most predominant. The dissolved phase data results were consistent with the suspended phase data results for most analytes. Barium concentrations were exceeded in 8 RCRA 3000-series wells with average concentrations ranging from 0.082 mg/L (Well 3005) to 0.31 mg/L (Well 3043, located west and upgradient of the area). Manganese concentrations (0.59-2.6 mg/L) exceeded background in 4 wells. Other inorganics that were detected above background levels are calcium and vanadium (3 wells each), aluminum (2 wells) and magnesium (1 well). Selenium, mercury, and antimony, which were detected above background concentrations in the RI/FS samples, were not detected above background as a result of the RCRA analyses. Well 3084 had the most number of elevated inorganics with seven. This is consistent with the RI/FS findings.

The elevated inorganic constituents and the area of most significant contamination is consistent in both the RI/FS and RCRA data. It would appear that the area of notable inorganic contamination is located

in the eastern portion of the area, possibly emanating from Waste Pit 3, as all four wells discussed above are located downgradient of this pit.

Organic Results

The RI/FS and RCRA 3000-series organic analytical results are presented in Appendix B.2. Tables 4-31 and 4-32 present the organic data summaries for the RI/FS and RCRA wells, respectively.

RI/FS Investigation Analyses

The 3000-series wells yielded a limited number of organic concentration detections. Well 3001, located southeast of Waste Pit 2, had maximum detected concentrations of acetone (37 µg/L), benzene (4 µg/L), 1,1-dichloroethane (5 µg/L), toluene (10 µg/L), tetrachloroethene (5 µg/L) and trichloroethene (5 µg/L). Well 3019, located east of Waste Pit 4, had detections of toluene (2.5-5 µg/L) and acetone (5.5 - 11µg/L). These two wells were the only wells to show organic compound detections. Both wells are located downgradient of the waste pit area. The definite source of this contamination at this depth interval can not be fully defined based on this limited amount of data. However, based on the detections of similar organic compounds in the 1000- and 2000-series wells, located in the same proximity downgradient of Waste Pit 1, as well as in the Waste Pit 1 material and leachate data, Waste Pit 1 may be assumed to be a potential source of this contamination.

RCRA Investigation Analyses

The results of the RCRA 3000-series organic analyses indicate the absence of the organic compounds detected in the RI/FS samplings. All organic chemical data were either very low (near or estimated below detection limits) or nondetect. The only exceptions to this are the detections of carbon disulfide at 0.5 to 27 µg/L in Well 3008, located southeast of Operable Unit 1, and at 0.5 to 16 µg/L in Well 3043, located west and upgradient of Operable Unit 1, near Paddy's Run Road. Chloroform detected at a maximum 22 µg/L in Well 3019 and acetone detected at 37.2 µg/L in Well 3084, were the only organic compounds detected within the waste pit area boundary.

It appears that the organic contamination seen in the RI/FS sampling may have migrated vertically and/or horizontally, away from the middle zone of the aquifer in the vicinity of the waste pit area.

4.4.2.3 4000-Series Well Data

Two 4000-series RI/FS and six RCRA wells were used to characterize the radiological and chemical nature of the bottom zone of the regional aquifer.

Radionuclide Characterization

Appendix B.2 presents the RI/FS and RCRA 4000-series radionuclide laboratory analytical results. Table 4-27 presents a summary of radionuclides detected in the RI/FS 4000-series wells and their

450

respective average, minimum and maximum concentrations, as well as, the number of samples collected per well (count). Table 4-28 presents the same information for the RCRA 4000-series wells.

RI/FS Investigation Analyses

Only Wells 4001 and 4011 were sampled under the RI/FS program. Groundwater flow in the lower portion of the Great Miami Aquifer is from west to east in the area (Section 3.4). Uranium-234 and U-238 were detected at concentrations of 2.45 pCi/L and 2.37 pCi/L, respectively, in Well 4011, located northwest of the pit areas (upgradient). These concentrations are near or below background levels. The only radiological constituent detected at Well 4001, located at the southeastern boundary of the waste pit area (downgradient), was Th-230 at 1.3 pCi/L, which is below background concentrations.

RCRA Investigation Analyses

Average total uranium concentrations were detected below background in Well 4011, located upgradient of the waste pit area, at 2.2 µg/L. The maximum concentration of total uranium was detected in Well 4101, located downgradient of the waste pit area, near the former production area, at 6.4 µg/L.

Other radionuclides detected above background concentration include Tc-99, which was exceeded in three wells with average ranges of 6.9 pCi/L (Well 4008) to 9.1 pCi/L (Well 4001). Strontium-90 (0.07-0.26 pCi/L) and total thorium (4.5 µg/L) were also detected above background levels. There are no discernable trends or specific source areas of radionuclide contamination in the lower zone of the Great Miami Aquifer, based on the RCRA data.

Chemical Characterization

Appendix B.2 presents the RI/FS and RCRA chemical analytical results for the 4000-series wells.

Inorganic Results

Tables 4-29 and 4-30 present the inorganic data summaries for the RI/FS and RCRA 4000-series well results, respectively.

RI/FS Investigation

Only four inorganic constituents were detected in average concentrations above background levels in the 4000-series wells. These analytes are barium (150 µg/L), molybdenum (23 µg/L) and silver (270 µg/L) in Well 4001. Zinc (760 µg/L) and barium (300 µg/L) were exceeded in Well 4011.
Well 4001 is located in the southeast portion of Operable Unit 1, and may be influenced by the waste pit areas, in particular Waste Pits 1, 2, and 3. Whereas, Well 4011 is located in the northwest corner of the area, upgradient of the influence of the waste pit areas. There are no clear identifiable source patterns present given the limited data points for the inorganics present in the 4000-series wells.

4783

RCRA Investigation Analyses

Five inorganic constituents were detected in average concentrations above background levels in the six 4000-series RCRA wells. Aluminum was detected in Well 4011, located upgradient of the waste pit area, at a concentration of 0.24 mg/L. Barium was detected in Wells 4001 (0.13 mg/L) and 4008 (0.11 mg/L). Beryllium was exceeded in all six wells, ranging from 0.004 to 0.008 mg/L. Vanadium was exceeded in Well 4011 at 0.028 mg/L and cobalt was exceeded in Well 4101 at 0.011 mg/L. There are no discernable source areas for inorganic contamination of the 4000-series wells based on the RCRA data. However, it does appear that the waste pit area has influenced the deep zone of the aquifer based on elevated downgradient well detections.

Organic Results

The 4000-series RI/FS and RCRA organic data summaries are presented in Tables 4-31 and 4-32, respectively.

RI/FS Investigation Analyses

Only four organic constituents were detected in low concentrations in the 4000-series wells samples. Trichloroethene (5 µg/L), tetrachloroethane (5 µg/L) and 1,1-dichloroethane (5 µg/L) were detected in Well 4001 near the detection limits and chlorobenzene was detected in Well 4011 at 5 µg/L. There is no indication of significant organic contamination in the 4000-series wells. However, since the majority of the organic contamination is present in the downgradient well (4001), it appears that the waste pit area is contributing organic contaminants to the deep zone of the Great Miami Aquifer. All three of the volatile organic compounds detected have a specific density greater than water, thus, would tend to sink to the bottom of the aquifer. Therefore, the detections in the deep horizon of the aquifer are not unexpected given these same compounds were detected in the shallower wells within the Great Miami Aquifer.

Due to the limited amount of data points for the 4000-series wells located within the Operable Unit 1 Study Area, it is not possible at this time to fully characterize the extent of contamination in the deep horizon of the Great Miami Aquifer. A detailed site-wide discussion of the nature and extent of contamination in the deep horizon of the Great Miami Aquifer will be conducted as part of the Operable Unit 5 RI report.

RCRA Investigation Analyses

Almost all organic compounds analyzed for in the RCRA 4000-series wells were either undetected or detected near or estimated below their respective minimum detection limits.

Acetone was the only significant volatile organic detection in Well 4011 at 38.9 µg/L. Because the RCRA data have not been validated, this common laboratory contaminate may not be indicative of the groundwater quality present in the lower zone of the Great Miami Aquifer. Bis(2-ethylhexyl)phthalate

452

was detected at 10.4 µg/L in Well 4001. Bis(2-ethylhexyl)phthalate is also a common laboratory contaminant (Section 4.2.0.5).

The volatile organic compounds detected in the RI/FS sampling were not detected in the RCRA samples, which may indicate migration from the area either horizontally and/or vertically into the bedrock, of the RI/FS organic compounds.

4.4.3 Groundwater Summary

Radionuclide Characterization

All of the 1000-series wells in the Operable Unit 1 area showed elevated concentrations of uranium for both the RI/FS and RCRA sampling. Most notable of these observations was the detection of 15,330 µg/L of total uranium, with an average concentration of 11,482 µg/L, in the RI/FS data for Well 1021, located on the south boundary of Waste Pit 4. Elevated levels of uranium isotopes were observed in wells located along the north and northwest boundaries of Waste Pit 4. For example, Wells 1082, 1084, and 1643 displayed peak U-238 activity concentrations. Correspondingly, the peak total uranium concentrations for wells in this area (1078, 1643, 1082, and 1084) were all greater than 100 µg/L. The observed U-238/U-239 ratios are consistently greater than one and the U-238/U-234 ratios are generally greater than 20 indicating the presence of depleted uranium ores.

A pattern of elevated uranium concentrations within the Operable Unit 1 perched groundwater appears to be centered on Waste Pit 4 and encompassing the Burn Pit. The wells with the highest average total uranium concentrations include 1078, 1643, 1022, 1073, 1075, 1644, 1021, 1019, 1082 and 1084, ranging from 71 to 11,482 µg/L.

The thorium and radium isotope activity levels within the glacial overburden groundwater system are present at much lower concentrations than those seen for uranium (less than 10 pCi/L for all isotopes, less than 15 µg/L for total thorium). Peak thorium isotope activity concentrations occurred in wells within the previously delineated Burn Pit/Waste Pit 4 area. Well 1021, on the southern boundary of Waste Pit 4 displayed the maximum activity concentrations of Th-228, and Well 1022, located between the Burn Pit and Waste Pit 4 had the peak detection of Th-232. The peak radium isotope concentrations of 4.2 pCi/L (Ra-226) and 4.6 pCi/L (Ra-228) were both observed in Well 1073, near Waste Pit 3.

Compared to the detections of uranium and thorium, the presence and distribution of strontium-90 was limited, with the maximum activity concentration recorded in Well 1643, located south of Waste Pit 5. There were no reportable detections of Cs-137, Ru-106, or plutonium isotopes (Pu-238, Pu-239/240). The zone of elevated radionuclides along the southeastern boundary of Waste Pit 5 would appear to be derived from contaminant migration from the Waste Pit 4, and possibly the Burn Pit.

In general, the Tc-99 activity levels appear to correlate with the uranium concentrations (i.e., elevated uranium activities were often associated with elevated Tc-99 activities), such as those Tc-99 levels observed for Wells 1073 (2805 pCi/L) and Well 1019 (1070 pCi/L). Wells along the western and northern portions of Operable Unit 1 displayed lower uranium concentrations than the Waste Pit 4/Burn Pit area; however, these wells contained elevated levels of Tc-99. Technetium-99 is more mobile than the other isotopes and could indicate the future distribution pattern of the other less mobile radionuclides in the groundwater.

The RCRA radionuclide sampling for the 1000-series wells closely reflect the trends seen in the RI/FS sampling. Well 1021 had the highest average total uranium concentration as well, but at a much lower concentration (2000 µg/L). In general, the RCRA radionuclide concentrations are much lower than those seen in the RI/FS data. This is probably due to the fact that the RCRA samples were collected 1 to 2 years after the majority of the RI/FS samples were collected. It appears that much of the radionuclide contamination is migrating, either vertically or horizontally, out of the perched groundwater zone in the vicinity of the waste pits.

The majority of the radiological contamination, mainly uranium isotopes, present in the 2000-series wells, based on RI/FS data, appears to be localized in the east and northeast portion of the Operable Unit 1, in particular, in the vicinity of Waste Pit 4, and to a lesser degree the Burn Pit. The total uranium concentration levels are relatively uniform in the wells located in this area. Groundwater at this depth flows from west to east. The wells located west of the primary source area (i.e., Waste Pit 4) contained significantly lower levels of radionuclides. It appears that these four source areas are the major contributors of radiological contamination to the upper horizon of the Great Miami Aquifer.

Mostly all of the RCRA 2000-series radionuclide data were fairly reflective of the RI/FS data, with the exception of Tc-99. Technetium-99 was detected above background concentrations in all RCRA 2000-series wells located within or near Operable Unit 1, with the highest concentrations downgradient of Waste Pits 4 and 5.

Elevated uranium concentrations were detected in every RI/FS 3000-series well sampled, except Well 3011, which is located in the northwest corner (upgradient of the waste pit area). The highest levels of total uranium occurred in wells 3084 (218 µg/L) and 3019 (56 µg/L), both located in the northeast (downgradient) part of the area, within the influence of Waste Pit 4.

The RCRA 3000-series well radionuclide data showed a marked increase over the RI/FS data. In particular concentrations of total uranium in Wells 3019 and 3084 rose by one to two orders of magnitude, respectively. Also, Tc-99 concentrations were exceeded in all RCRA wells, whereas, Tc-99 was not detected in the 3000-series RI/FS data.

It appears that a definite increase of contamination to the middle zone of the Great Miami Aquifer is occurring, possibly from vertical migration from the perched zones above in the vicinity of Waste Pit 4.

It is apparent that the waste pits are contributing radiological contaminants to the regional aquifer in the vicinity of Operable Unit 1. Uranium was detected below background levels in RI/FS Well 4011, located northwest of the waste pit area.

Due to the limited amount of data points on the 4000-series wells in the Operable Unit 1 Study Area, it is not possible to fully characterize the extent of radiological contaminants at this time. The nature and extent of contamination present within the Great Miami Aquifer will be fully characterized as part of the Operable Unit 5 RI.

The RCRA 4000-series data confirmed the RI/FS radiological results. Uranium concentrations were not of concern in the lower horizon of the aquifer within Operable Unit 1, however, Well 4101, located downgradient of the waste pits, near the former production area, showed an elevated concentration of total uranium at 6.4 µg/L. Technetium-99 concentrations were elevated in all six RCRA 4000-series wells.

Inorganic Characterization

Twenty-six inorganic analytes were detected at above background levels in the RI/FS 1000-series well data, most of which correlate to what was detected in the pit waste material and leachate samples. The following analytes were elevated in both the perched groundwater and the pit waste material and/or leachate samples: calcium, manganese, magnesium, beryllium, copper, lead, nickel, cadmium, selenium, molybdenum, and vanadium.

The RCRA 1000-series well inorganic analyses, overall, showed much lower concentrations of inorganics and at less frequencies. The predominant inorganic constituents detected above background concentrations in the RCRA wells were calcium, magnesium, manganese, and vanadium. It appears, based on the RCRA data, that a large portion of the inorganic contamination in the perched groundwater has moved eastward over time, possibly emanating from Waste Pit 3.

Fifteen inorganic constituents were detected at above background concentrations in at least one RI/FS sample collected from the 2000-series wells. These analytes include: antimony, barium, calcium, nickel, selenium, manganese, beryllium, silver, copper, aluminum, cadmium, chromium, magnesium, molybdenum, and vanadium. The wells that consistently showed elevated levels of these constituents are Wells 2649, 2643, 2084 and 2648. Most of the wells which exceeded background are located in the northeast section of the Operable Unit 1 study area. Since regional aquifer groundwater in the area

455

of the waste pits flows from west to east, it appears that the pits, in particular Waste Pit 3, are serving as a source of inorganic contamination to the Great Miami Aquifer.

The RCRA inorganic data indicated that the analytes aluminum and barium were the most prevalent inorganics in the 2000-series well data. Similar to the RI/FS findings, the majority of the contamination is present in the eastern half of the waste pit area.

Nine inorganic constituents were detected at above background concentrations in RI/FS samples collected from the 3000-series wells. These analytes include: aluminum, selenium, barium, antimony, calcium, magnesium, manganese, mercury, and vanadium. Similar to the 2000-series well characterization, it appears that the majority of the inorganic contamination in the 3000-series horizon is situated in the eastern portion of the site, possibly originating from Waste Pit 3 and migrating eastward.

The RCRA 3000-series well data showed elevated concentrations of the inorganics aluminum, calcium, barium, vanadium, magnesium, and manganese. The elevated RCRA constituents are similar to what was seen in the RI/FS data, with the area of highest inorganic contamination in the middle zone of the Great Miami Aquifer still located in the eastern portion of the area.

Only four inorganic constituents were detected above background concentrations in the RI/FS 4000-series well data; molybdenum, barium, silver, and zinc.

Five inorganic constituents; aluminum, barium, beryllium, vanadium and cobalt, were detected above background in the 4000-series RCRA wells.

Organic Characterization

Based on the RI/FS data, organic contamination in the 1000-series wells is limited. Well 1031, located downgradient of Waste Pit 1, was the only well to indicate significant organic contamination in the glacial overburden. The organic compounds trichloroethene, tetrachloroethene, 1,1-dichloroethane, 1,2-dichloroethylene and vinyl chloride were detected in this well. These same compounds were also detected in the Waste Pit 1 material and leachate samples. It would appear that the majority of the organic contamination in the glacial till may be linked with contamination associated with Waste Pit 1.

The RCRA data reflects the findings of the RI/FS. The only well to exhibit noteworthy organic concentrations was Well 1031. This well had concentrations of the same volatile organic compounds as seen in the RI/FS, only at lower levels.

A limited number of organic constituents were detected in the RI/FS 2000-series well data. These included 1,1,1-trichloroethane, 1,2-dichloroethylene, 1,1-dichloroethane, and toluene. Wells 2021 and

456

2022, both located in the vicinity of the Burn Pit and Waste Pit 4, and Well 2649, located downgradient of Waste Pit 1, have detected concentrations of two to four organic constituents each. All three of the above mentioned waste areas had detectable concentrations of one or more of these organic compounds in their waste material or sediment samples. The Burn Pit is unlined and its bottom is in direct contact with the Great Miami Aquifer, which may account for the presence of organic compounds in the 2000-series wells and their absence in 1000-series wells in the area of Wells 2021 and 2022.

The RCRA 2000-series well organic data depicted significant organic contamination in Well 2649 only. This well had detected concentrations of the same volatile organic compounds detected in the RI/FS data. The 1000-series well (1031), located in the same proximity of Well 2649, showed similar volatile organic contamination. Waste Pit 1 is the probable source of this contamination in the southwestern portion of the waste pit area.

The 3000-series wells had a very limited amount of organic concentration detections in the RI/FS data. Well 3001 had concentrations of acetone, benzene, 1,1-dichloroethane, trichloroethene, toluene, and tetrachloroethene.

The RCRA 3000-series well data revealed no detections of the RI/FS organic contaminants. The only significant organic compounds detected in the RCRA analyses, based on concentrations, were carbon disulfide, chloroform, and acetone.

Only four organic constituents were detected in low concentrations (5 µg/L each) in the 4000-series RI/FS well samples: trichloroethene, tetrachloroethene, 1,1-dichloroethane and chlorobenzene. There is no indication of significant organic contamination of the deep horizon of the Great Miami Aquifer in the vicinity of Operable Unit 1. However, the waste pit area does appear to be a contributor of low levels of organic contamination, most likely from Waste Pit 1, to the deep zone of the Great Miami Aquifer do to the absence of these compounds in the upgradient well and their presence in the downgradient well only.

Acetone and bis(2-ethylhexyl)phthalate, both common laboratory and field contaminants, were the only significant concentrations of organic compounds detected in the RCRA analyses for the 4000-series wells.

4.5 SURFACE WATER AND SEDIMENT

Several surface water and sediment sampling programs have been performed at the FEMP. Most focused on radiological characterization and to a lesser extent chemical characterization. Of these sampling programs, the FEMP Environmental Monitoring Program, the Dames and Moore Study, the

CIS, and the RI/FS Programs are the most useful for characterizing potential impacts of Operable Unit 1 sources on surface water and sediments.

Paddy's Run, the Great Miami River, the storm sewer outfall ditch and on-site natural surface drainageways are the main water bodies that have been sampled to evaluate the nature and extent of contamination within and outside Operable Unit 1. The objectives and the procedures for the sampling program for these studies were presented in Section 2.5 of this document.

One removal action, the Waste Pit Area Storm Water Runoff Control Removal Action, has been completed to address Operable Unit 1 impacts on surface water and sediment in Paddy's Run. An Engineering Evaluation/Cost Analysis (EE/CA) was performed to support this removal action (ASI/IT 1990). The EE/CA provides summary and analysis of surface water impacts resulting from surface contaminants in the Operable Unit 1 area. The removal action redirects surface runoff from the waste pit area away from Paddy's Run to a catchment basin. This allows treatment prior to release via the FEMP main effluent line.

The implementation of the removal action in June 1992 reduced contaminant loading from Operable Unit 1 runoff to Paddy's Run. For this reason historical data on Paddy's Run do not represent current conditions. Nonetheless, impacts have been demonstrated and documented in the EE/CA and must be addressed by the remedial action, through incorporation of the ongoing removal action activities or through other engineering controls.

4.5.1 Surface Water

Characterization for surface water in Waste Pits 4, 5, 6 and the Clearwell has been discussed in Section 4.2, along with the Waste Material in the pits. Hence this section addresses surface water runoff from the waste units of Operable Unit 1.

The sampling locations under the different studies are shown in Figures 2-4, 2-5, and 2-6. Samples were collected from Paddy's Run and various drainage ditches across the waste pit area. The summary discussion on significant findings from the major sampling programs focuses on uranium since it represents the predominant and consistently sampled contaminant on the site.

4.5.1.1 Operable Unit 1 Runoff

DOE has conducted three storm water runoff sampling studies in the waste storage area. These are the 1) Best Management Practices Plan, 2) the Dames and Moore Study, and 3) the FEMP RI/FS.

Best Management Practices Plan

As stated in Section 2.5, surface water samples were collected as part of the BMP plan in order to evaluate the condition of liquid discharges from the FEMP. Samples were analyzed for selected

radiological and chemical constituents as listed in Table 4-33. Only two samples were within Operable Unit 1 boundaries. Results for the two surface water samples collected are summarized in Table 4-33. As shown in the table, the sample collected from location DD07 (Figure 2-7) contains the highest uranium-238 concentration of 740 pCi/L. This sampling site is located on the west side of Waste Pit 3 close to Paddy's Run. The source of this uranium is likely to be surface runoff from Waste Pit 3 and 5. Also Total Dissolved Solids (TDS) in this sample appear to be relatively high.

1984 Groundwater Study

The objective of the 1984 Groundwater Study, Dames and Moore (1985), was to identify the source of groundwater contamination in three off-site wells. To meet this objective, several samples of surface water runoff and sediment from the waste storage area were collected. Collected samples of surface water runoff from drainage ditches in the waste pit area that fall within Operable Unit 1 boundaries were analyzed for total uranium. The results show total uranium concentrations ranging from 0.007 to 34 mg/L (Table 4-34).** The highest concentration was from location RO8, south of Waste Pit 2 and east of Waste Pit 1. Two other locations, RO4 and RO5, located between Waste Pits 4 and 5 showed elevated concentrations of 24 and 28 mg/L, respectively. At the time of sampling both Waste Pits 4 and 5 were open. It is possible that surface runoff from disposal operations conducted at these pits is the source of contamination at these locations.

In addition to the water samples from the drainage ditches, two seep samples from within Operable Unit 1 were collected and analyzed for total uranium. One sample collected from location RO9, between Waste Pits 3 and 5 and the second sample from location RO6, between Waste Pits 3 and the Clearwell (Figure 2-7). The concentration of total uranium in the seep samples was 3 and 4.6 mg/L, respectively.

RI/FS Program

Surface water samples under the RI/FS Sampling Program were collected from 11 locations within Operable Unit 1 during both the wet and dry seasons. The RI/FS sample locations were chosen to be downgradient of waste pit storm water runoff. Figure 2-7 shows the relative position of each RI/FS surface water sampling location.

ASIT-018, ASIT-019, and ASIT-022 are located to the north of Waste Pits 5 and 6 and receive rainwater runoff from two drainageways along the railroad. ASIT-030, ASIT-031 and ASIT-038 are located between Waste Pits 5 and 3 and receive runoff from Waste Pit 3 and perched water infiltration containing contamination from Waste Pit 5. Surface water typically ponds at location ASIT-030, and during extended precipitation runoff flows towards Paddy's Run, past locations ASIT-031 and ASIT-038. These sample locations normally are too dry to be sampled in the dry season. ASIT-027, ASIT-028 and ASIT-029 are located between Waste Pits 4, 5 and 6 and receive rainwater runoff from Waste Pit 4 and perched water infiltration containing contamination from Waste Pits 5 and 6.

ASIT-023 and ASIT-024 receive rainwater runoff primarily from Waste Pit 1 and perched water infiltration containing contamination from the Clearwell.

The RI/FS summary of surface water radiological results are shown in Table 4-35. The complete laboratory radiological analytical data for surface water are provided in Appendix C-9. Elevated concentrations of total uranium detected during the wet season were at sample locations ASIT-30, ASIT-31 and ASIT-38 and ranged from 3000 to 7030 mg/L (presented in Figure 4-35). Elevated concentrations of total uranium detected in samples collected during the dry season, were from locations ASIT-027, ASIT-028 and ASIT-038 ranging from 5067 to 8148 mg/L. The difference in concentration levels is probably due to the amount of runoff and suspended solids during the time of sampling. The source of high uranium levels in these areas is likely to be the surface runoff from Waste Pits 3, 4, 5, and 6. This is supported by the fact that activity ratios for the uranium isotopes indicate the presence of depleted uranium. This is consistent with the materials placed in these pits.

The concentration of total uranium at locations ASIT-23 and ASIT-24 south of Waste Pit 1 were 465 to 517 mg/L. This contamination is suspected to have come primarily from Waste Pit 1. The activity ratio of U-238/U-234 is about 2 and U-238/U-235 is about 30 which is consistent with depleted uranium. The contents of Waste Pit 1 are slightly depleted. Technetium-99 was detected at 34.9 pCi/L which is slightly above the detection limit for this nuclide.

Samples collected from the drainage swale north of Waste Pit 5 (ASIT-18, ASIT-019, and ASIT-022) exhibit relatively lower total uranium concentrations. The concentration of total uranium detected at locations along this swale ranged from 15 to 135 mg/L during the dry season and 92 to 944 mg/L during the wet season. The U-238/U-234 and U-238/U-235 activity ratios range from 1 to 5 and 20 to 60, respectively, indicating the source of the uranium contamination is both natural and depleted uranium. No conclusions can be drawn regarding the source of this contamination.

Other detected radionuclides include: Ra-226, Ra-228, and Tc-99. Radium-226 and Ra-228 were detected at levels which were at or slightly elevated above the Great Miami River UTLs for these contaminants, indicating that the level of contamination is only slightly above background. Technetium-99 was detected at locations ASIT-19, ASIT-23, ASIT-030 and ASIT-031 ranging from 34.9 to 175 pCi/L. The source of the technetium detected is likely to be the surface runoff from Waste Pits 3 and 5. Detection of Tc-99 in surface water runoff from Waste Pits 3 and 5 is consistent with what would be expected because the raffinate deposited there reveals the presence of elevated Tc-99.

Two samples from locations ASIT-30 and ASIT-31 were analyzed for general chemistry and full HSL constituents. The detected parameters were within background range. No organic constituents were detected. A complete list of analytical data for the samples is included in Appendix C.

4.5.1.2 Paddy's Run Stream Flow

Under the FEMP Environmental Monitoring Program, weekly grab samples were collected from Paddy's Run and analyzed for uranium. Additionally, composite samples were prepared bimonthly for sampling points W5, W7, and W8 (Figure 2-5) and analyzed for Ra-226 and Ra-228. A summary of the sample results from 1987 through 1992 is provided in Table 4-36. Sample locations W5 (off site) and W9 (on site) represent upgradient values for water in Paddy's Run in relation to the waste pit area. As shown in the Table, the uranium concentration at location W5 has varied from 0.34 to 3.6 pCi/L over the 6-year period between 1987 to 1992. The data show no temporal relationships. Sample location W10 is in Paddy's Run, immediately downstream of the waste storage area. The highest concentration of uranium measured in Paddy's Run consistently occurs at this location and ranged from 1.0 to 1100 pCi/L. With the implementation of the Waste Pit Area Runoff Control Removal Action, potentially contaminated surface water runoff is currently collected in a stormwater retention basin for treatment before discharged into free water bodies. Therefore contributions of the waste pit area to uranium concentration at this location, W10, are expected to decrease substantially. Construction activities may have caused a short term increased uranium discharge into Paddy's Run during 1991 and 1992. Like data from location W5, these data show no other temporal relationships.

4.5.2 Sediment

4.5.2.1 FEMP Environmental Monitoring Program

Sediment samples from Paddy's Run collected as part of the Environmental Monitoring Program were analyzed annually from 1975 through the present. The samples were analyzed for Tc-99, isotopic uranium, thorium, radium and plutonium. Table 4-37 shows the data collected during the period of six years from 1987 through 1992. Although uranium concentrations in sediment at some locations in Paddy's Run were slightly elevated, the average concentration was within background. Overall the data show values that are comparable to background concentrations provided in Table 4-2. Maximum values were as high as 3 to 4 times the average background sediment concentrations. Over the six-year period, the data show no discernible trends.

4.5.2.2 1986 Radiological Survey of Paddy's Run

In 1986, a special, survey was conducted by Dames and Moore (1986), along two major drainageways at the FEMP, Paddy's Run and the storm sewer outfall ditch. The study concentrated on locating contaminated sediment by direct radiation along the length of the two drainage systems. Sediment samples were collected at locations with elevated direct radiation readings. Uranium, thorium and radium were detected in relatively elevated concentrations. Uranium-238 ranged from 0.6 to 4.5 pCi/g. The thorium-230 concentrations ranged from 0.5 to 2.1 pCi/g. Radium-226 concentration ranged from 0.4 to 4.1 pCi/g. These findings suggest that the contaminants noted in the surface water samples are water soluble and are not attaching to stream sediment in significant quantities, in that these sediment values are within the distribution of background.

461

4.5.2.3 CIS Program

Sediments were sampled from the drainage channels during the CIS survey. The sediment sampling locations within Operable Unit 1 are shown on Figure 2-7. The summary for the CIS sediment radiological data is presented in Table 4-38. Complete analytical results are included in Appendix B.

Radionuclides analyzed were Cs-137, Np-237, isotopic plutonium, Ra-226, Ra-228, Ru-106, Sr-90, Tc-99, isotopic thorium, and isotopic uranium. All radium results were rejected.

The drainageway between Waste Pits 4 and 5 and the drainageway south of Waste Pit 4 revealed the highest concentration of contaminants detected. The drainageway between Waste Pits 4 and 5 revealed uranium along its entire length. Sediment sample locations SD-28-007 and SD-28-008 contained Tc-99, U-234, U-235/236 and U-238 at elevated concentrations and SD-28-008 contained Th-228 and Th-230 contamination, as well. The U-238 contamination ranges from 111 to 761 pCi/g with the highest concentration detected at SD-28-008. Technetium-99 was detected in all of the sampling locations in this drainageway ranging from 8.6 to 17 pCi/g. The U-238/U-234 ratios along this drainageway ranged from 5.2 to 6, and the U-238/U-235 ratios ranged from 24 to 61 indicating the source of uranium contamination is depleted uranium, which is in agreement with what was deposited in Waste Pit 4. The data are presented in Figure 4-36.

The concentration of contaminants in the drainageway at the south of Waste Pit 4 is almost as high as that for the drainageway to the north, and shows the same relationship of high uranium to thorium activity concentration exists for both. Uranium-238 ranged from 369 to 746 pCi/g. The Th-230 contamination ranged from 0.5 to 6.1 pCi/g. This relationship plus Tc-99 ranging from 7 to 17 pCi/g and U-238/U-234 ratios ranging from 5.2 to 5.9 leads to the same conclusion that the likely source of this contamination is surface runoff from Waste Pit 4 before it was covered.

The two drainageways to the north of Waste Pits 5 and 6 are primarily contaminated with uranium, but to a much lesser degree than the other two drainageways to the south. The U-238 ranges from 3.6 to 46 pCi/g, and Th-230 ranges from below the surface soil background level to one detect at 5 pCi/g. The U-238/U-234 ratio ranges from 1.9 to 4.2 and the U-238/U-235 ranges from 36 to 60, indicating the source of contamination is depleted uranium.

4.5.2.4 RI/FS Program

Surface sediment were collected under the RI/FS at three locations along the drainageway north of Waste Pits 5 and 6, along the railway. The laboratory radiological results are presented in Appendix C. The surface sediment sample locations are identified as ASIT-018, ASIT-019 and ASIT-022 and are presented in Figure 2-7. The sediment samples were analyzed for gross alpha, gross beta, Ra-226, Ra-228 and U-total. The total uranium ranged from 15 to 135 µg/g. The Th-226 and Th-228 were detected at levels below background for surface soil. As in the CIS data evaluation of

this drainageway, no specific pit in Operable Unit 1 can be determined to be the primary source of contamination.

4.5.3 Surface Water and Sediment Characterization Summary

A review of data from the different studies show a high degree of variability in the surface water contamination concentration pattern. The reasons for the variations in the data could be attributed to the amount of rainfall runoff during the time of sampling, topography which would affect flow from the area, the settling of contaminated suspend solids and the existence of a contaminant source upgradient of the sampling location.

The highest concentration of contaminants in surface water were detected at drainageways which received surface runoff from Waste Pits 3, 4, 5 and 6 (Figure 4-36). The predominant contaminant is uranium. The two drainageways running east-west between Waste Pits 3, 4, and 5 are contaminated along their total lengths. Uranium contamination in the surface water is as high as 8,148 pCi/L. Another drainageway running southeast and turning southwest between Waste Pits 4 and 6 contained water with elevated uranium concentrations. The drainageways in the north part of Operable Unit 1 are contaminated the least.

Most of the sampling activities took place before the surface runoff was controlled. At that time surface runoff from the waste pit area discharged into Paddy's Run. With the implementation of the Waste Pit Area Runoff Control Removal Action, potentially contaminated surface water runoff now flows into a catchment basin for treatment before being discharged into the Great Miami River.

Sediment were sampled along drainageways which were considered downstream of potential releases within Operable Unit 1. The highest contaminants were detected at locations downgradient from Waste Pit 4. The predominant contaminant was depleted uranium. Uranium-238 activity was detected at concentrations as high as 761 pCi/g. As shown in Figure 4-19, the drainageway located south of Waste Pit 4 and 6 revealed elevated levels of uranium along its entire length. Another drainageway between Waste Pits 4 and 5 showed elevated uranium concentrations.

4.6 AIR AND DIRECT RADIATION

4.6.1 Airborne Radon

Airborne radon measurements are routinely collected both on and off the FEMP property as part of the ongoing FEMP Environmental Monitoring Program. In addition to the Monitoring Program, a radon flux survey was conducted on the Waste Pits 1, 2, 3, and 4 to determine the average radon emissions from the waste pits and to verify that the average radon emission from each waste pit was below the NESHAP limit of 20 $pCi/m^2/s$. A summary of the results from the Chem-Nuclear Geotech (1992)

radon-flux survey, and the Environmental Monitoring Program (WEMCO 1989, 1990, 1991, and 1992) is provided in the following paragraphs. More details can be found in the cited reports.

4.6.1.1 Waste Pit Radon-Flux Survey

Table 4-39 summarizes the radon flux measurements for the waste pits. The average radon-flux densities calculated for Waste Pits 1, 2, 3, and 4 are 9.1, 6.4, 2.6, and 0.1 pCi/m^2/s respectively; well below the NESHAP emission limit of 20 pCi/m^2/s. Figure 4-37 shows areas of elevated radon-flux values across the Waste Pits 1, 2, 3, and 4. These areas are of limited areal extent and are the result of a few high measurements. The NESHAD limit is based on the average radon flux density rather than discrete measurements.

Waste Pit 1

There are three areas of higher radon-flux densities, greater than 10 pCi/m^2/s, over Waste Pit 1. These areas are of limited areal extent. The most significant, with a maximum radon-flux density of 75 pCi/m^2/s, lies on the western boundary of Waste Pit 1, next to the Clearwell. Both the RI/FS and CIS data from the waste pit borings indicate the presence of elevated concentrations of Radium-226 near the surface. The observed radon-flux pattern is likely reflecting localized areas that contain higher concentrations of Radium-226, are more permeable, and allow the radon gas to more readily escape.

Waste Pit 2

Waste Pit 2 has two areas showing radon-flux measurements greater than 10 pCi/m^2/s with limited areal extent. The maximum radon-flux measurement in Waste Pit 2 was 81.1 pCi/m^2/s located in the southwestern part of the pit. Historical records show that in 1975 a test pit was constructed on Waste Pit 2 for the disposal of raffinate waste from Plant 2/3 (Parsons 1993). The raffinate contains elevated concentrations of radium-226, the source of radon. Moreover, RI/FS and CIS data from the waste pit borings show the presence of elevated concentrations of Radium-226 near the surface of the pit. The occurrence of elevated radon-fluxes over limited portions of Waste Pit 2 is likely due to the presence of radium-226 in localized areas where soils are more permeable, allowing radon gas to more readily escape into the atmosphere.

Waste Pit 3

Like Waste Pits 1 and 2, most of Waste Pit 3 yielded low radon-flux density measurements. Overall, the radon-flux measurements on Waste Pit 3 were much lower than those measured on Waste Pits 1 and 2. Two areas of limited areal extent demonstrated flux measurements greater than 10 Pci/m^2/s. The maximum flux reading in Waste Pit 3 was 48 Pci/m^2/s located on the southern part of the pit. Waste Pit 3 was used for the disposal of neutralized raffinate from the FEMP Refinery (Plant 2/3). The raffinate contained elevated concentrations of Radium-226 which was left behind in the raffinate during the uranium extraction process. Thus, elevated levels of radon were anticipated in the vicinity of Waste Pit 3.

464

Waste Pit 4

Radon flux measurements for Pit 4 were considerably less than observed for the other pits. All 25 samples locations exhibited reading of less than 0.1 pCi/m^2/s.

4.6.1.2 FEMP Environmental Monitoring Program

Routine airborne radon monitoring at the FEMP is conducted as part of the Environmental Monitoring Program. Results for radon monitoring performed from 1989 through 1992 are summarized in the following paragraphs. More details are available in the annual FEMP Environmental Monitoring reports.

Figure 4-38 shows the average annual radon concentrations for 21 fenceline locations over the period from 1989 through 1992. Each location has either two, three, or six alpha-track-type radon detectors for measuring radon concentrations in the air over long time periods. The detectors are changed each calendar quarter and sent to the supplier for analysis.

The average quarterly radon concentration at each location was computed from the results of all detectors at that location. The annual average radon concentration at each location was then calculated from the quarterly averages. The average radon concentration at the fenceline was 0.74 pCi/L for 1989, 0.74 pCi/L for 1990, 0.90 pCi/L for 1991 and 0.57 pCi/L for 1992. The maximum radon concentration recorded was 1.5 pCi/L observed at locations H, at the southern tip of the FEMP site, and N, along the site perimeter immediately west of the waste pit area (Figure 2-12). None of the observed concentrations exceeded either the DOE guideline of 3.0 pCi/L above background or the EPA limit of 4.0 pCi/L for indoor radon concentrations.

4.6.2 Air Particulates

The end of FEMP's production mission has resulted in a measurable reduction in the concentration of air particulates. At present, the largest sources of airborne emissions are the boiler plant cooling tower mists and fugitive dust from the waste pit area and other locations where environmental cleanup activities are underway.

The FEMP operates 9 on-site air monitoring stations to measure the concentration of uranium and other airborne radionuclides (Figure 2-12). Air monitoring stations AMS-1 through AMS-7 are located along the FEMP perimeter fence. Stations AMS-6 and AMS-7 are closest to Operable Unit 1.

Figure 4-39 shows the average annual concentrations of airborne uranium for the years from 1989 through 1992. The average annual concentration of uranium for AMS-6 and AMS-7 were well below the DOE guideline of 0.1 pCi/m^3. These measurements were consistent with most of the fenceline monitoring stations. However, the monitoring station near Operable Unit 1 are both located upwind of

465

the unit. Only AMS-1 is located downwind of Operable Unit 1 in the prevailing wind direction. This is a remote station located near the north most fenceline of the facility.

Notably higher values were measurements at stations AMS-8 and AMS-9. These stations are located immediately downwind of the production area, in the prevailing wind direction. Consequently higher concentrations of airborne uranium are anticipated at these locations. Airborne uranium concentrations at the perimeter monitoring stations show no variation relative to their proximity with respect to Operable Unit 1. This decrease was also observed for air monitoring station AMS-6 and AMS-7 located closest to Operable Unit 1. The stations in the vicinity of Operable Unit 1 had concentrations on the average of equal to or less than other stations. Only monitoring stations AMS-8 and AMS-9 had concentrations that were noticeably higher in the average reading. These stations are located in the prevailing wind direction.

4.6.3 Direct Radiation

Direct radiation results within Operable Unit 1 were presented in the CIS report (Weston 1987). Under the CIS, beta-gamma dose rate measurements were taken using an HP-210T Geiger-Muller detector. The dose rate measurements were used to characterize dose rates to personnel working in the area and to verify the presence of elevated soil contaminant concentrations indicated during FIDLER surveys.

Figure 4-40 identifies areas within Operable Unit 1 which yielded direct radiation exposure rates greater than 3 mrad/hr. The highest dose rate, 35 mrad/hr, was found near the southwest perimeter of Waste Pit 6. Elevated dose rates were also found in the northern portion of Waste Pit 3 (9.5 mrad/hr) and at the south east corner of Waste Pit 4 (11 mrad/hr). Radiological analyses for soil samples taken in these areas indicate that uranium is the principal constituent causing elevated dose rates.

4.7 ECOLOGICAL CHARACTERIZATION

This section identifies the nature and extent of contaminants present in local ecological receptors through the analysis of biological resource samples. In addition, limited sampling results from Paddy's Run are included as a potential indicator of environmental impacts from Operable Unit 1. Additional ecological assessment data, including a thorough ecological characterization of the FEMP and vicinity, are presented in the Site-Wide Characterization Study (DOE 1992) and the Biological and Ecological Site Characterization of the Feed Materials Production Center (Facemire et al. 1990).

Information presented in this section is based on ecological data collected within the FEMP study area during biological sampling and analysis activities conducted in 1987 and 1988 (ASI/IT 1990). This previous study determined radionuclide and other constituent concentrations in soils, grasses, agricultural produce, and aquatic organisms on and in the vicinity of the FEMP.

4.7.1 Background and Methods

Studies by Facemire et al. (1990) conducted in 1986 and 1987 defined distinct habitats on the FEMP, including riparian woodlands (the Great Miami River, Paddy's Run, and adjacent wetlands), deciduous woodlands, pine plantations, grazed and ungrazed pastures, and a reclaimed flyash pile. Operable Unit 1 is surrounded by riparian woodlands (Paddy's Run and adjacent wetlands), upland deciduous woodlands, and grasslands. These habitats contain various species of trees and shrubs, herbaceous plants, mammals, birds, amphibians and reptiles, fish, aquatic macroinvertebrates, and terrestrial invertebrates.

The biological resources study (ASI/IT 1990) focused on potential exposure of humans or wildlife to radionuclides and other hazardous substances by transfer through the food chain. Possible exposure pathways include both aquatic food chains, (i.e., transfer from sediments to macroinvertebrates to fish to higher order consumers) and terrestrial food chains, (i.e., from soils to vegetation to animals). Radionuclide concentrations were determined in aquatic plants, benthic macroinvertebrates, and fish in the Great Miami River, Paddy's Run, and adjacent wetlands. For terrestrial resources, radionuclide concentrations were determined in soils, forage grasses, and agricultural produce. Several samples were also obtained from small mammals and one deer and were analyzed for radiological constituents. All faunal samples were collected under Scientific Collecting Permit No. 228 from the Ohio Department of Natural Resources, Division of Wildlife (ASI/IT 1990). Details on the methodology of collection and analysis of the data can be found in the Biological Sampling Analysis and Resources Report (ASI/IT 1990).

Control Areas and Other Sampled Sites

Agricultural and garden produce reference samples representing nonimpacted controls were collected from three sites near Brookville, Indiana. Results from these sites, presented in Table 4-40, indicate that, in general, the samples contained either no detectable levels of radionuclides, or low but detectable concentrations of some radionuclides.

Samples of garden produce and agricultural crops were collected in the vicinity of the FEMP. The locations of the sampling sites and sampling results are presented in Figure 4-42, and Tables 4-41 and 4-42, respectively. These downwind samples showed no detectable levels, or low but detectable levels, of radionuclides.

Concentration ratios (CR) (Table 4-43) were calculated for vegetation samples at the control sites and sites near the FEMP when radionuclide concentrations were above detection limits for both soil and vegetation samples. A CR greater than one suggests potential bioaccumulation of radionuclides by plants. The mean CR for the Brookville, Indiana control area was estimated to be 0.86 (standard deviation 0.69, n=6) while the mean CR for selected sites near the FEMP was estimated to be 1.03 (standard deviation = 0.91, n=7). With both mean CRs at or below 1.0, there is no evidence at either

the control sites or the FEMP vicinity sites that crops and produce are concentrating radionuclides relative to soil concentrations (ASI/IT 1990).

4.7.2 Vegetation and Soil

Two wetland sites near Operable Unit 1 were sampled (Site 9A and 9B, Figure 4-41). Soil and vegetation sample results are presented in Table 4-44. A mean CR for wetland plants near Operable Unit 1 was estimated to be 0.3 (standard deviation = 0.76, n=5). Individual concentration ratios were generally similar to concentration ratios in garden produce and agricultural crops for selected control sites and sites in the FEMP vicinity (Table 4-43).

Two algae samples were collected from Paddy's Run in 1988 at Sites PR-1 and PR-2A (Figure 4-41). PR-1 is located at the northern property line of the FEMP, above the zone of potential FEMP influence, and PR-2A is located just downstream from PR-1, closer to the site. Radionuclide results are presented in Table 4-44. Detectable levels of strontium-90 were found in the algae sample from PR-1. No other detectable radionuclides were found.

Surface soil and vegetation samples near Operable Unit 1 were collected and analyzed for radionuclide, inorganic, and HSL organics. The sample locations and results of radionuclide analyses are found in Figure 4-41 and Table 4-42, respectively. Results for inorganic and HSL organic analyses for vegetation and wildlife are presented in Table 4-46. The CR for total isotopic uranium was estimated to be 0.63 for Site 11 for roots and 1.1 for Site 9 grass roots. These values do not differ much from the CRs estimated for other vegetation on or near the FEMP.

Uranium isotope CRs in vegetation (wetland and terrestrial) were consistently higher in roots than in above ground tissue (Tables 4-42 and 4-43). The highest CR was estimated at 1.92 for a grass root sample collected near Operable Unit 1 while the lowest CR of 0.09 was estimated for a cattail leaf also sampled near Operable Unit 1. Other radionuclide concentrations near Operable Unit 1 (i.e., Cs-137, Sr-90) were consistently low. CRs were not calculated for these radionuclides because concentrations were not above the analytical limit of detection for either vegetation or soil.

With biological sampling and analysis results showing higher concentrations of radionuclides in roots as opposed to above ground vegetation, uptake of the constituents from soil pore water is the anticipated route of exposure. Deposition of the radionuclides onto leaves may be a more important route of exposure for vegetation downwind (north and east) of the FEMP.

Collected surface soil and vegetation samples near Operable Unit 1 were also analyzed for inorganic and HSL organics (Figure 4-41). Table 4-46 presents results of analyses for selected organic priority pollutants and inorganics. No organic constituents were detected except for butyl benzyl phthalate. Levels of butyl benzyl phthalate were estimated for grass blades (2000 mg/Kg) and grass roots

463

(1000 mg/Kg) at Site 9A. Chlordane and 4,4-DDT were the only two pesticides analyzed. No detectable levels of PCBs or pesticides were found in any sample collected near Operable Unit 1.

Arsenic levels for vegetation ranged from less than detectable levels in a grass root sample at Site 9A, to 13 mg/Kg in a grass blade sample. Barium concentrations ranged from less than detectable levels to 17.5 mg/Kg. Cadmium results for vegetation were generally less than the detection limit. Zinc, fluoride, and sulfate concentrations were variable while lead and vanadium were generally less than the analytical detection limit. Mercury concentrations were found to range up to levels of 2.1 mg/Kg in a grass root sample at Site 9A. Elevated levels of selected constituents may have resulted from FEMP environmental releases.

4.7.3 Mammals

Small mammals were collected for tissue samples from near Waste Pit 5 and from the pine plantation just north and northeast of the former production area (Figure 4-41). Small mammals sampled included deer mouse, shrew, and cottontail rabbit. Muscle tissues from two opossum were also analyzed, as well as the kidney and liver of a road-killed white tail deer. Results are presented in Table 4-47. Tissue results revealed no radionuclide constituents. Detectable radionuclides were found in a composite sample of small mammal organs. Total isotopic uranium was found to be 18.0 pCi/g. The composite carcass sample from which the organs were taken had no detectable radionuclides.

Mammal tissues were also analyzed for HSL organics and inorganic constituents. Results revealed no detections of HSL organics (Table 4-46). Inorganic analysis of deer liver showed elevated levels of aluminum, arsenic, fluoride, sulfate, and zinc. Kidney tissue demonstrated elevated concentrations of arsenic, fluoride, sulfate and zinc. No other inorganic constituents were detected. Potential releases into the environment may have contributed to elevated levels of these constituents.

4.7.4 Fish

Fish were collected from four sites along Paddy's Run (PR-1 through PR-4) and from a small drainage pond (Site 9B) north of the former production area in 1987 (Figure 4-41). PR-1 is located at the northern property line of the FEMP. PR-2 and PR-3 are located downstream of PR-1, and PR-4 (not depicted on Figure 4-41) was just above the confluence of Paddy's Run and the Great Miami River. Results are presented in Table 4-48. The presence of detectable levels of radionuclides in fish at Sites PR-2, PR-4, and 9B suggests that organisms may have been exposed to constituents from the FEMP, possibly as a result of runoff from the site or from other transport pathways such as air or groundwater.

One composite sample of minnows collected from PR-1 was analyzed for inorganics and HSL organics. The sample had no detectable levels of organics or pesticides (Table 4-46). Elevated levels of aluminum, arsenic, barium, cadmium, fluoride, mercury, sulfide, and zinc were found. No other

inorganic constituents were detected. The presence of detectable levels of these constituents suggests that fish samples at PR-1 may have been exposed to constituents from the FEMP.

4.7.5 Macroinvertebrates

Benthic macroinvertebrate (benthos) samples were collected from Paddy's Run (Figure 4-41). Crayfish caught while seining for smaller fish were sent to the analytical laboratory as benthos samples, although analytical results were derived separately for crayfish and composite samples of other macroinvertebrates such as snails, clams and annelid worms. Benthos sample results are presented in Table 4-49. Low but detectable concentrations of radionuclides were found in some Benthos samples.

These data suggest that constituents may be entering the aquatic food chain. Fish collected from Paddy's Run generally did not have radionuclide concentrations higher than comparable benthos samples (Tables 4-48 and 4-49). However, as fish are mobile and may have migrated from nonimpacted areas, this result was anticipated.

4.7.6 Ecological Characterization Summary

Radiological constituents were detected at low levels near the analytical detection limit in soil, agricultural crops, and garden produce samples from both off-site control areas and other areas in the vicinity of the FEMP. Ecological concentration ratios indicate limited bioaccumulation at control areas and other areas in the vicinity of the FEMP.

Samples collected near Operable Unit 1 suggest limited evidence of uptake, assimilation, and transfer of radiological constituents through ecological food chains. Although concentrations of uranium in soil and vegetation within Operable Unit 1 were the highest from the site, CRs were generally similar to CRs in garden produce and agricultural crops from control sites and sites in the FEMP vicinity.

Detectable levels of radionuclides in fish collected from Paddy's Run suggest that organisms may have been exposed to FEMP constituents. Benthic macroinvertebrates such as crayfish, snails, clams, and annelid worms collected also exhibited detectable levels of uranium isotopes. This finding is consistent with uranium's known potential to bioconcentrate in aquatic organisms.

Results of the ecological chemical characterization demonstrate that the only organic constituent of potential concern in Operable Unit 1 vegetation is butyl benzyl phthalate. In addition, elevated levels of arsenic, barium, mercury, and zinc were noted. Elevated levels of these constituents may have resulted from FEMP environmental releases.

Operable Unit 1 mammals were free of detectable concentrations of organics. However, elevated levels of arsenic, fluoride, sulfate, and zinc were recorded. Fish collected from Paddy's Run yielded

no detections of organics or pesticides. However, elevated concentrations of aluminum, arsenic, barium, cadmium, fluoride, mercury, sulfide, and zinc were found. The presence of these constituents suggests that fish and wildlife may have been exposed to inorganic constituents from the FEMP.

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TABLE 4-1.1.A
RADIOLOGICAL PROFILE OF PIT 1

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 1 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 1 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 1 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		48,500						
TOTAL DRY WASTE IN PIT (kg) (d)		92,137,858						
SPECIFIC GRAVITY OF WASTE (d)		3.04						
WATER CONTENT (wt. of water/dry wt.) (d)		22.40						
URANIUM-TOTAL	3.68	1,600,000 kg	17,000 ug/g	48,000 ug/g	1767	12 to 20 ft	scattered	Depleted magnesium flouride (MgF2) slag, slag leach filter cake, general sump sludge, dust collector residue. Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	360	3,900	16,000	1767	12 to 20 ft	scattered	
URANIUM-234	0.94	53	570	1,200 CIS	01-03	0 to 12 ft	scattered	
THORIUM-230	1.85	350	3,800	5,500	1766	7 to 14 ft	scattered	
RADIUM-226	1.27	4.7	51	100	1766	7 to 14ft	scattered	
URANIUM-235/236	0.13	7.8	85	260	1767	12 to 20 ft	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	17	180	490	1765	14 to 22 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	1.8	20	41	1766	7 to 14ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	28	300	790	1765	14 to 22 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	0.059	0.64 CIS	1.1 CIS	01-04	0 to 12ft		Fission material from the fallout of weapons testing, uranium from Hanford
NEPTUNIUM-237	<0.01	U	U CIS	U CIS				
PLUTONIUM-238	<0.01	U	U	U				
PLUTONIUM-239/240	<0.01	U	U	U				
RUTHENIUM-106	<0.06	U	U	U				
STRONTIUM-90	0.5	0.23	2.5	7.7	1767	6 to 12 ft	scattered	
TECHNETIUM-99	<0.9	0.39	4.2 CIS	15 CIS	01-03	0 to 12 ft	discreet	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

FOOT–NOTES FOR TABLES 4–1.1.A TO 4–1.8.A

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Project 419191.045.22
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(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 1 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 1 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 1 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		48,500						
TOTAL DRY WASTE IN PIT (kg) (d)		92,137,858						
SPECIFIC GRAVITY OF WASTE (d)		3.04						
WATER CONTENT (wt. of water/dry wt.) (d)		22.40						

b. From table 4.2, for Subsurface Soils, of this report.
c. Refer to sample calculations 1 and 34 in Appendix F.
d. Refer to Appendix A, and sample calculation 34 in Appendix F.
e. Based on average concentration, refer to sample calculation 35 in Appendix F.
f. From table 4.4, and 4.5 of this report.
h. Appendix A of this report.
i. Opperable unit 3 Work Plan Addendum, June 1992.
j. Sections 1 and 4.2 of this report.

U = non detected and is entered as a zero in all calculations.
CIS = Characterization Investigation Study (Refer to Appendix A).
pCi/g = picocuries per gram.
ug/g = microgram/gram.
kg = kilogram.

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TABLE 4-1.2.A
RADIOLOGICAL PROFILE OF PIT 2

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 2 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 2 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 2 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		24,200						
TOTAL DRY WASTE IN PIT (kg) (d)		17,514,507						
SPECIFIC GRAVITY OF WASTE (d)		2.62						
WATER CONTENT (wt. of water/dry wt.) (d)		176.90						
URANIUM-TOTAL	3.68	51,000 kg	2,900 ug/g	5,800 ug/g	1768	7 to 14 ft	scattered	Depleted magnesium flouride (MgF2) slag, slag leach filter cake, general sump sludge, dust collector residue. Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	82	4,700 CIS	18,000 CIS	02-02	0 to 10 ft	scattered	
URANIUM-234	0.94	68	3,900 CIS	18,000 CIS	02-02	0 to 10 ft	scattered	
THORIUM-230	1.85	192.66	11,000	18,000	1768	7 to 14 ft	scattered	
RADIUM-226	1.27	7.7	440	950	1768	7 to 14 ft	scattered	
URANIUM-235	0.13	32	1,800 CIS	8,800 CIS	02-02	0 to 10 ft	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	3.9	220	340	1768	7 to 14 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	3.2	180	440	1768	7 to 14 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	12	660	700	1768	14 to 17.5 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	0.025	1.4 CIS	3.6 CIS	02-01	0 to 8 ft	scattered	Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
NEPTUNIUM-237	<0.01	U	U CIS	U CIS				
PLUTONIUM-238	<0.01	0.0018	0.10 CIS	0.10 CIS	02-01	0 to 8 ft	scattered	
PLUTONIUM-239/240	<0.01	0.0033	0.19 CIS	0.60 CIS	02-02	0 to 10 ft	scattered	
RUTHENIUM-106	<0.06	0.058	3.3	11	1768	7 to 14 ft	scattered	
STRONTIUM-90	0.5	0.046	2.6	4.0	1769	16 to 22 ft	scattered	
TECHNETIUM-99	<0.9	2.3	130 CIS	620 CIS	02-02	0 to 10 ft	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Workplan Addendum(1992), and
3. Interviews with knowledgeable plant personnel

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TABLE 4-1.3.A
RADIOLOGICAL PROFILE OF PIT 3

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 3 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 3 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 3 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		204,100						
TOTAL DRY WASTE IN PIT (kg) (d)		235,071,108						
SPECIFIC GRAVITY OF WASTE (d)		2.62						
WATER CONTENT (wt. of water/dry wt.) (d)		74.00						
URANIUM-TOTAL	3.68	800,000 kg	3,400 ug/g	5,900 ug/g	1772	18 to 36 ft	scattered	Depleted magnesium flouride (MgF2) slag, slag leach filter cake, general sump sludge, dust collector residue. Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	220	940	1,700	1772	18 to 36 ft	scattered	
URANIUM-234	0.94	150	640	990	1771	28 to 41 ft	scattered	
THORIUM-230	1.85	1,400	6,100	12,000 CIS	03-02	0 to 20	scattered	
RADIUM-226	1.27	40	170	450	1770	12 to 24 ft	scattered	
URANIUM-235	0.13	12	52	52	1770	24 to 39 ft	discreet	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	40	170	400	1770	24 to 39 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	28	120	240	1770	24 to 39 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	66	280	820	1771	14 to 28 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	U	U	U				Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
NEPTUNIUM-237	<0.01	0.14	0.6 CIS	2.1 CIS	03-03	0-20	scattered	
PLUTONIUM-238	<0.01	0.10	0.44	0.98	1770	24 to 39 ft	scattered	
PLUTONIUM-239/240	<0.01	0.52	2.2 CIS	14 CIS	03-03	0-20	scattered	
RUTHENIUM-106	<0.06	U	U	U	03-03	0-20	scattered	
STRONTIUM-90	0.5	0.45	1.9 CIS	5.2 CIS	03-03	0-20	scattered	
TECHNETIUM-99	<0.9	54	230 CIS	1100 CIS	03-03	0 to 20	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

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TABLE 4-1.4.A
RADIOLOGICAL PROFILE OF PIT 4

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 4 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 4 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 4 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		55,100						
TOTAL DRY WASTE IN PIT (kg) (d)		98,590,826						
SPECIFIC GRAVITY OF WASTE (d)		3.02						
WATER CONTENT (wt. of water/dry wt.) (d)		29.10						
URANIUM-TOTAL	3.68	5,100,000 kg	52,000 ug/g	120,000 ug/g	1773	9 to 18 ft	scattered	Depleted magnesium flouride (MgF2) slag, slag leach filter cake, general sump sludge, dust collector residue. Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	1,900	19,000	42,000	1775	10 to 19 ft	scattered	
URANIUM-234	0.94	270	2,700	4,100	1775	10 to 19 ft	scattered	
THORIUM-230	1.85	100	1,000	1,800	1773	9 to 18 ft	scattered	
RADIUM-226	1.27	2.3	23	50	1775	19 to 30 ft	scattered	
URANIUM-235/236	0.13	40	380	930	1775	10 to 19 ft	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	20	230	840	1773	9 to 18 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	10	59	140	1773	9 to 18 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	90	950	2,500	1773	9 to 18 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	U	U	U				
NEPTUNIUM-237	<0.01	0.025	0.25 CIS	0.4 CIS	04-04	0 to 20 ft	scattered	Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
PLUTONIUM-238	<0.01	0.028	0.28 CIS	0.5 CIS	04-03	0 to 20 ft	scattered	
PLUTONIUM-239/240	<0.01	0.020	0.2 CIS	0.4 CIS	04-03	0 to 20 ft	scattered	
RUTHENIUM-106	<0.06	U	U	U				
STRONTIUM-90	0.5	4.0	44	140	1773	9 to 18 ft	scattered	
TECHNETIUM-99	<0.9	10	80 CIS	230 CIS	04-04	0 to 20 ft	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

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Project 419191.045.22
3ouirad-atm-09/29/93

TABLE 4-1.5.A
RADIOLOGICAL PROFILE OF PIT 5

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 5 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 5 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 5 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		97,900						
TOTAL DRY WASTE IN PIT (kg) (d)		117,625,873						
SPECIFIC GRAVITY OF WASTE (d)		2.43						
WATER CONTENT (wt. of water/dry wt.) (d)		54.70						
URANIUM-TOTAL	3.68	250,000 kg	2,100 ug/g	3,700 ug/g	05-03	0 to 18 ft	scattered	Depleted magnesium flouride (MgF2) slag, slag leach filter cake, general sump sludge, dust collector residue. Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	75	640 CIS	1,200 CIS	05-02	0 to 14 ft	scattered	
URANIUM-234	0.94	75	640 CIS	1,300 CIS	05-02	0 to 14 ft	scattered	
THORIUM-230	1.85	530	4,500 CIS	8,500 CIS	05-05	0 to 15 ft	scattered	
RADIUM-226	1.27	10	84	150	05-03	0 to 18 ft	scattered	
URANIUM-235	0.13	4	34 CIS	79 CIS	05-02	0 to 14 ft	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	3.50	30 CIS	55 CIS	05-03	0 to 28 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	2.20	19	39	05-07	0 to 6 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	3.60	31 CIS	44 CIS	05-03	0 to 28 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	3.10	26 CIS	78	05-04	0 to 16 ft	scattered	Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
NEPTUNIUM-237	<0.01	4.70	40	46	05-06	0 to 8 ft	scattered	
PLUTONIUM-238	<0.01	0.24	2 CIS	4.4 CIS	05-04	0 to 30 ft	scattered	
PLUTONIUM-239/240	<0.01	0.59	5 CIS	13 CIS	05-02	0 to 14 ft	scattered	
RUTHENIUM-106	<0.06	0.14	1.2	3.3	05-06	0 to 8 ft	scattered	
STRONTIUM-90	0.5	1.20	10 CIS	31 CIS	05-06	0 to 6 ft	scattered	
TECHNETIUM-99	<0.9	180	1,500	3,000	05-08	0 to 6 ft	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

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Project 419191.045.22
3outrad-atm-09/29/93

TABLE 4-1.6.A
RADIOLOGICAL PROFILE OF PIT 6

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN PIT 6 (Ci) (e)	(4) AVERAGE CONCENTRATION IN PIT 6 From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN PIT 6 From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		9,600						
TOTAL DRY WASTE IN PIT (kg) (d)		16,805,824						
SPECIFIC GRAVITY OF WASTE (d)		2.87						
WATER CONTENT (wt. of water/dry wt.) (d)		25.40						
URANIUM-TOTAL	3.68	220,000 kg	13,000 ug/g	28,000 ug/g	06-08	0 to 6 ft	scattered	Depleted magnesium flouride (MgF2) slag, slag leach filter cake, general sump sludge, dust collector residue. Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	285.70	17,000 CIS	29,000	06-05	0 to 6 ft	scattered	
URANIUM-234	0.94	57.00	3,400 CIS	5,300 CIS	06-02	0.7 to 4	scattered	
THORIUM-230	1.85	0.54	32	62	06-06	0 to 6 ft	scattered	
RADIUM-226	1.27	0.066	3.9	4.9	06-07	0 to 6 ft	scattered	
URANIUM-235	0.13	17.00	1,000 CIS	1,800 CIS	06-02	0.7 to 4	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	0.0090	0.53	1.2 CIS	06-01	1.2 to 4.5 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	0.91	54	190	06-04	0 to 6 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	0.020	1.2	1.7	06-06	0 to 6 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	0.30	18 CIS	31 CIS	06-02	0.7 to 4.0 ft	scattered	Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
NEPTUNIUM-237	<0.01	0.034	2.0 CIS	3.6 CIS	06-02	0.7 to 4.0 ft	scattered	
PLUTONIUM-238	<0.01	0.013	0.78 CIS	1.4 CIS	06-01	1.2 to 4.5 ft	scattered	
PLUTONIUM-239/240	<0.01	0.10	8.7 CIS	15 CIS	06-01	1.2 to 4.5 ft	scattered	
RUTHENIUM-106	<0.06	U	U	U				
STRONTIUM-90	0.5	0.10	4.1 CIS	5.1 CIS	06-01	1.2 to 4.5 ft	scattered	
TECHNETIUM-99	<0.9	2.2	130 CIS	160 CIS	03-06	0 to 15 ft	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

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Project 419191.045.22
3outrad-sm-09/29/93

TABLE 4-1.7.A
RADIOLOGICAL PROFILE OF BURN PIT

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN BURN PIT (Ci) (e)	(4) AVERAGE CONCENTRATION IN BURN PIT From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN BURN PIT From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		30,300						
TOTAL DRY WASTE IN PIT (kg) (d)		67,771,624						
SPECIFIC GRAVITY OF WASTE (d)		3.74						
WATER CONTENT (wt. of water/dry wt.) (d)		27.90						
URANIUM-TOTAL	3.68	140,000 kg	2,000 ug/g	4,500 ug/g	1776	19.5 to 32.5ft	scattered	Slag leach filter cake, neutralized raffinate, dust collector residue, general sump sludge. Uranium ore processing Refinery sump from the processing of uranium ore.
URANIUM-238	0.92	58	850	2,000	1776	19.5 to 32.5ft	scattered	
URANIUM-234	0.94	49	720	1,700	1776	19.5to32.5ft	scattered	
THORIUM-230	1.85	81	1,200	4,500	1776	19.5to32.5ft	scattered	
RADIUM-226	1.27	1.0	15	39	1776	19.5to32.5ft	scattered	
URANIUM-235/236	0.13	4.0	53	100	1776	19.5 to 32.5ft	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	4.0	57	410	1776	19.5to32.5ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	0.45	6.6	10	1776	6.5 to 19.5 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	8.0	120	900	1776	19.5to32.5ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	U	U	U				
NEPTUNIUM-237	<0.01	0.024	0.35 CIS	0.6 CIS	07-04	0 to16 ft	scattered	Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
PLUTONIUM-238	<0.01	0.012	0.17 CIS	0.5 CIS	07-03	0 to 14 ft	scattered	
PLUTONIUM-239/240	<0.01	0.010	0.15 CIS	0.4 CIS	07-05	0 to 12 ft	scattered	
RUTHENIUM-106	<0.06	U	U	U				
STRONTIUM-90	0.5	0.021	0.31	0.5	1777	0 to 6.5 ft	scattered	
TECHNETIUM-99	<0.9	2.0	29 CIS	64 CIS	07-05	0 to 12 ft	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

F-478

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Project 419191.045.22
3outrad-sm-09/29/93

TABLE 4-1.8.A
RADIOLOGICAL PROFILE OF CLEARWELL

(1) ANALYTE	(2) BACKGROUND CONCENTRATION FOR SOIL (pCi/g) (a,b)	(3) ESTIMATED RADIONUCLIDE QUANTITY IN CLEARWELL (Ci) (e)	(4) AVERAGE CONCENTRATION IN CLEARWELL From RI/FS (pCi/g) (f)	(5) HIGHEST HIT IN CLEARWELL From RI/FS (pCi/g) (f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES (i,j) (Refer to Sections 1 and 4.2)
TOTAL WASTE VOLUME IN PIT (yard3) (c)		3,700						
TOTAL DRY WASTE IN PIT (kg) (d)		2,892,394						
SPECIFIC GRAVITY OF WASTE (d)		1.44						
WATER CONTENT (wt. of water/dry wt.) (d)		40.90						
URANIUM-TOTAL	3.68	3,500 kg	1,200 ug/g	2,800 ug/g	CW-D	11 to 13 ft	scattered	Slag leach filter cake, neutralized raffinate, dust collector residue, uranium ore processing.
URANIUM-238	0.92	2.3	810	1,600	CW-D	11 to 13 ft	scattered	
URANIUM-234	0.94	1.3	460	1,100	CW-F	11 to 13 ft	scattered	
THORIUM-230	1.85	4.9	1,700 CIS	5,600 CIS	08-005	11 to 13 ft	scattered	
RADIUM-226	1.27	0.21	74	170	CW-E	11 to 13 ft	scattered	
URANIUM-235/236	0.13	0.55	190	370	CW-D	11 to 13 ft	scattered	Refinery sump from the processing of uranium ore.
THORIUM-232	1.24	0.055	19 CIS	39 CIS	08-005	11 to 13 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
RADIUM-228	1.25	0.052	18	26	CW-D	11 to 13 ft	scattered	Re-growth from Th-232 in the refinery sump.
THORIUM-228	1.25	0.11	37 CIS	56 CIS	08-001	11 to 13 ft	scattered	Thorium production, or impurities in the ore or ore concentrates.
CESIUM-137	<0.01	0.55	190 CIS	450 CIS	08-005	11 to 13 ft	scattered	Fission material from the processing of irradiated uranium from Hanford, and fallout from weapons testing.
NEPTUNIUM-237	<0.01	0.0032	1.1	2.2 CIS	08-008	11 to 13 ft	scattered	
PLUTONIUM-238	<0.01	0.00072	0.25	0.49	CW-D	11 to 13 ft	scattered	
PLUTONIUM-239/240	<0.01	0.00081	0.28	0.54	CW-E	11 to 13 ft	scattered	
RUTHENIUM-106	<0.06	0.0032	1.1	3.1	CW-D	11 to 13 ft	scattered	
STRONTIUM-90	0.5	0.025	8.5 CIS	26 CIS	08-005	11 to 13 ft	scattered	
TECHNETIUM-99	<0.9	1.0	360	700	CW-B	11 to 13 ft	scattered	

(a) Wastestream volumes and calculations were based on:
1. Materials Controls and Accounting (MC&A) records,
2. CRU 3 Work Plan Addendum (1992), and
3. Interviews with knowledgeable plant personnel.

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Project: 419191.045.22

ferme2-SM/KT-09/30/93

TABLE 4-1.1.B
METALS PROFILE OF PIT 1

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a.b)	(3) ESTIMATED METALS QUANTITY IN PIT 1 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 1 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 1 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		48,500						
Total dry waste quantity in pit (kg) (d)		92,137,858						
Specific gravity of waste (d)		3.0						
Water content (wt. of water/dry wt.) (%) (d)		22.40						
Antimony	6.7	4,515	49	130	1767	12-20.7	scattered	
Arsenic	8.79	599	6.5 CIS	15 CIS	01-03	0-12	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	23,034	250	440	1765	14-22	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	405	4.4	13	1767	12-20.7	scattered	
Boron	42.7	51,597	560	1700	1765	14-22	scattered	
Cadmium	0.59	829	9	19	1765	14-22	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	10,135	110	350	1767	12-20.7	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	1,658	18	47	1767	12-20.7	scattered	
Copper	16.3	4,607	50 CIS	160 CIS	01-03	0-12	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	22	0.24	0.73	1765	14-22	scattered	
Lead	13.4	2,948	32 CIS	90 CIS	01-03	0-12	scattered	Raffinate from concentrated ores.
Manganese	922	128,993	1400 CIS	3700	1766	14-20.5	scattered	Raffinate from concentrated ores.
Mercury	0.29	15	0.16 CIS	0.3 CIS	01-01	0-12	scattered	
Molybdenum	2.7	1,474	16	33	1767	12-20.7	scattered	
Nickel	28.5	2,764	30	65 CIS	01-03	0-12	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	0	U	U				
Silver	2.2	829	9 CIS	33 CIS	01-03	0-12	scattered	Raffinate from concentrated ores. Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	26	0.28 CIS	0.3 CIS	01-03	0-12	scattered	
Tin		0	U	U				
Uranium	4.64							
Vanadium	36.9	4,607	50	140	1767	12-20.7	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	1,843	20 CIS	58 CIS	01-03	0-12	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		240,902						

a. Waste streams, volumes, and calculations are based on:

1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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Project : 419191.045.22

ferme2-SM/KT-09/28/93

FOOTNOTES FOR TABLES 4-1.1.B TO 4-1.8.B

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY IN PIT 1 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 1 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 1 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		48,500						
Total waste quantity in pit (kg) (d)		92,137,858						
Specific gravity of waste (d)		3.0						
Water content (wt. of water/dry wt.) (%) (d)		22.40						

b. From Table 4.2 of this report, for subsurface soils.

c. Refer to sample calculations 1 and 34 in Appendix F.

d. Refer to Appendix A, and sample calculation 34 in Appendix F.

e. Based on average concentration, refer to sample calculation 36 in Appendix F.

f. From Table 4.7 and 4.8 of this report.

h. From Appendix A of this report.

i. Refer to Sections 1 & 4.2 of this report, and Table A.4.0 in Operable Unit 3 Work Plan Addendum, June 1992.

CIS = Characterization Investigation Study (refer to Appendix A).

U = Non detected and is entered as a zero in all calculations.

mg/kg = milligram per kilogram

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Project : 419191.045.22
ferme2-SM/KT-09/28/93

TABLE 4-1.2.B
METALS PROFILE OF PIT 2

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY IN PIT 2 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 2 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 2 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		24,200						
Total dry waste quantity in pit (kg) (d)		17,514,507						
Specific gravity of waste (d)		2.6						
Water content (wt. of water/dry wt.) (%) (d)		176.90						
Antimony	6.7	701	40	55	1769	16-22	scattered	
Arsenic	8.79	2,977	170	420	1768	7-14	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	19,266	1,100	1,900	1768	14-17.5	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	280	16	27	1769	16-22	scattered	
Boron	42.7	2,802	160	240	1768	7-14	scattered	
Cadmium	0.59	152	8.7	13	1768	7-14	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	3,153	180	280	1768	7-14	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	11,384	650	1,500	1768	7-14	scattered	
Copper	16.3	11,735	670	1,300	1768	7-14	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	25	1.4	2.9	1769	16-22	scattered	
Lead	13.4	8,582	490	760	1768	7-14	scattered	Raffinate from concentrated ores.
Manganese	922	24,520	1,400	2,900	1768	7-14	scattered	Raffinate from concentrated ores.
Mercury	0.29	30	1.7	2.6	1768	7-14	scattered	
Molybdenum	2.7	1,734	99	220	1768	7-14	scattered	
Nickel	28.5	13,661	780	1,700	1768	7-14	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	806	46	130	1769	8-16	scattered	Raffinate from concentrated ores.
Silver	2.2	165	9.4 CIS	23 CIS	02-01	0-10	scattered	Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	0	U CIS	U CIS				
Tin			U	U				
Uranium	4.64							
Vanadium	36.9	4,554	260	590	1768	7-14	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	15,413	880 CIS	3,300 CIS	02-03	0-8	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		121,939						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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TABLE 4-1.3.B
METALS PROFILE OF PIT 3

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY IN PIT 3 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 3 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 3 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		204,100						
Total dry waste quantity in pit (kg) (d)		235,071,108						
Specific gravity of waste (d)		2.6						
Water content (wt. of water/dry wt.) (%) (d)		74.00						
Antimony	6.7	7,287	31	64	1771	14-28	scattered	
Arsenic	8.79	799,242	3,400	15,000	1771	14-28	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	1,104,834	4,700 CIS	14,000 CIS	03-04	0-12	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	2,304	9.8 CIS	24 CIS	03-04	0-12	scattered	
Boron	42.7	23,507	100	240	1771	14-28	scattered	
Cadmium	0.59	2,586	11	39	1770	24-39	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	30,559	130	230	1770	24-39	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	5,877	25	51	1770	24-39	scattered	
Copper	16.3	258,578	1,100 CIS	2,300 CIS	03-03	0-12	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	259	1.1	1.7	1771	28-41	scattered	
Lead	13.4	98,730	420	840	1770	24-39	scattered	Raffinate from concentrated ores.
Manganese	922	2,585,782	11,000	20,000	1770	24-39	scattered	Raffinate from concentrated ores.
Mercury	0.29	400	1.7	5.1	1771	14-28	scattered	
Molybdenum	2.7	25,858	110	280	1770	12-24	scattered	
Nickel	28.5	37,611	160 CIS	500 CIS	03-03	0-12	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	6,112	26.0 CIS	90 CIS	03-04	0-12	scattered	Raffinate from concentrated ores.
Silver	2.2	1,199	5.1 CIS	8.1 CIS	03-05	0-12	scattered	Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	917	3.9 CIS	12 CIS	03-04	0-12	scattered	
Tin		17,865	76	190	1770	24-39	scattered	
Uranium	4.64	0						
Vanadium	36.9	705,213	3,000 CIS	9,700 CIS	03-04	0-12	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	32,910	140	330	1770	24-39	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		5,747,630						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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Project : 419191.045.22

ferme2-SM/KT-09/28/93

TABLE 4-1.4.B
METALS PROFILE OF PIT 4

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY IN PIT 4 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 4 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 4 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		55,100						
Total dry waste quantity in pit (kg) (d)		98,590,826						
Specific gravity of waste (d)		3.0						
Water content (wt. of water/dry wt.) (%) (d)		29.10						
Antimony	6.7	9,859	100	320	1773	9-18	scattered	
Arsenic	8.79	325	3.3	6.5	1775	10-19	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	236,618	2,400 CIS	6,700 CIS	04-04	0-20	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	1,666	17	51	1773	9-18	scattered	
Boron	42.7	25,634	260	1,000	1773	9-18	scattered	
Cadmium	0.59	1,084	11	35	1773	9-18	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	46,338	470	1,500	1773	9-18	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	5,817	59	180	1773	9-18	scattered	
Copper	16.3	17,746	180	480	1773	9-18	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	21	0.21	0.64	1775	10-19	scattered	
Lead	13.4	4,239	43 CIS	63	1775	10-19	scattered	Raffinate from concentrated ores.
Manganese	922	285,913	2,900	5,600	1775	10-19	scattered	Raffinate from concentrated ores.
Mercury	0.29	33	0.33 CIS	0.62	1773	9-18	scattered	
Molybdenum	2.7	3,451	35	96	1773	9-18	scattered	
Nickel	28.5	8,282	84	220	1773	9-18	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	0	U	U				Raffinate from concentrated ores.
Silver	2.2	23,662	240	760	1773	9-18	scattered	Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	0	U	U				
Tin		6,408	65	130	1773	9-18	scattered	
Uranium	4.64							
Vanadium	36.9	17,746	180	560	1773	9-18	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	6,704	68	200	1773	9-18	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		701,547						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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Project: 419191.045.22

ferme2-SM/KT-09/28/93

TABLE 4-1.5.B
METALS PROFILE OF PIT 5

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY IN PIT 5 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 5 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 5 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		97,900						
Total dry waste quantity in pit (kg) (d)		117,625,873						
Specific gravity of waste (d)		2.4						
Water content (wt. of water/dry wt.) (%) (d)		54.70						
Antimony	6.7	4,235	36 CIS	88	05-01	N/A-15	scattered	
Arsenic	8.79	112,921	960 CIS	2,800 CIS	05-05	0-12	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	2,705,395	23,000 CIS	37,000 CIS	05-01	0-3	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	1,117	9.5	22	05-01	N/A-15	scattered	
Boron	42.7	0	no data	no data				
Cadmium	0.59	647	5.5 CIS	17 CIS	05-06	0-12	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	14,115	120 CIS	220 CIS	05-02	0-14	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	3,058	26 CIS	44 CIS	05-01	0-3	scattered	
Copper	16.3	588,129	5,000 CIS	18,000 CIS	05-06	0-12	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	0	U	U				
Lead	13.4	18,820	160 CIS	240 CIS	05-03	0-12	scattered	Raffinate from concentrated ores.
Manganese	922	211,727	1,800 CIS	4,700 CIS	05-03	0-12	scattered	Raffinate from concentrated ores.
Mercury	0.29	129	1.1 CIS	1.8 CIS	05-04	0-12	scattered	
Molybdenum	2.7	45,874	390	1,400	05-01	N/A-15	scattered	
Nickel	28.5	15,291	130 CIS	250 CIS	05-03	0-12	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	882	7.5 CIS	18 CIS	05-05	0-12	scattered	Raffinate from concentrated ores.
Silver	2.2	1,117	9.5	22	05-08	N/A-6	scattered	Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	2,588	22	100	05-08	N/A-6	scattered	
Tin		3,776	32	93	05-08	N/A-6	scattered	
Uranium	4.64							
Vanadium	36.9	317,590	2,700 CIS	5,400 CIS	05-05	0-12	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	21,173	180 CIS	280	05-05	N/A-8	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		4,068,585						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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Project : 419191.045.22

ferme2-SM/KT-09/28/93

TABLE 4-1.6.B
METALS PROFILE OF PIT 6

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY IN PIT 6 (kg) (e)	(4) AVERAGE CONCENT. IN PIT 6 from RI/FS (mg/kg)(f)	(5) HIGHEST HIT IN PIT 6 from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		9,600						
Total dry waste quantity in pit (kg) (d)		16,805,824						
Specific gravity of waste (d)		2.9						
Water content (wt. of water/dry wt.) (%) (d)		25.40						
Antimony	6.7	84	5	26	06-07	N/A-6	scattered	
Arsenic	8.79	689	41	77	06-06	N/A-6	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	1,597	95 CIS	95 CIS	06-04	0-10	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	96	5.7 CIS	5.7 CIS	06-04	0-10	scattered	
Boron	42.7	0	no data	no data				
Cadmium	0.59	96	5.7 CIS	12	06-05	N/A-6	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	504	30 CIS	60	06-08	N/A-6	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	437	26 CIS	26 CIS	06-04	0-10	scattered	
Copper	16.3	3,697	220 CIS	220 CIS	06-04	0-10	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	0	U	U				
Lead	13.4	1,042	62	110	06-06	N/A-6	scattered	Raffinate from concentrated ores.
Manganese	922	2,689	160	310	06-01	N/A-7	scattered	Raffinate from concentrated ores.
Mercury	0.29	5	0.29	1.1	06-01	N/A-7	scattered	
Molybdenum	2.7	0	U	U				
Nickel	28.5	857	51 CIS	51 CIS	06-04	0-10	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	0	U	U				
Silver	2.2	2,689	160 CIS	160 CIS	06-04	0-10	scattered	Raffinate from concentrated ores. Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	773	46	110	06-06	N/A-6	scattered	
Tin		168	10	22	06-06	N/A-6	scattered	
Uranium	4.64							
Vanadium	36.9	1,681	100 CIS	120	06-05	N/A-6	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	807	48 CIS	61	06-01	N/A-7	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		17,910						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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Project: 419191.045.22

ferme2-SM/KT-09/28/93

TABLE 4-1.7.B
METALS PROFILE OF BURN PIT

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY BURN PIT (kg) (e)	(4) AVERAGE CONCENT. BURN PIT from RI/FS (mg/kg)(f)	(5) HIGHEST HIT BURN PIT from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		30,300						
Total dry waste quantity in pit (kg) (d)		67,771,624						
Specific gravity of waste (d)		3.7						
Water content (wt. of water/dry wt.) (%) (d)		27.90						
Antimony	6.7	657	9.7	18	1776	19.5-32.5	scattered	
Arsenic	8.79	1,152	17	39	1776	19.5-32.5	scattered	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	88,103	1,300 CIS	7,100 CIS	07-04	0-12	scattered	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	230	3.4 CIS	16 CIS	07-04	0-12	scattered	
Boron	42.7	2,101	31	48	1776	6.5-19.5	scattered	
Cadmium	0.59	454	6.7 CIS	35 CIS	07-04	0-12	scattered	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	3,727	55	91	1776	19.5-32.5	scattered	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	2,894	43	110	1776	19.5-32.5	scattered	
Copper	16.3	9,488	140	260	1776	6.5-19.5	scattered	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	8	0.12	0.21	1777	6.5-26	scattered	
Lead	13.4	10,843	160	280	1776	6.5-19.5	scattered	Raffinate from concentrated ores.
Manganese	922	36,597	540	1,700 CIS	07-04	0-12	scattered	Raffinate from concentrated ores.
Mercury	0.29	39	0.57	1.2	1776	6.5-19.5	scattered	
Molybdenum	2.7	1,084	16	25	1776	19.5-32.5	scattered	
Nickel	28.5	6,099	90	210	1776	19.5-32.5	scattered	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	88	1.3	2	1777	6.5-26	scattered	Raffinate from concentrated ores.
Silver	2.2	5,896	87 CIS	510 CIS	07-04	0-12	scattered	Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	22	0.33 CIS	0.5 CIS	07-05	0-12	scattered	
Tin		0	U	U				
Uranium	4.64							
Vanadium	36.9	4,337	64 CIS	290 CIS	07-04	0-12	scattered	Slag leach filter cake, MgF2 slag.
Zinc	59	18,976	280	510	1776	6.5-19.5	scattered	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		192,798						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

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Project : 419191.045.22

ferme2-SM/KT-09/28/93

TABLE 4-1.8.B
METALS PROFILE OF CLEARWELL

(1) ANALYTE	(2) BACKGROUND CONCENT. FOR SOIL (mg/kg) (a,b)	(3) ESTIMATED METALS QUANTITY CLEAR WELL (kg) (e)	(4) AVERAGE CONCENT. CLEARWEL from RI/FS (mg/kg)(f)	(5) HIGHEST HIT CLEARWI from RI/FS (mg/kg)(f)	(6) LOCATION OF HIGHEST HIT (h)	(7) VERTICAL PROFILE (ft) (h)	(8) HORIZONTAL PROFILE (h)	(9) POSSIBLE SOURCES Refer to Sections 1 and 4.2 for details of sources) (i)
Total waste volume in pit (yard3) (c)		3,700						
Total dry waste quantity in pit (kg) (d)		2,892,394						
Specific gravity of waste (d)		1.4						
Water content (wt. of water/dry wt.) (%) (d)		40.90						
Antimony	6.7	26	9 CIS	32 CIS	08-03	11-13	stratified	
Arsenic	8.79	104	36	59	CW-F	11-13	stratified	Raffinate from concentrated ores, Scrap Recovery Plant sump.
Barium	99.2	8,388	2,900 CIS	6,900 CIS	08-03	11-13	stratified	Raffinate from concentrated ores, Pilot Plant Wet Side.
Beryllium	0.62	8	2.9 CIS	9.1 CIS	08-03	11-13	stratified	
Boron	42.7	0	no data	no data				
Cadmium	0.59	11	3.7 CIS	7.2 CIS	08-03	11-13	stratified	Raffinate from concentrated ores, Pilot Plant wet side, Metals Production and Fabrication Plants, Reconditioning Bldg.
Chromium	19	289	100	200	CW-F	11-13	stratified	Raffinate from concentrated ores, refinery, Metals Plants, Pilot Plant Wet Side, Cooling Towers.
Cobalt	15.7	46	16	26	CW-F	11-13	stratified	
Copper	16.3	4,049	1,400	3,300	CW-F	11-13	stratified	Plant 1 Storage, Scrap Recovery Plant, production plant, Plant 9 Sump, Pilot plant Wet Side, Plant 8 W. Pad, Copper Scrap.
Cyanide	0.11	10	3.5 CIS	9.2 CIS	08-03	11-13	stratified	
Lead	13.4	781	270	590	CW-F	11-13	stratified	Raffinate from concentrated ores.
Manganese	922	20,825	7,200	20,000	CW-F	11-13	stratified	Raffinate from concentrated ores.
Mercury	0.29	7	2.4 CIS	4.4 CIS	08-03	11-13	stratified	
Molybdenum	2.7	67	23	41	CW-D	11-13	stratified	
Nickel	28.5	318	110	230	CW-F	11-13	stratified	Special Products Plant, Plant 9 Sump Treatment Pilot Plant Wet Side.
Selenium	0.6	5	1.7 CIS	3.7 CIS	08-03	11-13	stratified	Raffinate from concentrated ores.
Silver	2.2	17	6	13	CW-F	11-13	stratified	Ore Refinery Plant, Laboratory, Main Maintenance Building.
Thallium	0.43	3	1.0 CIS	2.1 CIS	08-03	11-13	stratified	
Tin		32	11	24	CW-F	11-13	stratified	
Uranium	4.64							
Vanadium	36.9	2,169	750 CIS	2,600 CIS	08-03	11-13	stratified	Slag leach filter cake, MgF2 slag.
Zinc	59	492	170	310	CW-F	11-13	stratified	Raffinate from concentrated ores, Pilot Plant Annex, UF6 to UF4.
TOTAL METALS		37,648						

a. Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum, 1992, and
3. Interviews with knowledgeable plant personnel.

4783

TABLE 4-1.1.C
ORGANIC PROFILE OF PIT 1

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fecem5-KT-09/30/93

(1) ANALYTE	(2) ESTIMATED CHEMICAL QUANTITY IN PIT 1 (kg)(a,e)	(3) AVERAGE CONCENT. IN PIT 1 from RI/FS (ug/kg) (f)	(4) HIGHEST HIT IN PIT 1 from RI/FS (ug/kg)(f)	(5) LOCATION OF HIGHEST HIT (h)	(6) VERTICAL PROFILE (ft) (h)	(7) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	48,500						
Total dry waste quantity in pit (kg)(c)	92,137,858						
Specific gravity of waste (d)	3.04						
Water content (wt. of water/dry wt.) (%)(d)	22.4						
1- FURANS							
2,3,7,8-TCDF (j)	0.30	3.3	14	1765	7-14	scattered	. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations. . High temperature processes such as copper shredding, hydrometallurgical system.
Dibenzofuran (j)	0.00	U	U				
Heptachlorodibenzofuran	0.08	0.9	2.7	1766	14-20.5	scattered	
Hexachlorodibenzofuran	0.10	1.1	2.9	1765	7-14	scattered	
Octachlorodibenzofuran	0.02	0.23	0.76	1766	14-20.5	scattered	
Pentachlorodibenzofuran	0.20	2.2	7.9	1765	7-14	scattered	
Tetrachlorodibenzofuran (j)	0.92	10	35	1765	7-14	scattered	
TOTAL CHLORINATED DIBENZO FURANS (j)	1.3						
2- DIOXINS							
2,3,7,8-TCDD (k)	0.00	U	U				
Heptachlorordibenzo-p-dioxin	0.07	0.73	2.3	1766	14-20.5	scattered	. From the same sources as in case 1
Hexachlorodibenzo-p-dioxin	0.16	1.7	4.9	1766	14-20.5	scattered	
Octachlorodibenzo-p-dioxin	0.03	0.3	0.74	1766	14-20.5	scattered	
Tetrachlorodibenzo-p-dioxin (k)	0.00	U	U				
TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)	0.3						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

FOOT-NOTES FOR TABLES 4-1.1.C TO 4-1.8.C

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fecem5-KT-09/30/93

(1) ANALYTE	(2) ESTIMATED CHEMICAL QUANTITY IN PIT 1 (kg)(a,e)	(3) AVERAGE CONCENT. IN PIT 1 from RI/FS (ug/kg) (f)	(4) HIGHEST HIT IN PIT 1 from RI/FS (ug/kg)(f)	(5) LOCATION OF HIGHEST HIT (h)	(6) VERTICAL PROFILE (ft) (h)	(7) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	48,500						
Total dry waste quantity in pit (kg)(c)	92,137,858						
Specific gravity of waste (d)	3.04						
Water content (wt. of water/dry wt.) (%)(d)	22.4						

Foot-notes for Table 4-1.1.C to 4-1.8.C

b. Refer to Sample Calculation 1 and 34 in Appendix F.
c. Refer to Sample Calculation 34 in Appendix F.
d. Refer to Appendix A, and Sample Calculation 34 in Appendix F.
e. Based on average concentration. Refer to Sample Calculation 37 in Appendix F.
f. From Table 4.9 and 4.10 of this report. Background concentration of organics in soil is considered to be non-detected.
h. From Appendix A of this report.
i. Refer to Sections 1 & 4.2, Appendix F of this report, and Table A.4.0 in Operable Unit 3 Work Plan Addendum, June 1992.
j. 2,3,7,8-TCDF and Dibenzofuran are included in Tetrachlorodibenzofuran. Therefore they are not included in the total value.
k. 2,3,7,8-TCDD is included in Tetrachlorodibenzo-p-dioxin. Therefore it is not included in the total value.

CIS = Characterization Investigation Study (refer to Appendix A).
PAHs = Throughout this report, the term "PAHs" is used interchangeably with the term "PNAs" for Polynuclear Aromatic Hydrocarbons.
U = Non detected and is entered as a zero in all calculations.
ug/kg = microgram per kilogram

TABLE 4-1.1.C (continued)
ORGANIC PROFILE OF PIT 1

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(2) ESTIMATED CHEMICAL QUANTITY IN PIT 1 (kg)(a,e)	(3) AVERAGE CONCENT. IN PIT 1 from RI/FS (ug/kg) (f)	(4) HIGHEST HIT IN PIT 1 from RI/FS (ug/kg)(f)	(5) LOCATION OF HIGHEST HIT (h)	(6) VERTICAL PROFILE (ft) (h)	(7) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	48,500						
Total dry waste quantity in pit (kg)(c)	92,137,858						
Specific gravity of waste (d)	3.04						
Water content (wt. of water/dry wt.) (%)(d)	22.4						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	36	390 CIS	900	1767	6-12	scattered	. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Coal dust and coal by-products. . Fuel oils, direct or as products of combustion. . Oil reclaimer. . Asphalt. . Main maintenance, solvent extraction, laboratories, stores etc.
Acenaphthene	0	U	U				
Acenaphthylene	0	U	U				
Anthracene	38	410 CIS	540 CIS	01-02	0-12	scattered	
Benzo(a)anthracene	28	300 CIS	540 CIS	01-02	0-12	scattered	
Benzo(a)pyrene	39	420 CIS	540 CIS	01-02	0-12	scattered	
Benzo(b)fluoranthene	23	250 CIS	470 CIS	01-05	0-12	scattered	
Benzo(g,h,i)perylene	0	U	U				
Benzo(k)fluoranthene	39	420 CIS	540 CIS	01-02	0-12	scattered	
Chrysene	30	330 CIS	540 CIS	01	0-12	scattered	
Dibenzo(a,h)anthracene	0	U	U				
Fluoranthene	32	350	1,000	1765	7-14	scattered	
Fluorene	0	U	U				
Indeno(1,2,3-cd)pyrene	0	U	U				
Naphthalene	31	340 CIS	540 CIS	01-02	0-12	scattered	
Phenanthrene	92	1,000 CIS	2,400 CIS	01	0-12	scattered	
Pyrene	27	290	900				
TOTAL PAHs	415						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.1.C (continued)
ORGANIC PROFILE OF PIT 1

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(2) ESTIMATED CHEMICAL QUANTITY IN PIT 1 (kg)(a,e)	(3) AVERAGE CONCENT. IN PIT 1 from RI/FS (ug/kg) (f)	(4) HIGHEST HIT IN PIT 1 from RI/FS (ug/kg)(f)	(5) LOCATION OF HIGHEST HIT (h)	(6) VERTICAL PROFILE (ft) (h)	(7) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	48,500						
Total dry waste quantity in pit (kg)(c)	92,137,858						
Specific gravity of waste (d)	3.04						
Water content (wt. of water/dry wt.) (%)(d)	22.4						
4- PCBs							
Aroclor-1221	175	1,900	6,400	1766	14-20.5	scattered	. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	0	U	U				. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	332	3,600	10,000	1765	7-14	scattered	
Aroclor-1254	525	5,700 CIS	12,000 CIS	01	0-12	scattered	. Fire brigade training
Aroclor-1260	415	4,500 CIS	7,800 CIS	01	0-12	scattered	
TOTAL PCBs	1,447						
5- OTHER CHEMICALS							
4,4-DDT	60	650 CIS	1,600 CIS	01-04	0-12	scattered	. From application of pesticides and/or herbicides.
Pentachlorophenol	0	U	U				. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	0	U	U				
2,4,5-Trichlorophenol	0	U	U				. From application of pesticides and/or herbicides.
4-Nitroaniline	0	U	U				. In corrosion inhibitor.
Benzene	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Dichlorodifluoromethane	1,382	15,000	29,600	1766	13.5-14	scattered	. Refrigeration oil, fabrication ware house.
Tetrachloroethene	20	220 CIS	650	1766	13.5-14	scattered	. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tributyl Phosphate	1,290	14,000	25,000	1765	7-14	scattered	. Charcoal treatment, uranium removal process.
Vinyl Chloride	0	U	U				. Progeny of parent Tetrachloroethene or Trichloroethene.
TOTAL OTHER CHEMICALS	2,752						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.2.C
ORGANIC PROFILE OF PIT 2

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(9) ESTIMATED CHEMICAL QUANTITY IN PIT 2 (kg)(a,e)	(10) AVERAGE CONCENT. IN PIT 2 from RI/FS (ug/kg) (f)	(11) HIGHEST HIT IN PIT 2 from RI/FS (ug/kg) (f)	(12) LOCATION OF HIGHEST HIT (h)	(13) VERTICAL PROFILE (ft) (h)	(14) HORIZONTAL PROFILE (h)	(8-2) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	24,200						
Total dry waste quantity in pit (kg)(c)	17,514,507						
Specific gravity of waste (d)	2.62						
Water content (wt. of water/dry wt.) (%)(d)	176.9						
1- FURANS							
2,3,7,8-TCDF (j)	0.00	U	U				. Bottom ash from three solid waste incinerators, oil burner, or graphite burner.
Dibenzofuran (j)	151	8,600	36,000	02-05	0-10	scattered	. In calcined raffinate.
Heptachlorodibenzofuran	0.04	2	5.9	1768	7-14	scattered	. Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations.
Hexachlorodibenzofuran	0.01	0.77	2.7	1768	7-14	scattered	. High temperature processes such as copper shredding, hydrometallurgical system.
Octachlorodibenzofuran	0.03	1.8	4.9	1768	7-14	scattered	
Pentachlorodibenzofuran	0.004	0.2	0.55	1768	7-14	scattered	
Tetrachlorodibenzofuran (j)	0.00	U	U				
TOTAL CHLORINATED DIBENZO FURANS (j)	0.1						
2- DIOXINS							
2,3,7,8-TCDD (k)	0.00	U	U				
Heptachlorordibenzo-p-dioxin	0.05	2.7	8.1	1768	7-14	scattered	. From the same sources as in case 1
Hexachlorodibenzo-p-dioxin	0.00	0.21	0.65	1769	8-16	scattered	
Octachlorodibenzo-p-dioxin	0.30	17	45.9	1768	7-14	scattered	
Tetrachlorodibenzo-p-dioxin (k)	0.00	U	U				
TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)	0.3						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.2.C (continued)
ORGANIC PROFILE OF PIT 2

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(9) ESTIMATED CHEMICAL QUANTITY IN PIT 2 (kg)(a,c)	(10) AVERAGE CONCENT. IN PIT 2 from RI/FS (ug/kg) (f)	(11) HIGHEST HIT IN PIT 2 from RI/FS (ug/kg) (f)	(12) LOCATION OF HIGHEST HIT (h)	(13) VERTICAL PROFILE (ft) (h)	(14) HORIZONTAL PROFILE (h)	(8-2) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	24,200						
Total dry waste quantity in pit (kg)(c)	17,514,507						
Specific gravity of waste (d)	2.62						
Water content (wt. of water/dry wt.) (%)(d)	176.9						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	58	3,300	7,800	1769	16-22	scattered	. Bottom ash from three solid waste incinerators, oil burner, or graphite burner.
Acenaphthene	228	13,000	43,000 CIS	02-05	0-10	scattered	. In calcined raffinate.
Acenaphthylene	14	810 CIS	2,600	1769	15-15.5	scattered	. Coal dust and coal by-products.
Anthracene	438	25,000 CIS	120,000 CIS	02-05	0-10	scattered	. Fuel oils, direct or as products of combustion.
Benzo(a)anthracene	666	38,000	130,000 CIS	02-05	0-10	scattered	. Oil reclaimer.
Benzo(a)pyrene	473	27,000	120,000 CIS	02-05	0-10	scattered	. Asphalt.
Benzo(b)fluoranthene	455	26,000	130,000	1769	16-22	scattered	. Main maintenance, solvent extraction, laboratories, stores etc.
Benzo(g,h,i)perylene	298	17,000	42,000	1769	16-22	scattered	
Benzo(k)fluoranthene	280	16,000	75,000 CIS	02-05	0-10	scattered	
Chrysene	490	28,000	100,000	1769	16-22	scattered	
Dibenzo(a,h)anthracene	119	6,800	20,000	1769	16-22	scattered	
Fluoranthene	1,751	100,000 CIS	490,000 CIS	02-05	0-10	scattered	
Fluorene	245	14,000	62,000 CIS	02-05	0-10	scattered	
Indeno(1,2,3-cd)pyrene	263	15,000	46,000 CIS	02-05	0-10	scattered	
Naphthalene	158	9,000	23,000	1769	16-22	scattered	
Phenanthrene	1,646	94,000	370,000 CIS	02-05	0-10	scattered	
Pyrene	1,401	80,000	250,000 CIS	02-05	0-10	scattered	
TOTAL PAHs	8,983						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.2.C (continued)
ORGANIC PROFILE OF PIT 2

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(9) ESTIMATED CHEMICAL QUANTITY IN PIT 2 (kg)(a,e)	(10) AVERAGE CONCENT. IN PIT 2 from RI/FS (ug/kg) (f)	(11) HIGHEST HIT IN PIT 2 from RI/FS (ug/kg) (f)	(12) LOCATION OF HIGHEST HIT (h)	(13) VERTICAL PROFILE (ft) (h)	(14) HORIZONTAL PROFILE (h)	(8-2) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	24,200						
Total dry waste quantity in pit (kg)(c)	17,514,507						
Specific gravity of waste (d)	2.62						
Water content (wt. of water/dry wt.) (%)(d)	176.9						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	0	U	U				. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	39	2,200	5,200 CIS	02-05	0-10	scattered	. Fire brigade training
Aroclor-1254	49	2,800 CIS	10,000 CIS	02-05	0-10	scattered	
Aroclor-1260	0	U	U				
TOTAL PCBs	88						
5- OTHER CHEMICALS							
4,4-DDT	11	620 CIS	1,400 CIS	02-01	0-10	scattered	. From application of pesticides and/or herbicides.
Pentachlorophenol	58	3,300	13,000	1769	15-15.5	scattered	. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	56	3,200	13,000	1769	15-15.5	scattered	. From application of pesticides and/or herbicides.
2,4,5-Trichlorophenol	0	U	U				. In corrosion inhibitor.
4-Nitroaniline	72	4,100 CIS	7,900 CIS	02-03	0-10	stratified	. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Benzene	0.14	8.2	19	1769	20-20.5	scattered	
Dichlorodifluoromethane	0	U	U				. Refrigeration oil, fabrication ware house.
Tetrachloroethene	0.25	14	45	1768	6-6.5	scattered	. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tributyl Phosphate	385	22,000	39,000	1768	14-17.5	scattered	. Charcoal treatment, uranium removal process.
Vinyl Chloride	12	670	1,900	1769	15-15.5	scattered	. Progeny of parent Tetrachloroethene or Trichloroethene.
TOTAL OTHER CHEMICALS	594						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.3.C
ORGANIC PROFILE OF PIT 3

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(15) ESTIMATED CHEMICAL QUANTITY IN PIT 3 (kg)(a,e)	(16) AVERAGE CONCENT. IN PIT 3 from RI/FS (ug/kg) (f)	(17) HIGHEST HIT IN PIT 3 from RI/FS (ug/kg) (f)	(18) LOCATION OF HIGHEST HIT (h)	(19) VERTICAL PROFILE (ft) (h)	(20) HORIZONTAL PROFILE (h)	(8-35) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	204,100						
Total dry waste quantity in pit (kg)(c)	235,071,108						
Specific gravity of waste (d)	2.62						
Water content (wt. of water/dry wt.) (%)(d)	74						
1- FURANS							
2,3,7,8-TCDF (j)	0.00	U	U				. From raffinate slurry.
Dibenzofuran (j)	0.00	U	U				. Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations.
Heptachlorodibenzofuran	0.09	0.4	0.95	1770	24-39	scattered	. High temperature processes such as copper shredding, hydrometallurgical system.
Hexachlorodibenzofuran	0.04	0.16	0.35	1770	24-39	scattered	
Octachlorodibenzofuran	0.10	0.43	1.1	1770	24-39	scattered	
Pentachlorodibenzofuran	0.00	U	U				
Tetrachlorodibenzofuran (j)	0.01	0.06	0.2	1770	24-39	scattered	
TOTAL CHLORINATED DIBENZO FURANS (j)	0.2						
2- DIOXINS							
2,3,7,8-TCDD (k)	0.00	U	U				
Heptachlorordibenzo-p-dioxin	0.28	1.2	3.2	1770	24-39	scattered	. From the same sources as in case 1
Hexachlorodibenzo-p-dioxin	0.03	0.11	0.28	1770	24-39	scattered	
Octachlorodibenzo-p-dioxin	1.86	7.9	19.4	1770	24-39	scattered	
Tetrachlorodibenzo-p-dioxin (k)	0.00	U	U				
TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)	2.2						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.3.C (continued)
ORGANIC PROFILE OF PIT 3

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(15) ESTIMATED CHEMICAL QUANTITY IN PIT 3 (kg)(a,e)	(16) AVERAGE CONCENT. IN PIT 3 from RI/FS (ug/kg) (f)	(17) HIGHEST HIT IN PIT 3 from RI/FS (ug/kg) (f)	(18) LOCATION OF HIGHEST HIT (h)	(19) VERTICAL PROFILE (ft) (h)	(20) HORIZONTAL PROFILE (h)	(8-35) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	204,100						
Total dry waste quantity in pit (kg)(c)	235,071,108						
Specific gravity of waste (d)	2.62						
Water content (wt. of water/dry wt.) (%)(d)	74						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	0	U	U				. From raffinate slurry.
Acenaphthene	0	U	U				. Coal dust, coal fly ash, and coal by-products.
Acenaphthylene	85	360	1,000	1770	24-39	scattered	. Fuel oils, direct or as products of
Anthracene	87	370	1,000	1770	24-39	scattered	combustion.
Benzo(a)anthracene	139	590 CIS	1,000	1770	24-39	scattered	. Oil reclaimer.
Benzo(a)pyrene	92	390	1,000	1770	24-39	scattered	. Asphalt.
Benzo(b)fluoranthene	139	590 CIS	1,000	1770	24-39	scattered	. Main maintenance, solvent extraction,
Benzo(g,h,i)perylene	87	370	1,000	1770	24-39	scattered	laboratories, stores etc.
Benzo(k)fluoranthene	0	U	U				
Chrysene	139	590 CIS	1,000	1770	24-39	scattered	
Dibenzo(a,h)anthracene	0	U	U				
Fluoranthene	143	610 CIS	1,000	1770	24-39	scattered	
Fluorene	0	U	U				
Indeno(1,2,3-cd)pyrene	87	370	1,000	1770	24-39	scattered	
Naphthalene	0	U	U				
Phenanthrene	141	600 CIS	1,000	1770	24-39	scattered	
Pyrene	143	610 CIS	1,000	1770	24-39	scattered	
TOTAL PAHs	1,281						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.3.C (continued)
ORGANIC PROFILE OF PIT 3

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(15) ESTIMATED CHEMICAL QUANTITY IN PIT 3 (kg)(a,e)	(16) AVERAGE CONCENT. IN PIT 3 from RI/FS (ug/kg) (f)	(17) HIGHEST HIT IN PIT 3 from RI/FS (ug/kg) (f)	(18) LOCATION OF HIGHEST HIT (h)	(19) VERTICAL PROFILE (ft) (h)	(20) HORIZONTAL PROFILE (h)	(8-35) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	204,100						
Total dry waste quantity in pit (kg)(c)	235,071,108						
Specific gravity of waste (d)	2.62						
Water content (wt. of water/dry wt.) (%)(d)	74						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	0	U	U				. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	282	1,200	4,800	1771	28-41	scattered	. Fire brigade training
Aroclor-1254	235	1,000	3,400	1771	28-41	scattered	
Aroclor-1260	0	U	U				
TOTAL PCBs	517						
5- OTHER CHEMICALS							
4,4-DDT	0	U	U				. From application of pesticides and/or herbicides.
Pentachlorophenol	470	2,000 CIS	2,900 CIS	03-07	0-12	scattered	. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	0	U	U				. From application of pesticides and/or herbicides.
2,4,5-Trichlorophenol	0	U	U				. In corrosion inhibitor.
4-Nitroaniline	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Benzene	0	U	U				. Refrigeration oil, fabrication ware house.
Dichlorodifluoromethane	0	no data	no data				. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tetrachloroethene	2	7.6	22	1770	22-22.5	scattered	. Charcoal treatment, uranium removal process.
Tributyl Phosphate	0	U	U				. Progeny of parent Tetrachloroethene or Trichloroethene.
Vinyl Chloride	0	U	U				
TOTAL OTHER CHEMICALS	472						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.4.C
ORGANIC PROFILE OF PIT 4

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(21) ESTIMATED CHEMICAL QUANTITY IN PIT 4 (kg)(a,e)	(22) AVERAGE CONCENT. IN PIT 4 from RI/FS (ug/kg) (f)	(23) HIGHEST HIT IN PIT 4 from RI/FS (ug/kg)(f)	(24) LOCATION OF HIGHEST HIT (h)	(25) VERTICAL PROFILE (ft) (h)	(26) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	55,100						
Total dry waste quantity in pit (kg)(c)	98,590,826						
Specific gravity of waste (d)	3.02						
Water content (wt. of water/dry wt.) (%)(d)	29.1						
1- FURANS							
2,3,7,8-TCDF (j)	0.44	4.5	9.9	1774	10-20	scattered	. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations. . High temperature processes such as copper shredding, hydrometallurgical system.
Dibenzofuran (j)	74.93	760 CIS	1700 CIS	04-04	0-20	scattered	
Heptachlorodibenzofuran	0.22	2.2	4.4	1774	10-20	scattered	
Hexachlorodibenzofuran	0.31	3.1	8.5	1774	10-20	scattered	
Octachlorodibenzofuran	0.21	2.1	8	1773	9-18	scattered	
Pentachlorodibenzofuran	0.51	5.2	15	1774	10-20	scattered	
Tetrachlorodibenzofuran (j)	1.48	15	34	1774	10-20	scattered	
TOTAL CHLORINATED DIBENZO FURANS (j)	2.7						
2- DIOXINS							
2,3,7,8-TCDD (k)	0.00	U	U	1773	9-18	scattered	
Heptachlorordibenzo-p-dioxin	0.21	2.1	4	1773	9-18	scattered	. From the same sources as in case 1
Hexachlorodibenzo-p-dioxin	0.11	1.1	2.7	1774	10-20	scattered	
Octachlorodibenzo-p-dioxin	0.40	4.1	9	1775	10-19	scattered	
Tetrachlorodibenzo-p-dioxin (k)	0.02	0.2	0.47	1774	10-20	scattered	
TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)	0.7						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.4.C (continued)
ORGANIC PROFILE OF PIT 4

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(21) ESTIMATED CHEMICAL QUANTITY IN PIT 4 (kg)(a,e)	(22) AVERAGE CONCENT. IN PIT 4 from RI/FS (ug/kg) (f)	(23) HIGHEST HIT IN PIT 4 from RI/FS (ug/kg)(f)	(24) LOCATION OF HIGHEST HIT (h)	(25) VERTICAL PROFILE (ft) (h)	(26) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	55,100						
Total dry waste quantity in pit (kg)(c)	98,590,826						
Specific gravity of waste (d)	3.02						
Water content (wt. of water/dry wt.) (%)(d)	29.1						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	63	640 CIS	1,100 CIS	04-04	0-20	scattered	. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Coal dust and coal by-products. . Fuel oils, direct or as products of combustion. . Oil reclaimer. . Asphalt. . Main maintenance, solvent extraction, laboratories, stores etc.
Acenaphthene	54	550	1,900	1775	10-19	scattered	
Acenaphthylene	63	640 CIS	1,900 CIS	04-04	0-20	scattered	
Anthracene	138	1,400 CIS	3,300 CIS	04-04	0-20	scattered	
Benzo(a)anthracene	187	1,900 CIS	4,700	1775	10-19	scattered	
Benzo(a)pyrene	207	2,100 CIS	4,800 CIS	04-04	0-20	scattered	
Benzo(b)fluoranthene	217	2,200 CIS	5,800 CIS	04-04	0-20	scattered	
Benzo(g,h,i)perylene	49	500 CIS	2,300	1775	10-19	scattered	
Benzo(k)fluoranthene	177	1,800 CIS	3,700 CIS	04-04	0-20	scattered	
Chrysene	197	2,000 CIS	4,500 CIS	04-02	0-20	scattered	
Dibenzo(a,h)anthracene	38	390 CIS	560 CIS	04-04	0-20	scattered	
Fluoranthene	621	6,300 CIS	18,000 CIS	04-04	0-20	scattered	
Fluorene	128	1,300 CIS	3,400 CIS	04-04	0-20	scattered	
Indeno(1,2,3-cd)pyrene	46	470	2,300	1775	10-19	scattered	
Naphthalene	88	890 CIS	2,700 CIS	04-04	0-20	scattered	
Phenanthrene	562	5,700 CIS	16,000 CIS	04-04	0-20	scattered	
Pyrene	256	2,600 CIS	9,000	1775	10-19	scattered	
TOTAL PAHs	3,094						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

501

4789

TABLE 4-1.4.C (continued)
ORGANIC PROFILE OF PIT 4

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(21) ESTIMATED CHEMICAL QUANTITY IN PIT 4 (kg)(a,e)	(22) AVERAGE CONCENT. IN PIT 4 from RI/FS (ug/kg) (f)	(23) HIGHEST HIT IN PIT 4 from RI/FS (ug/kg)(f)	(24) LOCATION OF HIGHEST HIT (h)	(25) VERTICAL PROFILE (ft) (h)	(26) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	55,100						
Total dry waste quantity in pit (kg)(c)	98,590,826						
Specific gravity of waste (d)	3.02						
Water content (wt. of water/dry wt.) (%)(d)	29.1						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	52	530 CIS	1,000 CIS	04-03	0-20	scattered	. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	325	3,300	7,500	1774	10-20	scattered	. Fire brigade training
Aroclor-1254	227	2,300	6,800	1775	19-30	scattered	
Aroclor-1260	0	U	U				
TOTAL PCBs	604						
5- OTHER CHEMICALS							
4,4-DDT	0	U	U				. From application of pesticides and/or herbicides.
Pentachlorophenol	0	U	U				. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	0	U	U				. From application of pesticides and/or herbicides.
2,4,5-Trichlorophenol	0	U	U				. In corrosion inhibitor.
4-Nitroaniline	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Benzene	0	4.3	14	1773	16-16.5	discreet	. Refrigeration oil, fabrication ware house.
Dichlorodifluoromethane	0	U	U				. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tetrachloroethene	38	390 CIS	530 CIS	04-02	0-20	scattered	. Charcoal treatment, uranium removal process.
Tributyl Phosphate	5,915	60,000	72,000	1775	19-30	scattered	. Progeny of parent Tetrachloroethene or Trichloroethene.
Vinyl Chloride	1	7.8	16	1774	9.5-10	scattered	
TOTAL OTHER CHEMICALS	5,955						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.5.C
ORGANIC PROFILE OF PIT 5

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(33) ESTIMATED CHEMICAL QUANTITY IN PIT 5 (kg)(a,e)	(34) AVERAGE CONCENT. IN PIT 5 from CIS (ug/kg) (f)	(35) HIGHEST HIT IN PIT 5 from CIS (ug/kg)(f)	(36) LOCATION OF HIGHEST HIT (h)	(37) VERTICAL PROFILE (ft) (h)	(38) HORIZONTAL PROFILE (h)	(8-35) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b) Total dry waste quantity in pit (kg)(c) Specific gravity of waste (d) Water content (wt. of water/dry wt.) (%)(d)	97,900 117,625,873 2.43 54.7	Data from RI were rejected because of long holding time					
1- FURANS 2,3,7,8-TCDF (j) Dibenzofuran (j) Heptachlorodibenzofuran Hexachlorodibenzofuran Octachlorodibenzofuran Pentachlorodibenzofuran Tetrachlorodibenzofuran (j) TOTAL CHLORINATED DIBENZO FURANS (j)		U	U				. From raffinate slurry. . Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations. . High temperature processes such as copper shredding, hydrometallurgical system.
2- DIOXINS 2,3,7,8-TCDD (k) Heptachlorordibenzo-p-dioxin Hexachlorodibenzo-p-dioxin Octachlorodibenzo-p-dioxin Tetrachlorodibenzo-p-dioxin (k) TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)							. From the same sources as in case 1

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.5.C (continued)
ORGANIC PROFILE OF PIT 5

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(33) ESTIMATED CHEMICAL QUANTITY IN PIT 5 (kg)(a,e)	(34) AVERAGE CONCENT. IN PIT 5 from CIS (ug/kg) (f)	(35) HIGHEST HIT IN PIT 5 from CIS (ug/kg)(f)	(36) LOCATION OF HIGHEST HIT (h)	(37) VERTICAL PROFILE (ft) (h)	(38) HORIZONTAL PROFILE (h)	(8-35) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	97,900	Data from RI were rejected because of long holding time					
Total dry waste quantity in pit (kg)(c)	117,625,873						
Specific gravity of waste (d)	2.43						
Water content (wt. of water/dry wt.) (%)(d)	54.7						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	0	U	U				. From raffinate slurry.
Acenaphthene	0	U	U				. Coal dust, coal fly ash, and coal by-products.
Acenaphthylene	0	U	U				. Fuel oils, direct or as products of combustion.
Anthracene	0	U	U				. Oil reclaimer.
Benzo(a)anthracene	0	U	U				. Asphalt.
Benzo(a)pyrene	0	U	U				. Main maintenance, solvent extraction, laboratories, stores etc.
Benzo(b)fluoranthene	0	U	U				
Benzo(g,h,i)perylene	0	U	U				
Benzo(k)fluoranthene	0	U	U				
Chrysene	0	U	U				
Dibenzo(a,h)anthracene	0	U	U				
Fluoranthene	0	U	U				
Fluorene	0	U	U				
Indeno(1,2,3-cd)pyrene	0	U	U				
Naphthalene	0	U	U				
Phenanthrene	0	U	U				
Pyrene	0	U	U				
TOTAL PAHs	0						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.5.C (continued)
ORGANIC PROFILE OF PIT 5

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(33) ESTIMATED CHEMICAL QUANTITY IN PIT 5 (kg)(a,e)	(34) AVERAGE CONCENT. IN PIT 5 from CIS (ug/kg) (f)	(35) HIGHEST HIT IN PIT 5 from CIS (ug/kg)(f)	(36) LOCATION OF HIGHEST HIT (h)	(37) VERTICAL PROFILE (ft) (h)	(38) HORIZONTAL PROFILE (h)	(8-35) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	97,900	Data from RI were rejected because of long holding time					
Total dry waste quantity in pit (kg)(c)	117,625,873						
Specific gravity of waste (d)	2.43						
Water content (wt. of water/dry wt.) (%)(d)	54.7						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	0	U	U				. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	141	1,200	3,100	05-02	0-14	stratified	. Fire brigade training
Aroclor-1254	247	2,100	6,200	05-02	0-14	stratified	
Aroclor-1260	0	U	U				
TOTAL PCBs	388						
5- OTHER CHEMICALS							
4,4-DDT	0	U	U				. From application of pesticides and/or herbicides.
Pentachlorophenol	0	U	U				. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	0	U	U				. From application of pesticides and/or herbicides.
2,4,5-Trichlorophenol	0	U	U				. In corrosion inhibitor.
4-Nitroaniline	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Benzene	0	U	U				. Refrigeration oil, fabrication ware house.
Dichlorodifluoromethane	0	U	U				. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tetrachloroethene	0	U	U				. Charcoal treatment, uranium removal process.
Tributyl Phosphate	0	no data	no data				. Progeny of parent Tetrachloroethene or Trichloroethene.
Vinyl Chloride	0	U	U				
TOTAL OTHER CHEMICALS	0						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.6.C
ORGANIC PROFILE OF PIT 6

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(39) ESTIMATED CHEMICAL QUANTITY IN PIT 6 (kg)(a,e)	(40) AVERAGE CONCENT. IN PIT 6 from CIS (ug/kg) (f)	(41) HIGHEST HIT IN PIT 6 from CIS (ug/kg)(f)	(42) LOCATION OF HIGHEST HIT (h)	(43) VERTICAL PROFILE (ft) (h)	(44) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b) Total dry waste quantity in pit (kg)(c) Specific gravity of waste (d) Water content (wt. of water/dry wt.) (%)(d)	9,600 16,805,824 2.87 25.4	Data from RI were rejected because of long holding time					
1- FURANS							
2,3,7,8-TCDF (j) Dibenzofuran (j) Heptachlorodibenzofuran Hexachlorodibenzofuran Octachlorodibenzofuran Pentachlorodibenzofuran Tetrachlorodibenzofuran (j) TOTAL CHLORINATED DIBENZO FURANS (j)	0	U	U				. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations. . High temperature processes such as copper shredding, hydrometallurgical system.
2- DIOXINS							
2,3,7,8-TCDD (k) Heptachlorordibenzo-p-dioxin Hexachlorodibenzo-p-dioxin Octachlorodibenzo-p-dioxin Tetrachlorodibenzo-p-dioxin (k) TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)							. From the same sources as in case 1

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.6.C (continued)
ORGANIC PROFILE OF PIT 6

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(39) ESTIMATED CHEMICAL QUANTITY IN PIT 6 (kg)(a,e)	(40) AVERAGE CONCENT. IN PIT 6 from CIS (ug/kg) (f)	(41) HIGHEST HIT IN PIT 6 from CIS (ug/kg)(f)	(42) LOCATION OF HIGHEST HIT (h)	(43) VERTICAL PROFILE (ft) (h)	(44) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	9,600	Data from RI were rejected because of long holding time					
Total dry waste quantity in pit (kg)(c)	16,805,824						
Specific gravity of waste (d)	2.87						
Water content (wt. of water/dry wt.) (%)(d)	25.4						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	0	U	U				. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Coal dust and coal by-products. . Fuel oils, direct or as products of combustion. . Oil reclaimer. . Asphalt. . Main maintenance, solvent extraction, laboratories, stores etc.
Acenaphthene	0	U	U				
Acenaphthylene	0	U	U				
Anthracene	0	U	U				
Benzo(a)anthracene	0	U	U				
Benzo(a)pyrene	0	U	U				
Benzo(b)fluoranthene	0	U	U				
Benzo(g,h,i)perylene	0	U	U				
Benzo(k)fluoranthene	0	U	U				
Chrysene	0	U	U				
Dibenzo(a,h)anthracene	0	U	U				
Fluoranthene	0	U	U				
Fluorene	0	U	U				
Indeno(1,2,3-cd)pyrene	0	U	U				
Naphthalene	0	U	U				
Phenanthrene	0	U	U				
Pyrene	0	U	U				
TOTAL PAHs	0						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.6.C (continued)
ORGANIC PROFILE OF PIT 6

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(39) ESTIMATED CHEMICAL QUANTITY IN PIT 6 (kg)(a,e)	(40) AVERAGE CONCENT. IN PIT 6 from CIS (ug/kg) (f)	(41) HIGHEST HIT IN PIT 6 from CIS (ug/kg)(f)	(42) LOCATION OF HIGHEST HIT (h)	(43) VERTICAL PROFILE (ft) (h)	(44) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	9,600	Data from RI were rejected because of long holding time					
Total dry waste quantity in pit (kg)(c)	16,805,824						
Specific gravity of waste (d)	2.87						
Water content (wt. of water/dry wt.) (%)(d)	25.4						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	0	U	U				. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	0	U	U				. Fire brigade training
Aroclor-1254	6	370	640	06-03	0-15	scattered	
Aroclor-1260	0	U	U				
TOTAL PCBs	6						
5- OTHER CHEMICALS							
4,4-DDT		U	U				. From application of pesticides and/or herbicides.
Pentachlorophenol	0	U	U				. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	0	U	U				. From application of pesticides and/or herbicides.
2,4,5-Trichlorophenol	0	U	U				. In corrosion inhibitor.
4-Nitroaniline	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Benzene	0	U	U				. Refrigeration oil, fabrication ware house.
Dichlorodifluoromethane	0	no data	no data				. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tetrachloroethene	269	16,000	29,000	06-04	0-10	scattered	. Charcoal treatment, uranium removal process.
Tributyl Phosphate	0	no data	no data				. Progeny of parent Tetrachloroethene or Trichloroethene.
Vinyl Chloride	0	U	U				
TOTAL OTHER CHEMICALS	269						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

4283
508

TABLE 4-1.7.C
ORGANIC PROFILE OF BURN PIT

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(27) ESTIMATED CHEMICAL QUANTITY BURN PIT (kg)(a,e)	(28) AVERAGE CONCENT. BURN PIT from RI/FS (ug/kg) (f)	(29) HIGHEST HIT BURN PIT from RI/FS (ug/kg)(f)	(30) LOCATION OF HIGHEST HIT (h)	(31) VERTICAL PROFILE (ft) (h)	(32) HORIZONTAL PROFILE (h)	(8-B) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	30,300						
Total dry waste quantity in pit (kg)(c)	67,771,624						
Specific gravity of waste (d)	3.74						
Water content (wt. of water/dry wt.) (%)(d)	27.9						
1- FURANS							
2,3,7,8-TCDF (j)	0	U	U				. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations. . High temperature processes such as copper shredding, hydrometallurgical system.
Dibenzofuran (j)	27.11	400	900	1776	19.5-32.5	discreet	
Heptachlorodibenzofuran	0.01	0.13	0.31	1777	0-6.5	scattered	
Hexachlorodibenzofuran	0	U	U				
Octachlorodibenzofuran	0.01	0.19	0.37	1777	0-6.5	scattered	
Pentachlorodibenzofuran	0	U	U				
Tetrachlorodibenzofuran (j)	0	U	U				
TOTAL CHLORINATED DIBENZO FURANS (j)	0.02						
2- DIOXINS							
2,3,7,8-TCDD (k)	0	U	U				
Heptachlorordibenzo-p-dioxin	0.04	0.55	0.98	1776	19.5-32.5	scattered	. From the same sources as in case 1
Hexachlorodibenzo-p-dioxin	0	U	U				
Octachlorodibenzo-p-dioxin	0.16	2.3	4	1776	19.5-32.5	scattered	
Tetrachlorodibenzo-p-dioxin (k)	0	U	U				
TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)	0.2						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.7.C (continued)
ORGANIC PROFILE OF BURN PIT

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(27) ESTIMATED CHEMICAL QUANTITY BURN PIT (kg)(a,e)	(28) AVERAGE CONCENT. BURN PIT from RI/FS (ug/kg) (f)	(29) HIGHEST HIT BURN PIT from RI/FS (ug/kg)(f)	(30) LOCATION OF HIGHEST HIT (h)	(31) VERTICAL PROFILE (ft) (h)	(32) HORIZONTAL PROFILE (h)	(8-B) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	30,300						
Total dry waste quantity in pit (kg)(c)	67,771,624						
Specific gravity of waste (d)	3.74						
Water content (wt. of water/dry wt.) (%)(d)	27.9						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	0	U	U				. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	0	U	U				. Fire brigade training
Aroclor-1254	163	2,400	7,700	1776	19.5-32.5	scattered	. In creosote from railroad ties.
Aroclor-1260	0	U	U				
TOTAL PCBs	163						
5- OTHER CHEMICALS							
4,4-DDT	0	U	U				. From application of pesticides and/or herbicides.
Pentachlorophenol	149	2,200 CIS	2,600 CIS	07-02	0-12	scattered	. Fire brigade training, and in creosote from railroad ties.
4-Nitrophenol	0	U	U				
2,4,5-Trichlorophenol	142	2,100 CIS	2,500 CIS	07-01	0-10	scattered	. From application of pesticides and/or herbicides.
4-Nitroaniline	0	U	U				. In corrosion inhibitor.
Benzene	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Dichlorodifluoromethane	0	no data	no data				. Refrigeration oil, fabrication ware house.
Tetrachloroethene	14	210 CIS	260 CIS	07-04	0-12	scattered	. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tributyl Phosphate	0	no data	no data				. Charcoal treatment, uranium removal process.
Vinyl Chloride	0.41	6.1	15	1776	6-6.5	scattered	. Progeny of parent Tetrachloroethene or Trichloroethene.
TOTAL OTHER CHEMICALS	306						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.7.C (continued)
ORGANIC PROFILE OF BURN PIT

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(27) ESTIMATED CHEMICAL QUANTITY BURN PIT (kg)(a,e)	(28) AVERAGE CONCENT. BURN PIT from RI/FS (ug/kg) (f)	(29) HIGHEST HIT BURN PIT from RI/FS (ug/kg)(f)	(30) LOCATION OF HIGHEST HIT (h)	(31) VERTICAL PROFILE (ft) (h)	(32) HORIZONTAL PROFILE (h)	(8-B) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	30,300						
Total dry waste quantity in pit (kg)(c)	67,771,624						
Specific gravity of waste (d)	3.74						
Water content (wt. of water/dry wt.) (%)(d)	27.9						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	28	410 CIS	820	1776	19.5-32.5	scattered	. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . In creosote from railroad ties. . Coal dust and coal by-products. . Fuel oils, direct or as products of combustion. . Oil reclaimer. . Asphalt. . Main maintenance, solvent extraction, laboratories, stores etc.
Acenaphthene	30	450	1,100	1776	19.5-32.5	discreet	
Acenaphthylene	0	U	U				
Anthracene	64	950	3,100	1776	19.5-32.5	scattered	
Benzo(a)anthracene	115	1,700	6,300	1776	19.5-32.5	scattered	
Benzo(a)pyrene	75	1,100	3,900	1776	19.5-32.5	scattered	
Benzo(b)fluoranthene	176	2,600	9,600	1776	19.5-32.5	discreet	
Benzo(g,h,i)perylene	61	900	2,900	1776	19.5-32.5	scattered	
Benzo(k)fluoranthene	54	800	5,000	1776	19.5-32.5	scattered	
Chrysene	129	1,900	7,000	1776	19.5-32.5	scattered	
Dibenzo(a,h)anthracene	0	U	U				
Fluoranthene	285	4,200	16,000	1776	19.5-32.5	scattered	
Fluorene	37	550	1,700	1776	19.5-32.5	scattered	
Indeno(1,2,3-cd)pyrene	49	720	2,200	1776	19.5-32.5	scattered	
Naphthalene	54	790	5,000	1776	19.5-32.5	scattered	
Phenanthrene	264	3,900	15,000	1776	19.5-32.5	scattered	
Pyrene	251	3,700	14,000	1776	19.5-32.5	scattered	
TOTAL PAHs	1,672						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.8.C
ORGANIC PROFILE OF CLEARWELL

Fernald
Project : 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(45) ESTIMATED CHEMICAL QUANTITY CLEARWELL (kg)(a,e)	(46) AVERAGE CONCENT. CLEARWELL from CIS (ug/kg) (f)	(47) HIGHEST HIT IN CLEARWELL from CIS (ug/kg) (f)	(48) LOCATION OF HIGHEST HIT (h)	(49) VERTICAL PROFILE (ft) (h)	(50) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b) Total dry waste quantity in pit (kg)(c) Specific gravity of waste (d) Water content (wt. of water/dry wt.) (%)(d)	3,700 2,892,394 1.44 40.9	Data from RI were rejected because of long holding time					
1- FURANS							
2,3,7,8-TCDF (j) Dibenzofuran (j) Heptachlorodibenzofuran Hexachlorodibenzofuran Octachlorodibenzofuran Pentachlorodibenzofuran Tetrachlorodibenzofuran (j) TOTAL CHLORINATED DIBENZO FURANS (j)		U	U				. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Oxidation of PCBs (from PCB-contaminated oil) in high temperature heat transfer operations. . High temperature processes such as copper shredding, hydrometallurgical system.
2- DIOXINS							
2,3,7,8-TCDD (k) Heptachlorordibenzo-p-dioxin Hexachlorodibenzo-p-dioxin Octachlorodibenzo-p-dioxin Tetrachlorodibenzo-p-dioxin (k) TOTAL CHLORINATED DIBENZO-P-DIOXINS (k)							. From the same sources as in case 1

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-1.8.C (continued)
ORGANIC PROFILE OF CLEARWELL

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(45) ESTIMATED CHEMICAL QUANTITY CLEARWELL (kg)(a,e)	(46) AVERAGE CONCENT. CLEARWELL from CIS (ug/kg) (f)	(47) HIGHEST HIT IN CLEARWELL from CIS (ug/kg) (f)	(48) LOCATION OF HIGHEST HIT (h)	(49) VERTICAL PROFILE (ft) (h)	(50) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	3,700	Data from RI were rejected because of long holding time					
Total dry waste quantity in pit (kg)(c)	2,892,394						
Specific gravity of waste (d)	1.44						
Water content (wt. of water/dry wt.) (%)(d)	40.9						
3- POLYNUCLEAR AROMATICS (PAHs)							
2-Methynaphthalene	0	U	U				. Bottom ash from three solid waste incinerators, oil burner, or graphite burner. . Coal dust and coal by-products. . Fuel oils, direct or as products of combustion. . Oil reclaimer. . Asphalt. . Main maintenance, solvent extraction, laboratories, stores etc.
Acenaphthene	0	U	U				
Acenaphthylene	0	no data	no data				
Anthracene	3	930	1400	08-03	11-13	stratified	
Benzo(a)anthracene	2	780	1400	08-03	11-13	stratified	
Benzo(a)pyrene	3	990	1400	08-03	11-13	stratified	
Benzo(b)fluoranthene	3	1,000	1400	08-03	11-13	stratified	
Benzo(g,h,i)perylene	3	880	1400	08-03	11-13	stratified	
Benzo(k)fluoranthene	3	1,000	1400	08-03	11-13	stratified	
Chrysene	2	660	1400	08-03	11-13	stratified	
Dibenzo(a,h)anthracene	0	U	U				
Fluoranthene	5	1,600	3100	08-01	11-13	stratified	
Fluorene	3	890	1400	08-03	11-13	stratified	
Indeno(1,2,3-cd)pyrene	3	890	1400	08-03	11-13	stratified	
Naphthalene	0	U	U				
Phenanthrene	2	650	2100	08-01	11-13	stratified	
Pyrene	2	800	1400	08-03	11-13	stratified	
TOTAL PAHs	32						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

4783

TABLE 4-1.8.C (continued)
ORGANIC PROFILE OF CLEARWELL

Fernald
Project: 419191.045.22
fecem5-KT-09/30/93

(1) ANALYTE	(45) ESTIMATED CHEMICAL QUANTITY CLEARWELL (kg)(a,e)	(46) AVERAGE CONCENT. CLEARWELL from CIS (ug/kg) (f)	(47) HIGHEST HIT IN CLEARWELL from CIS (ug/kg) (f)	(48) LOCATION OF HIGHEST HIT (h)	(49) VERTICAL PROFILE (ft) (h)	(50) HORIZONTAL PROFILE (h)	(8) POSSIBLE SOURCES (i) (Refer to Sections 1 & 4.2, and Appendix F for details of sources)
Total waste volume in pit (yard3)(b)	3,700	Data from RI were rejected because of long holding time					
Total dry waste quantity in pit (kg)(c)	2,892,394						
Specific gravity of waste (d)	1.44						
Water content (wt. of water/dry wt.) (%)(d)	40.9						
4- PCBs							
Aroclor-1221	0	U	U				. Used in heat transfer liquids (transformers capacitors, and fluorescent light ballasts)
Aroclor-1242	1	220	330	08-01	11-13	stratified	. In hydraulic fluids and lubricants (for core machining, sludge pickling etc.).
Aroclor-1248	1	300	330	08-01	11-13	stratified	
Aroclor-1254	1	300	740	08-02	11-13	stratified	. Fire brigade training
Aroclor-1260	0	U	U				
TOTAL PCBs	2						
5- OTHER CHEMICALS							
4,4-DDT	0	U	U				. From application of pesticides and/or herbicides.
Pentachlorophenol	0	U	U				. Fire brigade training, and from application of pesticides and/or herbicides.
4-Nitrophenol	0	U	U				
2,4,5-Trichlorophenol	18	6,100	7600	08-01	11-13	stratified	. From application of pesticides and/or herbicides.
4-Nitroaniline	0	U	U				. In corrosion inhibitor.
Benzene	0	U	U				. Hilco oil reclaimer, scrap metal pickling, solvent extraction, heavy equipment storage
Dichlorodifluoromethane	0	no data	no data				. Refrigeration oil, fabrication ware house.
Tetrachloroethene	0	U	U				. Contaminated oil storage drums, liquid waste incinerator, de-zincing Zn-Th metal, casting
Tributyl Phosphate	0	no data	no data				. Charcoal treatment, uranium removal process.
Vinyl Chloride	0	U	U				. Progeny of parent Tetrachloroethene or Trichloroethene.
TOTAL OTHER CHEMICALS	18						

a.
Waste streams, volumes, and calculations are based on:
1. Materials Control and Accounting (MC&A) records
2. CRU3 Work plan Addendum 1992, and
3. Interviews with knowledgeable plant personnel.

TABLE 4-2

BACKGROUND CONCENTRATIONS FOR SOILS AND GROUNDWATER

	Background Concentration[a]			
	Soils		Groundwater	
Analyte	Surface (0-6 inches)	Subsurface (48-54 inches)	Perched[b]	Shandon Tributary[c]
Radionuclides	(pCi/g)	(pCi/g)	(pCi/L)	(pCi/L)
Actinium-227	0.15[d]	0.13[d]	0.0[e]	0.0[e]
Bismuth-210	1.33[f]	0.70[f]	0.0[e]	0.0[e]
Bismuth-214	1.33[f]	0.70[f]	0.0[e]	0.0[e]
Cesium-137	0.71	0.0[eg]	0.0[eg]	0.0[eg]
Lead-210	1.33	0.70	0.0[e]	0.0[e]
Neptunium-237	0.0[e]	0.0[e]	<1[h]	<1[h]
Plutonium-238	0.0[e]	0.0[e]	<1[h]	<1[h]
Plutonium-239	0.0[e]	0.0[e]	<1[h]	<1[h]
Plutonium-240	0.0[e]	0.0[e]	<1[h]	<1[h]
Polonium-210	1.33[f]	0.70[f]	0.0[e]	0.0[e]
Protactinium-231	0.15[f]	0.13[f]	0.0[e]	0.0[e]
Radium-224	0.90	0.96	0.0[e]	0.0[e]
Radium-226	1.45	1.27	1[i]	1.77
Radium-228	1.19	1.25	4.57	4.8
Ruthenium-106	<0.07	<0.06	0.0[eg]	0.0[eg]
Strontium-90	<0.5	0.5	0.0[eg]	0.0[eg]
Technetium-99	<0.9	<0.9	0.0[eg]	0.0[eg]
Thorium-228	1.43	1.25	1.6[i]	1.6[i]
Thorium-230	1.97	1.85	2[i]	2.5[i]
Thorium-232	1.36	1.24	<1[h]	<1[h]
Total Thorium	12.4 mg/kg[j]	13.3 mg/kg[j]	3 µg/L[i]	2.47 µg/L[i]
Uranium-234	1.24	0.94	1.88	2.43
Uranium-235/236	0.15	0.13	<1[j]	<1[j]
Uranium-238	1.22	0.92	1.5[i]	4.4[i]
Total Uranium	3.71 mg/kg[j]	3.68 mg/kg[j]	1.23 µg/L[j]	2.92 µg/L[j]
Metals	(mg/kg)	(mg/kg)	(mg/L)	(mg/L)
Aluminum	11,880	14,700	0.123	0.188
Antimony	7.7[h]	6.7[h]	0.0[e]	0.038[i]
Arsenic	8.45	8.79	0.058	0.088
Barium	91.3	99.2	0.477	.077
Beryllium	0.60[i]	0.62	0.002	0.002

TABLE 4-2
(Continued)

Analyte	Background Concentration[a]			
	Soils		Groundwater	
	Surface (0-6 inches)	Subsurface (48-54 inches)	Perched[b]	Shandon Tributary[c]
Boron	21.8[k]	42.7	0.0[e]	0.0[e]
Cadmium	0.82	0.59[i]	0.006	0.006
Calcium	4340	145,000	124,000	142,000
Chromium	15.5	19.0	0.034	0.067
Cobalt	15.2	15.7	<0.01[h]	<0.01[h]
Copper	14.1	16.3	0.029	0.022
Cyanide	0.25	0.11[h]	0.0[e]	0.0[e]
Iron	22,300	28,000	9.22	4.67
Lead	25.6	13.4	0.021	0.028
Magnesium	3350	43,100	48.5	40.7
Manganese	1770	922	0.150	0.514
Mercury	0.30[i]	0.29[i]	0.004[i]	0.0004
Molybdenum	2.6[h]	2.7[i]	0.028[i]	0.02
Nickel	20.9	28.5	0.026	0.026
Potassium	1230	2100	27	4.31
Selenium	0.70[i]	0.60[h]	<0.003[h]	0.006[i]
Silicon	1760	1700	0.0[e]	0.0[e]
Silver	2.6[h]	2.2[h]	0.038	0.014
Sodium	51.1	198	57.6	52.9
Thallium	0.58[i]	0.43[h]	0.0[e]	<0.012[h]
Vanadium	30.4	36.9	0.002	0.026
Zinc	62.2	59.0	0.032[i]	0.480
All Organic Compounds	0.0[c]	0.0[c]	0.0[c]	0.0[c]
General Water Chemistry			(mg/L)	(mg/L)
Ammonia	NA[l]	NA	4.58	18.2
Chloride	NA	NA	97.0	83.5
Fluoride	NA	NA	1.3	1.24
Nitrate	NA	NA	0.286	1.25
Total Phosphorus	NA	NA	0.208	0.979
Sulfate	NA	NA	138	346

[a] Source: DOE 1993b (soils), DOE 1993a (Groundwater). Background concentrations are based on the 95th percentile of the data distribution from site-specific background data except as noted.

TABLE 4-2
(Continued)

[b] Wells used to evaluate the perched groundwater background concentrations include 1040, 1059, and 1060.

[c] Wells used to evaluate the Shandon Tributary background concentrations include 2043, 2050, 2056, 2066, 2383, 3024, 3043, and 4011.

[d] Because of poor SQL values, this nuclide was assumed to be in secular equilibrium with its present, U-235.

[e] Value assumed to be zero.

[f] Value assumed based on secular equilibrium for radioactive decay chain.

[g] This radionuclide is a fission product, and its presence in the environment is due only to atmospheric releases of radiation (e.g., weapons testing). This radionuclide is not naturally occurring and is only expected to be present at or near detectable activities in the surface soil.

[h] All of the values in the data set were not detectable. The average SQL was substituted as the best representative value for the 95th percentile.

[i] Less than or equal to 10 percent of measured concentrations were above the SQL. The maximum detected value was substituted as the 95th percentile.

[j] Individual activity concentrations of the three isotopes for uranium and thorium were converted to mass concentrations. The three isotope mass concentrations were added to obtain the total thorium or uranium mass concentration.

[k] The calculated standard deviation was greater than 2.00. This was caused by the combination of only 12 values out of 30 above SQL and the maximum concentration of 1140 µg/g. Summary statistics for 0 to 6 inches without suspected outlier were used as the representative statistics for this data set.

[l] NA - Not applicable

TABLE 4-3

OPERABLE UNIT 1 - RI/FS DATA SOURCES

Study	Environmental Media											
	Pits 1-4 & Burn Pit Waste	Pits 1-4 & Burn Pit Leachate	Pits 5, 6 & Clearwell Waste	Pits 5, 6 & Clearwell Surface Water	Surface Soil	Subsurface Soil	Perched Groundwater	GMA Groundwater	Surface Water	Sediment	Air & Direct Radiation	Ecological
Characterization Investigation Study	X		X	X	X					X	X	
1991 RI/FS Waste Pit Sampling	X	X										
1992 RI/FS Waste Pit Sampling			X									
RI/FS Other Media Sampling					X	X	X	X	X	X		X
FEMP Environmental Monitoring Program					X				X	X	X	
Best Management Practices Plan									X			
1986 Analysis of Sediment Samples from Paddy's Run										X		
Waste Pit Area Storm Water Runoff Control Removal Action					X							
1984 Groundwater Study						X	X	X				
Waste Pit Radon Flux Survey											X	
RCRA Groundwater Monitoring Program							X	X				

TABLE 4-4
PIT MATERIAL STATISTICAL SUMMARY -- CIS RADIOLOGICAL DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/g	5	0.64	0.2	1.1	5	1.4	0.2	3.6	7	U	U	U
NEPTUNIUM-237	pCi/g	5	U	U	U	5	U	U	U	7	0.6	0.2	2.1
PLUTONIUM-238	pCi/g	5	U	U	U	5	0.1	0.1	0.1	7	0.26	0.08	1
PLUTONIUM-239/240	pCi/g	5	U	U	U	5	0.19	0.05	0.6	7	2.2	0.05	14
RUTHENIUM-106	pCi/g	5	U	U	U	5	U	U	U	7	U	U	U
STRONTIUM-90	pCi/g	5	U	U	U	5	U	U	U	7	1.9	0.6	5.2
TECHNETIUM-99	pCi/g	5	4.2	1	15	5	130	1	620	7	230	1.2	1100
THORIUM-228	pCi/g	5	20	6.1	52	5	63	11	160	7	12	1	40
THORIUM-230	pCi/g	5	1500	330	3600	5	1400	41	4000	7	4600	15	12000
THORIUM-232	pCi/g	5	22	7.7	55	5	43	11	88	7	16	1	59
URANIUM-234	pCi/g	5	560	240	1200	5	3900	40	18000	7	210	27	480
URANIUM-235	pCi/g	5	56	16	150	5	1800	2	8800	7	12	2.5	21
URANIUM-238	pCi/g	5	2000	360	7000	5	4700	60	18000	7	440	130	1400

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

TABLE 4-4
PIT MATERIAL STATISTICAL SUMMARY -- CIS RADIOLOGICAL DATA

		Pit 4				Pit 5				Pit 6			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Max	Max	Count	Avg	Min	Max
CESIUM-137	pCi/g	4	U	U	U	6	26	76	76	4	18	4	31
NEPTUNIUM-237	pCi/g	4	0.25	0.1	0.4	6	8.6	19	19	4	2	0.9	3.6
PLUTONIUM-238	pCi/g	4	0.28	0.1	0.5	6	2	4.4	4.4	4	0.78	0.4	1.4
PLUTONIUM-239/240	pCi/g	4	0.2	0.1	0.4	6	5	13	13	4	8.7	4	15
RUTHENIUM-106	pCi/g	4	U	U	U	6	U	U	U	4	U	U	U
STRONTIUM-90	pCi/g	4	U	U	U	6	10	31	31	4	4.1	2.6	5.1
TECHNETIUM-99	pCi/g	4	80	6.8	230	6	1300	2990	3000	4	130	84	160
THORIUM-228	pCi/g	4	110	18	400	6	31	44	44	4	0.5	0.2	1.2
THORIUM-230	pCi/g	4	430	230	570	6	4500	8480	8500	4	31	14	44
THORIUM-232	pCi/g	4	37	17	92	6	30	55	55	4	0.5	0.2	1.2
URANIUM-234	pCi/g	4	780	150	2300	6	640	1250	1300	4	3400	2000	5300
URANIUM-235	pCi/g	4	150	35	430	6	34	79	79	4	1000	350	1800
URANIUM-238	pCi/g	4	4600	510	16000	6	640	1230	1200	4	17000	13000	19000

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-4
PIT MATERIAL STATISTICAL SUMMARY -- CIS RADIOLOGICAL DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/g	6	U	U	U	4	190	18	450
NEPTUNIUM-237	pCi/g	6	0.35	0.1	0.6	4	1.1	0.3	2.2
PLUTONIUM-238	pCi/g	6	0.17	0.1	0.5	4	U	U	U
PLUTONIUM-239/240	pCi/g	6	0.15	0.1	0.4	4	U	U	U
RUTHENIUM-106	pCi/g	6	U	U	U	4	U	U	U
STRONTIUM-90	pCi/g	6	U	U	U	4	8.5	1.3	26
TECHNETIUM-99	pCi/g	6	29	1.2	64	4	99	0.4	280
THORIUM-228	pCi/g	6	7.6	1.5	19	4	37	20	56
THORIUM-230	pCi/g	6	60	5.7	220	4	1700	110	5600
THORIUM-232	pCi/g	6	7.2	1.1	21	4	19	2.8	39
URANIUM-234	pCi/g	6	140	9.9	420	4	290	240	380
URANIUM-235	pCi/g	6	8.4	0.5	27	4	35	24	49
URANIUM-238	pCi/g	6	180	22	450	4	620	550	670

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-5
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS RADIOLOGICAL DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/g	6	U	U	U	4	0.39	0.3	1.3	6	U	U	U
PLUTONIUM-238	pCi/g	5	U	U	U	4	U	U	U	5	0.44	0.6	0.98
PLUTONIUM-239/240	pCi/g	6	U	U	U	4	U	U	U	5	0.77	0.6	1.6
RADIUM-226	pCi/g	6	51	1.3	100	4	440	160	950	6	170	1.4	450
RADIUM-228	pCi/g	6	20	2.8	41	4	180	71	440	6	120	1.5	240
RUTHENIUM-106	pCi/g	6	U	U	U	4	3.3	2.4	11	6	U	U	U
STRONTIUM-90	pCi/g	6	2.5	0.5	7.7	4	2.6	0.5	4	6	1.3	0.5	4.9
TECHNETIUM-99	pCi/g	6	0.56	0.9	1.1	4	0.75	0.9	1.6	6	13	1.4	33
THORIUM-228	pCi/g	4	300	130	790	2	660	620	700	5	280	1.5	820
THORIUM-230	pCi/g	4	3800	490	5500	2	11000	2600	18000	9	6100	3.3	11000
THORIUM-232	pCi/g	4	180	130	490	2	220	270	340	5	170	1.2	400
THORIUM-TOTAL	µg/g	4	1700	1200	4400	2	2600	2400	2800	5	1500	11	3600
URANIUM-234	pCi/g	4	570	420	830	2	950	250	1700	4	640	150	990
URANIUM-235	pCi/g	--	--	--	--	--	--	--	--	1	52	52	52
URANIUM-235/236	pCi/g	5	85	20	260	2	74	19	130	4	49	24	89
URANIUM-238	pCi/g	5	3900	450	16000	2	1100	280	1900	8	940	660	1700
URANIUM-TOTAL	µg/g	6	17000	2100	48000	4	2900	850	5800	6	3400	2400	5900

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-5
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS RADIOLOGICAL DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/g	6	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/g	--	--	--	--	4	U	U	U
PLUTONIUM-239/240	pCi/g	--	--	--	--	4	U	U	U
RADIUM-226	pCi/g	6	23	4.1	50	4	15	2.2	39
RADIUM-228	pCi/g	6	59	18	140	4	6.6	1.9	10
RUTHENIUM-106	pCi/g	6	U	U	U	4	U	U	U
STRONTIUM-90	pCi/g	6	44	0.5	140	4	0.31	0.5	0.5
TECHNETIUM-99	pCi/g	6	4.1	0.9	9.4	4	1.6	0.79	3.3
THORIUM-228	pCi/g	4	950	27	2500	4	120	2	900
THORIUM-230	pCi/g	6	1000	240	1800	4	1200	5.3	4500
THORIUM-232	pCi/g	4	230	23	840	4	57	1.7	410
THORIUM-TOTAL	µg/g	4	2100	210	7600	4	510	15	3700
URANIUM-234	pCi/g	3	2700	470	4100	4	720	41	1700
URANIUM-235	pCi/g	1	27	27	27	--	--	--	--
URANIUM-235/236	pCi/g	4	380	28	930	4	53	3.8	100
URANIUM-238	pCi/g	4	19000	440	42000	4	850	120	2000
URANIUM-TOTAL	µg/g	6	52000	1300	120000	4	2000	460	4500

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-5
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS RADIOLOGICAL DATA

Parameter	Units	Pit 5				Pit 6				Clearwell			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/g	9	23	2.8	78	8	7.2	0.9	14	6	42	9.2	71
GROSS ALPHA	pCi/g	9	2800	770	9400	8	8700	3300	14000	6	910	200	2100
GROSS BETA	pCi/g	9	650	260	1000	8	14000	7200	23000	6	950	230	1800
NEPTUNIUM-237	pCi/g	2	40	33	46		--	--	--	6	1.1	0.06	1.8
PLUTONIUM-238	pCi/g	9	0.054	0.019	0.3	8	0.53	0.08	1	6	0.25	0.08	0.49
PLUTONIUM-239/240	pCi/g	9	0.49	0.007	3.7	8	7.8	0.6	14	6	0.28	0.07	0.54
RADIUM-226	pCi/g	9	84	27	150	8	3.9	2.9	4.9	6	74	10	170
RADIUM-228	pCi/g	9	19	2.9	39	8	54	8	190	6	18	6.6	26
RUTHENIUM-106	pCi/g	9	1.2	0.84	3.3	8	U	U	U	6	1.1	1.4	3.1
STRONTIUM-90	pCi/g	9	3.9	0.11	15	8	2.6	0.89	4.8	6	3.2	1.5	13
TECHNETIUM-99	pCi/g	9	1500	590	3000	8	18	3.7	45	6	360	110	700
THORIUM-228	pCi/g	9	11	0.48	38	8	1.2	0.7	1.7	6	20	6.1	28
THORIUM-230	pCi/g	9	380	9.8	2600	8	32	4.6	62	6	140	63	310
THORIUM-232	pCi/g	9	2.5	0.08	10	8	0.53	0.2	1	6	5.3	2.7	9.7
THORIUM-TOTAL	µg/g	9	23	0.025	92		--	--	--	6	49	25	89
URANIUM-234	pCi/g	9	560	170	860	8	2400	1000	4100	6	460	47	1100
URANIUM-235/236	pCi/g	9	14	0.25	39	8	200	110	340	6	190	2.5	370
URANIUM-238	pCi/g	9	590	220	960	8	15000	6900	29000	6	810	140	1600
URANIUM-TOTAL	µg/g	9	2100	670	3700	8	13000	2800	28000	6	1200	210	2800

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

TABLE 4-6
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS RADIOLOGICAL DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/L	1	U	U	U	2	10	20	20	2	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	2	U	U	U	1	0.5	1	1
PLUTONIUM-239/240	pCi/L	4	U	U	U	2	U	U	U	1	0.5	1	1
RADIUM-226	pCi/L	1	120	120	120	2	180	72	280	--	--	--	--
RADIUM-228	pCi/L	1	85	85	85	--	--	--	--	--	--	--	--
RUTHENIUM-106	pCi/L	1	U	U	U	2	75	150	150	2	U	U	U
STRONTIUM-90	pCi/L	4	5.1	5	13	1	6.6	6.6	6.6	1	110	110	110
TECHNETIUM-99	pCi/L	4	15	30	30	2	53	30	91	3	230	120	350
THORIUM-228	pCi/L	1	0.5	1	1	--	--	--	--	--	--	--	--
THORIUM-230	pCi/L	1	0.5	1	1	--	--	--	--	--	--	--	--
THORIUM-232	pCi/L	1	0.5	1	1	--	--	--	--	--	--	--	--
THORIUM-TOTAL	µg/L	1	1.5	2.9	2.9	--	--	--	--	--	--	--	--
URANIUM-234	pCi/L	4	970	3.8	3800	2	640	190	1100	3	800	400	1600
URANIUM-235/236	pCi/L	4	71	1	270	2	46	12	80	3	43	26	79
URANIUM-238	pCi/L	4	1100	3.7	4000	2	760	270	1200	3	1100	420	2500
URANIUM-TOTAL	µg/L	4	3500	5.1	12000	2	2200	780	3700	3	2300	820	5000

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4788

TABLE 4-6
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS RADIOLOGICAL DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/L	3	U	U	U	2	U	U	U
PLUTONIUM-238	pCi/L	3	0.5	1	1	1	U	U	U
PLUTONIUM-239/240	pCi/L	3	0.5	1	1	1	U	U	U
RADIUM-226	pCi/L	3	5.1	1	9.3	1	73	73	73
RADIUM-228	pCi/L	1	8.5	8.5	8.5	--	--	--	--
RUTHENIUM-106	pCi/L	3	U	U	U	2	U	U	U
STRONTIUM-90	pCi/L	3	8.4	5	17	2	2.5	5	5
TECHNETIUM-99	pCi/L	3	180	30	350	2	15	30	30
THORIUM-228	pCi/L	2	13	13	14	--	--	--	--
THORIUM-230	pCi/L	2	3.5	3.8	5.2	--	--	--	--
THORIUM-232	pCi/L	2	0.88	1.6	1.9	--	--	--	--
THORIUM-TOTAL	µg/L	2	8	15	17	--	--	--	--
URANIUM-234	pCi/L	2	86000	24000	150000	2	450	7.7	900
URANIUM-235/236	pCi/L	2	14000	1600	27000	2	33	1.4	65
URANIUM-238	pCi/L	2	230000	27000	430000	2	500	8.2	980
URANIUM-TOTAL	µg/L	3	200000	41000	500000	2	1400	1	2900

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-6
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max
CADMIUM	µg/L	1	U	U	U	6	14	5	34
CALCIUM	µg/L	1	710000	710000	710000	6	1600000	1300000	1900000
CHROMIUM	µg/L	1	U	U	U	6	17	10	36
COBALT	µg/L	1	U	U	U	6	100	60	180
COPPER	µg/L	1	U	U	U	6	950	18	2200
CYANIDE	mg/L	2	0.0085	0.004	0.013	--	--	--	--
IRON	µg/L	1	290	290	290	6	540	25	2700
LEAD	µg/L	1	550	550	550	6	50	70	120
MAGNESIUM	µg/L	1	700000	700000	700000	6	130000	47000	210000
MANGANESE	µg/L	1	800	800	800	6	76000	14000	180000
MERCURY	µg/L	1	U	U	U	6	U	U	U
MOLYBDENUM	µg/L	--	--	--	--	6	71	10	160
NICKEL	µg/L	1	68	68	68	6	1000	110	2500
POTASSIUM	µg/L	1	16000	16000	16000	6	5800	3000	8400
SELENIUM	µg/L	1	U	U	U	6	U	U	U
SILICON	µg/L	--	--	--	--	6	15000	4500	24000
SILVER	µg/L	1	43	43	43	6	17	20	49
SODIUM	µg/L	1	86000	86000	86000	--	--	--	--
THALLIUM	µg/L	1	480	480	480	6	U	U	U
VANADIUM	µg/L	1	U	U	U	6	58	10	130
ZINC	µg/L	1	2600	2600	2600	6	590	220	1200

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

4783

TABLE 4-7
PIT MATERIAL STATISTICAL SUMMARY -- CIS INORGANIC DATA

		Pit 1				Pit 2				Pit 3			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	mg/kg	5	9600	1700	20000	4	16000	7200	22000	6	24000	10000	64000
ANTIMONY	mg/kg	5	1.4	0.4	2.4	4	0.73	0.4	1.2	6	8.3	2.6	18
ARSENIC	mg/kg	5	6.5	0.9	15	4	5.1	2.8	10	6	1100	15	3100
BARIUM	mg/kg	5	250	120	370	4	140	97	210	6	4700	250	14000
BERYLLIUM	mg/kg	5	0.98	0.2	2.2	4	3.8	0.8	8.9	6	9.8	1.2	24
CADMIUM	mg/kg	5	2.1	0.4	5	4	5.9	3	9.6	6	6.1	2.5	13
CALCIUM	mg/kg	5	66000	4800	190000	4	54000	34000	80000	6	100000	53000	180000
CHROMIUM	mg/kg	5	18	2.5	46	4	43	17	91	6	77	20	150
COBALT	mg/kg	5	9.6	1.9	28	4	140	14	450	6	14	4.9	21
COPPER	mg/kg	5	50	20	160	4	120	38	330	6	1100	79	2300
CYANIDE	mg/kg	5	U	U	U	4	U	U	U	5	U	U	U
IRON	mg/kg	5	8000	1800	20000	4	20000	13000	24000	6	18000	11000	27000
LEAD	mg/kg	5	32	5	90	4	84	25	190	6	230	52	610
MAGNESIUM	mg/kg	5	25000	7600	37000	4	19000	8900	27000	6	32000	25000	52000
MANGANESE	mg/kg	5	1400	150	2900	4	720	530	920	6	2700	520	11000
MERCURY	mg/kg	5	0.16	0.1	0.3	4	0.38	0.1	0.7	6	1.1	0.1	4
NICKEL	mg/kg	5	25	5.4	65	4	200	36	610	6	160	29	500
OSMIUM	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
POTASSIUM	mg/kg	5	1100	170	2600	4	2400	800	4300	6	1800	120	3200
SELENIUM	mg/kg	5	U	U	U	4	3.4	0.4	10	6	26	0.5	90
SILVER	mg/kg	5	9	2	33	4	9.4	1.7	23	6	5.1	2	8.1
SODIUM	mg/kg	5	1200	76	3600	4	1200	480	2300	6	3400	1300	7600
THALLIUM	mg/kg	5	0.28	0.2	0.3	4	U	U	U	6	3.9	0.3	12
TIN	mg/kg	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/kg	5	31	7.7	67	4	60	38	110	6	3000	50	9700
ZINC	mg/kg	5	20	0.9	58	4	880	54	3300	6	130	45	310

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-7
PIT MATERIAL STATISTICAL SUMMARY -- CIS INORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	mg/kg	4	7100	3700	10000	6	11000	6400	15000	1	4700	4700	4700
ANTIMONY	mg/kg	4	0.38	0.3	0.5	6	36	20	64	1	U	U	U
ARSENIC	mg/kg	4	1.6	0.3	4.6	6	960	140	2800	1	7.6	7.6	7.6
BARIUM	mg/kg	4	2400	440	6700	6	23000	16000	37000	1	95	95	95
BERYLLIUM	mg/kg	4	3.7	0.2	13	6	9.2	2.9	18	1	5.7	5.7	5.7
CADMIUM	mg/kg	4	8.3	0.4	29	6	5.5	1.4	17	1	5.7	5.7	5.7
CALCIUM	mg/kg	4	44000	14000	61000	6	170000	120000	210000	1	22000	22000	22000
CHROMIUM	mg/kg	4	34	7.9	94	6	120	26	220	1	30	30	30
COBALT	mg/kg	4	26	2.3	84	6	26	10	44	1	26	26	26
COPPER	mg/kg	4	72	23	190	6	5000	670	18000	1	220	220	220
CYANIDE	mg/kg	4	U	U	U	2	U	U	U	1	U	U	U
IRON	mg/kg	4	8900	3100	16000	6	15000	11000	18000	1	2800	2800	2800
LEAD	mg/kg	4	43	24	63	6	160	59	240	1	60	60	60
MAGNESIUM	mg/kg	4	19000	11000	24000	6	48000	25000	63000	1	32000	32000	32000
MANGANESE	mg/kg	4	2700	1800	3600	6	1800	350	4700	1	35	35	35
MERCURY	mg/kg	4	0.33	0.1	0.6	6	1.1	0.4	1.8	1	U	U	U
NICKEL	mg/kg	4	25	8.2	50	6	130	26	250	1	51	51	51
OSMIUM	mg/kg	3	U	U	U	--	--	--	--	--	--	--	--
POTASSIUM	mg/kg	4	1300	890	1900	5	1200	610	1500	1	910	910	910
SELENIUM	mg/kg	3	U	U	U	6	7.5	2.8	18	1	U	U	U
SILVER	mg/kg	4	110	1.6	440	6	6.4	2.9	9.4	1	160	160	160
SODIUM	mg/kg	4	590	260	1200	6	5400	1400	10000	1	600	600	600
THALLIUM	mg/kg	4	U	U	U	6	5.9	2.4	11	1	U	U	U
TIN	mg/kg	3	58	30	87	--	--	--	--	--	--	--	--
VANADIUM	mg/kg	4	74	11	240	6	2700	790	5400	1	100	100	100
ZINC	mg/kg	4	44	14	84	6	180	120	210	1	48	48	48

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4788

TABLE 4-7
PIT MATERIAL STATISTICAL SUMMARY -- CIS INORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	mg/kg	6	6800	2900	12000	4	14000	1900	24000
ANTIMONY	mg/kg	6	0.58	0.3	1.4	4	9	0.9	32
ARSENIC	mg/kg	6	6	0.2	21	4	10	6	18
BARIUM	mg/kg	6	1300	50	7100	4	2900	730	6900
BERYLLIUM	mg/kg	6	3.4	0.5	16	4	2.9	0.6	9.1
CADMIUM	mg/kg	6	6.7	0.5	35	4	3.7	1.2	7.2
CALCIUM	mg/kg	6	40000	10000	120000	4	150000	130000	180000
CHROMIUM	mg/kg	6	24	7.9	88	4	51	41	76
COBALT	mg/kg	6	24	2.5	100	4	14	6.2	23
COPPER	mg/kg	6	46	12	170	4	600	200	1100
CYANIDE	mg/kg	6	U	U	U	4	3.5	0.9	9.2
IRON	mg/kg	6	9600	3800	17000	4	20000	20000	21000
LEAD	mg/kg	6	22	6.7	53	4	48	32	83
MAGNESIUM	mg/kg	6	19000	3900	57000	4	32000	17000	45000
MANGANESE	mg/kg	6	470	120	1700	4	1200	760	1700
MERCURY	mg/kg	6	0.12	0.1	0.2	4	2.4	0.4	4.4
NICKEL	mg/kg	6	18	4.8	60	4	41	24	67
OSMIUM	mg/kg	--	--	--	--	--	--	--	--
POTASSIUM	mg/kg	6	880	490	1500	4	2500	1700	3700
SELENIUM	mg/kg	5	0.4	0.3	0.5	4	1.7	0.6	3.7
SILVER	mg/kg	6	87	1.4	510	4	2.5	0.6	3.9
SODIUM	mg/kg	6	590	72	1300	4	2600	1300	3500
THALLIUM	mg/kg	6	0.33	0.2	0.5	4	1	0.4	2.1
TIN	mg/kg	--	--	--	--	--	--	--	--
VANADIUM	mg/kg	6	64	16	290	4	750	100	2600
ZINC	mg/kg	6	42	15	75	4	110	82	190

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-8
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Aluminum	mg/kg	6	2400	770	4700	4	16000	9800	23000	5	9800	4700	17000
Ammonia	mg/kg	1	48	48	48	4	0.98	0.1	2.4	5	U	U	U
Antimony	mg/kg	6	49	8.5	130	4	40	20	55	5	31	7.7	64
Arsenic	mg/kg	6	1.2	0.41	1.7	4	170	48	420	5	3400	6.9	15000
Barium	mg/kg	6	250	15	440	4	1100	430	1900	5	1400	110	3600
Beryllium	mg/kg	6	4.4	1.1	13	4	16	5.3	27	5	5.2	1	11
Boron	mg/kg	5	560	21	1700	4	160	60	240	5	100	43	240
Bromide	mg/kg	--	--	--	--	2	U	U	U	4	U	U	U
Cadmium	mg/kg	6	9	0.83	19	4	8.7	4	13	5	11	2.2	39
Calcium	mg/kg	6	77000	1500	200000	4	83000	49000	100000	5	120000	45000	190000
Chloride	mg/kg	--	--	--	--	2	3900	2900	4900	4	17000	9600	24000
Chromium	mg/kg	6	110	12	350	4	180	94	280	5	130	29	230
Cobalt	mg/kg	6	18	4.9	47	4	650	210	1500	5	25	8.6	51
Copper	mg/kg	6	47	13	110	4	670	260	1300	5	1000	22	2000
Cyanide	mg/kg	6	0.24	0.12	0.73	4	1.4	0.68	2.9	4	1.1	0.26	1.7
Fluoride	mg/kg	--	--	--	--	2	U	U	U	5	860	0.4	2400
Iron	mg/kg	6	1300	520	2600	4	22000	14000	39000	5	15000	6500	26000
Lead	mg/kg	5	17	3.4	53	4	490	170	760	5	420	14	840
Magnesium	mg/kg	6	62000	3200	130000	4	47000	23000	68000	5	32000	16000	52000
Manganese	mg/kg	6	870	64	3700	4	1400	580	2900	5	11000	340	20000
Mercury	mg/kg	6	U	U	U	4	1.7	0.74	2.6	5	1.7	0.12	5.1
Molybdenum	mg/kg	6	16	4.7	33	4	99	45	220	5	110	11	280
Nickel	mg/kg	6	30	13	57	4	780	190	1700	5	130	24	290
Nitrate	mg/kg	--	--	--	--	2	6700	4400	9100	4	43000	22000	57000
Oil and Grease	mg/kg	--	--	--	--	3	5900	270	16000	4	600	120	1500
pH	S.U.	--	--	--	--	4	8	7.7	8.9	6	8	7.7	8.3
Phosphate	mg/kg	--	--	--	--	2	710	180	1200	4	U	U	U
Phosphorus	mg/kg	1	6.7	6.7	6.7	3	38000	34000	44000	6	11000	230	58000
Potassium	mg/kg	6	590	110	1200	4	7000	4100	11000	5	1600	1000	2100
Selenium	mg/kg	6	U	U	U	4	46	3.1	130	5	1.9	0.5	3.6
Silicon	mg/kg	5	3600	1500	7200	4	1700	1000	2600	5	2300	890	5000
Tin	mg/kg	5	U	U	U	4	U	U	U	4	76	51	190
Total Kjeldahl Nitrogen	mg/kg	1	48	48	48	--	--	--	--	--	--	--	--
Total Organic Carbon	mg/kg	3	23000	6900	34000	2	110000	110000	110000	2	150000	130000	180000
Total Organic Nitrogen	mg/kg	1	U	U	U	4	5100	0.1	12000	6	4200	130	8900
Vanadium	mg/kg	6	50	8.8	140	4	260	86	590	5	820	28	2100

4783

TABLE 4-8
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Zinc	mg/kg	6	12	1.3	25	4	270	110	490	5	140	55	330

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-8
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Aluminum	mg/kg	5	5500	1200	11000	4	6400	5300	8600
Ammonia	mg/kg	3	79	0.1	240	2	U	U	U
Antimony	mg/kg	5	100	7.4	320	4	9.7	7.2	18
Arsenic	mg/kg	5	3.3	1.8	6.5	4	17	6.9	39
Barium	mg/kg	5	1800	310	3700	4	220	120	300
Beryllium	mg/kg	5	17	0.47	51	4	1.5	0.89	1.9
Boron	mg/kg	5	260	38	1000	3	31	24	48
Bromide	mg/kg	2	U	U	U	1	U	U	U
Cadmium	mg/kg	5	11	0.87	35	4	2.9	0.72	5.4
Calcium	mg/kg	5	15000	7200	33000	4	59000	36000	89000
Chloride	mg/kg	2	27	0.4	53	1	190	190	190
Chromium	mg/kg	5	470	11	1500	4	55	15	91
Cobalt	mg/kg	5	59	2.5	180	4	43	6.7	110
Copper	mg/kg	5	180	18	480	4	140	18	260
Cyanide	mg/kg	5	0.21	0.13	0.64	4	0.12	0.12	0.21
Fluoride	mg/kg	2	1900	0.4	3800	1	49	49	49
Iron	mg/kg	5	3500	1200	7400	4	20000	11000	31000
Lead	mg/kg	5	40	23	63	4	160	13	280
Magnesium	mg/kg	5	16000	6300	34000	4	17000	8000	26000
Manganese	mg/kg	5	2900	680	5600	4	540	240	960
Mercury	mg/kg	5	0.23	0.12	0.62	4	0.57	0.12	1.2
Molybdenum	mg/kg	5	35	5	96	4	16	7.5	25
Nickel	mg/kg	5	84	7.9	220	4	90	16	210
Nitrate	mg/kg	2	U	U	U	1	U	U	U
Oil and Grease	mg/kg	4	4900	540	18000	--	--	--	--
pH	S.U.	3	6.7	6.3	7.3	1	8.5	8.5	8.5
Phosphate	mg/kg	2	U	U	U	--	--	--	--
Phosphorus	mg/kg	4	62	2.4	150	2	500	210	780
Potassium	mg/kg	5	2200	3.9	4200	4	1200	870	1400
Selenium	mg/kg	5	U	U	U	4	1.3	0.66	2
Silicon	mg/kg	5	3000	690	4100	3	1100	780	1400
Silver	mg/kg	5	240	5.7	760	4	14	6.2	22
Sodium	mg/kg	5	1100	280	2300	4	440	130	810
Sulfate	mg/kg	2	U	U	U	1	170	170	170
Sulfide	mg/kg	2	15	0.5	29	2	30	0.5	59
Thallium	mg/kg	5	U	U	U	4	U	U	U

TABLE 4-8
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Tin	mg/kg	5	65	0.24	130	2	U	U	U
Total Kjeldahl Nitrogen	mg/kg	--	--	--	--	--	--	--	--
Total Organic Carbon	mg/kg	2	30000	6100	54000	1	150000	150000	150000
Total Organic Nitrogen	mg/kg	4	320	3.2	830	2	550	460	640
Vanadium	mg/kg	5	180	10	560	4	33	22	43
Zinc	mg/kg	5	68	6	200	4	280	40	510

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-8
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 5				Pit 6				Clearwell			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	mg/kg	9	8400	4000	12000	9	12000	1600	20000	6	17000	13000	21000
AMMONIA, AS NITROGE	mg/kg	9	900	160	2400	8	59	12	140	5	94	12	150
ANTIMONY	mg/kg	9	29	4.3	88	9	5	1.7	26	6	5.8	1.4	11
ARSENIC	mg/kg	9	380	28	720	9	41	17	77	6	36	16	59
BARIUM	mg/kg	9	11000	7400	18000	9	45	11	72	6	1200	200	1800
BERYLLIUM	mg/kg	9	9.5	1.1	22	9	1.1	0.36	2.1	6	1.6	0.69	2.9
BROMIDE	mg/kg	9	U	U	U	8	120	37	380	6	U	U	U
CADMIUM	mg/kg	9	2.5	1.2	4.7	9	1.7	0.5	12	6	1.8	0.24	2.9
CALCIUM	mg/kg	9	180000	78000	250000	9	79000	12000	160000	6	140000	99000	180000
CHLORIDE	mg/kg	9	660	570	1400	8	950	270	2300	6	U	U	U
CHROMIUM	mg/kg	9	64	31	98	9	20	5.2	60	6	100	23	200
COBALT	mg/kg	9	10	6.3	17	9	3.7	1.8	25	6	16	9.2	26
COPPER	mg/kg	9	3000	210	6500	9	11	5.1	48	6	1400	83	3300
CYANIDE	mg/kg	9	U	U	U	8	U	U	U	6	0.69	0.37	1.5
IRON	mg/kg	9	12000	7600	21000	9	8700	1200	15000	6	18000	15000	20000
LEAD	mg/kg	9	93	66	130	9	62	27	110	6	270	23	590
MAGNESIUM	mg/kg	9	32000	14000	43000	9	23000	12000	42000	6	21000	14000	27000
MANGANESE	mg/kg	9	410	210	490	9	160	28	310	6	7200	740	20000
MERCURY	mg/kg	9	0.83	0.27	1.5	9	0.29	0.19	1.1	6	0.92	0.14	1.6
MOLYBDENUM	mg/kg	9	390	37	1400	9	U	U	U	6	23	2.3	41
NICKEL	mg/kg	9	85	22	180	9	16	6.5	23	6	110	32	230
NITRATE/NITRITE	mg/kg	9	22000	7500	54000	8	17	3.7	52	6	30	7.3	69
OIL & GREASE	mg/kg					8	30	22	83	5	160	50	290
pH	S.U.	9	8.9	8	10	7	10	7	13	4	6.9	6.8	7
POTASSIUM	mg/kg	9	1000	450	2200	9	3400	400	6400	6	4100	3300	4800
SELENIUM	mg/kg	9	U	U	U	9	U	U	U	6	0.35	0.14	0.85
SILVER	mg/kg	9	9.5	1.2	22	9	4.3	1.5	9.2	6	6	0.55	13
SODIUM	mg/kg	9	6900	2400	16000	9	380	190	590	6	600	270	1000
SULFATE	mg/kg	3	4800	3500	6800	8	660	74	1600	4	400	210	570
THALLIUM	mg/kg	9	22	9.5	100	9	46	21	110	6	0.73	0.14	1.6
TIN	mg/kg	9	32	10	93	9	10	5.5	22	6	11	1.9	24
TOTAL KJELDAHL NITRO	mg/kg	9	1100	380	1900	8	620	350	860	6	620	220	1100
TOTAL ORGANIC CARBO	mg/kg	9	18000	2600	35000	8	14000	2500	35000	6	42000	3000	85000
TOTAL ORGANIC NITRO	mg/kg	9	280	#NUM!	630	7	540	340	800	4	710	470	910
TOTAL PHOSPHORUS	mg/kg	9	730	420	1100	8	2000	570	3900	5	U	U	U
VANADIUM	mg/kg	9	1700	45	4500	9	27	5	120	6	150	39	290

4788

TABLE 4-8
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS INORGANIC DATA

Parameter	Units	Pit 5				Pit 6				Clearwell			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ZINC	mg/kg	9	170	78	280	9	34	6.7	61	6	170	53	310

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

536

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Chemical Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1-TRICHLOROETHANE	µg/kg	4	190	120	240	4	260	150	360	6	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,1,2-TRICHLOROETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,1-DICHLOROETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,1-DICHLOROETHENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,2,4-TRICHLOROBENZENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
1,2-DICHLOROBENZENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
1,2-DICHLOROETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,2-DICHLOROETHENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,2-DICHLOROPROPANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,2-DICHLOROPROPENE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
1,3-DICHLOROPROPENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
1,3-DICHLOROPROPYLENE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
2,4,5-TRICHLOROPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
2,4,6-TRICHLOROPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
2,4-DICHLOROPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
2,4-DIMETHYLPHENOL	µg/kg	6	U	U	U	5	650	150	1600	6	U	U	U
2,4-DINITROPHENOL	µg/kg	6	U	U	U	5	U	U	U	3	U	U	U
2,4-DINITROTOLUENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
2,6-DINITROTOLUENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
2-BUTANONE	µg/kg	4	2600	2100	3800	2	2700	2600	2700	1	3600	3600	3600
2-CHLOROETHYL VINYL ETHER	µg/kg	4	U	U	U	2	U	U	U	1	U	U	U
2-CHLORONAPHTHALENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
2-CHLOROPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
2-HEXANONE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
2-METHYLNAPHTHALENE	µg/kg	6	390	220	540	5	1800	470	7000	6	U	U	U
2-METHYLPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
2-NITROANILINE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
2-NITROPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
3,3-DICHLOROBENZIDINE	µg/kg	6	810	130	1100	5	U	U	U	6	U	U	U
3-NITROANILINE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
4,4-DDD	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
4,4-DDE	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
4,4-DDT	µg/kg	6	650	96	1600	5	620	23	1400	7	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/kg	6	U	U	U	3	U	U	U	5	U	U	U

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Chemical Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-BROMOPHENYL PHENYL ETHER	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	U	U	U
4-CHLOROANILINE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
4-CHLOROPHENOL PHENYL ETHER	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
4-METHYL-2-PENTANONE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
4-METHYLPHENOL	µg/kg	6	U	U	U	5	690	350	1600	5	U	U	U
4-METHYLPHENOLPROPHYL ETHE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/kg	6	U	U	U	5	4100	2400	7900	6	U	U	U
4-NITROPHENOL	µg/kg	6	U	U	U	5	U	U	U	3	U	U	U
ACENAPHTHENE	µg/kg	6	U	U	U	5	9100	80	43000	6	U	U	U
ACENAPHTHYLENE	µg/kg	6	U	U	U	5	810	470	1600	8	U	U	U
ACETONE	µg/kg	4	310	58	430	4	410	230	540	6	U	U	U
ACRYLONITRILE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ALPHA-BHC	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ANTHRACENE	µg/kg	6	410	74	540	5	25000	58	120000	6	U	U	U
AROCLOR 1016	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
AROCLOR 1221	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
AROCLOR 1232	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
AROCLOR 1242	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
AROCLOR 1248	µg/kg	6	2500	480	3900	5	1500	320	5200	7	U	U	U
AROCLOR 1254	µg/kg	6	5700	720	12000	5	2800	320	10000	7	370	140	860
AROCLOR 1260	µg/kg	6	4500	960	7800	5	U	U	U	7	U	U	U
BENZENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
BENZO(A)ANTHRACENE	µg/kg	6	300	84	540	5	27000	55	130000	6	590	60	960
BENZO(A)PYRENE	µg/kg	6	420	140	540	5	25000	110	120000	6	U	U	U
BENZO(B)FLUORANTHENE	µg/kg	6	250	55	470	4	1600	110	5300	6	590	110	960
BENZO(G,H,I)PERYLENE	µg/kg	6	U	U	U	5	8900	290	42000	6	U	U	U
BENZO(K)FLUORANTHENE	µg/kg	6	420	140	540	5	16000	180	75000	6	U	U	U
BENZOIC ACID	µg/kg	1	U	U	U	3	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
BETA-BHC	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
BIS(2-CHLOROETHYL)PHTHALATE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL)ETHER	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/kg	6	900	440	1800	5	U	U	U	6	480	110	1100

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Chemical Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BIS(CHLOROMETHYL)ETHER	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
BROMOFORM	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
BROMOMETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
BUTANOIC ACID, METHYL ESTER	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
C-10 UNK HYDROCARBON	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
CARBON DISULFIDE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
CARBON TETRACHLORIDE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
CHLORDANE	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
CHLOROBENZENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
CHLOROETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
CHLOROFORM	µg/kg	4	180	67	240	4	U	U	U	6	U	U	U
CHLOROMETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
CHRYSENE	µg/kg	6	330	64	540	5	1300	74	4200	6	590	75	960
DELTA-BHC	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
DI-N-BUTYLPHTHALATE	µg/kg	6	U	U	U	5	730	96	1600	6	450	84	960
DI-N-OCTYLPHTHALATE	µg/kg	6	390	150	830	5	550	96	1600	6	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/kg	6	U	U	U	5	3700	470	16000	6	U	U	U
DIBENZOFURAN	µg/kg	6	U	U	U	5	7700	78	36000	6	U	U	U
DIBROMOCHLOROMETHANE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
DICHLORODIFLUOROMETHANE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
DIETHYL PHTHALATE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
DIMETHYL PHTHALATE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
DIPROPYLAMINE	µg/kg	1	U	U	U	2	U	U	U	--	--	--	--
ENDOSULFAN I	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ENDOSULFAN II	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ENDOSULFAN SULFATE	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ENDRIN	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ENDRIN KETONE	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
ETHYLBENZENE	µg/kg	4	140	40	240	4	240	48	360	6	U	U	U
FLUORANTHENE	µg/kg	6	220	110	430	5	100000	160	490000	6	610	230	960
FLUORENE	µg/kg	6	U	U	U	5	13000	150	62000	6	U	U	U
GAMMA-BHC(Lindane)	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
HEPTACHLOR	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
HEPTACHLOR EPOXIDE	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U

4783

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Chemical Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEXACHLOROBENZENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
HEXACHLOROBUTADIENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
HEXACHLOROETHANE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/kg	6	U	U	U	5	9800	340	46000	6	U	U	U
ISOPHORONE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
METHOXYCHLOR	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
METHYLENE CHLORIDE	µg/kg	4	220	140	360	4	320	170	550	1	420	420	420
N-NITROSO-DI-N-PROPYLAMINE	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
N-NITROSODIPHENYLAMINE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
NAPHTHALENE	µg/kg	6	340	54	540	5	3800	190	16000	6	U	U	U
NITROBENZENE	µg/kg	6	U	U	U	5	U	U	U	6	U	U	U
PENTACHLOROPHENOL	µg/kg	6	U	U	U	5	U	U	U	5	2000	630	2900
PHENANTHRENE	µg/kg	6	1000	97	2400	5	78000	98	370000	6	600	120	960
PHENOL	µg/kg	6	U	U	U	5	680	330	1600	5	U	U	U
PYRENE	µg/kg	6	190	72	360	5	53000	88	250000	6	610	190	960
STYRENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
TETRACHLOROETHENE	µg/kg	4	220	200	240	4	U	U	U	6	U	U	U
TOLUENE	µg/kg	4	150	40	240	4	U	U	U	6	U	U	U
TOTAL XYLENE	µg/kg	4	U	U	U	4	260	210	360	6	U	U	U
TOXAPHENE	µg/kg	6	U	U	U	5	U	U	U	7	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
TRICHLOROETHENE	µg/kg	5	U	U	U	4	U	U	U	6	U	U	U
VINYL ACETATE	µg/kg	4	U	U	U	4	U	U	U	6	U	U	U
VINYL CHLORIDE	µg/kg	4	U	U	U	4	620	430	710	6	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

540

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1-TRICHLOROETHANE	µg/kg	4	260	120	320	6	U	U	U	5	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
1,1,2-TRICHLOROETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
1,1-DICHLOROETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
1,1-DICHLOROETHENE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
1,2,4-TRICHLOROBENZENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
1,2-DICHLOROBENZENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
1,2-DICHLOROETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
1,2-DICHLOROETHENE	µg/kg	4	U	U	U	6	U	U	U	4	U	U	U
1,2-DICHLOROPROPANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
1,2-DICHLOROPROPENE	µg/kg	1	U	U	U	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
1,3-DICHLOROPROPENE	µg/kg	4	U	U	U	6	U	U	U	4	U	U	U
1,3-DICHLOROPROPYLENE	µg/kg	--	--	--	--	1	U	U	U	--	--	--	--
1,4-DICHLOROBENZENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2,4,5-TRICHLOROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2,4,6-TRICHLOROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2,4-DICHLOROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2,4-DIMETHYLPHENOL	µg/kg	5	410	240	470	6	U	U	U	4	U	U	U
2,4-DINITROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2,4-DINITROTOLUENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2,6-DINITROTOLUENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2-BUTANONE	µg/kg	1	100	100	100	--	--	--	--	5	1300	530	1900
2-CHLOROETHYL VINYL ETHER	µg/kg	1	U	U	U	4	U	U	U	--	--	--	--
2-CHLORONAPHTHALENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2-CHLOROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2-HEXANONE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
2-METHYLNAPHTHALENE	µg/kg	5	640	420	1100	6	U	U	U	3	U	U	U
2-METHYLPHENOL	µg/kg	5	380	96	470	6	U	U	U	4	U	U	U
2-NITROANILINE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
2-NITROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
3,3-DICHLOROBENZIDINE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
3-NITROANILINE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
4,4-DDD	µg/kg	4	U	U	U	6	U	U	U	4	U	U	U
4,4-DDE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
4,4-DDT	µg/kg	4	U	U	U	6	U	U	U	4	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-BROMOPHENYL PHENYL ETHER	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/kg	5	U	U	U	6	U	U	U	3	U	U	U
4-CHLOROANILINE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
4-CHLOROPHENOL PHENYL ETHER	µg/kg	3	U	U	U	6	U	U	U	4	U	U	U
4-METHYL-2-PENTANONE	µg/kg	4	U	U	U	6	U	U	U	1	U	U	U
4-METHYLPHENOL	µg/kg	5	430	360	470	6	U	U	U	4	U	U	U
4-METHYLPHENOLPROPHYL ETHE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
4-NITROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ACENAPHTHENE	µg/kg	5	530	87	1200	6	U	U	U	4	U	U	U
ACENAPHTHYLENE	µg/kg	6	640	170	1900	6	U	U	U	4	U	U	U
ACETONE	µg/kg	4	490	350	630	6	2800	470	6300	4	1500	1200	1900
ACRYLONITRILE	µg/kg	--	--	--	--	4	U	U	U	--	--	--	--
ALDRIN	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ALPHA-BHC	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ANTHRACENE	µg/kg	5	1400	260	3300	6	U	U	U	4	U	U	U
AROCLOR 1016	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
AROCLOR 1221	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
AROCLOR 1232	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
AROCLOR 1242	µg/kg	5	530	230	1000	6	U	U	U	4	U	U	U
AROCLOR 1248	µg/kg	5	490	93	850	6	1200	330	3100	4	U	U	U
AROCLOR 1254	µg/kg	5	530	98	1000	6	2100	330	6200	4	370	81	640
AROCLOR 1260	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
BENZENE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
BENZO(A)ANTHRACENE	µg/kg	5	1900	52	4100	6	U	U	U	4	U	U	U
BENZO(A)PYRENE	µg/kg	5	2100	320	4800	6	U	U	U	4	U	U	U
BENZO(B)FLUORANTHENE	µg/kg	5	2200	250	5800	6	U	U	U	4	U	U	U
BENZO(G,H,I)PERYLENE	µg/kg	5	500	130	1300	6	U	U	U	4	U	U	U
BENZO(K)FLUORANTHENE	µg/kg	5	1800	330	3700	6	U	U	U	4	U	U	U
BENZOIC ACID	µg/kg	--	--	--	--	3	U	U	U	3	U	U	U
BENZYL ALCOHOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
BETA-BHC	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
BIS(2-CHLOROETHYL)PHTHALATE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL)ETHER	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/kg	5	300	140	450	6	950	84	2300	4	720	410	910

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BIS(CHLOROMETHYL)ETHER	µg/kg	--	--	--	--	4	U	U	U	--	--	--	--
BROMODICHLOROMETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
BROMOFORM	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
BROMOMETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
BUTANOIC ACID, METHYL ESTER	µg/kg	--	--	--	--	--	--	--	--	2	5.5	5	6
BUTYL BENZYL PHTHALATE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
C-10 UNK HYDROCARBON	µg/kg	--	--	--	--	1	2100	2100	2100	--	--	--	--
CARBON DISULFIDE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
CARBON TETRACHLORIDE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
CHLORDANE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
CHLOROBENZENE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
CHLOROETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
CHLOROFORM	µg/kg	4	460	40	1300	6	U	U	U	5	U	U	U
CHLOROMETHANE	µg/kg	4	U	U	U	4	U	U	U	5	U	U	U
CHRYSENE	µg/kg	5	2000	70	4500	6	U	U	U	4	U	U	U
DELTA-BHC	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
DI-N-BUTYLPHTHALATE	µg/kg	5	300	60	490	6	670	56	1900	4	U	U	U
DI-N-OCTYLPHTHALATE	µg/kg	5	340	170	460	6	U	U	U	4	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/kg	5	390	65	560	6	U	U	U	4	U	U	U
DIBENZOFURAN	µg/kg	5	760	98	1700	6	U	U	U	4	U	U	U
DIBROMOCHLOROMETHANE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
DICHLORODIFLUOROMETHANE	µg/kg	--	--	--	--	4	U	U	U	--	--	--	--
DIELDRIN	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
DIETHYL PHTHALATE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
DIMETHYL PHTHALATE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
DIPROPYLAMINE	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN I	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ENDOSULFAN II	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ENDOSULFAN SULFATE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ENDRIN	µg/kg	5	U	U	U	6	U	U	U	3	U	U	U
ENDRIN KETONE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
ETHYLBENZENE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
FLUORANTHENE	µg/kg	5	6300	170	18000	6	U	U	U	4	U	U	U
FLUORENE	µg/kg	5	1300	160	3400	6	U	U	U	4	U	U	U
GAMMA-BHC(Lindane)	µg/kg	4	U	U	U	6	U	U	U	4	U	U	U
HEPTACHLOR	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
HEPTACHLOR EPOXIDE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEXACHLOROBENZENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
HEXACHLOROBUTADIENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/kg	5	U	U	U	6	U	U	U	3	U	U	U
HEXACHLOROETHANE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/kg	5	470	150	1400	6	U	U	U	4	U	U	U
ISOPHORONE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
METHOXYCHLOR	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
METHYLENE CHLORIDE	µg/kg	4	840	200	2200	6	340	42	630	3	830	760	980
N-NITROSO-DI-N-PROPYLAMINE	µg/kg	5	U	U	U	1	U	U	U	4	U	U	U
N-NITROSODIPHENYLAMINE	µg/kg	5	U	U	U	6	U	U	U	3	U	U	U
NAPHTHALENE	µg/kg	5	890	62	2700	6	U	U	U	4	U	U	U
NITROBENZENE	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
PENTACHLOROPHENOL	µg/kg	5	U	U	U	6	U	U	U	4	U	U	U
PHENANTHRENE	µg/kg	5	5700	110	16000	6	U	U	U	4	U	U	U
PHENOL	µg/kg	5	420	310	470	6	720	200	1900	4	U	U	U
PYRENE	µg/kg	5	2600	93	6600	6	U	U	U	3	U	U	U
STYRENE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
TETRACHLOROETHENE	µg/kg	3	390	320	530	6	U	U	U	5	16000	770	29000
TOLUENE	µg/kg	4	180	60	320	6	U	U	U	5	U	U	U
TOTAL XYLENE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
TOXAPHENE	µg/kg	5	U	U	U	6	U	U	U	3	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/kg	4	250	60	320	6	U	U	U	1	U	U	U
TRICHLOROETHENE	µg/kg	4	310	280	320	6	U	U	U	5	650	170	930
VINYL ACETATE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U
VINYL CHLORIDE	µg/kg	4	U	U	U	6	U	U	U	5	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY -- CIS ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1-TRICHLOROETHANE	µg/kg	6	U	U	U	3	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/kg	6	U	U	U	3	U	U	U
1,1,2-TRICHLOROETHANE	µg/kg	6	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/kg	6	U	U	U	3	U	U	U
1,1-DICHLOROETHENE	µg/kg	6	U	U	U	3	U	U	U
1,2,4-TRICHLOROBENZENE	µg/kg	8	U	U	U	4	U	U	U
1,2-DICHLOROBENZENE	µg/kg	8	U	U	U	4	U	U	U
1,2-DICHLOROETHANE	µg/kg	6	U	U	U	3	U	U	U
1,2-DICHLOROETHENE	µg/kg	6	U	U	U	3	U	U	U
1,2-DICHLOROPROPANE	µg/kg	6	U	U	U	3	U	U	U
1,2-DICHLOROPROPENE	µg/kg	–	–	–	–	–	–	–	–
1,3-DICHLOROBENZENE	µg/kg	8	U	U	U	4	U	U	U
1,3-DICHLOROPROPENE	µg/kg	6	U	U	U	3	U	U	U
1,3-DICHLOROPROPYLENE	µg/kg	–	–	–	–	–	–	–	–
1,4-DICHLOROBENZENE	µg/kg	8	U	U	U	4	U	U	U
2,4,5-TRICHLOROPHENOL	µg/kg	8	2100	500	2500	4	6100	3400	7600
2,4,6-TRICHLOROPHENOL	µg/kg	8	U	U	U	4	U	U	U
2,4-DICHLOROPHENOL	µg/kg	8	U	U	U	4	U	U	U
2,4-DIMETHYLPHENOL	µg/kg	8	U	U	U	4	U	U	U
2,4-DINITROPHENOL	µg/kg	5	U	U	U	4	U	U	U
2,4-DINITROTOLUENE	µg/kg	8	U	U	U	4	U	U	U
2,6-DINITROTOLUENE	µg/kg	8	U	U	U	4	U	U	U
2-BUTANONE	µg/kg	1	70	70	70	–	–	–	–
2-CHLOROETHYL VINYL ETHER	µg/kg	6	U	U	U	–	–	–	–
2-CHLORONAPHTHALENE	µg/kg	8	U	U	U	4	U	U	U
2-CHLOROPHENOL	µg/kg	8	U	U	U	4	U	U	U
2-HEXANONE	µg/kg	6	U	U	U	3	U	U	U
2-METHYLNAPHTHALENE	µg/kg	8	410	50	500	4	U	U	U
2-METHYLPHENOL	µg/kg	8	U	U	U	4	U	U	U
2-NITROANILINE	µg/kg	8	U	U	U	4	U	U	U
2-NITROPHENOL	µg/kg	8	U	U	U	4	U	U	U
3,3-DICHLOROBENZIDINE	µg/kg	8	U	U	U	4	U	U	U
3-NITROANILINE	µg/kg	8	U	U	U	4	U	U	U
4,4-DDD	µg/kg	7	U	U	U	4	U	U	U
4,4-DDE	µg/kg	7	U	U	U	4	U	U	U
4,4-DDT	µg/kg	7	U	U	U	4	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/kg	8	U	U	U	4	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/kg	8	U	U	U	4	U	U	U

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY – CIS ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLORO-3-METHYLPHENOL	µg/kg	8	U	U	U	4	U	U	U
4-CHLOROANILINE	µg/kg	8	U	U	U	4	U	U	U
4-CHLOROPHENOL PHENYL ETHE	µg/kg	7	U	U	U	2	U	U	U
4-METHYL-2-PENTANONE	µg/kg	6	U	U	U	3	U	U	U
4-METHYLPHENOL	µg/kg	8	U	U	U	4	U	U	U
4-METHYLPHENOLPROPHYL ETHE	µg/kg	1	U	U	U	–	–	–	–
4-NITROANILINE	µg/kg	8	U	U	U	4	U	U	U
4-NITROPHENOL	µg/kg	8	U	U	U	4	U	U	U
ACENAPHTHENE	µg/kg	7	U	U	U	4	U	U	U
ACENAPHTHYLENE	µg/kg	8	U	U	U	4	U	U	U
ACETONE	µg/kg	6	440	210	750	3	1600	890	2000
ACRYLONITRILE	µg/kg	–	–	–	–	–	–	–	–
ALDRIN	µg/kg	7	U	U	U	4	U	U	U
ALPHA-BHC	µg/kg	7	U	U	U	4	U	U	U
ANTHRACENE	µg/kg	8	U	U	U	4	930	450	1400
AROCLOR 1016	µg/kg	7	U	U	U	4	U	U	U
AROCLOR 1221	µg/kg	7	U	U	U	4	U	U	U
AROCLOR 1232	µg/kg	7	U	U	U	4	U	U	U
AROCLOR 1242	µg/kg	6	U	U	U	4	220	120	330
AROCLOR 1248	µg/kg	6	U	U	U	4	300	270	330
AROCLOR 1254	µg/kg	7	790	45	2700	4	300	130	740
AROCLOR 1260	µg/kg	7	U	U	U	4	U	U	U
BENZENE	µg/kg	6	U	U	U	3	U	U	U
BENZO(A)ANTHRACENE	µg/kg	8	240	61	470	4	780	140	1400
BENZO(A)PYRENE	µg/kg	8	390	160	500	4	990	670	1400
BENZO(B)FLUORANTHENE	µg/kg	8	240	69	470	4	1000	670	1400
BENZO(G,H,I)PERYLENE	µg/kg	8	370	85	500	4	880	230	1400
BENZO(K)FLUORANTHENE	µg/kg	8	400	200	500	4	1000	670	1400
BENZOIC ACID	µg/kg	3	U	U	U	–	–	–	–
BENZYL ALCOHOL	µg/kg	8	U	U	U	4	U	U	U
BETA-BHC	µg/kg	7	U	U	U	4	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/kg	8	U	U	U	4	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/kg	8	U	U	U	3	U	U	U
BIS(2-CHLOROETHYL)PHTHALATE	µg/kg	–	–	–	–	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/kg	8	460	440	500	4	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/kg	8	650	74	2000	4	430	200	670
BIS(CHLOROMETHYL)ETHER	µg/kg	–	–	–	–	–	–	–	–
BROMODICHLOROMETHANE	µg/kg	6	U	U	U	3	U	U	U

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY – CIS ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
BROMOFORM	µg/kg	6	U	U	U	3	U	U	U
BROMOMETHANE	µg/kg	6	U	U	U	3	U	U	U
BUTANOIC ACID, METHYL ESTER	µg/kg	–	–	–	–	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/kg	8	U	U	U	4	U	U	U
C-10 UNK HYDROCARBON	µg/kg	–	–	–	–	–	–	–	–
CARBON DISULFIDE	µg/kg	6	U	U	U	3	U	U	U
CARBON TETRACHLORIDE	µg/kg	6	U	U	U	3	U	U	U
CHLORDANE	µg/kg	8	U	U	U	4	U	U	U
CHLOROBENZENE	µg/kg	6	U	U	U	3	U	U	U
CHLOROETHANE	µg/kg	6	U	U	U	3	U	U	U
CHLOROFORM	µg/kg	6	U	U	U	3	U	U	U
CHLOROMETHANE	µg/kg	6	U	U	U	3	U	U	U
CHRYSENE	µg/kg	8	310	73	470	4	660	74	1400
DELTA-BHC	µg/kg	7	U	U	U	4	U	U	U
DI-N-BUTYLPHTHALATE	µg/kg	8	230	52	490	4	970	120	1700
DI-N-OCTYLPHTHALATE	µg/kg	8	280	67	500	4	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/kg	8	U	U	U	4	U	U	U
DIBENZOFURAN	µg/kg	8	U	U	U	4	U	U	U
DIBROMOCHLOROMETHANE	µg/kg	6	U	U	U	3	U	U	U
DICHLORODIFLUOROMETHANE	µg/kg	–	–	–	–	–	–	–	–
DIELDRIN	µg/kg	7	U	U	U	4	U	U	U
DIETHYL PHTHALATE	µg/kg	8	U	U	U	4	920	410	1400
DIMETHYL PHTHALATE	µg/kg	8	U	U	U	4	U	U	U
DIPROPYLAMINE	µg/kg	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/kg	7	U	U	U	4	U	U	U
ENDOSULFAN II	µg/kg	7	U	U	U	4	U	U	U
ENDOSULFAN SULFATE	µg/kg	7	U	U	U	4	U	U	U
ENDRIN	µg/kg	7	U	U	U	4	U	U	U
ENDRIN KETONE	µg/kg	7	U	U	U	4	U	U	U
ETHYLBENZENE	µg/kg	6	220	200	270	3	U	U	U
FLUORANTHENE	µg/kg	8	350	74	500	4	1600	670	3100
FLUORENE	µg/kg	8	U	U	U	4	890	280	1400
GAMMA-BHC(Lindane)	µg/kg	7	U	U	U	3	U	U	U
HEPTACHLOR	µg/kg	7	U	U	U	4	U	U	U
HEPTACHLOR EPOXIDE	µg/kg	7	U	U	U	4	U	U	U
HEXACHLOROBENZENE	µg/kg	8	460	440	500	4	U	U	U
HEXACHLOROBUTADIENE	µg/kg	8	U	U	U	4	U	U	U
HEXACHLOROCYCLOPENTADIEN	µg/kg	8	460	440	500	4	U	U	U

547

4783

TABLE 4-9
PIT MATERIAL STATISTICAL SUMMARY – CIS ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
HEXACHLOROETHANE	µg/kg	8	U	U	U	4	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/kg	8	370	78	500	4	890	270	1400
ISOPHORONE	µg/kg	8	460	440	500	4	U	U	U
METHOXYCHLOR	µg/kg	7	U	U	U	4	U	U	U
METHYLENE CHLORIDE	µg/kg	6	320	210	400	3	770	450	1000
N-NITROSO-DI-N-PROPYLAMINE	µg/kg	8	U	U	U	2	U	U	U
N-NITROSODIPHENYLAMINE	µg/kg	7	U	U	U	2	U	U	U
NAPHTHALENE	µg/kg	8	U	U	U	4	U	U	U
NITROBENZENE	µg/kg	8	460	440	500	4	U	U	U
PENTACHLOROPHENOL	µg/kg	8	2200	1200	2600	4	U	U	U
PHENANTHRENE	µg/kg	8	300	49	500	4	650	94	2100
PHENOL	µg/kg	8	420	99	650	4	U	U	U
PYRENE	µg/kg	8	330	79	500	4	800	94	1400
STYRENE	µg/kg	6	U	U	U	3	U	U	U
TETRACHLOROETHENE	µg/kg	6	210	170	260	3	U	U	U
TOLUENE	µg/kg	6	180	50	230	3	U	U	U
TOTAL XYLENE	µg/kg	6	330	200	890	3	U	U	U
TOXAPHENE	µg/kg	7	U	U	U	4	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/kg	6	U	U	U	3	U	U	U
TRICHLOROETHENE	µg/kg	6	U	U	U	3	U	U	U
VINYL ACETATE	µg/kg	6	U	U	U	3	U	U	U
VINYL CHLORIDE	µg/kg	6	U	U	U	3	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-Tetrachloroethane	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
1,1,1-Trichloroethane	µg/kg	9	19	3	120	6	90	6	150	9	24	2	170
1,1,2,2-Tetrachloroethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
1,1,2-Trichloroethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
1,1-Dichloroethane	µg/kg	9	6	2	33	6	9.2	5	23	9	U	U	U
1,1-Dichloroethene	µg/kg	9	4.5	5	16	6	29	6	120	9	U	U	U
1,2,3,4,6,7,8-HpCDD	µg/kg	6	0.4	0.017	1.2	4	1.3	0.24	3.8	6	0.64	0.11	1.7
1,2,3,4,6,7,8-HpCDF	µg/kg	6	0.42	0.051	1.2	4	0.36	0.18	1	6	0.1	0.027	0.21
1,2,3,4,7,8,9-Heptachlorodiben	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
1,2,3,4,7,8-Hexachlorodibenzo-	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
1,2,3,4,7,8-Hexachlorodibenzof	µg/kg	6	0.36	0.051	0.83	4	0.13	0.016	0.33	6	U	U	U
1,2,3,6,7,8-Hexachlorodibenzo-	µg/kg	6	0.28	0.071	0.77	4	U	U	U	6	0.13	0.04	0.85
1,2,3,6,7,8-Hexachlorodibenzof	µg/kg	6	0.14	0.048	0.29	4	U	U	U	6	U	U	U
1,2,3,7,8,9-Hexachlorodibenzo-	µg/kg	6	0.18	0.021	0.53	4	U	U	U	6	U	U	U
1,2,3,7,8,9-Hexachlorodibenzof	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
1,2,3,7,8-Pentachlorodibenzo-p	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
1,2,3,7,8-Pentachlorodibenzofu	µg/kg	6	0.37	0.053	1.2	4	U	U	U	6	U	U	U
1,2,3-Trichloropropane	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
1,2,4,5-Tetrachlorobenzene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
1,2,4-Trichlorobenzene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
1,2-Dibromo-3-chloropropane	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
1,2-Dibromoethane	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
1,2-Dichlorobenzene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
1,2-Dichloroethane	µg/kg	9	U	U	U	6	9.8	6	18	9	U	U	U
1,2-Dichloroethylene	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
1,2-Dichloropropane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
1,3,5-Trinitrobenzene	µg/kg	2	U	U	U	--	--	--	--	1	U	U	U
1,3-Dichlorobenzene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
1,3-Dinitrobenzene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
1,4-Dichlorobenzene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
1,4-Dioxane	µg/kg	4	1600	42	6240	1	650	650	654	--	--	--	--
1,4-Naphthoquinone	µg/kg	5	U	U	U	--	--	--	--	1	U	U	U
1-Naphthylamine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
2,3,4,6,7,8-Hexachlorodibenzof	µg/kg	6	0.19	0.059	0.41	4	U	U	U	6	U	U	U
2,3,4,6-Tetrachlorophenol	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
2,3,4,7,8-Pentachlorodibenzofu	µg/kg	6	0.39	0.052	1.2	4	U	U	U	6	U	U	U

4788

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,3,7,8-TCDD	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
2,3,7,8-TCDF	µg/kg	6	3.3	0.22	14	4	U	U	U	6	U	U	U
2,4,5-T	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
2,4,5-TP (Silvex)	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
2,4,5-Trichlorophenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2,4,6-Trichlorophenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2,4-D	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
2,4-Dichlorophenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2,4-Dimethylphenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2,4-Dinitrophenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2,4-Dinitrotoluene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2,6-Dichlorophenol	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
2,6-Dinitrotoluene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2-Acetylaminofluorene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
2-Butanone	µg/kg	9	11	2	29	6	U	U	U	6	32	12	86
2-Chloro-1,3-butadiene	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
2-Chloronaphthalene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2-Chlorophenol	µg/kg	8	U	U	U	5	700	220	2600	4	U	U	U
2-Hexanone	µg/kg	9	5.9	3	17	6	U	U	U	9	10	6	36
2-Methylnaphthalene	µg/kg	8	230	100	900	5	3300	650	7800	4	U	U	U
2-Methylphenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2-Naphthylamine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
2-Nitroaniline	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2-Nitrophenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
2-Picoline	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
3,3'-Dichlorobenzidine	µg/kg	8	U	U	U	5	U	U	U	7	U	U	U
3,3'-Dimethylbenzidine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
3-Chloropropene	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
3-Methylcholanthrene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
3-Methylphenol	µg/kg	3	230	42	900	1	U	U	U	1	U	U	U
3-Nitroaniline	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
4,4-DDD	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
4,4-DDE	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
4,4-DDT	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
4,6-Dinitro-2-methylphenol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
4-Aminobiphenyl	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-Bromophenyl phenyl ether	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
4-Chloro-3-methylphenol	µg/kg	8	U	U	U	5	700	230	2600	4	U	U	U
4-Chloroaniline	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
4-Chlorophenylphenyl ether	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
4-Methyl-2-pentanone	µg/kg	9	5.1	3	12	6	U	U	U	9	10	3	36
4-Methylphenol	µg/kg	8	U	U	U	5	710	190	2600	4	U	U	U
4-Nitroaniline	µg/kg	7	U	U	U	5	U	U	U	4	U	U	U
4-Nitrophenol	µg/kg	8	U	U	U	5	3200	190	13000	4	U	U	U
4-Nitroquinoline-1-oxide	µg/kg	1	U	U	U	1	U	U	U	1	U	U	U
5-Nitro-o-toluidine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
7,12-Dimethylbenz(a)anthracene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
a,a-Dimethylphenethylamine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Acenaphthene	µg/kg	8	U	U	U	5	13000	150	31000	4	U	U	U
Acenaphthylene	µg/kg	8	U	U	U	5	700	110	2600	4	360	96	1000
Acetone	µg/kg	8	53	10	170	6	24	13	71	6	400	6	1200
Acetonitrile	µg/kg	4	U	U	U	--	--	--	--	1	U	U	U
Acetophenone	µg/kg	4	U	U	U	--	--	--	--	1	U	U	U
Acrolein	µg/kg	4	U	U	U	--	--	--	--	1	U	U	U
Acrylonitrile	µg/kg	2	U	U	U	1	U	U	U	1	U	U	U
Aldrin	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
alpha-BHC	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
alpha-Chlordane	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Aniline	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Anthracene	µg/kg	8	U	U	U	5	19000	650	56000	7	370	130	1000
Aramite	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Aroclor-1016	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Aroclor-1221	µg/kg	6	1900	100	6400	4	U	U	U	6	U	U	U
Aroclor-1232	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Aroclor-1242	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Aroclor-1248	µg/kg	6	3600	66	10000	4	2200	1300	4900	6	1200	100	4800
Aroclor-1254	µg/kg	5	4900	250	10000	4	U	U	U	6	1000	98	3400
Aroclor-1260	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Azinphosmethyl	µg/kg	1	U	U	U	1	U	U	U	3	U	U	U
Benzene	µg/kg	9	U	U	U	6	8.2	6	19	9	U	U	U
Benzo(a)anthracene	µg/kg	8	U	U	U	5	38000	650	100000	7	400	360	1000
Benzo(a)pyrene	µg/kg	7	U	U	U	5	27000	650	68000	7	390	280	1000

4789

4788

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Benzo(b)fluoranthene	µg/kg	8	U	U	U	5	26000	200	130000	7	430	460	1000
Benzo(g,h,i)perylene	µg/kg	8	U	U	U	5	17000	650	42000	7	370	160	1000
Benzo(k)fluoranthene	µg/kg	8	U	U	U	5	16000	650	44000	7	U	U	U
Benzoic acid	µg/kg	8	770	87	4400	5	1900	300	13000	4	1300	44	4900
Benzyl alcohol	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
beta-BHC	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
bis(2-Chloroethoxy)methane	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
bis(2-Chloroethyl)ether	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
bis(2-Chloroisopropyl) ether	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
bis(2-Ethylhexyl) phthalate	µg/kg	8	270	59	900	5	760	650	2600	7	400	49	840
Bromodichloromethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Bromoform	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Bromomethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Butyl benzyl phthalate	µg/kg	8	U	U	U	5	U	U	U	7	U	U	U
Carbon disulfide	µg/kg	9	3.2	5	8	6	U	U	U	9	U	U	U
Carbon Tetrachloride	µg/kg	9	3	2	8	6	U	U	U	9	U	U	U
Chlorobenzene	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Chlorobenzilate	µg/kg	4	U	U	U	2	U	U	U	3	U	U	U
Chloroethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Chloroform	µg/kg	9	99	1	600	6	27	6	84	9	26	3	110
Chloromethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Chrysene	µg/kg	8	U	U	U	5	28000	650	100000	7	400	370	1000
cis-1,3-Dichloropropene	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
delta-BHC	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Demeton	µg/kg	1	U	U	U	1	U	U	U	3	U	U	U
Di-n-butyl phthalate	µg/kg	8	240	83	900	5	U	U	U	7	310	93	1000
Di-n-octyl phthalate	µg/kg	8	U	U	U	5	750	480	2600	7	U	U	U
Diallate	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Diazinon	µg/kg	1	U	U	U	1	U	U	U	3	U	U	U
Dibenzo(a,h)anthracene	µg/kg	8	U	U	U	5	6800	650	20000	7	U	U	U
Dibenzofuran	µg/kg	8	U	U	U	5	8600	650	21000	4	U	U	U
Dibromochloromethane	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Dibromomethane	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
Dichlorodifluoromethane	µg/kg	2	15000	280	29600	1	U	U	U	--	--	--	--
Dieldrin	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Diethyl phthalate	µg/kg	8	U	U	U	5	720	110	2600	4	1300	150	4300

552

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Dimethoate	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
Dimethyl phthalate	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
Dinoseb	µg/kg	6	U	U	U	3	U	U	U	4	U	U	U
Diphenylamine	µg/kg	5	U	U	U	1	U	U	U	1	U	U	U
Disulfoton	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
Endosulfan II	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Endosulfan sulfate	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Endosulfan-I	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Endrin	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Endrin ketone	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Ethion	µg/kg	1	U	U	U	2	U	U	U	3	U	U	U
Ethyl cyanide	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Ethyl methacrylate	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
Ethyl methanesulfonate	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
Ethylbenzene	µg/kg	9	35	3	220	6	8.2	6	19	9	U	U	U
Famphur	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
Fluoranthene	µg/kg	8	350	160	1000	5	96000	320	280000	7	420	120	1000
Fluorene	µg/kg	8	U	U	U	5	14000	650	37000	4	U	U	U
gamma-BHC (Lindane)	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
gamma-Chlordane	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Heptachlor	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Heptachlor epoxide	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Heptachlorodibenzo-p-dioxin	µg/kg	6	0.73	0.017	2.3	4	2.7	0.28	8.1	6	1.2	0.11	3.2
Heptachlorodibenzofuran	µg/kg	6	0.9	0.072	2.7	4	2	0.35	5.9	6	0.4	0.03	0.95
Hexachlorobenzene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
Hexachlorobutadiene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
Hexachlorocyclopentadiene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
Hexachlorodibenzo-p-dioxin	µg/kg	6	1.7	0.15	4.9	4	0.21	0.12	0.65	6	0.11	0.044	0.28
Hexachlorodibenzofuran	µg/kg	6	1.1	0.054	2.9	4	0.77	0.13	2.7	6	0.16	0.015	0.35
Hexachloroethane	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
Hexachlorophene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Hexachloropropene	µg/kg	--	--	--	--	--	--	--	--	1	U	U	U
Indeno(1,2,3-cd)pyrene	µg/kg	8	U	U	U	5	15000	650	37000	7	370	130	1000
Iodomethane	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
Isobutyl alcohol	µg/kg	3	U	U	U	--	--	--	--	--	--	--	--
Isodrin	µg/kg	4	U	U	U	2	U	U	U	3	U	U	U

4788

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Isophorone	µg/kg	8	U	U	U	5	U	U	U	5	340	220	940
Isosafrole	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Kepone	µg/kg	4	U	U	U	2	U	U	U	3	U	U	U
Malathion	µg/kg	1	U	U	U	1	U	U	U	3	U	U	U
Methacrylonitrile	µg/kg	4	U	U	U	--	--	--	--	2	U	U	U
Methapyrilene	µg/kg	1	U	U	U	--	--	--	--	1	U	U	U
Methoxychlor	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Methyl methacrylate	µg/kg	4	U	U	U	1	U	U	U	2	U	U	U
Methyl methanesulfonate	µg/kg	5	U	U	U	1	U	U	U	1	U	U	U
Methylene chloride	µg/kg	9	7.9	6	26	6	26	6	75	9	30	7	92
N-Nitroso-di-n-propylamine	µg/kg	8	U	U	U	5	U	U	U	4	350	270	940
N-Nitrosodi-n-butylamine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
N-Nitrosodiethylamine	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
N-Nitrosodimethylamine	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
N-Nitrosodiphenylamine	µg/kg	8	U	U	U	5	710	170	2600	4	U	U	U
N-Nitrosomethylethylamine	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
N-Nitrosomorpholine	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
N-Nitrosopiperidine	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
N-Nitrosopyrrolidine	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
Naphthalene	µg/kg	8	U	U	U	5	9000	650	23000	4	U	U	U
Nitrobenzene	µg/kg	8	U	U	U	5	U	U	U	4	U	U	U
O,O,O-Triethylphosphorothioate	µg/kg	5	U	U	U	3	U	U	U	4	U	U	U
o-Toluidine	µg/kg	3	U	U	U	--	--	--	--	1	U	U	U
Octachlorodibenzo-p-dioxin	µg/kg	6	0.3	0.012	0.74	4	17	3	45.9	6	7.9	3.7	19.4
Octachlorodibenzofuran	µg/kg	6	0.23	0.015	0.76	4	1.8	0.16	4.9	6	0.43	0.041	1.1
p-Dimethylaminoazobenzene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
p-Phenylenediamine	µg/kg	3	U	U	U	1	U	U	U	1	U	U	U
Parathion, ethyl	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
Parathion, methyl	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
Pentachlorobenzene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Pentachlorodibenzo-p-dioxin	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Pentachlorodibenzofuran	µg/kg	6	2.2	0.052	7.9	4	0.2	0.08	0.55	6	U	U	U
Pentachloroethane	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Pentachloronitrobenzene	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Pentachlorophenol	µg/kg	8	U	U	U	5	3300	830	13000	5	440	81	1000
Phenacetin	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameters	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Phenanthrene	µg/kg	8	710	290	2100	5	94000	190	280000	7	390	77	1000
Phenol	µg/kg	8	280	400	900	5	650	170	2600	4	U	U	U
Phorate	µg/kg	4	U	U	U	2	U	U	U	3	U	U	U
Pronamide	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Pyrene	µg/kg	8	290	400	900	5	80000	240	230000	7	400	110	1000
Pyridine	µg/kg	3	U	U	U	1	U	U	U	--	--	--	--
Safrole	µg/kg	4	U	U	U	1	U	U	U	1	U	U	U
Styrene	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Sulfotepp	µg/kg	7	U	U	U	3	U	U	U	4	U	U	U
Tetrachlorethene	µg/kg	9	120	4	650	6	14	6	45	9	7.6	6	22
Tetrachlorodibenzo-p-dioxin	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
Tetrachlorodibenzofuran	µg/kg	6	10	0.1	35	4	U	U	U	6	0.06	0.031	0.2
Tetraethylpyrophosphate	µg/kg	5	U	U	U	1	U	U	U	3	U	U	U
Thionazin	µg/kg	5	U	U	U	2	U	U	U	3	U	U	U
Toluene	µg/kg	9	9.2	2	49	6	U	U	U	9	5.1	5	18
Total xylenes	µg/kg	9	180	3	1100	6	8.2	6	19	9	U	U	U
Toxaphene	µg/kg	6	U	U	U	4	U	U	U	6	U	U	U
trans-1,3-Dichloropropene	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
trans-1,4-Dichloro-2-butene	µg/kg	3	U	U	U	1	U	U	U	2	U	U	U
Tributyl phosphate	µg/kg	3	14000	2800	25000	4	22000	6900	39000	1	U	U	U
Trichloroethene	µg/kg	9	6	4	27	6	7.8	6	19	9	5.1	6	18
Trichlorofluoromethane	µg/kg	4	U	U	U	1	U	U	U	2	3.8	4.1	7.11
Vinyl Acetate	µg/kg	9	U	U	U	6	U	U	U	9	U	U	U
Vinyl chloride	µg/kg	9	U	U	U	6	670	34	1900	9	U	U	U

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

4783

4783

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-Tetrachloroethane	µg/kg	3	U	U	U	1	U	U	U
1,1,1-Trichloroethane	µg/kg	9	30	5	140	4	3.3	2	8
1,1,2,2-Tetrachloroethane	µg/kg	9	U	U	U	4	U	U	U
1,1,2-Trichloroethane	µg/kg	9	U	U	U	4	U	U	U
1,1-Dichloroethane	µg/kg	9	46	2	330	5	27	7	110
1,1-Dichloroethene	µg/kg	9	3.7	2	11	4	U	U	U
1,2,3,4,6,7,8-HpCDD	µg/kg	6	1.3	0.37	2.6	4	0.33	0.31	0.52
1,2,3,4,6,7,8-HpCDF	µg/kg	6	1.2	0.44	3.2	4	0.13	0.071	0.28
1,2,3,4,7,8,9-Heptachlorodiben	µg/kg	6	0.85	0.17	2.9	4	0.17	0.091	0.35
1,2,3,4,7,8-Hexachlorodibenzo-	µg/kg	6	0.38	0.06	2.2	4	U	U	U
1,2,3,4,7,8-Hexachlorodibenzof	µg/kg	6	1	0.37	2.9	4	U	U	U
1,2,3,6,7,8-Hexachlorodibenzo-	µg/kg	6	0.32	0.077	1.8	4	U	U	U
1,2,3,6,7,8-Hexachlorodibenzof	µg/kg	6	0.5	0.12	1.1	4	U	U	U
1,2,3,7,8,9-Hexachlorodibenzo-	µg/kg	6	0.31	0.1	1.4	4	U	U	U
1,2,3,7,8,9-Hexachlorodibenzof	µg/kg	6	0.62	0.21	2.9	4	U	U	U
1,2,3,7,8-Pentachlorodibenzo-p	µg/kg	6	U	U	U	4	U	U	U
1,2,3,7,8-Pentachlorodibenzofu	µg/kg	6	0.91	0.57	2.1	4	U	U	U
1,2,3-Trichloropropane	µg/kg	3	U	U	U	1	U	U	U
1,2,4,5-Tetrachlorobenzene	µg/kg	3	U	U	U	--	--	--	--
1,2,4-Trichlorobenzene	µg/kg	9	U	U	U	4	U	U	U
1,2-Dibromo-3-chloropropane	µg/kg	2	U	U	U	1	U	U	U
1,2-Dibromoethane	µg/kg	2	U	U	U	1	U	U	U
1,2-Dichlorobenzene	µg/kg	9	U	U	U	4	U	U	U
1,2-Dichloroethane	µg/kg	9	3.1	3	8	4	U	U	U
1,2-Dichloroethylene	µg/kg	9	20	3	110	4	U	U	U
1,2-Dichloropropane	µg/kg	9	U	U	U	4	U	U	U
1,3,5-Trinitrobenzene	µg/kg	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	µg/kg	9	U	U	U	4	U	U	U
1,3-Dinitrobenzene	µg/kg	3	U	U	U	--	--	--	--
1,4-Dichlorobenzene	µg/kg	9	U	U	U	4	U	U	U
1,4-Dioxane	µg/kg	2	U	U	U	--	--	--	--
1,4-Naphthoquinone	µg/kg	2	U	U	U	--	--	--	--
1-Naphthylamine	µg/kg	3	U	U	U	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzof	µg/kg	6	0.5	0.27	1.2	4	U	U	U
2,3,4,6-Tetrachlorophenol	µg/kg	3	U	U	U	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofu	µg/kg	6	1.1	0.68	2.7	4	U	U	U

556

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
2,3,7,8-TCDD	µg/kg	6	U	U	U	4	U	U	U
2,3,7,8-TCDF	µg/kg	6	4.5	1.5	9.9	4	U	U	U
2,4,5-T	µg/kg	3	U	U	U	2	U	U	U
2,4,5-TP (Silvex)	µg/kg	3	U	U	U	2	U	U	U
2,4,5-Trichlorophenol	µg/kg	9	U	U	U	4	U	U	U
2,4,6-Trichlorophenol	µg/kg	9	U	U	U	4	U	U	U
2,4-D	µg/kg	3	U	U	U	2	U	U	U
2,4-Dichlorophenol	µg/kg	9	370	230	2300	4	U	U	U
2,4-Dimethylphenol	µg/kg	9	U	U	U	4	U	U	U
2,4-Dinitrophenol	µg/kg	9	1800	47	11000	4	U	U	U
2,4-Dinitrotoluene	µg/kg	9	U	U	U	4	U	U	U
2,6-Dichlorophenol	µg/kg	3	U	U	U	--	--	--	--
2,6-Dinitrotoluene	µg/kg	9	U	U	U	4	U	U	U
2-Acetylaminofluorene	µg/kg	2	U	U	U	--	--	--	--
2-Butanone	µg/kg	7	18	10	59	4	15	12	41
2-Chloro-1,3-butadiene	µg/kg	2	U	U	U	1	U	U	U
2-Chloronaphthalene	µg/kg	9	U	U	U	4	U	U	U
2-Chlorophenol	µg/kg	9	U	U	U	4	U	U	U
2-Hexanone	µg/kg	9	9.6	3	29	4	5.6	2	15
2-Methylnaphthalene	µg/kg	9	310	260	920	4	340	70	820
2-Methylphenol	µg/kg	9	U	U	U	4	U	U	U
2-Naphthylamine	µg/kg	3	U	U	U	--	--	--	--
2-Nitroaniline	µg/kg	9	U	U	U	4	U	U	U
2-Nitrophenol	µg/kg	9	U	U	U	4	U	U	U
2-Picoline	µg/kg	3	U	U	U	--	--	--	--
3,3'-Dichlorobenzidine	µg/kg	9	U	U	U	4	U	U	U
3,3'-Dimethylbenzidine	µg/kg	3	U	U	U	--	--	--	--
3-Chloropropene	µg/kg	2	4.5	3	12	1	U	U	U
3-Methylcholanthrene	µg/kg	--	--	--	--	--	--	--	--
3-Methylphenol	µg/kg	3	U	U	U	--	--	--	--
3-Nitroaniline	µg/kg	7	U	U	U	4	U	U	U
4,4-DDD	µg/kg	4	U	U	U	4	U	U	U
4,4-DDE	µg/kg	4	U	U	U	4	U	U	U
4,4-DDT	µg/kg	6	U	U	U	4	U	U	U
4,6-Dinitro-2-methylphenol	µg/kg	9	U	U	U	4	U	U	U
4-Aminobiphenyl	µg/kg	3	U	U	U	--	--	--	--

4783

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
4-Bromophenyl phenyl ether	µg/kg	9	U	U	U	4	U	U	U
4-Chloro-3-methylphenol	µg/kg	9	360	55	2300	4	U	U	U
4-Chloroaniline	µg/kg	9	U	U	U	4	U	U	U
4-Chlorophenylphenyl ether	µg/kg	9	U	U	U	4	U	U	U
4-Methyl-2-pentanone	µg/kg	9	16	2	83	4	6.9	6	15
4-Methylphenol	µg/kg	9	U	U	U	4	U	U	U
4-Nitroaniline	µg/kg	9	U	U	U	4	U	U	U
4-Nitrophenol	µg/kg	9	U	U	U	4	U	U	U
4-Nitroquinoline-1-oxide	µg/kg	3	U	U	U	--	--	--	--
5-Nitro-o-toluidine	µg/kg	3	U	U	U	--	--	--	--
7,12-Dimethylbenz(a)anthracene	µg/kg	--	--	--	--	--	--	--	--
a,a-Dimethylphenethylamine	µg/kg	--	--	--	--	--	--	--	--
Acenaphthene	µg/kg	9	550	400	1900	4	450	450	1100
Acenaphthylene	µg/kg	9	U	U	U	4	U	U	U
Acetone	µg/kg	6	19	12	57	5	44	16	100
Acetonitrile	µg/kg	2	U	U	U	1	U	U	U
Acetophenone	µg/kg	3	U	U	U	--	--	--	--
Acrolein	µg/kg	2	U	U	U	1	U	U	U
Acrylonitrile	µg/kg	2	U	U	U	1	U	U	U
Aldrin	µg/kg	4	U	U	U	4	U	U	U
alpha-BHC	µg/kg	4	U	U	U	4	U	U	U
alpha-Chlordane	µg/kg	6	U	U	U	4	U	U	U
Aniline	µg/kg	3	U	U	U	--	--	--	--
Anthracene	µg/kg	9	670	400	2700	4	950	450	3100
Aramite	µg/kg	--	--	--	--	--	--	--	--
Aroclor-1016	µg/kg	6	U	U	U	4	U	U	U
Aroclor-1221	µg/kg	6	U	U	U	4	U	U	U
Aroclor-1232	µg/kg	6	U	U	U	4	U	U	U
Aroclor-1242	µg/kg	6	U	U	U	4	U	U	U
Aroclor-1248	µg/kg	6	3300	310	7500	4	U	U	U
Aroclor-1254	µg/kg	6	2300	770	6800	4	2400	24	7700
Aroclor-1260	µg/kg	6	U	U	U	3	U	U	U
Azinphosmethyl	µg/kg	3	U	U	U	2	U	U	U
Benzene	µg/kg	9	4.3	5	14	4	U	U	U
Benzo(a)anthracene	µg/kg	9	1000	400	4700	4	1700	450	6300
Benzo(a)pyrene	µg/kg	9	730	400	2900	4	1100	450	3900

558

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Benzo(b)fluoranthene	µg/kg	9	1200	400	5200	4	2600	450	9600
Benzo(g,h,i)perylene	µg/kg	9	470	400	2300	4	900	450	2900
Benzo(k)fluoranthene	µg/kg	9	U	U	U	4	800	450	5000
Benzoic acid	µg/kg	9	730	120	4400	4	U	U	U
Benzyl alcohol	µg/kg	9	U	U	U	4	U	U	U
beta-BHC	µg/kg	4	U	U	U	4	U	U	U
bis(2-Chloroethoxy)methane	µg/kg	9	U	U	U	4	U	U	U
bis(2-Chloroethyl)ether	µg/kg	9	U	U	U	4	U	U	U
bis(2-Chloroisopropyl) ether	µg/kg	9	U	U	U	4	U	U	U
bis(2-Ethylhexyl) phthalate	µg/kg	9	700	94	2700	4	2500	80	9700
Bromodichloromethane	µg/kg	9	U	U	U	4	U	U	U
Bromoform	µg/kg	9	U	U	U	4	U	U	U
Bromomethane	µg/kg	9	U	U	U	4	U	U	U
Butyl benzyl phthalate	µg/kg	9	U	U	U	4	U	U	U
Carbon disulfide	µg/kg	9	3.2	3	8	4	2.9	1	8
Carbon Tetrachloride	µg/kg	9	3	2	8	4	U	U	U
Chlorobenzene	µg/kg	9	U	U	U	4	3.1	2	8
Chlorobenzilate	µg/kg	3	U	U	U	1	U	U	U
Chloroethane	µg/kg	9	9.4	11	35	4	U	U	U
Chloroform	µg/kg	9	140	5	630	4	U	U	U
Chloromethane	µg/kg	9	U	U	U	4	U	U	U
Chrysene	µg/kg	9	870	400	3300	4	1900	450	7000
cis-1,3-Dichloropropene	µg/kg	9	U	U	U	4	U	U	U
delta-BHC	µg/kg	4	U	U	U	4	U	U	U
Demeton	µg/kg	3	U	U	U	2	U	U	U
Di-n-butyl phthalate	µg/kg	9	350	150	2300	4	U	U	U
Di-n-octyl phthalate	µg/kg	9	500	140	1000	4	U	U	U
Diallate	µg/kg	--	--	--	--	--	--	--	--
Diazinon	µg/kg	3	U	U	U	2	U	U	U
Dibenzo(a,h)anthracene	µg/kg	9	U	U	U	4	U	U	U
Dibenzofuran	µg/kg	9	440	400	1200	4	400	450	900
Dibromochloromethane	µg/kg	9	U	U	U	4	U	U	U
Dibromomethane	µg/kg	3	U	U	U	1	U	U	U
Dichlorodifluoromethane	µg/kg	1	U	U	U	--	--	--	--
Dieldrin	µg/kg	4	U	U	U	4	U	U	U
Diethyl phthalate	µg/kg	9	350	89	2300	4	760	80	5000

789

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Dimethoate	µg/kg	3	U	U	U	2	U	U	U
Dimethyl phthalate	µg/kg	9	U	U	U	4	U	U	U
Dinoseb	µg/kg	6	U	U	U	2	U	U	U
Diphenylamine	µg/kg	3	U	U	U	--	--	--	--
Disulfoton	µg/kg	3	U	U	U	2	U	U	U
Endosulfan II	µg/kg	4	U	U	U	4	U	U	U
Endosulfan sulfate	µg/kg	4	U	U	U	4	U	U	U
Endosulfan-I	µg/kg	4	U	U	U	4	U	U	U
Endrin	µg/kg	4	U	U	U	4	U	U	U
Endrin ketone	µg/kg	6	U	U	U	4	U	U	U
Ethion	µg/kg	3	U	U	U	2	U	U	U
Ethyl cyanide	µg/kg	2	U	U	U	1	U	U	U
Ethyl methacrylate	µg/kg	3	U	U	U	1	U	U	U
Ethyl methanesulfonate	µg/kg	3	U	U	U	--	--	--	--
Ethylbenzene	µg/kg	9	6.4	3	28	4	12	6	28
Famphur	µg/kg	3	U	U	U	2	U	U	U
Fluoranthene	µg/kg	9	1900	400	11000	4	4200	450	16000
Fluorene	µg/kg	9	580	400	2000	4	550	52	1700
gamma-BHC (Lindane)	µg/kg	4	U	U	U	4	U	U	U
gamma-Chlordane	µg/kg	6	U	U	U	4	U	U	U
Heptachlor	µg/kg	4	U	U	U	4	U	U	U
Heptachlor epoxide	µg/kg	4	U	U	U	4	U	U	U
Heptachlorodibenzo-p-dioxin	µg/kg	6	2.1	0.67	4	4	0.55	0.31	0.98
Heptachlorodibenzofuran	µg/kg	6	2.2	0.95	4.4	4	0.13	0.079	0.31
Hexachlorobenzene	µg/kg	9	U	U	U	4	U	U	U
Hexachlorobutadiene	µg/kg	9	U	U	U	4	U	U	U
Hexachlorocyclopentadiene	µg/kg	9	U	U	U	4	U	U	U
Hexachlorodibenzo-p-dioxin	µg/kg	6	1.1	0.47	2.7	4	U	U	U
Hexachlorodibenzofuran	µg/kg	6	3.1	1.4	8.5	4	U	U	U
Hexachloroethane	µg/kg	9	U	U	U	4	U	U	U
Hexachlorophene	µg/kg	--	--	--	--	--	--	--	--
Hexachloropropene	µg/kg	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/kg	9	470	400	2300	4	720	450	2200
Iodomethane	µg/kg	3	U	U	U	1	U	U	U
Isobutyl alcohol	µg/kg	2	69	17	240	--	--	--	--
Isodrin	µg/kg	3	U	U	U	1	U	U	U

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Isophorone	µg/kg	9	U	U	U	4	U	U	U
Isosafrole	µg/kg	3	U	U	U	--	--	--	--
Kepone	µg/kg	3	U	U	U	1	U	U	U
Malathion	µg/kg	3	U	U	U	2	U	U	U
Methacrylonitrile	µg/kg	2	U	U	U	1	U	U	U
Methapyrilene	µg/kg	--	--	--	--	--	--	--	--
Methoxychlor	µg/kg	6	U	U	U	4	U	U	U
Methyl methacrylate	µg/kg	3	U	U	U	1	U	U	U
Methyl methanesulfonate	µg/kg	3	U	U	U	--	--	--	--
Methylene chloride	µg/kg	9	54	7	230	5	18	7	56
N-Nitroso-di-n-propylamine	µg/kg	9	U	U	U	4	U	U	U
N-Nitrosodi-n-butylamine	µg/kg	3	U	U	U	--	--	--	--
N-Nitrosodiethylamine	µg/kg	3	U	U	U	--	--	--	--
N-Nitrosodimethylamine	µg/kg	3	U	U	U	--	--	--	--
N-Nitrosodiphenylamine	µg/kg	9	U	U	U	4	U	U	U
N-Nitrosomethylethylamine	µg/kg	3	U	U	U	--	--	--	--
N-Nitrosomorpholine	µg/kg	3	U	U	U	--	--	--	--
N-Nitrosopiperidine	µg/kg	3	U	U	U	--	--	--	--
N-Nitrosopyrrolidine	µg/kg	3	U	U	U	--	--	--	--
Naphthalene	µg/kg	9	340	210	920	4	790	200	5000
Nitrobenzene	µg/kg	9	U	U	U	4	U	U	U
O,O,O-Triethylphosphorothioate	µg/kg	5	U	U	U	2	U	U	U
o-Toluidine	µg/kg	1	U	U	U	--	--	--	--
Octachlorodibenzo-p-dioxin	µg/kg	6	4.1	1.3	9	4	2.3	0.66	4
Octachlorodibenzofuran	µg/kg	6	2.1	0.4	8	4	0.19	0.13	0.37
p-Dimethylaminoazobenzene	µg/kg	--	--	--	--	--	--	--	--
p-Phenylenediamine	µg/kg	3	U	U	U	--	--	--	--
Parathion, ethyl	µg/kg	3	U	U	U	2	U	U	U
Parathion, methyl	µg/kg	3	U	U	U	2	U	U	U
Pentachlorobenzene	µg/kg	3	U	U	U	--	--	--	--
Pentachlorodibenzo-p-dioxin	µg/kg	6	U	U	U	4	U	U	U
Pentachlorodibenzofuran	µg/kg	6	5.2	1.5	15	4	U	U	U
Pentachloroethane	µg/kg	3	U	U	U	--	--	--	--
Pentachloronitrobenzene	µg/kg	3	U	U	U	--	--	--	--
Pentachlorophenol	µg/kg	9	U	U	U	4	U	U	U
Phenacetin	µg/kg	3	U	U	U	--	--	--	--

TABLE 4-10
PIT MATERIAL STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Phenanthrene	µg/kg	9	2200	400	12000	4	3900	310	15000
Phenol	µg/kg	9	U	U	U	4	U	U	U
Phorate	µg/kg	3	U	U	U	2	U	U	U
Pronamide	µg/kg	3	U	U	U	--	--	--	--
Pyrene	µg/kg	9	1600	400	9000	4	3700	240	14000
Pyridine	µg/kg	--	--	--	--	--	--	--	--
Safrole	µg/kg	3	U	U	U	--	--	--	--
Styrene	µg/kg	9	3.1	3	8	4	U	U	U
Sulfotepp	µg/kg	5	U	U	U	2	U	U	U
Tetrachlorethene	µg/kg	8	48	3	240	4	U	U	U
Tetrachlorodibenzo-p-dioxin	µg/kg	6	0.2	0.092	0.47	3	U	U	U
Tetrachlorodibenzofuran	µg/kg	6	15	1.1	34	3	U	U	U
Tetraethylpyrophosphate	µg/kg	3	U	U	U	2	U	U	U
Thionazin	µg/kg	3	U	U	U	2	U	U	U
Toluene	µg/kg	9	8.6	2	33	4	2.6	2	7
Total xylenes	µg/kg	9	38	3	230	4	76	7	190
Toxaphene	µg/kg	6	U	U	U	4	U	U	U
trans-1,3-Dichloropropene	µg/kg	9	U	U	U	4	U	U	U
trans-1,4-Dichloro-2-butene	µg/kg	3	U	U	U	1	U	U	U
Tributyl phosphate	µg/kg	2	60000	48000	72000	--	--	--	--
Trichloroethene	µg/kg	9	80	2	210	4	U	U	U
Trichlorofluoromethane	µg/kg	2	4.5	2	14	1	U	U	U
Vinyl Acetate	µg/kg	9	U	U	U	4	U	U	U
Vinyl chloride	µg/kg	9	7.8	11	16	4	6.1	3	15

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-11
PIT LEACHATE RI/FS STATISTICAL SUMMARY FOR INORGANIC DATA

		Pit 1				Pit 2				Pit3			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Alkalinity as CaCO3	mg/L	3	1100	5	2900	--	--	--	--	3	300	180	470
Aluminum	µg/L	6	920	510	1500	4	1600	410	2700	6	2900	940	6400
Ammonia	mg/L	5	150	0.2	400	2	170	74	280	3	U	U	U
Antimony	µg/L	5	220	91	400	4	360	180	570	6	620	450	710
Arsenic	µg/L	5	2.1	2	3.3	4	42	27	68	6	430	150	1500
Barium	µg/L	5	670	85	2000	4	370	320	450	6	330	170	530
Beryllium	µg/L	5	43	3.2	100	4	4.2	2.6	5.7	6	6.3	5.2	8.1
Boron	µg/L	5	760	230	1600	4	1600	470	2800	6	5400	3800	7400
Bromide	mg/L	1	0.5	1	1	--	--	--	--	3	U	U	U
Cadmium	µg/L	5	20	10	41	4	160	45	280	6	340	190	480
Calcium	µg/L	5	1100000	170000	3000000	4	1100000	750000	1700000	6	1900000	1000000	2800000
Chloride	mg/L	4	3200	0.5	5400	2	4000	1800	6200	3	23000	15000	33000
Chromium	µg/L	5	170	130	210	4	52	10	110	6	37	10	180
Cobalt	µg/L	5	710	18	1800	4	260	52	600	6	130	90	160
Copper	µg/L	5	69	47	97	4	89	42	150	6	460	98	780
Cyanide	µg/L	4	220	2	370	1	32	32	32	3	430	2	1300
Fluoride	mg/L	3	14	0.4	34	2	U	U	U	3	40	80	80
Iron	µg/L	6	210	94	590	4	1400	100	3200	6	3400	260	12000
Lead	µg/L	6	2.8	2	4.8	4	16	2	45	6	320	2	1600
Magnesium	µg/L	6	220000	740	650000	4	1800000	300000	3800000	6	3600000	1600000	5000000
Manganese	µg/L	6	110000	18	330000	4	3900	3600	4500	6	130000	93000	180000
Mercury	µg/L	7	U	U	U	4	1.7	0.2	4.6	6	21	0.2	99
Molybdenum	µg/L	6	200	24	580	4	580	83	1600	6	2500	1000	5200
Nickel	µg/L	6	4300	32	13000	4	120	20	190	6	16	20	47
Nitrate	mg/L	5	31	0.4	82	2	2400	230	4700	3	7	4200	6600
Phosphate	mg/L	1	0.5	1	1	--	--	--	--	3	U	U	U
Phosphorus	mg/L	4	0.41	0.15	0.82	2	29	25	32	--	--	--	--
Potassium	µg/L	6	250000	130000	320000	4	640000	18000	1300000	6	660000	430000	830000
Selenium	µg/L	5	U	U	U	4	33	6	58	6	61	10	140
Silicon	µg/L	6	11000	540	31000	4	7700	5500	10000	6	5400	2500	9200
Silver	µg/L	6	110	110	120	4	97	80	120	6	150	130	170
Sodium	µg/L	6	700000	630000	870000	4	1300000	93000	3100000	6	3500000	1900000	4600000
Sulfate	mg/L	4	1.2	1.9	2	2	160	120	200	3	4500	4000	4800
Sulfide	mg/L	5	U	U	U	2	U	U	U	3	0.25	0.5	0.5
Thallium	µg/L	5	3.6	2	20	4	5.4	2	10	6	110	24	190
Tin	µg/L	5	U	U	U	4	U	U	U	6	100	200	200

4783

4789

TABLE 4-11
PIT LEACHATE RI/FS STATISTICAL SUMMARY FOR INORGANIC DATA

		Pit 1				Pit 2				Pit3			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Total Organic Carbon	mg/L	5	50	1	140	2	5.6	3.5	7.7	3	19	9.9	25
Total Organic Nitrogen	mg/L	1	U	U	U	--	--	--	--	--	--	--	--
Vanadium	µg/L	5	92	69	120	4	200	93	330	6	580	240	1200
Zinc	µg/L	5	120	5	300	4	45	22	63	6	79	43	160

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-11
PIT LEACHATE RI/FS STATISTICAL SUMMARY FOR INORGANIC DATA

		Pit 4				Burn Pit			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max
Alkalinity as CaCO3	mg/L	2	550	260	840	2	1900	530	3300
Aluminum	µg/L	3	6100	1300	12000	2	4600	650	8500
Ammonia	mg/L	3	47	9.3	81	2	U	U	U
Antimony	µg/L	3	640	200	960	2	99	96	100
Arsenic	µg/L	3	1.9	2	2.5	2	45	41	49
Barium	µg/L	3	1100	99	2800	2	1300	150	2400
Beryllium	µg/L	3	36	10	81	2	2.9	2	3.7
Boron	µg/L	3	1700	1000	2900	2	1200	370	2100
Bromide	mg/L	3	U	U	U	1	U	U	U
Cadmium	µg/L	3	83	30	120	2	12	10	20
Calcium	µg/L	3	390000	79000	700000	2	1300000	92000	2500000
Chloride	mg/L	3	4100	1900	5300	2	550	0.5	1100
Chromium	µg/L	3	1100	240	2200	2	98	67	130
Cobalt	µg/L	3	210	52	340	2	28	19	38
Copper	µg/L	3	290	66	640	2	81	45	120
Cyanide	µg/L	3	24	20	27	2	2.3	2	3.6
Fluoride	mg/L	2	0.2	0.4	0.4	1	19	19	19
Iron	µg/L	3	3900	440	10000	2	4300	190	8500
Lead	µg/L	3	1.3	2	2	2	54	10	98
Magnesium	µg/L	3	750000	230000	1100000	2	70000	780	140000
Manganese	µg/L	3	240000	44000	560000	2	1500	25	3000
Mercury	µg/L	3	0.13	0.2	0.2	2	0.21	0.2	0.32
Molybdenum	µg/L	3	530	400	630	2	670	290	1100
Nickel	µg/L	3	1000	230	2100	2	210	120	300
Nitrate	mg/L	3	U	U	U	2	U	U	U
Phosphate	mg/L	2	U	U	U	1	0.5	1	1
Phosphorus	mg/L	2	0.5	1	1	1	0.19	0.19	0.19
Potassium	µg/L	3	230000	23000	480000	2	330000	220000	450000
Selenium	µg/L	3	U	U	U	2	2.4	2	3.8
Silicon	µg/L	3	15000	11000	20000	2	11000	1400	20000
Silver	µg/L	3	540	120	1200	2	70	32	110
Sodium	µg/L	3	620000	240000	830000	2	350000	100	700000
Sulfate	mg/L	3	U	U	U	2	81	2	160
Sulfide	mg/L	3	0.25	0.5	0.5	2	0.87	0.5	1.5
Thallium	µg/L	3	U	U	U	2	U	U	U
Tin	µg/L	3	100	200	200	2	U	U	U

TABLE 4-11
PIT LEACHATE RI/FS STATISTICAL SUMMARY FOR INORGANIC DATA

		Pit 4				Burn Pit			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max
Total Organic Carbon	mg/L	3	66	48	81	2	130	15	240
Total Organic Nitrogen	mg/L	--	--	--	--	--	--	--	--
Vanadium	µg/L	3	450	110	930	2	71	68	74
Zinc	µg/L	3	170	8.9	410	2	130	16	250

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-Tetrachloroethane	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
1,1,1-Trichloroethane	µg/L	5	36	5	83	2	9.3	5	32	3	2	1	5
1,1,2,2-Tetrachloroethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
1,1,2-Trichloroethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
1,1-Dichloroethane	µg/L	5	14	4	52	2	2.5	5	5	3	U	U	U
1,1-Dichloroethene	µg/L	5	6	3	15	2	2.3	2	5	3	U	U	U
1,2,3,4,6,7,8-HpCDD	ng/L	2	0.37	0.37	1.1	2	0.51	0.84	1.2	3	1.1	0.45	2.2
1,2,3,4,6,7,8-HpCDF	ng/L	2	0.48	0.41	1.5	2	0.6	0.89	1.5	3	0.63	0.78	2
1,2,3,4,7,8,9-Heptachlorodiben	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
1,2,3,4,7,8-Hexachlorodibenzo-	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
1,2,3,4,7,8-Hexachlorodibenzof	ng/L	2	0.5	0.61	1.4	2	0.62	0.87	1.6	3	U	U	U
1,2,3,6,7,8-Hexachlorodibenzo-	ng/L	2	0.66	0.83	1.8	2	U	U	U	3	0.4	0.52	1.1
1,2,3,6,7,8-Hexachlorodibenzof	ng/L	2	0.46	0.65	1.2	2	U	U	U	3	U	U	U
1,2,3,7,8,9-Hexachlorodibenzo-	ng/L	2	0.69	0.87	1.9	2	U	U	U	3	U	U	U
1,2,3,7,8,9-Hexachlorodibenzof	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
1,2,3,7,8-Pentachlorodibenzo-p	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
1,2,3,7,8-Pentachlorodibenzofu	ng/L	2	0.18	0.34	0.38	2	U	U	U	3	U	U	U
1,2,3-Trichloropropane	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
1,2,4,5-Tetrachlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
1,2,4-Trichlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
1,2-Dibromo-3-chloropropane	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
1,2-Dibromoethane	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
1,2-Dichlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
1,2-Dichloroethane	µg/L	5	U	U	U	2	2.3	2	5	3	U	U	U
1,2-Dichloroethylene	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
1,2-Dichloropropane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
1,3,5-Trinitrobenzene	µg/L	3	U	U	U	1	5	10	10	--	--	--	--
1,3-Dichlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
1,3-Dinitrobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
1,4-Dichlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
1,4-Dioxane	µg/L	1	65	65	65	2	71	12	130	3	650	300	1000
1,4-Naphthoquinone	µg/L	3	U	U	U	1	5	10	10	--	--	--	--
1-Naphthylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzof	ng/L	2	0.51	0.64	1.4	2	U	U	U	3	U	U	U
2,3,4,6-Tetrachlorophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofu	ng/L	2	0.21	0.41	0.41	2	U	U	U	3	U	U	U

4788

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,3,7,8-TCDD	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
2,3,7,8-TCDF	ng/L	2	1	1.6	2.5	2	U	U	U	3	U	U	U
2,4,5-T	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
2,4,5-TP (Silvex)	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
2,4,5-Trichlorophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,4,6-Trichlorophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,4-D	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
2,4-Dichlorophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,4-Dimethylphenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,4-Dinitrophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,4-Dinitrotoluene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2,6-Dichlorophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2,6-Dinitrotoluene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2-Acetylaminofluorene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2-Butanone	µg/L	5	39	10	110	2	U	U	U	3	21	6	44
2-Chloro-1,3-butadiene	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
2-Chloronaphthalene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2-Chlorophenol	µg/L	3	U	U	U	2	5	10	10	--	--	--	--
2-Hexanone	µg/L	5	26	3	60	2	U	U	U	3	21	10	40
2-Methylnaphthalene	µg/L	3	10	10	40	1	5	10	10	--	--	--	--
2-Methylphenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2-Naphthylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2-Nitroaniline	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
2-Nitrophenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
2-Picoline	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
3,3'-Dichlorobenzidine	µg/L	3	U	U	U	1	U	U	U	3	U	U	U
3,3'-Dimethylbenzidine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
3-Chloropropene	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
3-Methylcholanthrene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
3-Methylphenol	µg/L	3	32	33	120	2	U	U	U	--	--	--	--
3-Nitroaniline	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
4,4-DDD	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
4,4-DDE	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
4,4-DDT	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
4,6-Dinitro-2-methylphenol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
4-Aminobiphenyl	µg/L	3	U	U	U	1	U	U	U	--	--	--	--

563

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-Bromophenyl phenyl ether	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
4-Chloro-3-methylphenol	µg/L	3	U	U	U	2	5	10	10	--	--	--	--
4-Chloroaniline	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
4-Chlorophenylphenyl ether	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
4-Methyl-2-pentanone	µg/L	5	45	10	110	2	U	U	U	3	20	10	25
4-Methylphenol	µg/L	3	U	U	U	2	5	10	10	--	--	--	--
4-Nitroaniline	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
4-Nitrophenol	µg/L	3	U	U	U	2	25	50	50	--	--	--	--
4-Nitroquinoline-1-oxide	µg/L	2	U	U	U	1	U	U	U	--	--	--	--
5-Nitro-o-toluidine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
7,12-Dimethylbenz(a)anthracene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
a,a-Dimethylphenethylamine	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	3	U	U	U	2	8.5	10	12	--	--	--	--
Acenaphthylene	µg/L	3	U	U	U	1	5	10	10	--	--	--	--
Acetone	µg/L	4	95	10	300	2	5	10	10	3	110	30	240
Acetonitrile	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Acetophenone	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Acrolein	µg/L	2	U	U	U	2	U	U	U	3	U	U	U
Acrylonitrile	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
Aldrin	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
alpha-BHC	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
alpha-Chlordane	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Aniline	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Anthracene	µg/L	3	U	U	U	2	3.5	2	10	3	5	10	10
Aramite	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Aroclor-1016	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Aroclor-1221	µg/L	3	0.83	0.5	2.5	2	U	U	U	3	U	U	U
Aroclor-1232	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Aroclor-1242	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Aroclor-1248	µg/L	3	0.83	0.5	2.5	2	0.25	0.5	0.5	3	2.5	5	5
Aroclor-1254	µg/L	3	1.7	1	5	2	U	U	U	3	5	10	10
Aroclor-1260	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Benzene	µg/L	5	U	U	U	2	2.5	5	5	3	U	U	U
Benzidine	µg/L	2	25	50	50	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	3	U	U	U	1	5	10	10	3	5	10	10
Benzo(a)pyrene	µg/L	3	U	U	U	1	5	10	10	3	5	10	10

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Benzo(b)fluoranthene	µg/L	3	U	U	U	1	5	10	10	3	5	10	10
Benzo(g,h,i)perylene	µg/L	3	U	U	U	1	5	10	10	3	5	10	10
Benzo(k)fluoranthene	µg/L	3	U	U	U	1	5	10	10	3	U	U	U
Benzoic acid	µg/L	3	50	50	200	2	25	50	50	--	--	--	--
Benzyl alcohol	µg/L	3	U	U	U	2	U	U	U	--	--	--	--
beta-BHC	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
bis(2-Chloroethoxy)methane	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
bis(2-Chloroethyl)ether	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
bis(2-Chloroisopropyl) ether	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
bis(2-Ethylhexyl) phthalate	µg/L	3	10	10	40	1	7	7	7	3	5	10	10
Bromodichloromethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Bromoform	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Bromomethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Butyl benzyl phthalate	µg/L	3	U	U	U	1	U	U	U	3	U	U	U
Carbazole	µg/L	1	5	10	10	--	--	--	--	--	--	--	--
Carbon disulfide	µg/L	5	2.5	5	5	2	U	U	U	3	U	U	U
Carbon Tetrachloride	µg/L	5	2.5	5	5	2	U	U	U	3	U	U	U
Chlorobenzene	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Chlorobenzilate	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Chloroethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Chloroform	µg/L	5	430	1	1300	2	3	5	7	3	56	30	71
Chloromethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Chrysene	µg/L	3	U	U	U	1	5	10	10	3	5	10	10
cis-1,3-Dichloropropene	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
delta-BHC	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Di-n-butyl phthalate	µg/L	3	10	10	40	1	U	U	U	3	5	10	10
Di-n-octyl phthalate	µg/L	3	U	U	U	1	5	10	10	3	U	U	U
Diallate	µg/L	2	U	U	U	1	U	U	U	--	--	--	--
Dibenzo(a,h)anthracene	µg/L	3	U	U	U	1	5	10	10	3	U	U	U
Dibenzofuran	µg/L	3	U	U	U	2	5	5	10	--	--	--	--
Dibromochloromethane	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Dibromomethane	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
Dichlorodifluoromethane	µg/L	2	100	200	200	1	U	U	U	--	--	--	--
Dieldrin	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Diethyl phthalate	µg/L	3	U	U	U	1	5	10	10	--	--	--	--
Dimethoate	µg/L	2	U	U	U	2	U	U	U	--	--	--	--

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Dimethyl phthalate	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Dinoseb	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
Diphenylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Disulfoton	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
Endosulfan II	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Endosulfan sulfate	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Endosulfan-I	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Endrin	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Endrin ketone	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Ethyl cyanide	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Ethyl methacrylate	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
Ethyl methanesulfonate	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Ethylbenzene	µg/L	5	6.6	4	16	2	2.5	5	5	3	U	U	U
Famphur	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
Fluoranthene	µg/L	3	10	10	40	2	7	9	10	3	5	10	10
Fluorene	µg/L	3	U	U	U	2	5.5	6	10	--	--	--	--
gamma-BHC (Lindane)	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
gamma-Chlordane	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Heptachlor	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Heptachlor epoxide	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Heptachlorodibenzo-p-dioxin	ng/L	2	0.68	1.1	1.6	2	1.1	0.84	3.6	3	1.6	0.45	3.5
Heptachlorodibenzofuran	ng/L	2	0.6	0.7	1.7	2	0.91	0.92	1.8	3	1.1	0.92	2.4
Hexachlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Hexachlorobutadiene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Hexachlorocyclopentadiene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Hexachlorodibenzo-p-dioxin	ng/L	2	1.1	2	2.2	2	0.85	0.4	3	3	0.44	0.57	1.2
Hexachlorodibenzofuran	ng/L	2	0.51	0.62	1.4	2	0.65	0.88	1.7	3	0.54	0.65	1.7
Hexachloroethane	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Hexachlorophene	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
Hexachloropropene	µg/L	1	40	80	80	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	3	U	U	U	1	5	10	10	3	5	10	10
Iodomethane	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
Isobutyl alcohol	µg/L	3	U	U	U	2	U	U	U	3	36	22	48
Isodrin	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Isophorone	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Isosafrole	µg/L	3	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Kepone	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Methacrylonitrile	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Methapyrilene	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
Methoxychlor	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
Methyl methacrylate	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
Methyl methanesulfonate	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Methylene chloride	µg/L	5	11	5	26	2	11	5	20	3	1.5	2	5
N-Nitroso-di-n-propylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosodi-n-butylamine	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosodiethylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosodimethylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosodiphenylamine	µg/L	3	U	U	U	1	5	10	10	--	--	--	--
N-Nitrosomethylethylamine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosomorpholine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosopiperidine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
N-Nitrosopyrrolidine	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
Naphthalene	µg/L	3	U	U	U	1	5	10	10	--	--	--	--
Nitrobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
O,O,O-Triethylphosphorothioate	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
o-Toluidine	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Octachlorodibenzo-p-dioxin	ng/L	2	0.23	0.32	0.59	2	3.7	4.2	6.5	3	16	3.1	26
Octachlorodibenzofuran	ng/L	2	0.24	0.4	0.56	2	0.7	0.7	1.4	3	1	0.38	1.6
p-Dimethylaminoazobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
p-Phenylenediamine	µg/L	2	U	U	U	1	U	U	U	--	--	--	--
Parathion, ethyl	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
Parathion, methyl	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
Pentachlorobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Pentachlorodibenzo-p-dioxin	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
Pentachlorodibenzofuran	ng/L	2	0.3	0.39	0.79	2	0.46	0.72	1.1	3	U	U	U
Pentachloroethane	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Pentachloronitrobenzene	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Pentachlorophenol	µg/L	3	U	U	U	2	25	50	50	--	--	--	--
Phenacetin	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Phenanthrene	µg/L	3	10	10	40	1	5	10	10	3	5	10	10
Phenol	µg/L	3	10	10	40	2	5	10	10	--	--	--	--
Phorate	µg/L	2	U	U	U	2	U	U	U	--	--	--	--

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
Pronamide	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Pyrene	µg/L	3	10	10	40	2	6	7	10	3	5	10	10
Pyridine	µg/L	4	U	U	U	--	--	--	--	--	--	--	--
Safrole	µg/L	3	U	U	U	1	U	U	U	--	--	--	--
Styrene	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Sulfotepp	µg/L	3	U	U	U	2	U	U	U	1	U	U	U
Tetrachlorethene	µg/L	5	15	5	47	2	2.5	5	5	3	1.8	1	5
Tetrachlorodibenzo-p-dioxin	ng/L	2	U	U	U	2	U	U	U	3	U	U	U
Tetrachlorodibenzofuran	ng/L	2	0.37	0.39	1.1	2	U	U	U	3	0.2	0.27	0.57
Tetraethylpyrophosphate	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
Thionazin	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
Toluene	µg/L	5	6.5	1	16	2	U	U	U	3	2.5	5	5
Total xylenes	µg/L	5	18	4	33	2	2.5	5	5	3	U	U	U
Toxaphene	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
trans-1,3-Dichloropropene	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
trans-1,4-Dichloro-2-butene	µg/L	4	U	U	U	2	U	U	U	3	U	U	U
Tributyl phosphate	µg/L	2	13	10	40	--	--	--	--	--	--	--	--
Trichloroethene	µg/L	5	5.1	5	9	2	2.5	5	5	3	2.5	5	5
Trichlorofluoromethane	µg/L	4	U	U	U	2	U	U	U	3	5	10	10
Triethylphosphorothioate	µg/L	--	--	--	--	1	5	10	10	--	--	--	--
Vinyl Acetate	µg/L	5	U	U	U	2	U	U	U	3	U	U	U
Vinyl chloride	µg/L	5	U	U	U	2	81	1	160	3	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-Tetrachloroethane	µg/L	3	U	U	U	2	U	U	U
1,1,1-Trichloroethane	µg/L	2	63	5	120	2	420000	37	840000
1,1,2,2-Tetrachloroethane	µg/L	3	U	U	U	2	U	U	U
1,1,2-Trichloroethane	µg/L	3	U	U	U	2	U	U	U
1,1-Dichloroethane	µg/L	3	89	20	160	2	250000	640	500000
1,1-Dichloroethene	µg/L	3	7.2	5	10	2	U	U	U
1,2,3,4,6,7,8-HpCDD	ng/L	3	0.37	0.45	0.94	1	3.3	3.3	3.3
1,2,3,4,6,7,8-HpCDF	ng/L	3	0.58	0.66	2	1	0.13	0.26	0.26
1,2,3,4,7,8,9-Heptachlorodiben	ng/L	3	0.82	0.93	2.8	1	0.19	0.37	0.37
1,2,3,4,7,8-Hexachlorodibenzo-	ng/L	3	0.37	0.55	0.86	1	U	U	U
1,2,3,4,7,8-Hexachlorodibenzof	ng/L	3	0.56	0.98	1.2	1	U	U	U
1,2,3,6,7,8-Hexachlorodibenzo-	ng/L	3	0.3	0.44	0.68	1	U	U	U
1,2,3,6,7,8-Hexachlorodibenzof	ng/L	3	0.48	0.87	1	1	U	U	U
1,2,3,7,8,9-Hexachlorodibenzo-	ng/L	3	0.31	0.46	0.72	1	U	U	U
1,2,3,7,8,9-Hexachlorodibenzof	ng/L	3	0.62	1.1	1.3	1	U	U	U
1,2,3,7,8-Pentachlorodibenzo-p	ng/L	3	U	U	U	1	U	U	U
1,2,3,7,8-Pentachlorodibenzofu	ng/L	3	0.49	0.91	1	1	U	U	U
1,2,3-Trichloropropane	µg/L	3	U	U	U	2	U	U	U
1,2,4,5-Tetrachlorobenzene	µg/L	2	U	U	U	2	U	U	U
1,2,4-Trichlorobenzene	µg/L	2	U	U	U	2	U	U	U
1,2-Dibromo-3-chloropropane	µg/L	3	U	U	U	2	U	U	U
1,2-Dibromoethane	µg/L	3	U	U	U	2	U	U	U
1,2-Dichlorobenzene	µg/L	2	U	U	U	2	U	U	U
1,2-Dichloroethane	µg/L	3	2.5	5	5	2	U	U	U
1,2-Dichloroethylene	µg/L	3	68	5	180	2	U	U	U
1,2-Dichloropropane	µg/L	3	U	U	U	2	U	U	U
1,3,5-Trinitrobenzene	µg/L	--	--	--	--	2	13	10	40
1,3-Dichlorobenzene	µg/L	2	U	U	U	2	U	U	U
1,3-Dinitrobenzene	µg/L	2	U	U	U	2	U	U	U
1,4-Dichlorobenzene	µg/L	2	U	U	U	2	U	U	U
1,4-Dioxane	µg/L	1	U	U	U	1	1000	1000	1000
1,4-Naphthoquinone	µg/L	--	--	--	--	2	U	U	U
1-Naphthylamine	µg/L	--	--	--	--	2	U	U	U
2,3,4,6,7,8-Hexachlorodibenzof	ng/L	3	0.57	1	1.2	1	U	U	U
2,3,4,6-Tetrachlorophenol	µg/L	2	U	U	U	2	U	U	U
2,3,4,7,8-Pentachlorodibenzofu	ng/L	3	0.53	0.99	1.1	1	U	U	U

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
2,3,7,8-TCDD	ng/L	3	U	U	U	1	U	U	U
2,3,7,8-TCDF	ng/L	3	1.4	2.1	3.6	1	U	U	U
2,4,5-T	µg/L	3	U	U	U	2	U	U	U
2,4,5-TP (Silvex)	µg/L	3	U	U	U	2	U	U	U
2,4,5-Trichlorophenol	µg/L	2	U	U	U	2	U	U	U
2,4,6-Trichlorophenol	µg/L	2	U	U	U	2	U	U	U
2,4-D	µg/L	3	U	U	U	2	U	U	U
2,4-Dichlorophenol	µg/L	2	5	10	10	2	U	U	U
2,4-Dimethylphenol	µg/L	2	U	U	U	2	U	U	U
2,4-Dinitrophenol	µg/L	2	25	50	50	2	U	U	U
2,4-Dinitrotoluene	µg/L	2	U	U	U	2	U	U	U
2,6-Dichlorophenol	µg/L	2	U	U	U	2	U	U	U
2,6-Dinitrotoluene	µg/L	2	U	U	U	2	U	U	U
2-Acetylaminofluorene	µg/L	2	U	U	U	2	U	U	U
2-Butanone	µg/L	3	99	24	180	2	1800	4	3500
2-Chloro-1,3-butadiene	µg/L	3	U	U	U	2	U	U	U
2-Chloronaphthalene	µg/L	2	U	U	U	2	U	U	U
2-Chlorophenol	µg/L	2	U	U	U	2	U	U	U
2-Hexanone	µg/L	3	28	1	53	2	47	10	89
2-Methylnaphthalene	µg/L	2	5.5	6	10	2	18	16	40
2-Methylphenol	µg/L	2	U	U	U	2	U	U	U
2-Naphthylamine	µg/L	--	--	--	--	2	U	U	U
2-Nitroaniline	µg/L	2	U	U	U	2	U	U	U
2-Nitrophenol	µg/L	2	U	U	U	2	U	U	U
2-Picoline	µg/L	2	U	U	U	2	U	U	U
3,3'-Dichlorobenzidine	µg/L	2	U	U	U	2	U	U	U
3,3'-Dimethylbenzidine	µg/L	2	U	U	U	2	U	U	U
3-Chloropropene	µg/L	3	5	10	10	2	U	U	U
3-Methylcholanthrene	µg/L	2	15	30	30	2	U	U	U
3-Methylphenol	µg/L	--	--	--	--	2	U	U	U
3-Nitroaniline	µg/L	2	U	U	U	2	U	U	U
4,4-DDD	µg/L	3	U	U	U	2	U	U	U
4,4-DDE	µg/L	3	U	U	U	2	U	U	U
4,4-DDT	µg/L	3	U	U	U	2	U	U	U
4,6-Dinitro-2-methylphenol	µg/L	2	U	U	U	2	U	U	U
4-Aminobiphenyl	µg/L	2	U	U	U	2	U	U	U

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
4-Bromophenyl phenyl ether	µg/L	2	U	U	U	2	U	U	U
4-Chloro-3-methylphenol	µg/L	2	5	10	10	2	U	U	U
4-Chloroaniline	µg/L	2	U	U	U	2	U	U	U
4-Chlorophenylphenyl ether	µg/L	2	U	U	U	2	U	U	U
4-Methyl-2-pentanone	µg/L	3	32	16	46	2	67	6	130
4-Methylphenol	µg/L	2	U	U	U	2	U	U	U
4-Nitroaniline	µg/L	2	U	U	U	2	U	U	U
4-Nitrophenol	µg/L	2	U	U	U	2	U	U	U
4-Nitroquinoline-1-oxide	µg/L	--	--	--	--	--	--	--	--
5-Nitro-o-toluidine	µg/L	--	--	--	--	2	U	U	U
7,12-Dimethylbenz(a)anthracene	µg/L	2	10	20	20	2	U	U	U
a,a-Dimethylphenethylamine	µg/L	2	5	10	10	1	U	U	U
Acenaphthene	µg/L	2	8.5	10	12	2	13	10	40
Acenaphthylene	µg/L	2	U	U	U	2	U	U	U
Acetone	µg/L	3	210	22	540	2	1900	28	3800
Acetonitrile	µg/L	2	U	U	U	2	U	U	U
Acetophenone	µg/L	--	--	--	--	2	U	U	U
Acrolein	µg/L	3	U	U	U	2	U	U	U
Acrylonitrile	µg/L	--	--	--	--	--	--	--	--
Aldrin	µg/L	3	U	U	U	2	U	U	U
alpha-BHC	µg/L	3	U	U	U	2	U	U	U
alpha-Chlordane	µg/L	3	U	U	U	2	U	U	U
Aniline	µg/L	2	U	U	U	2	U	U	U
Anthracene	µg/L	2	11	10	17	2	13	10	40
Aramite	µg/L	2	5	10	10	2	U	U	U
Aroclor-1016	µg/L	3	U	U	U	2	U	U	U
Aroclor-1221	µg/L	3	U	U	U	2	U	U	U
Aroclor-1232	µg/L	3	U	U	U	2	U	U	U
Aroclor-1242	µg/L	3	U	U	U	2	U	U	U
Aroclor-1248	µg/L	3	10	5	50	2	U	U	U
Aroclor-1254	µg/L	3	20	10	100	2	5.3	1	20
Aroclor-1260	µg/L	3	U	U	U	2	U	U	U
Benzene	µg/L	3	2.7	3	5	2	U	U	U
Benzidine	µg/L	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	2	5	10	10	2	13	10	40
Benzo(a)pyrene	µg/L	2	5	10	10	2	13	10	40

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Benzo(b)fluoranthene	µg/L	2	5	10	10	2	13	10	40
Benzo(g,h,i)perylene	µg/L	2	5	10	10	2	13	10	40
Benzo(k)fluoranthene	µg/L	2	U	U	U	2	13	10	40
Benzoic acid	µg/L	2	25	50	50	2	U	U	U
Benzyl alcohol	µg/L	2	U	U	U	2	U	U	U
beta-BHC	µg/L	3	U	U	U	2	U	U	U
bis(2-Chloroethoxy)methane	µg/L	2	U	U	U	2	U	U	U
bis(2-Chloroethyl)ether	µg/L	2	U	U	U	2	U	U	U
bis(2-Chloroisopropyl) ether	µg/L	2	U	U	U	2	U	U	U
bis(2-Ethylhexyl) phthalate	µg/L	2	5	10	10	2	13	10	40
Bromodichloromethane	µg/L	3	U	U	U	2	U	U	U
Bromoform	µg/L	3	U	U	U	2	U	U	U
Bromomethane	µg/L	3	U	U	U	2	U	U	U
Butyl benzyl phthalate	µg/L	2	U	U	U	2	U	U	U
Carbazole	µg/L	2	12	10	18	1	5	10	10
Carbon disulfide	µg/L	3	2	1	5	2	2.5	5	5
Carbon Tetrachloride	µg/L	3	2.5	5	5	2	U	U	U
Chlorobenzene	µg/L	3	U	U	U	2	2.5	5	5
Chlorobenzilate	µg/L	3	U	U	U	2	U	U	U
Chloroethane	µg/L	3	3.3	2	6	2	U	U	U
Chloroform	µg/L	2	669	38	1300	2	U	U	U
Chloromethane	µg/L	3	U	U	U	2	U	U	U
Chrysene	µg/L	2	5	10	10	2	13	10	40
cis-1,3-Dichloropropene	µg/L	3	U	U	U	2	U	U	U
delta-BHC	µg/L	3	U	U	U	2	U	U	U
Di-n-butyl phthalate	µg/L	2	5	10	10	2	U	U	U
Di-n-octyl phthalate	µg/L	2	5	10	10	2	U	U	U
Diallate	µg/L	2	5	10	10	1	U	U	U
Dibenzo(a,h)anthracene	µg/L	2	U	U	U	2	U	U	U
Dibenzofuran	µg/L	2	5	10	10	2	13	10	40
Dibromochloromethane	µg/L	3	U	U	U	2	U	U	U
Dibromomethane	µg/L	3	U	U	U	2	U	U	U
Dichlorodifluoromethane	µg/L	--	--	--	--	--	--	--	--
Dieldrin	µg/L	3	U	U	U	2	U	U	U
Diethyl phthalate	µg/L	2	5	10	10	2	13	10	40
Dimethoate	µg/L	1	U	U	U	--	--	--	--

4783

577

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Dimethyl phthalate	µg/L	2	U	U	U	2	U	U	U
Dinoseb	µg/L	3	U	U	U	2	U	U	U
Diphenylamine	µg/L	--	--	--	--	2	U	U	U
Disulfoton	µg/L	3	U	U	U	--	--	--	--
Endosulfan II	µg/L	3	U	U	U	2	U	U	U
Endosulfan sulfate	µg/L	3	U	U	U	2	U	U	U
Endosulfan-I	µg/L	3	U	U	U	2	U	U	U
Endrin	µg/L	3	U	U	U	2	U	U	U
Endrin ketone	µg/L	3	U	U	U	2	U	U	U
Ethyl cyanide	µg/L	3	U	U	U	2	U	U	U
Ethyl methacrylate	µg/L	3	U	U	U	2	U	U	U
Ethyl methanesulfonate	µg/L	2	U	U	U	2	U	U	U
Ethylbenzene	µg/L	3	2	1	5	2	13	4	22
Famphur	µg/L	1	U	U	U	--	--	--	--
Fluoranthene	µg/L	2	3.5	2	10	2	13	10	40
Fluorene	µg/L	2	7	9	10	2	13	10	40
gamma-BHC (Lindane)	µg/L	3	U	U	U	2	U	U	U
gamma-Chlordane	µg/L	3	U	U	U	2	U	U	U
Heptachlor	µg/L	3	U	U	U	2	U	U	U
Heptachlor epoxide	µg/L	3	U	U	U	2	U	U	U
Heptachlorodibenzo-p-dioxin	ng/L	3	0.37	0.45	0.94	1	0.36	0.72	0.72
Heptachlorodibenzofuran	ng/L	3	0.69	0.77	2.4	1	0.16	0.31	0.31
Hexachlorobenzene	µg/L	2	U	U	U	2	U	U	U
Hexachlorobutadiene	µg/L	2	U	U	U	2	U	U	U
Hexachlorocyclopentadiene	µg/L	2	U	U	U	2	U	U	U
Hexachlorodibenzo-p-dioxin	ng/L	3	0.32	0.48	0.75	1	U	U	U
Hexachlorodibenzofuran	ng/L	3	0.57	0.99	1.2	1	U	U	U
Hexachloroethane	µg/L	2	U	U	U	2	U	U	U
Hexachlorophene	µg/L	2	25	50	50	1	U	U	U
Hexachloropropene	µg/L	--	--	--	--	1	U	U	U
Indeno(1,2,3-cd)pyrene	µg/L	2	5	10	10	2	13	10	40
Iodomethane	µg/L	3	U	U	U	2	U	U	U
Isobutyl alcohol	µg/L	3	59	19	200	2	1100	200	2100
Isodrin	µg/L	3	U	U	U	2	U	U	U
Isophorone	µg/L	2	U	U	U	2	U	U	U
Isosafrole	µg/L	2	U	U	U	2	U	U	U

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Kepone	µg/L	3	U	U	U	2	U	U	U
Methacrylonitrile	µg/L	3	U	U	U	2	U	U	U
Methapyrilene	µg/L	2	20	40	40	2	50	40	160
Methoxychlor	µg/L	3	U	U	U	2	U	U	U
Methyl methacrylate	µg/L	3	U	U	U	2	U	U	U
Methyl methanesulfonate	µg/L	--	--	--	--	2	U	U	U
Methylene chloride	µg/L	3	200	47	490	2	100	5	200
N-Nitroso-di-n-propylamine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosodi-n-butylamine	µg/L	2	U	U	U	1	U	U	U
N-Nitrosodiethylamine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosodimethylamine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosodiphenylamine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosomethylethylamine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosomorpholine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosopiperidine	µg/L	2	U	U	U	2	U	U	U
N-Nitrosopyrrolidine	µg/L	2	U	U	U	2	U	U	U
Naphthalene	µg/L	2	11	10	16	2	16	12	40
Nitrobenzene	µg/L	2	U	U	U	2	U	U	U
O,O,O-Triethylphosphorothioate	µg/L	1	U	U	U	2	U	U	U
o-Toluidine	µg/L	2	U	U	U	2	U	U	U
Octachlorodibenzo-p-dioxin	ng/L	3	0.53	0.9	1.2	1	0.9	1.8	1.8
Octachlorodibenzofuran	ng/L	3	0.37	0.58	0.9	1	0.55	1.1	1.1
p-Dimethylaminoazobenzene	µg/L	2	15	30	30	2	U	U	U
p-Phenylenediamine	µg/L	2	U	U	U	2	U	U	U
Parathion, ethyl	µg/L	1	U	U	U	--	--	--	--
Parathion, methyl	µg/L	3	U	U	U	--	--	--	--
Pentachlorobenzene	µg/L	2	U	U	U	2	U	U	U
Pentachlorodibenzo-p-dioxin	ng/L	3	U	U	U	1	U	U	U
Pentachlorodibenzofuran	ng/L	3	0.51	0.95	1.1	1	U	U	U
Pentachloroethane	µg/L	2	U	U	U	2	U	U	U
Pentachloronitrobenzene	µg/L	2	U	U	U	2	U	U	U
Pentachlorophenol	µg/L	2	U	U	U	2	U	U	U
Phenacetin	µg/L	2	U	U	U	2	U	U	U
Phenanthrene	µg/L	2	5	10	10	2	13	10	40
Phenol	µg/L	2	U	U	U	2	U	U	U
Phorate	µg/L	3	U	U	U	--	--	--	--

4783

TABLE 4-12
PIT LEACHATE STATISTICAL SUMMARY -- RI/FS ORGANIC DATA

Parameter	Units	Pit 4				Burn Pit			
		Count	Avg	Min	Max	Count	Avg	Min	Max
Pronamide	µg/L	2	U	U	U	2	U	U	U
Pyrene	µg/L	2	5	10	10	2	13	10	40
Pyridine	µg/L	2	5	10	10	1	20	40	40
Safrole	µg/L	2	U	U	U	2	U	U	U
Styrene	µg/L	3	2.5	5	5	2	U	U	U
Sulfotepp	µg/L	3	U	U	U	2	U	U	U
Tetrachlorethene	µg/L	3	61	4	140	2	U	U	U
Tetrachlorodibenzo-p-dioxin	ng/L	3	0.51	0.68	1.4	1	U	U	U
Tetrachlorodibenzofuran	ng/L	3	0.6	0.69	1.7	1	U	U	U
Tetraethylpyrophosphate	µg/L	3	U	U	U	--	--	--	--
Thionazin	µg/L	2	U	U	U	--	--	--	--
Toluene	µg/L	3	3.8	3	6	2	92	3	180
Total xylenes	µg/L	3	3	1	5	2	73	16	130
Toxaphene	µg/L	3	U	U	U	2	U	U	U
trans-1,3-Dichloropropene	µg/L	3	U	U	U	2	U	U	U
trans-1,4-Dichloro-2-butene	µg/L	3	U	U	U	2	U	U	U
Tributyl phosphate	µg/L	2	13	10	40	2	110	89	130
Trichloroethene	µg/L	3	47	3	99	2	U	U	U
Trichlorofluoromethane	µg/L	3	2.7	1	10	2	U	U	U
Triethylphosphorothioate	µg/L	--	--	--	--	--	--	--	--
Vinyl Acetate	µg/L	3	U	U	U	2	U	U	U
Vinyl chloride	µg/L	3	5.3	6	10	2	250	14	1000

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-13
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR RADIOLOGICAL DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NEPTUNIUM-237	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
PLUTONIUM-238	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
PLUTONIUM-239/240	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RADIUM-226	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RADIUM-228	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
STRONTIUM-90	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TECHNETIUM-99	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
THORIUM-228	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
THORIUM-230	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
THORIUM-232	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-234	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-238	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4788

TABLE 4-13
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR RADIOLOGICAL DATA

		Pit 4				Pit 5				Pit 6			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/L	1	U	U	U	2	71	51	90	5	U	U	U
NEPTUNIUM-237	pCi/L	1	U	U	U	2	U	U	U	5	U	U	U
PLUTONIUM-238	pCi/L	1	U	U	U	2	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	1	U	U	U	2	U	U	U	4	U	U	U
RADIUM-226	pCi/L	--	--	--	--	--	--	--	--	5	U	U	U
RADIUM-228	pCi/L	--	--	--	--	--	--	--	--	5	18	10	31
RUTHENIUM-106	pCi/L	1	U	U	U	2	U	U	U	5	U	U	U
STRONTIUM-90	pCi/L	1	U	U	U	2	38	34	41	5	U	U	U
TECHNETIUM-99	pCi/L	1	190	190	190	2	280	240	320	5	1600	530	3500
THORIUM-228	pCi/L	1	U	U	U	2	U	U	U	--	--	--	--
THORIUM-230	pCi/L	1	0.2	0.2	0.2	2	0.1	0.1	0.1	5	0.2	0.1	0.3
THORIUM-232	pCi/L	1	U	U	U	2	U	U	U	5	U	U	U
URANIUM-234	pCi/L	1	3400	3400	3400	2	420	410	420	5	63	22	77
URANIUM-235	pCi/L	1	220	220	220	2	19	18	19	5	6.7	1.5	9.3
URANIUM-238	pCi/L	1	11000	11000	11000	2	390	370	400	5	360	120	460

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

582

TABLE 4-13
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR RADIOLOGICAL DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
CESIUM-137	pCi/L	--	--	--	--	2	U	U	U
NEPTUNIUM-237	pCi/L	--	--	--	--	--	--	--	--
PLUTONIUM-238	pCi/L	--	--	--	--	2	U	U	U
PLUTONIUM-239/240	pCi/L	--	--	--	--	2	U	U	U
RADIUM-226	pCi/L	--	--	--	--	2	2.1	4.1	6.1
RADIUM-228	pCi/L	--	--	--	--	2	U	U	U
RUTHENIUM-106	pCi/L	--	--	--	--	2	U	U	U
STRONTIUM-90	pCi/L	--	--	--	--	2	U	U	U
TECHNETIUM-99	pCi/L	--	--	--	--	2	3000	2000	4000
THORIUM-228	pCi/L	--	--	--	--	--	--	--	--
THORIUM-230	pCi/L	--	--	--	--	2	0.3	0.2	0.4
THORIUM-232	pCi/L	--	--	--	--	2	U	U	U
URANIUM-234	pCi/L	--	--	--	--	2	1900	1800	1900
URANIUM-235	pCi/L	--	--	--	--	2	120	110	120
URANIUM-238	pCi/L	--	--	--	--	2	5800	5400	6200

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-14
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR INORGANIC DATA

		Pit 1				Pit 2				Pit 3			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTIMONY	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ARSENIC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BARIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BERYLLIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CALCIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
COBALT	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
COPPER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CYANIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
LEAD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MAGNESIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MANGANESE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MERCURY	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NICKEL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
POTASSIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SELENIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SODIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THALLIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ZINC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-14
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR INORGANIC DATA

		Pit 4				Pit 5				Pit 6			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	--	--	--	--	2	U	U	U	6	300	51	490
ANTIMONY	µg/L	--	--	--	--	2	4.2	3.9	4.5	6	1.5	1.4	1.7
ARSENIC	µg/L	--	--	--	--	2	2.1	2.1	2.1	6	U	U	U
BARIUM	µg/L	--	--	--	--	2	110	100	110	6	U	U	U
BERYLLIUM	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
CADMIUM	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
CALCIUM	µg/L	--	--	--	--	2	180000	180000	180000	6	90000	63000	110000
CHROMIUM	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
COBALT	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
COPPER	µg/L	--	--	--	--	2	21	20	21	6	U	U	U
CYANIDE	mg/L	--	--	--	--	--	--	--	--	5	10	10	10
CYANIDE	µg/L	--	--	--	--	2	77	67	87	1	10	10	10
IRON	µg/L	--	--	--	--	2	U	U	U	6	21	14	51
LEAD	µg/L	--	--	--	--	2	2.2	1.5	2.9	6	1.4	1.1	2.9
MAGNESIUM	µg/L	--	--	--	--	2	390000	390000	390000	6	1800	660	5500
MANGANESE	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
MERCURY	µg/L	--	--	--	--	2	U	U	U	6	0.2	0.2	0.2
NICKEL	µg/L	--	--	--	--	2	20	19	21	6	U	U	U
POTASSIUM	µg/L	--	--	--	--	2	70000	48000	92000	6	35000	23000	42000
SELENIUM	µg/L	--	--	--	--	2	1.9	1.7	2.1	6	U	U	U
SILVER	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
SODIUM	µg/L	--	--	--	--	2	1200000	1200000	1300000	6	97000	90000	110000
THALLIUM	µg/L	--	--	--	--	2	U	U	U	6	U	U	U
VANADIUM	µg/L	--	--	--	--	2	47	46	47	6	U	U	U
ZINC	µg/L	--	--	--	--	2	49	4.3	94	6	5.5	4.3	8

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

TABLE 4-14
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR INORGANIC DATA

Parameter	Units	Burn Pit				Clearwell			
		Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	--	--	--	--	2	U	U	U
ANTIMONY	µg/L	--	--	--	--	2	U	U	U
ARSENIC	µg/L	--	--	--	--	2	3.8	3.3	4.2
BARIUM	µg/L	--	--	--	--	2	U	U	U
BERYLLIUM	µg/L	--	--	--	--	2	U	U	U
CADMIUM	µg/L	--	--	--	--	2	U	U	U
CALCIUM	µg/L	--	--	--	--	2	99000	86000	110000
CHROMIUM	µg/L	--	--	--	--	2	U	U	U
COBALT	µg/L	--	--	--	--	2	U	U	U
COPPER	µg/L	--	--	--	--	2	17	14	19
CYANIDE	mg/L	--	--	--	--	--	--	--	--
CYANIDE	µg/L	--	--	--	--	2	49	10	87
IRON	µg/L	--	--	--	--	2	29	25	33
LEAD	µg/L	--	--	--	--	2	U	U	U
MAGNESIUM	µg/L	--	--	--	--	2	120000	95000	160000
MANGANESE	µg/L	--	--	--	--	2	12	4	20
MERCURY	µg/L	--	--	--	--	2	U	U	U
NICKEL	µg/L	--	--	--	--	2	U	U	U
POTASSIUM	µg/L	--	--	--	--	2	22000	15000	28000
SELENIUM	µg/L	--	--	--	--	2	2.4	1.7	3
SILVER	µg/L	--	--	--	--	2	13	11	14
SODIUM	µg/L	--	--	--	--	2	380000	260000	500000
THALLIUM	µg/L	--	--	--	--	2	U	U	U
VANADIUM	µg/L	--	--	--	--	2	270	23	510
ZINC	µg/L	--	--	--	--	2	27	7	47

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1-TRICHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROETHYL VINYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-HEXANONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDT	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROPHENOL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1016	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1221	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1232	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1242	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1248	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1254	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR 1260	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BROMOFORM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBON DISULFIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON TETRACHLORIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORDANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROFORM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN I	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
GAMMA-BHC(Lindane)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

4783

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 1				Pit 2				Pit 3			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
STYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL XYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL CHLORIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,1-DICHLOROETHANE	µg/L	1	6	6	6	2	U	U	U	5	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	4	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	6	U	U	U
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-HEXANONE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
3,3-DICHLOROBENZIDINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
3-NITROANILINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4,4-DDD	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4,4-DDE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4,4-DDT	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-CHLOROANILINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROPHENOL PHENYL ETHER	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ACETONE	µg/L	1	17	17	17	2	U	U	U	5	U	U	U
ALDRIN	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ANTHRACENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1016	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1221	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1232	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1242	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1248	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1254	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
AROCLOR 1260	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BENZENE	µg/L	1	U	U	U	2	8	5	11	5	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	--	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BETA-BHC	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	4	4	4	2	U	U	U	5	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BROMOFORM	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
CARBON DISULFIDE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON TETRACHLORIDE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
CHLORDANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
CHLOROFORM	µg/L	1	U	U	U	2	U	U	U	5	2.8	2	5
CHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
CHRYSENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DELTA-BHC	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	1	U	U	U	2	U	U	U	4	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DIELDRIN	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DIETHYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
DIMETHYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ENDOSULFAN I	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ENDRIN	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ENDRIN KETONE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ETHYLBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
FLUORANTHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
FLUORENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
GAMMA-BHC(Lindane)	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
HEXACHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
HEXACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
ISOPHORONE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
METHOXYCHLOR	µg/L	2	U	U	U	2	U	U	U	5	U	U	U
METHYLENE CHLORIDE	µg/L	1	U	U	U	2	1.5	1	2	5	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U

4783

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Pit 4				Pit 5				Pit 6			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
NITROBENZENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
PENTACHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
PHENANTHRENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
PHENOL	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
PYRENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
STYRENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
TETRACHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	5	1.8	1	2
TOLUENE	µg/L	1	U	U	U	2	3	1	5	5	3	1	6
TOTAL XYLENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
TOXAPHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
TRICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U
VINYL CHLORIDE	µg/L	1	U	U	U	2	U	U	U	5	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

584

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1-TRICHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
1,1-DICHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
1,1-DICHLOROETHENE	µg/L	--	--	--	--	2	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	2	U	U	U
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	2	U	U	U
1,2-DICHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
1,2-DICHLOROPROPANE	µg/L	--	--	--	--	2	U	U	U
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	2	U	U	U
1,3-DICHLOROPROPENE	µg/L	--	--	--	--	2	U	U	U
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	2	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	2	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	2	U	U	U
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	2	U	U	U
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	2	U	U	U
2,4-DINITROPHENOL	µg/L	--	--	--	--	2	U	U	U
2,4-DINITROTOLUENE	µg/L	--	--	--	--	2	U	U	U
2,6-DINITROTOLUENE	µg/L	--	--	--	--	2	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	--	--	--	--	2	U	U	U
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	2	U	U	U
2-CHLOROPHENOL	µg/L	--	--	--	--	2	U	U	U
2-HEXANONE	µg/L	--	--	--	--	2	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	2	U	U	U
2-METHYLPHENOL	µg/L	--	--	--	--	2	U	U	U
2-NITROANILINE	µg/L	--	--	--	--	2	U	U	U
2-NITROPHENOL	µg/L	--	--	--	--	2	U	U	U
3,3-DICHLOROBENZIDINE	µg/L	--	--	--	--	2	U	U	U
3-NITROANILINE	µg/L	--	--	--	--	2	U	U	U
4,4-DDD	µg/L	--	--	--	--	2	U	U	U
4,4-DDE	µg/L	--	--	--	--	2	U	U	U
4,4-DDT	µg/L	--	--	--	--	2	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	2	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	2	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	2	U	U	U
4-CHLOROANILINE	µg/L	--	--	--	--	2	U	U	U

4788

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROPHENOL PHENYL ETHER	µg/L	--	--	--	--	2	U	U	U
4-METHYL-2-PENTANONE	µg/L	--	--	--	--	2	U	U	U
4-METHYLPHENOL	µg/L	--	--	--	--	2	U	U	U
4-NITROANILINE	µg/L	--	--	--	--	2	U	U	U
4-NITROPHENOL	µg/L	--	--	--	--	2	U	U	U
ACENAPHTHENE	µg/L	--	--	--	--	2	U	U	U
ACENAPHTHYLENE	µg/L	--	--	--	--	2	U	U	U
ACETONE	µg/L	--	--	--	--	2	310	100	520
ALDRIN	µg/L	--	--	--	--	2	U	U	U
ALPHA-BHC	µg/L	--	--	--	--	2	U	U	U
ANTHRACENE	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1016	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1221	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1232	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1242	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1248	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1254	µg/L	--	--	--	--	2	U	U	U
AROCLOR 1260	µg/L	--	--	--	--	2	U	U	U
BENZENE	µg/L	--	--	--	--	2	U	U	U
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	2	U	U	U
BENZO(A)PYRENE	µg/L	--	--	--	--	2	U	U	U
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	2	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	2	U	U	U
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	2	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	2	U	U	U
BENZYL ALCOHOL	µg/L	--	--	--	--	2	U	U	U
BETA-BHC	µg/L	--	--	--	--	2	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	2	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	2	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	--	--	--	--	2	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	--	--	--	--	2	7	4	10
BROMODICHLOROMETHANE	µg/L	--	--	--	--	2	U	U	U
BROMOFORM	µg/L	--	--	--	--	2	U	U	U
BROMOMETHANE	µg/L	--	--	--	--	2	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	2	U	U	U
CARBON DISULFIDE	µg/L	--	--	--	--	2	U	U	U
CARBON TETRACHLORIDE	µg/L	--	--	--	--	2	U	U	U

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

Parameter	Units	Burn Pit				Clear Well			
		Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORDANE	µg/L	--	--	--	--	2	U	U	U
CHLOROBENZENE	µg/L	--	--	--	--	2	U	U	U
CHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
CHLOROFORM	µg/L	--	--	--	--	1	U	U	U
CHLOROMETHANE	µg/L	--	--	--	--	2	U	U	U
CHRYSENE	µg/L	--	--	--	--	2	U	U	U
DELTA-BHC	µg/L	--	--	--	--	2	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	--	--	--	--	2	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	--	--	--	--	2	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	2	U	U	U
DIBENZOFURAN	µg/L	--	--	--	--	2	U	U	U
DIBROMOCHLOROMETHANE	µg/L	--	--	--	--	2	U	U	U
DIELDRIN	µg/L	--	--	--	--	2	U	U	U
DIETHYL PHTHALATE	µg/L	--	--	--	--	2	U	U	U
DIMETHYL PHTHALATE	µg/L	--	--	--	--	2	U	U	U
ENDOSULFAN I	µg/L	--	--	--	--	2	U	U	U
ENDOSULFAN II	µg/L	--	--	--	--	2	U	U	U
ENDOSULFAN SULFATE	µg/L	--	--	--	--	2	U	U	U
ENDRIN	µg/L	--	--	--	--	2	U	U	U
ENDRIN KETONE	µg/L	--	--	--	--	2	U	U	U
ETHYLBENZENE	µg/L	--	--	--	--	2	U	U	U
FLUORANTHENE	µg/L	--	--	--	--	2	U	U	U
FLUORENE	µg/L	--	--	--	--	2	U	U	U
GAMMA-BHC(Lindane)	µg/L	--	--	--	--	2	U	U	U
HEPTACHLOR	µg/L	--	--	--	--	2	U	U	U
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	2	U	U	U
HEXACHLOROBENZENE	µg/L	--	--	--	--	2	U	U	U
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	2	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	2	U	U	U
HEXACHLOROETHANE	µg/L	--	--	--	--	2	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	2	U	U	U
ISOPHORONE	µg/L	--	--	--	--	2	U	U	U
METHOXYCHLOR	µg/L	--	--	--	--	2	U	U	U
METHYLENE CHLORIDE	µg/L	--	--	--	--	2	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	2	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	2	U	U	U
NAPHTHALENE	µg/L	--	--	--	--	2	U	U	U

4783

4783

TABLE 4-15
PIT SURFACE WATER CIS STATISTICAL SUMMARY FOR ORGANIC DATA

		Burn Pit				Clear Well			
Parameter	Units	Count	Avg	Min	Max	Count	Avg	Min	Max
NITROBENZENE	µg/L	--	--	--	--	2	U	U	U
PENTACHLOROPHENOL	µg/L	--	--	--	--	2	U	U	U
PHENANTHRENE	µg/L	--	--	--	--	2	U	U	U
PHENOL	µg/L	--	--	--	--	2	U	U	U
PYRENE	µg/L	--	--	--	--	2	U	U	U
STYRENE	µg/L	--	--	--	--	2	U	U	U
TETRACHLOROETHENE	µg/L	--	--	--	--	2	U	U	U
TOLUENE	µg/L	--	--	--	--	2	U	U	U
TOTAL XYLENE	µg/L	--	--	--	--	2	U	U	U
TOXAPHENE	µg/L	--	--	--	--	2	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	2	U	U	U
TRICHLOROETHENE	µg/L	--	--	--	--	2	U	U	U
VINYL ACETATE	µg/L	--	--	--	--	2	U	U	U
VINYL CHLORIDE	µg/L	--	--	--	--	2	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

4783

TABLE 4-16
SURFACE SOIL CIS RADIOLOGICAL DATA

Sample ID		SS-46-037	SS-46-045	SS-46-059	SS-46-112	SS-46-136	SS-46-407
N Coordinate		481811.14	481758.43	481565.34	481183.28	481180.54	482006.80
E Coordinate		1379252.93	1379351.52	1379096.15	1378435.44	1378535.41	1379414.34
Parameters	Unit						
Cs-137	pCi/g	0.4	U	0.4	1.6	U	U
Np-237	pCi/g	U[a]	U	U	U	U	U
Pu-238	pCi/g	U	U	U	U	0.6	U
Pu-239/240	pCi/g	U	U	U	U	0.3	U
Ru-106	pCi/g	U	U	U	U	U	U
Sr-90	pCi/g	U	U	U	U	U	U
Tc-99	pCi/g	U	U	U	2.6	6.5	14
Th-228	pCi/g	0.8	0.7	2.4	3.1	7.4	0.2
Th-230	pCi/g	U	1.6	11	74	61	1.1
Th-232	pCi/g	0.8	0.6	1.4	3	5.5	0.3
U-234	pCi/g	28	4.6	55	88	67	130
U-235	pCi/g	2.1	0.4	5.7	6.5	3.9	16
U-238	pCi/g	157	23	280	210	155	710

See footnotes at end of table

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4783

TABLE 4-16
(Continued)

Sample ID		SS-46-427	SS-46-428	SS-46-430	SS-46-432	SS-46-434	SS-46-435
N Coordinate		481724.87	481632.95	481775.21	481841.09	481800.54	481761.85
E Coordinate		1379188.54	1379148.01	1379176.92	1379291.76	1379183.61	1379226.57
Parameters	Unit						
Cs-137	pCi/g	U	2.5	1.5	U	U	0.8
Np-237	pCi/g	U	U	U	U	U	U
Pu-238	pCi/g	0.1	U	U	U	U	0.2
Pu-239/240	pCi/g	0.4	U	U	U	U	0.2
Ru-106	pCi/g	U	U	U	U	U	U
Sr-90	pCi/g	U	U	U	U	U	U
Tc-99	pCi/g	6	U	U	U	U	5.5
Th-228	pCi/g	2.8	2.5	1.3	0.1	0.7	4.8
Th-230	pCi/g	13	24	5.4	0.3	146	18
Th-232	pCi/g	1.6	1.7	1	0.1	0.8	2.3
U-234	pCi/g	127	33	54	57	14	109
U-235	pCi/g	11	2.9	4.2	51	0.6	10
U-238	pCi/g	738	154	287	342	15	639

See footnotes at end of table

FER/OU1RI/DC.1229.416/09-22-93/2:46pm

TABLE 4-16
(Continued)

Sample ID		SS-46-444	SS-46-446	SS-46-452	SS-46-456	SS-46-457	SS-46-474
N Coordinate		482008.66	482016.21	481461.26	481456.13	481844.86	481692.20
E Coordinate		1379127.29	1379070.47	1378805.19	1378737.02	1379409.91	1379212.66
Parameters	Unit						
Cs-137	pCi/g	U	U	U	1.8	1.2	U
Np-237	pCi/g	U	U	U	U	U	U
Pu-238	pCi/g	U	U	U	U	U	U
Pu-239/240	pCi/g	U	U	U	U	U	U
Ru-106	pCi/g	U	U	U	U	U	U
Sr-90	pCi/g	U	U	U	U	U	U
Tc-99	pCi/g	U	U	U	U	U	33
Th-228	pCi/g	U	1.4	1.4	U	0.4	0.2
Th-230	pCi/g	0.1	13	25	0.9	0.5	1.4
Th-232	pCi/g	U	1.7	2.1	U	U	0.2
U-234	pCi/g	47	21	22	11	20	43
U-235	pCi/g	5.2	1.6	0.7	0.5	1.8	3.4
U-238	pCi/g	238	95	25	27	113	293

See footnotes at end of table

FER/OU1RI/DC.1229.416/09-22-93/2:46pm

4783

TABLE 4-16
(Continued)

Sample ID		SS-46-478	SS-46-488	SS-46-495	SS-46-500	SS-46-504	SS-46-623
N Coordinate		481355.63	481377.40	481373.98	481306.87	481657.77	482031.59
E Coordinate		1378717.27	1378652.84	1378777.79	1378707.93	1379154.70	1378983.86
Parameters	Unit						
Cs-137	pCi/g	0.7	1.4	U	U	U	6
Np-237	pCi/g	U	U	U	U	U	0.5
Pu-238	pCi/g	U	U	U	U	U	0.7
Pu-239/240	pCi/g	U	U	U	U	U	0.6
Ru-106	pCi/g	U	U	U	U	U	U
Sr-90	pCi/g	U	U	U	U	U	1.5
Tc-99	pCi/g	5.6	U	7fi	U	7.9	58
Th-228	pCi/g	U	5.4	7.8	0.3	U	48
Th-230	pCi/g	0.1	32	32	4	0.1	972
Th-232	pCi/g	U	3	2.4	0.2	U	31
U-234	pCi/g	73	18	123	12	241	155
U-235	pCi/g	5.8	1	10	0.6	25	11
U-238	pCi/g	406	60	753	28	1500	157

[a]Analyte undetected

602

4783

4783

TABLE 4-17

SURFACE SOIL RI/FS RADIOLOGICAL DATA

Sample ID		007800	007879	033063	033043	033156	005125	005126	005420	005629	005632	005635	005638	005674
Boring No.		1025	1083	1645	1646	2643								
Parameter	Unit[c]													
Cs-137	pCi/g	U[a]	U	*[b]	U	U	U	U	U	U	U	U	U	U
Np-237	pCi/g	U	U	*	*	U	U	U	U	U	U	U	U	U
Pu-238	pCi/g	U	U	*	*	U	U	U	U	U	U	U	U	U
Pu-239/240	pCi/g	U	U	*	*	U	U	U	U	U	U	U	U	U
Ra-226	pCi/g	2.1	U	1.33	2.24	0.89	U	U	0.8	0.7	0.8	0.9	1	1.2
Ra-228	pCi/g	4.7	U	0.73	2.81	0.71	U	U	0.5	0.9	1	1.1	1.3	1.8
Ru-106	pCi/g	U	U	U	U	U	U	U	U	U	U	U	U	U
Sr-90	pCi/g	U	U	*	*	U	0.6	0.5	U	U	U	U	0.9	U
Tc-99	pCi/g	U	*	0.9	0.9	U	U	U	U	U	U	0.9	U	U
Th-228	pCi/g	4.1	0.7	*	*	1.93	0.9	0.9	0.8	1	0.9	1.7	1.4	2.2
Th-230	pCi/g	1.7	1.6	*	*	1.89	2.1	2	1.5	2.7	1.8	6.1	4.2	2.9
Th-232	pCi/g	1.6	0.6	*	*	0.64	0.7	0.8	0.6	0.9	0.9	1.1	1.4	1.3
Th-Total	ug/g	*	*	*	*	5.8	*	*	*	*	*	*	*	*
U-234	pCi/g	2.3	6.2	15.7	28.5	24.6	2.9	2.6	1	5.3	2.9	3.9	2.4	3.7
U-235/236	pCi/g	U	0.9	1.71	3.91	1.97	U	U	U	0.8	U	U	U	U
U-238	pCi/g	8.3	32	73.4	103.7	76.2	5.2	4.2	1.5	9.7	3.9	16.1	8	12.5
U-Total	µg/g	*	*	238.7	413.5	237.8	*	*	3	29	21	62	30	41

[a]Analyte undetected
[b]Analyte not analyzed
[c]µg = micrograms
pCi/g = picoCuries/gram

TABLE 4-18

SURFACE SOIL WPA INORGANIC DATA

Sample ID		WPA2	WPA3	WPA4	WPA5	WPA6	WPA7	WPA8	WPA9
Lab ID		61009	61016	61023	61030	61037	61044	61050	61058
Parameters	Unit								
Aluminum	mg/kg	2660	4320	7470	9410	2580	5300	7100	5800
Antimony	mg/kg	22.6	30.8	27.8	21.3	22.7	29.5	19.6	28
Arsenic	mg/kg	4.1	4.7	6.4	4.2	4.2	4.5	3.9	3.9
Barium	mg/kg	31.4	42.6	52.5	64.7	27.2	49.9	52.9	51.9
Beryllium	mg/kg	0.62	0.67	0.75	0.69	0.58	0.76	0.63	0.72
Cadmium	mg/kg	5	7.7	5.7	3.4	4.6	5.9	3.3	5.7
Iron	mg/kg	6670	13200	17800	18900	7180	13100	14900	14000
Magnesium	mg/kg	21200	38900	21900	8650	19900	25800	12000	24800
Mercury	mg/kg	U[a]	U	U	U	U	U	U	U
Manganese	mg/kg	423	317	438	655	426	638	512	556
Zinc	mg/kg	21.9	35.3	42.5	46.7	28.9	32.2	38.6	40.9
Vanadium	mg/kg	11.2	16.4	22.2	23.8	10.9	15.4	18.9	18.9
Thallium	mg/kg	U	U	0.68	U	U	U	U	U
Sodium	mg/kg	137	134	109	92.5	135	165	83.6	161
Silver	mg/kg	7.8	9.4	10.3	7.2	7.6	6.7	7.3	10.3
Selenium	mg/kg	U	U	U	U	U	U	U	U
Potassium	mg/kg	434	880	1210	1060	448	849	1120	951
Nickel	mg/kg	24.8	28.4	27.8	27.9	19.7	26.8	20.3	31.9
Molybdenum	mg/kg	3.7	5.7	4.6	3	3.9	4.1	U	4.4
Lead	mg/kg	34.3	7.9	10.5	12.1	8.4	13.5	12.1	7.9
Calcium	mg/kg	137000	124000	99100	26400	143000	155000	35000	101000
Chromium	mg/kg	7.8	11.3	16.3	17	6.1	7.4	14.4	14.4
Cobalt	mg/kg	6.6	9.6	10.9	11.1	7	9	8.2	10.6
Copper	mg/kg	12.1	15.7	18.3	14.6	11.4	18.5	14.5	14.8
Cyanide	mg/kg	U	U	U	U	U	U	U	U

TABLE 4-18
(Continued)

Sample ID		WPA10	WPA11	WPA12	WPA13	WPA14	WPA16	WPA17	WPA38	WPA43
Lab ID		61065	61072	61079	61086	61093	61107	61114	61260	61295
Parameters	Unit									
Aluminum	mg/kg	2880	5330	4170	5240	11700	13500	5340	5410	8820
Antimony	mg/kg	25.1	20.3	22.6	32.5	25.5	32.8	28.3	26.4	25.2
Arsenic	mg/kg	2.8	3.5	3.8	4.3	5.3	11.2	5.4	4.6	5.8
Barium	mg/kg	22.5	48.2	34	37.5	92.3	123	47.9	56.3	73.8
Beryllium	mg/kg	0.63	0.62	0.65	0.73	0.79	0.97	0.64	1	0.8
Cadmium	mg/kg	5.5	4	5.3	7.5	3.2	4.7	5.6	6.6	4.3
Iron	mg/kg	8200	15700	9610	12800	23800	24500	13500	7160	17800
Magnesium	mg/kg	25500	12500	24300	39000	6370	13700	24200	32900	14900
Mercury	mg/kg	U	U	U	0.11	U	U	U	U	U
Manganese	mg/kg	445	707	391	329	759	841	391	694	519
Zinc	mg/kg	23.6	27.7	59.2	79.9	47.8	64.6	37.9	28	51.3
Vanadium	mg/kg	11.8	18	13.9	17.5	26.9	33	18.1	13.5	22.9
Thallium	mg/kg	U	U	U	U	U	U	U	U	U
Sodium	mg/kg	140	U	U	122	54.6	108	111	185	91.7
Silver	mg/kg	6.7	9.4	7.6	8.7	5.8	8.7	9.2	9.3	9.4
Selenium	mg/kg	U	U	U	0.44	U	U	U	0.62	U
Potassium	mg/kg	586	686	692	813	797	1300	674	763	1120
Nickel	mg/kg	19.7	20.8	22.4	26.7	23.1	38.5	25.1	50.2	23.9
Molybdenum	mg/kg	3.9	3.3	4.1	4.7	3.5	4.8	4.6	4.4	3.6
Lead	mg/kg	6.8	7.8	12	7.9	12.6	16.5	8	20.4	21.6
Calcium	mg/kg	152000	73900	130000	123000	21000	41600	85300	104000	59600
Chromium	mg/kg	5.9	13.3	8.8	11.9	18.8	24.5	14.9	12.4	17.9
Cobalt	mg/kg	7.3	8.5	7.4	9	17	15.7	9.4	6.5	9.9
Copper	mg/kg	13.3	13.8	15.4	19.7	17.8	25.9	17.4	16.7	20.1
Cyanide	mg/kg	U	U	0.37	0.6	U	U	U	0.71	0.5

[a]Undetected

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TABLE 4-19

SURFACE SOIL WPA ORGANIC DATA

Sample ID Lab ID		WPA2 61009	WPA4 61023	WPA7 61044	WPA38 61260	WPA43 61295
Parameters	Unit[b]					
4,4-DDD	µg/kg	U[a]	U	U	U	U
4,4-DDE	µg/kg	18	U	U	U	U
4,4-DDT	µg/kg	U	U	U	U	U
Aldrin	µg/kg	U	U	U	U	U
Aroclor-1016	µg/kg	U	U	U	U	U
Aroclor-1221	µg/kg	U	U	U	U	U
Aroclor-1232	µg/kg	U	U	U	U	U
Aroclor-1242	µg/kg	U	U	U	U	U
Aroclor-1248	µg/kg	U	U	U	U	U
Aroclor-1254	µg/kg	U	U	64	1400	53
Aroclor-1260	µg/kg	U	200	U	U	U
Dieldrin	µg/kg	18	U	U	U	U
Endosulfan II	µg/kg	18	U	U	U	U
Endosulfan sulfate	µg/kg	U	U	U	U	U
Endosulfan-I	µg/kg	U	U	U	U	U
Endrin	µg/kg	U	U	U	U	U
Endrin ketone	µg/kg	U	U	U	U	U
Heptachlor	µg/kg	U	U	U	U	U
Heptachlor epoxide	µg/kg	U	U	U	U	U
Methoxychlor	µg/kg	U	U	U	U	U
Toxaphene	µg/kg	U	U	U	U	U
alpha-BHC	µg/kg	U	U	U	U	U
alpha-Chlordane	µg/kg	U	U	U	U	U
beta-BHC	µg/kg	U	U	U	U	U
delta-BHC	µg/kg	U	U	U	U	U
gamma-BHC (Lindane)	µg/kg	U	U	U	U	U
gamma-Chlordane	µg/kg	U	U	U	U	U

[a]Undetected
[b]µg = micrograms

TABLE 4-20

RI/FS SUBSURFACE SOIL
RESULTS ABOVE RADIOLOGICAL BACKGROUND CONCENTRATION
(pCi/g)

Depth (feet)	Zone	Boring No.	Sample No.	Ra-226	Ra-228	Sr-90	Tc-99	Th-228	Th-230	Th-232	U-234	U-235/236	U-238
3.0	1	1078	007676	-[a]	-	-	-	2.3	3	1.8	97.2	6.1	320.2
3.0	1	1079	007370	-	-	-	-	-	2.3	-	4.4	-	8.9
3.0	1	1644	033092	32.6	12.3	0.784	1.07	4.11	44.6	4.21	4712	278	4682
3.0	1	1944	033025	-	-	0.715	-	-	-	-	158	7.66	178
4.5	1	1028	007819	1.4	1.8	-	-	1.7	2.8	1.5	13.6	2.9	89.4
4.5	1	1643	033221	2.12	1.97	-	-	-	6.46	-	90.1	9.14	128.7
6.0	1	1082	007660	-	-	0.9	-	-	-	-	4.4	0.8	22.5
6.0	1	1943	033009	-	-	1.13	-	1.76	2.59	-	14.9	-	36.7
13.5	1	1073	008487	19.7	18.6	-	6.1	22.9	710	33.1	112	4.7	125
15.0	1	1074	008472	-	-	-	-	-	-	-	-	-	-
15.0	1	2649	033203	-	-	-	-	-	-	-	2.52	-	6.77
16.5	1	1031	008843	-	-	-	1.9	-	4.7	-	6.9	0.8	28
16.5	1	2027	007851	-	-	-	-	-	-	-	-	-	-
18.0	1	1076	008159	1210	160	-	-	-	2.4	-	-	-	-
19.5	1	1080	008792	-	-	-	0.9	-	-	-	-	-	-
19.5	1	3004	007922	-	-	-	-	-	-	-	-	-	-
22.5	1	3084	007526	-	-	-	-	-	-	-	-	-	-
22.5	1	1973	008142	1180	165	8.9	-	581	24.1	761	429	144	1404
24.0	1	1075	008573	-	-	-	-	-	-	-	-	-	-
33.0	1	1081	007655	-	-	-	-	-	-	-	-	-	-
34.5	1	2648	033140	-	-	-	-	-	-	-	1.13	-	-
36.0	1	2643	033179	-	-	-	-	-	-	-	2.21	-	2.12
37.5	1	2648	033142	-	-	-	-	-	-	-	1.64	-	-
37.5	1	3011	007589	-	-	-	-	-	-	-	-	-	-
39.0	2	2028	032684	-	-	0.979	-	-	-	-	-	-	-

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TABLE 4-20
(Continued)

Depth (feet)	Zone	Boring No.	Sample No.	Ra-226	Ra-228	Sr-90	Tc-99	Th-228	Th-230	Th-232	U-234	U-235/236	U-238
27.0	1	2649	033211	-	-	-	-	-	-	-	-	-	-
35.0	1	3004	007932	9.5	-	6.9	-	-	-	-	4.1	-	3.8
61.5	2	3084	007546	-	-	-	-	-	3.1	-	-	-	-
66.5	2	2027	007874	-	-	-	-	-	-	-	-	-	-
66.5	2	2028	032700	-	-	1.03	-	-	-	-	1.24	-	-
66.5	2	3011	007595	-	-	-	-	-	-	-	-	-	-
76.5	2	2027	007876	-	-	-	-	-	-	-	-	-	-
116.5	3	3004	008179	-	-	-	-	-	-	-	-	-	-
121.5	3	3084	007558	-	-	-	-	-	-	-	-	-	-
181.5	4	4011	032899	-	-	-	-	-	-	-	-	-	-

[a]Concentrations below background.

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 1022				MONITORING WELL 1025				MONITORING WELL 1027			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NEPTUNIUM-237	pCi/L	3	U	U	U	4	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
RADIUM-226	pCi/L	2	U	U	U	3	U	U	U	4	0.75	0.5	1.5
RADIUM-228	pCi/L	2	U	U	U	4	1.8	1.5	5	3	U	U	U
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
STRONTIUM-90	pCi/L	4	U	U	U	3	U	U	U	4	U	U	U
TECHNETIUM-99	pCi/L	4	15	15	30.4	6	33	15	105	6	U	U	U
THORIUM-228	pCi/L	4	2	0.5	3.1	5	0.68	0.5	1.4	6	0.62	0.5	1.2
THORIUM-230	pCi/L	4	3.1	0.5	6.6	5	0.62	0.5	1.1	6	U	U	U
THORIUM-232	pCi/L	4	7.1	0.5	23.1	4	U	U	U	4	U	U	U
THORIUM-TOTAL	µg/L	3	15	2	23	3	3.5	1.5	7	3	U	U	U
URANIUM-234	pCi/L	4	630	560	661	6	2.9	1.7	4.9	6	U	U	U
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
URANIUM-235/236	pCi/L	4	40	30	48.6	6	U	U	U	5	U	U	U
URANIUM-238	pCi/L	4	1300	1200	1460	6	3	1.7	5.4	6	U	U	U
URANIUM-TOTAL	µg/L	4	3400	2700	3800	5	8.9	5.6	11	6	0.75	0.5	2

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1028				MONITORING WELL 1031				MONITORING WELL 1073			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NEPTUNIUM-237	pCi/L	1	0.7	0.7	0.7	3	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/L	1	U	U	U	3	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	1	U	U	U	3	U	U	U	4	U	U	U
RADIUM-226	pCi/L	1	U	U	U	3	2.9	2.8	3	4	2.4	0.5	4.2
RADIUM-228	pCi/L	1	U	U	U	3	U	U	U	3	2.5	1.5	4.6
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
STRONTIUM-90	pCi/L	1	U	U	U	2	U	U	U	4	U	U	U
TECHNETIUM-99	pCi/L	3	31	15	63	5	U	U	U	4	1400	15	2805
THORIUM-228	pCi/L	3	0.43	0.3	1	5	U	U	U	3	0.8	0.5	1.4
THORIUM-230	pCi/L	3	0.73	0.5	1.2	5	U	U	U	3	8.1	0.5	23.3
THORIUM-232	pCi/L	1	0.7	0.7	0.7	3	U	U	U	3	1.5	0.5	2.7
THORIUM-TOTAL	µg/L	--	--	--	--	3	3.2	2	9	3	14	4.5	25
URANIUM-234	pCi/L	3	9	5.1	13.3	5	4.6	1.1	13.1	4	860	599	968
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-235/236	pCi/L	3	0.67	0.5	1	5	U	U	U	4	31	9.9	43.4
URANIUM-238	pCi/L	3	20	1.6	34.3	5	13	1.4	37.6	4	1100	730	1290
URANIUM-TOTAL	µg/L	3	44	0.5	70	5	36	3	106	3	3600	3200	4380

4783

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 1074				MONITORING WELL 1075				MONITORING WELL 1076			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NEPTUNIUM-237	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	4	U	U	U	2	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	4	U	U	U	2	U	U	U
RADIUM-226	pCi/L	4	U	U	U	4	1.2	1.1	1.4	4	U	U	U
RADIUM-228	pCi/L	3	U	U	U	3	2.5	1.5	4.6	3	U	U	U
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
STRONTIUM-90	pCi/L	4	U	U	U	4	2.8	2.5	7.1	4	3.2	2.5	5.3
TECHNETIUM-99	pCi/L	6	15	15	31.6	4	62	15	106	4	U	U	U
THORIUM-228	pCi/L	5	U	U	U	4	0.63	0.5	1	4	0.8	0.5	1.1
THORIUM-230	pCi/L	5	0.72	0.5	1.6	4	1.3	0.5	2.6	4	1.6	0.5	3.1
THORIUM-232	pCi/L	3	0.67	0.5	1	4	0.95	0.5	2.3	3	U	U	U
THORIUM-TOTAL	µg/L	3	6.8	3.5	9	3	2.2	1	7	2	U	U	U
URANIUM-234	pCi/L	5	2.5	1.6	3.6	4	270	132	467	4	7.2	3.7	12.4
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-235/236	pCi/L	5	U	U	U	4	14	8.4	22.7	4	0.88	0.5	2
URANIUM-238	pCi/L	5	2.3	0.5	5.6	4	290	178	467	4	21	4.9	54
URANIUM-TOTAL	µg/L	5	5.6	3	7	4	780	500	1340	3	71	33	144

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 1078				MONITORING WELL 1079				MONITORING WELL 1080			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NEPTUNIUM-237	pCi/L	4	U	U	U	4	U	U	U	3	U	U	U
PLUTONIUM-238	pCi/L	3	U	U	U	4	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	3	U	U	U	4	U	U	U	4	U	U	U
RADIUM-226	pCi/L	4	U	U	U	3	U	U	U	3	0.87	0.5	1.6
RADIUM-228	pCi/L	4	U	U	U	4	U	U	U	3	U	U	U
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
STRONTIUM-90	pCi/L	3	U	U	U	4	U	U	U	4	U	U	U
TECHNETIUM-99	pCi/L	4	U	U	U	6	U	U	U	6	U	U	U
THORIUM-228	pCi/L	4	0.85	0.5	1.9	6	U	U	U	6	U	U	U
THORIUM-230	pCi/L	4	0.7	0.5	1.3	6	U	U	U	6	U	U	U
THORIUM-232	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
THORIUM-TOTAL	µg/L	3	2.7	2	6	3	2.2	2	5	3	2.8	2	5
URANIUM-234	pCi/L	4	12	7	21.6	6	1.2	0.5	2.2	6	3.1	2	4.5
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-235/236	pCi/L	4	0.98	0.5	2.4	6	U	U	U	6	U	U	U
URANIUM-238	pCi/L	4	39	19.3	83	6	0.6	0.5	1.1	6	2.2	1.3	4.4
URANIUM-TOTAL	µg/L	3	96	53	144	6	2.3	2	3	6	5.2	3	7

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NEPTUNIUM-237	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
RADIUM-226	pCi/L	4	U	U	U	5	0.58	0.3	1.1	4	U	U	U
RADIUM-228	pCi/L	4	U	U	U	5	1.9	1.5	3.5	3	U	U	U
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
STRONTIUM-90	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
TECHNETIUM-99	pCi/L	6	U	U	U	6	24	15	67.6	6	290	15	549
THORIUM-228	pCi/L	6	0.65	0.5	1.4	6	0.8	0.5	1.7	6	1.1	0.5	4.3
THORIUM-230	pCi/L	6	0.6	0.5	1.1	6	0.87	0.5	2.7	6	1.1	0.5	2.9
THORIUM-232	pCi/L	4	0.63	0.5	1	4	1.9	0.5	6	4	U	U	U
THORIUM-TOTAL	µg/L	3	5.8	3.5	9	3	3	2	8	3	2.5	2	5
URANIUM-234	pCi/L	6	12	6.3	17.6	6	61	33.5	84	6	8.5	5.8	10.9
URANIUM-235	pCi/L	1	U	U	U	--	--	--	--	1	U	U	U
URANIUM-235/236	pCi/L	5	U	U	U	6	6.1	3.7	8.3	5	U	U	U
URANIUM-238	pCi/L	6	20	6.6	34.9	6	320	154	463	6	32	24.7	36.5
URANIUM-TOTAL	µg/L	6	55	19	94	6	930	467	1437	6	89	70	114

4783

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1084				MONITORING WELL 1643				MONITORING WELL 1644			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
NEPTUNIUM-237	pCi/L	3	U	U	U	2	U	U	U	1	U	U	U
PLUTONIUM-238	pCi/L	3	U	U	U	2	U	U	U	1	U	U	U
PLUTONIUM-239/240	pCi/L	3	U	U	U	2	U	U	U	1	U	U	U
RADIUM-226	pCi/L	3	U	U	U	2	0.53	0.5	1	1	7.34	7.34	7.34
RADIUM-228	pCi/L	3	1.6	1.5	3.4	2	2.7	1.5	3.88	1	1.88	1.88	1.88
RUTHENIUM-106	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
STRONTIUM-90	pCi/L	3	U	U	U	1	16	15.9	15.9	1	U	U	U
TECHNETIUM-99	pCi/L	2	U	U	U	1	U	U	U	--	--	--	--
THORIUM-228	pCi/L	3	1.2	0.5	2	2	U	U	U	1	U	U	U
THORIUM-230	pCi/L	3	1.4	0.5	2.3	2	0.94	0.5	1.38	1	3.96	3.96	3.96
THORIUM-232	pCi/L	3	1	0.5	1.5	2	1	0.5	1.53	1	U	U	U
THORIUM-TOTAL	µg/L	3	8.7	2	14	2	3.3	1.65	4.92	1	U	U	U
URANIUM-234	pCi/L	3	41	27.6	51.7	2	66	0.5	131	1	60.3	60.3	60.3
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-235/236	pCi/L	3	4.5	2.2	5.7	2	4.5	0.5	8.46	1	3.17	3.17	3.17
URANIUM-238	pCi/L	3	190	122	262	2	120	0.5	239	1	60.8	60.8	60.8
URANIUM-TOTAL	µg/L	3	510	293	635	2	71	1.98	141	2	165	125	205

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1645				MONITORING WELL 1646				MONITORING WELL 1836			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
NEPTUNIUM-237	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
PLUTONIUM-238	pCi/L	1	U	U	U	--	--	--	--	1	U	U	U
PLUTONIUM-239/240	pCi/L	1	U	U	U	--	--	--	--	1	U	U	U
RADIUM-226	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
RADIUM-228	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
RUTHENIUM-106	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
STRONTIUM-90	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
TECHNETIUM-99	pCi/L	--	--	--	--	--	--	--	--	1	248	248	248
THORIUM-228	pCi/L	1	U	U	U	--	--	--	--	1	1.3	1.3	1.3
THORIUM-230	pCi/L	1	1.58	1.58	1.58	--	--	--	--	1	U	U	U
THORIUM-232	pCi/L	1	U	U	U	--	--	--	--	1	U	U	U
THORIUM-TOTAL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
URANIUM-234	pCi/L	--	--	--	--	--	--	--	--	1	6.93	6.93	6.93
URANIUM-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
URANIUM-235/236	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
URANIUM-238	pCi/L	--	--	--	--	--	--	--	--	1	10.3	10.3	10.3
URANIUM-TOTAL	µg/L	1	24.5	24.5	24.5	1	640	640	640	1	27.9	27.9	27.9

4788

TABLE 4-21
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1838			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	1	U	U	U
NEPTUNIUM-237	pCi/L	1	U	U	U
PLUTONIUM-238	pCi/L	1	U	U	U
PLUTONIUM-239/240	pCi/L	1	U	U	U
RADIUM-226	pCi/L	--	--	--	--
RADIUM-228	pCi/L	1	U	U	U
RUTHENIUM-106	pCi/L	1	U	U	U
STRONTIUM-90	pCi/L	1	1.32	1.32	1.32
TECHNETIUM-99	pCi/L	1	U	U	U
THORIUM-228	pCi/L	1	1.18	1.18	1.18
THORIUM-230	pCi/L	1	U	U	U
THORIUM-232	pCi/L	1	U	U	U
THORIUM-TOTAL	µg/L	1	U	U	U
URANIUM-234	pCi/L	1	38.3	38.3	38.3
URANIUM-235	pCi/L	--	--	--	--
URANIUM-235/236	pCi/L	1	2.39	2.39	2.39
URANIUM-238	pCi/L	1	103	103	103
URANIUM-TOTAL	µg/L	1	291	291	291

Count = Number of samples analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
GROSS ALPHA	pCi/L	2	34	26	42.9	4	380	5	1490	1	460	460	460
GROSS BETA	pCi/L	2	53	32	72.9	4	540	3	2150	1	430	430	426
NP-237	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
PU-238	pCi/L	--	--	--	--	1	0.068	0.068	0.0679	1	U	U	U
PU-239/240	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
RA-226	pCi/L	3	0.43	0.25	0.739	4	0.21	0.06	0.356	1	U	U	U
RA-228	pCi/L	3	1.4	0.26	2.9	4	0.58	0.37	2	1	U	U	U
RU-106	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
SR-90	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TC-99	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
TH-228	pCi/L	3	1.2	0.81	1.66	4	1.5	1.2	1.81	1	0.29	0.29	0.293
TH-230	pCi/L	3	0.75	0.29	1	4	0.78	0.14	1.72	1	0.42	0.42	0.421
TH-232	pCi/L	3	0.55	0.29	0.827	4	0.35	0.14	1.2	1	U	U	U
TH-TOTAL	µg/L	3	5	2.6	7.46	4	3.1	1.3	10	1	U	U	U
U-234	pCi/L	4	4.6	1.4	12.5	5	1.7	0.11	4.84	2	81	80	83.2
U-235	pCi/L	1	0.067	0.067	0.067	1	U	U	U	--	--	--	--
U-235/236	pCi/L	3	0.69	0.095	1.77	4	0.18	0.08	0.43	2	9.7	8.9	10.4
U-236	pCi/L	1	0.01	0.01	0.01	--	--	--	--	--	--	--	--
U-238	pCi/L	4	5.2	1.8	12.8	5	2.8	0.11	8.88	2	340	330	350
U-TOTAL	µg/L	6	10	3.8	31.1	5	7.3	0.37	26.6	3	900	760	1040

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	1	U	U	U	1	U	U	U	3	4.2	3.4	12
GROSS ALPHA	pCi/L	1	850	850	847	1	900	900	898	2	17	0.059	66
GROSS BETA	pCi/L	1	1400	1400	1390	1	720	720	720	2	26	0.05	52.3
NP-237	pCi/L	1	U	U	U	1	U	U	U	3	0.063	0.048	0.17
PU-238	pCi/L	1	U	U	U	1	U	U	U	3	0.056	0.031	0.18
PU-239/240	pCi/L	1	U	U	U	1	U	U	U	3	0.044	0.023	0.14
RA-226	pCi/L	1	2	2	1.99	1	U	U	U	4	0.34	0.12	0.722
RA-228	pCi/L	1	1.7	1.7	1.71	1	U	U	U	4	2.8	0.35	17
RU-106	pCi/L	1	U	U	U	1	U	U	U	3	45	33	120
SR-90	pCi/L	--	--	--	--	--	--	--	--	1	1.3	1.3	1.34
TC-99	pCi/L	1	U	U	U	1	U	U	U	3	22	14	29.8
TH-228	pCi/L	1	0.55	0.55	0.551	1	1.7	1.7	1.73	5	1.3	0.5	2.79
TH-230	pCi/L	1	8.5	8.5	8.45	1	1.2	1.2	1.18	5	0.84	0.33	1.87
TH-232	pCi/L	1	5.9	5.9	5.85	1	0.63	0.63	0.629	4	0.33	0.33	0.68
TH-TOTAL	µg/L	1	53	53	52.8	1	5.7	5.7	5.67	4	3.2	2.9	6.1
U-234	pCi/L	2	120	46	203	2	1200	350	2120	5	5.9	0.18	13.4
U-235	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
U-235/236	pCi/L	2	15	5.1	25.6	2	93	25	160	4	0.39	0.18	0.884
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	2	570	210	932	2	2400	640	4130	5	5.2	0.18	11.5
U-TOTAL	µg/L	3	2000	970	2780	3	5200	1500	12400	11	9.7	5.4	34.5

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1029				MONITORING WELL 1031			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	3	4.3	3.6	10	--	--	--	--	3	4.5	2.8	12
GROSS ALPHA	pCi/L	3	140	59	215	1	30	30	30	5	88	14	330
GROSS BETA	pCi/L	3	100	78	138	1	28	28	28	5	180	11	538
NP-237	pCi/L	3	0.18	0.049	0.9	--	--	--	--	3	0.058	0.045	0.14
PU-238	pCi/L	3	0.04	0.027	0.099	--	--	--	--	3	0.056	0.033	0.0996
PU-239/240	pCi/L	3	0.055	0.027	0.099	--	--	--	--	3	0.045	0.025	0.15
RA-226	pCi/L	4	0.063	0.05	0.16	1	0.76	0.76	0.76	5	1.7	0.44	3.95
RA-228	pCi/L	4	0.57	0.5	1.1	1	U	U	U	5	0.67	0.46	2
RU-106	pCi/L	3	35	26	88	--	--	--	--	3	37	22	96
SR-90	pCi/L	2	0.52	0.27	0.772	--	--	--	--	1	0.93	0.93	0.927
TC-99	pCi/L	4	8	6.5	18	--	--	--	--	4	8.3	5.5	22
TH-228	pCi/L	5	0.95	0.26	2.31	1	U	U	U	5	0.76	0.34	1.18
TH-230	pCi/L	5	0.54	0.29	1	1	U	U	U	5	0.25	0.21	0.67
TH-232	pCi/L	4	0.15	0.11	0.48	1	U	U	U	5	0.34	0.16	0.745
TH-TOTAL	µg/L	4	1.3	0.95	4.4	1	U	U	U	5	3.6	2.1	7.8
U-234	pCi/L	5	26	18	35.5	1	2.3	2.3	2.32	6	1.8	0.42	2.82
U-235	pCi/L	1	2.6	2.6	2.6	--	--	--	--	--	--	--	--
U-235/236	pCi/L	4	2.7	1.8	3.79	1	0.53	0.53	0.529	5	0.31	0.09	0.667
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	5	110	76	149	1	1.7	1.7	1.73	6	4.6	2.8	7.44
U-TOTAL	µg/L	11	320	130	700	1	3.6	3.6	3.64	11	16	6.5	50.9

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

CHEMICAL PARAMETERS	UNITS	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	--	--	--	--	3	4	2.8	12	--	--	--	--
GROSS ALPHA	pCi/L	--	--	--	--	4	7.8	0.0075	25	--	--	--	--
GROSS BETA	pCi/L	--	--	--	--	4	130	0.013	478	--	--	--	--
NP-237	pCi/L	--	--	--	--	3	0.064	0.022	0.22	--	--	--	--
PU-238	pCi/L	--	--	--	--	3	0.059	0.028	0.1	--	--	--	--
PU-239/240	pCi/L	--	--	--	--	3	0.041	0.028	0.0663	--	--	--	--
RA-226	pCi/L	--	--	--	--	4	0.23	0.06	0.516	--	--	--	--
RA-228	pCi/L	--	--	--	--	4	4.5	0.38	33	--	--	--	--
RU-106	pCi/L	--	--	--	--	3	42	33	96	--	--	--	--
SR-90	pCi/L	--	--	--	--	1	U	U	U	--	--	--	--
TC-99	pCi/L	--	--	--	--	4	9	5.5	27	--	--	--	--
TH-228	pCi/L	--	--	--	--	4	0.56	0.17	1.25	--	--	--	--
TH-230	pCi/L	--	--	--	--	4	0.28	0.17	0.8	--	--	--	--
TH-232	pCi/L	--	--	--	--	4	0.23	0.17	0.8	--	--	--	--
TH-TOTAL	µg/L	--	--	--	--	4	2.1	1.5	7.2	--	--	--	--
U-234	pCi/L	1	960	960	961	5	1.6	1.4	1.66	1	290	290	289
U-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-235/236	pCi/L	1	69	69	69.3	4	0.11	0.085	0.25	1	14	14	13.9
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	1	1200	1200	1240	5	1.3	1	1.51	1	300	300	304
U-TOTAL	µg/L	1	3700	3700	3730	10	3.2	2.5	4.5	1	910	910	910

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1076				MONITORING WELL 1077				MONITORING WELL 1078			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
GROSS ALPHA	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
GROSS BETA	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NP-237	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
PU-238	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
PU-239/240	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RA-226	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RA-228	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RU-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
SR-90	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TC-99	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-228	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-230	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-232	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-TOTAL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
U-234	pCi/L	1	12	12	12.1	1	2.9	2.9	2.89	1	140	140	140
U-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-235/236	pCi/L	1	0.63	0.63	0.627	1	U	U	U	1	7.5	7.5	7.53
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	1	23	23	23.1	1	3.2	3.2	3.2	1	170	170	168
U-TOTAL	µg/L	2	63	57	68.8	2	8	6.4	9.57	1	500	500	501

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1079				MONITORING WELL 1080				MONITORING WELL 1081			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	3	14	3.2	68	2	4.3	4.1	9.1	2	3.9	3.7	8.1
GROSS ALPHA	pCi/L	4	7.8	6.5	20	2	25	24	26.4	4	160	10	565
GROSS BETA	pCi/L	4	8.4	3.4	28	2	33	27	37.7	4	130	6	490
NP-237	pCi/L	3	0.048	0.029	0.13	2	0.055	0.035	0.0758	2	0.067	0.048	0.17
PU-238	pCi/L	3	0.07	0.04	0.18	2	0.076	0.021	0.26	2	0.42	0.024	0.819
PU-239/240	pCi/L	3	0.035	0.031	0.08	2	0.095	0.021	0.169	2	0.13	0.08	0.178
RA-226	pCi/L	4	0.16	0.05	0.279	3	0.99	0.24	2.21	4	0.084	0.049	0.24
RA-228	pCi/L	4	0.81	0.37	1.75	3	1.1	0.55	2	4	0.75	0.48	2
RU-106	pCi/L	3	22	3.5	72	2	35	35	71	2	32	32	64
SR-90	pCi/L	1	0.46	0.46	0.459	1	2.4	2.4	2.35	--	--	--	--
TC-99	pCi/L	4	11	8.5	24	3	10	7.5	30	3	8.2	7.5	17
TH-228	pCi/L	5	4.1	0.33	19	4	0.9	0.44	1.87	5	0.85	0.29	2.11
TH-230	pCi/L	5	0.58	0.12	1.13	4	0.93	0.11	1.88	5	1	0.16	3.34
TH-232	pCi/L	4	0.19	0.12	0.65	3	0.72	0.44	0.919	4	0.27	0.16	0.78
TH-TOTAL	µg/L	4	1.7	1.1	5.8	3	6.5	4	8.29	4	2.4	1.5	7
U-234	pCi/L	5	1.2	0.91	1.8	4	3.1	2.8	4.05	5	11	5.3	23.5
U-235	pCi/L	1	U	U	U	1	U	U	U	1	U	U	U
U-235/236	pCi/L	4	0.094	0.08	0.22	3	0.25	0.11	0.514	4	0.53	0.17	1.12
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	5	0.67	0.37	1	4	2.4	1.1	4.56	5	14	6.2	34.4
U-TOTAL	µg/L	10	2.1	1.1	3	10	5	3.2	7.3	10	23	16	40.5

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1082				MONITORING WELL 1083				MONITORING WELL 1084			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	2	3.7	3.3	8.1	3	4.9	4.6	10	--	--	--	--
GROSS ALPHA	pCi/L	4	250	140	320	3	44	0.087	71.5	--	--	--	--
GROSS BETA	pCi/L	4	290	250	303	3	120	0.17	185	--	--	--	--
NP-237	pCi/L	2	0.051	0.021	0.16	3	0.062	0.047	0.17	--	--	--	--
PU-238	pCi/L	2	0.032	0.018	0.0465	3	0.025	0.023	0.059	--	--	--	--
PU-239/240	pCi/L	2	0.031	0.018	0.089	3	0.087	0.023	0.216	--	--	--	--
RA-226	pCi/L	4	0.098	0.08	0.19	4	0.24	0.049	0.667	--	--	--	--
RA-228	pCi/L	4	2	1	2.86	4	3.7	0.49	24	--	--	--	--
RU-106	pCi/L	2	31	25	75	3	43	36	97	--	--	--	--
SR-90	pCi/L	--	--	--	--	1	0.35	0.35	0.35	--	--	--	--
TC-99	pCi/L	3	23	6	53.9	4	270	130	452	--	--	--	--
TH-228	pCi/L	5	0.62	0.29	1.42	5	1	0.23	1.89	--	--	--	--
TH-230	pCi/L	5	1.3	0.42	4.31	5	0.41	0.22	1	--	--	--	--
TH-232	pCi/L	4	1	0.29	1.69	4	0.49	0.22	1.12	--	--	--	--
TH-TOTAL	µg/L	4	9.1	2.9	15.3	4	4.4	2	10.1	--	--	--	--
U-234	pCi/L	5	34	0.26	49.2	6	16	2.7	44	1	19	19	19.4
U-235	pCi/L	1	4.8	4.8	4.8	2	0.59	0.5	1	--	--	--	--
U-235/236	pCi/L	4	2.9	0.08	4.97	4	0.68	0.1	0.974	1	1.9	1.9	1.9
U-236	pCi/L	--	--	--	--	1	0.6	0.6	0.6	--	--	--	--
U-238	pCi/L	5	160	0.08	213	6	31	2.3	41	1	78	78	78.1
U-TOTAL	µg/L	10	570	0.27	687	12	99	72	128	1	230	230	233

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
GROSS ALPHA	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
GROSS BETA	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
NP-237	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
PU-238	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
PU-239/240	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RA-226	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RA-228	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
RU-106	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
SR-90	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TC-99	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-228	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-230	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-232	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TH-TOTAL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
U-234	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-235/236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-TOTAL	µg/L	4	220	110	383	4	150	89	230	4	29	18	43.3

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-22
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNITS	COUNT	AVG	MIN	MAX
CS-137	pCi/L	--	--	--	--
GROSS ALPHA	pCi/L	--	--	--	--
GROSS BETA	pCi/L	--	--	--	--
NP-237	pCi/L	--	--	--	--
PU-238	pCi/L	--	--	--	--
PU-239/240	pCi/L	--	--	--	--
RA-226	pCi/L	--	--	--	--
RA-228	pCi/L	--	--	--	--
RU-106	pCi/L	--	--	--	--
SR-90	pCi/L	--	--	--	--
TC-99	pCi/L	--	--	--	--
TH-228	pCi/L	--	--	--	--
TH-230	pCi/L	--	--	--	--
TH-232	pCi/L	--	--	--	--
TH-TOTAL	µg/L	--	--	--	--
U-234	pCi/L	--	--	--	--
U-235	pCi/L	--	--	--	--
U-235/236	pCi/L	--	--	--	--
U-236	pCi/L	--	--	--	--
U-238	pCi/L	--	--	--	--
U-TOTAL	µg/L	4	990	430	1830

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

4788

4788

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1011				MONITORING WELL 1019				MONITORING WELL 1021			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ANTIMONY	µg/L	--	--	--	--	1	U	U	U	1	2.3	2.3	2.3
ARSENIC	µg/L	4	32	1	200	4	110	1	440	2	51	1	200
BARIUM	µg/L	4	160	140	210	4	140	100	200	2	160	130	200
BERYLLIUM	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	4	4.9	1	15	4	2.5	1	6	2	U	U	U
CALCIUM	µg/L	3	180000	170000	190000	4	410000	270000	530000	2	120000	100000	130000
CHROMIUM	µg/L	4	16	5	40	4	18	10	40	2	U	U	U
COBALT	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
COPPER	µg/L	4	10	5	20	4	U	U	U	2	U	U	U
HEXAVALENT CHROMIUM	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
IRON	µg/L	4	7900	260	27000	4	1000	750	1500	2	330	2.5	650
LEAD	µg/L	4	46	2	300	4	7.5	1	50	2	13	1	50
MAGNESIUM	µg/L	3	60000	38000	75000	4	120000	86000	160000	2	37000	30000	43000
MANGANESE	µg/L	4	1500	1100	2000	4	1300	1000	1600	2	1400	790	2100
MERCURY	µg/L	4	0.23	0.1	1	4	U	U	U	2	U	U	U
MOLYBDENUM	µg/L	4	8.8	5	20	4	13	10	20	2	20	10	29
NICKEL	µg/L	4	26	10	54	4	15	10	30	2	U	U	U
OSMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
POTASSIUM	µg/L	3	790	570	1200	4	1100	360	1900	2	2200	2100	2300
SELENIUM	µg/L	4	33	1	200	4	27	1	200	2	51	2.1	200
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	4	2.1	0.25	10	4	5.1	0.25	20	2	2.6	0.25	10
SODIUM	µg/L	4	7100	5200	11000	4	270000	120000	440000	2	9600	8900	10000
THALLIUM	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
TIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	µg/L	--	--	--	--	1	10	10	10	1	U	U	U
ZINC	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ALKALINITY AS CACO3	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
AMMONIA	mg/L	3	0.22	0.05	0.5	4	0.21	0.1	0.5	2	0.085	0.05	0.12

4783

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1011				MONITORING WELL 1019				MONITORING WELL 1021			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	4	10	4	14	4	930	310	1800	2	76	16	140
CYANIDE	mg/L	--	--	--	--	1	U	U	U	1	U	U	U
FLUORIDE	mg/L	4	0.77	0.3	1.9	4	0.46	0.25	0.6	2	1.7	1.6	1.8
NITRATE	mg/L	4	1.3	0.05	5	4	3.3	0.05	13	2	0.14	0.1	0.17
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	4	0.013	0.005	0.03	4	0.013	0.005	0.02	2	0.028	0.005	0.1
PHOSPHORUS	mg/L	3	0.37	0.12	0.8	4	0.14	0.061	0.22	2	0.37	0.14	0.61
SULFATE	mg/L	4	65	41	80	4	330	220	580	2	240	180	310
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	2	2.5	0.34	4.7	1	0.4	0.4	0.4	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC HALIDES	mg/L	2	0.083	0.025	0.14	3	0.17	0.05	0.24	1	U	U	U
TOTAL ORGANIC NITROGEN	mg/L	3	1.6	0.05	4.2	4	0.13	0	0.5	2	0.18	0.05	0.3

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1022				MONITORING WELL 1025				MONITORING WELL 1027			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	--	--	--	--	3	350	180	580	2	74	13	140
ANTIMONY	µg/L	--	--	--	--	2	19	15	47	--	--	--	--
ARSENIC	µg/L	2	U	U	U	3	1.9	1	2.6	4	27	1	200
BARIUM	µg/L	2	33	25	40	4	77	57	93	6	68	37	200
BERYLLIUM	µg/L	--	--	--	--	3	2.1	1.2	2.5	2	0.75	0.5	1
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	2	1.8	1	5	3	8.6	0.35	25	4	3.8	1	9
CALCIUM	µg/L	2	400000	310000	490000	4	490000	390000	570000	6	110000	68000	130000
CHROMIUM	µg/L	2	U	U	U	4	28	0.85	62	6	20	5	35
COBALT	µg/L	--	--	--	--	3	10	2.6	16	2	U	U	U
COPPER	µg/L	2	U	U	U	4	4.6	3.4	10	6	8.2	5	30
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	2	8	2.5	27	4	170	11	300	6	530	63	2100
LEAD	µg/L	2	U	U	U	4	2.4	1	11	6	5.6	1	50
MAGNESIUM	µg/L	2	120000	95000	150000	4	200000	150000	210000	6	42000	24000	48000
MANGANESE	µg/L	2	1200	320	2100	3	280	0.2	460	4	89	70	130
MERCURY	µg/L	2	U	U	U	3	4.1	0.1	24	4	0.39	0.1	2.4
MOLYBDENUM	µg/L	2	U	U	U	2	13	10	33	4	14	10	50
NICKEL	µg/L	2	U	U	U	4	48	14	97	6	10	1	40
OSMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
POTASSIUM	µg/L	2	3200	2300	4000	3	4800	4300	5500	4	1500	1200	5000
SELENIUM	µg/L	2	U	U	U	3	0.97	0.9	2	4	26	1	200
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	2	90	5	170	4	3.1	0.25	10	6	8.5	0.25	20
SODIUM	µg/L	2	16000	8500	23000	3	170000	110000	210000	4	10000	6600	14000
THALLIUM	µg/L	--	--	--	--	2	1.3	0.5	4.1	--	--	--	--
TIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
VANADIUM	µg/L	--	--	--	--	3	43	1.7	67	2	22	22	22
ZINC	µg/L	--	--	--	--	3	110	16	290	2	17	13	21
ALKALINITY AS CACO3	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
AMMONIA	mg/L	2	0.15	0.1	0.2	1	0.29	0.29	0.29	4	0.19	0.05	0.4

4783

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1022				MONITORING WELL 1025				MONITORING WELL 1027			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	2	40	12	68	3	910	830	1000	6	7.1	2	11
CYANIDE	mg/L	--	--	--	--	1	U	U	U	--	--	--	--
FLUORIDE	mg/L	2	0.94	0.9	0.98	3	0.46	0.36	0.54	6	1.2	0.96	1.7
NITRATE	mg/L	2	0.15	0.1	0.19	4	90	20	160	6	0.19	0.05	0.44
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	2	0.03	0.01	0.1	2	0.073	0.005	0.14	4	0.015	0.005	0.05
PHOSPHORUS	mg/L	2	0.45	0.15	0.75	1	0.52	0.52	0.52	3	0.11	0.09	0.13
SULFATE	mg/L	2	1200	1100	1200	3	450	280	680	6	130	60	160
SULFIDE	mg/L	--	--	--	--	1	4.3	4.3	4.3	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	--	--	--	--	1	U	U	U	2	3.9	0.2	15
TOTAL ORGANIC CARBON	mg/L	--	--	--	--	2	3.2	2.3	4.1	2	2.2	1	3.5
TOTAL ORGANIC HALIDES	mg/L	1	0.025	0.025	0.05	3	0.041	0.025	0.06	4	0.018	0.012	0.05
TOTAL ORGANIC NITROGEN	mg/L	2	0.85	0.4	1.3	--	--	--	--	3	0.13	0.05	0.2

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1028				MONITORING WELL 1031				MONITORING WELL 1073			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	2	26	25	50	2	220	220	230	1	210	210	210
ANTIMONY	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ARSENIC	µg/L	1	U	U	U	3	1.7	1	3	4	1.8	1	3.2
BARIUM	µg/L	2	5.8	1	11	4	250	12	810	4	140	68	210
BERYLLIUM	µg/L	2	11	0.5	22	2	1.6	1.3	1.9	1	U	U	U
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	1	U	U	U	3	10	1	29	4	9.9	0.35	36
CALCIUM	µg/L	2	220000	200	450000	4	220000	310	320000	4	1300000	340000	4000000
CHROMIUM	µg/L	2	37	10	64	4	24	10	36	4	17	1.4	46
COBALT	µg/L	2	11	5	17	2	8.6	5	12	1	5.2	5.2	5.2
COPPER	µg/L	2	30	5	55	4	13	5	24	4	31	12	84
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	2	9.5	2.5	16	4	180	12	600	4	91	2.5	200
LEAD	µg/L	2	U	U	U	4	2.3	1	6.1	4	3.1	1	11
MAGNESIUM	µg/L	2	95000	2.5	190000	4	12000	5700	25000	4	330000	280000	360000
MANGANESE	µg/L	1	2	2	2	3	9.2	2.6	14	4	1800	690	2800
MERCURY	µg/L	1	U	U	U	3	0.27	0.1	0.5	4	7600	0.1	30000
MOLYBDENUM	µg/L	--	--	--	--	2	610	540	680	4	490	370	580
NICKEL	µg/L	2	54	10	98	4	25	4.9	39	4	100	66	160
OSMIUM	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
POTASSIUM	µg/L	1	110	110	110	3	230000	98000	460000	4	19000	0.69	33000
SELENIUM	µg/L	1	U	U	U	3	2.5	1	4	4	0.98	0.9	2
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	2	3.8	2.5	10	4	7.1	0.25	20	4	4.4	0.25	20
SODIUM	µg/L	1	U	U	U	3	220000	200000	220000	4	150000	130000	180000
THALLIUM	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
VANADIUM	µg/L	2	34	6.5	61	2	32	31	33	1	U	U	U
ZINC	µg/L	2	64	55	150	2	16	2.4	30	1	20	20	20
ALKALINITY AS CACO3	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
AMMONIA	mg/L	--	--	--	--	2	150	130	170	4	40	5.3	62

4788

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1028				MONITORING WELL 1031				MONITORING WELL 1073			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	2	260	0.25	520	4	1100	890	1200	4	1100	830	1300
CYANIDE	mg/L	1	U	U	U	1	79	79	79	1	U	U	U
FLUORIDE	mg/L	2	0.14	0.05	0.23	4	1.6	1.5	1.7	4	6	5.2	7.3
NITRATE	mg/L	1	160	160	160	3	35	26	46	4	82	16	200
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	1	U	U	U	2	0.031	0.02	0.042	4	0.068	0.005	0.24
PHOSPHORUS	mg/L	--	--	--	--	2	0.34	0.32	0.36	2	0.26	0.025	0.49
SULFATE	mg/L	2	320	2.2	640	4	170	110	270	4	420	330	610
SULFIDE	mg/L	--	--	--	--	2	U	U	U	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	--	--	--	--	1	120	120	120	2	15	0.05	29
TOTAL ORGANIC CARBON	mg/L	1	9.1	9.1	9.1	2	13	11	16	--	--	--	--
TOTAL ORGANIC HALIDES	mg/L	1	0.032	0.032	0.032	4	0.61	0.13	0.9	3	0.29	0.13	0.56
TOTAL ORGANIC NITROGEN	mg/L	--	--	--	--	--	--	--	--	2	12	0.05	24

631

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1074				MONITORING WELL 1075				MONITORING WELL 1076			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	3	82	13	190	1	U	U	U	1	14	14	14
ANTIMONY	µg/L	2	19	15	47	1	U	U	U	1	47	47	47
ARSENIC	µg/L	5	1.5	1	3.1	12	17	0.95	100	4	1.4	1	3
BARIUM	µg/L	6	84	69	97	12	430	81	760	4	60	58	65
BERYLLIUM	µg/L	3	0.97	0.5	2.4	1	U	U	U	1	U	U	U
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	-	--
CADMIUM	µg/L	5	3.4	0.35	8.6	12	8.9	0.35	50	4	1.2	0.35	5
CALCIUM	µg/L	6	130000	120000	130000	4	1700000	1500000	1800000	4	97000	13000	130000
CHROMIUM	µg/L	6	23	0.85	41	12	57	10	300	4	13	0.85	30
COBALT	µg/L	3	4.2	2.6	10	1	8.5	8.5	8.5	1	U	U	U
COPPER	µg/L	6	4.7	3.4	10	4	160	3.4	600	4	10	3.4	20
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	6	57	2.5	120	4	4200	1300	10000	4	26	2.5	50
LEAD	µg/L	6	11	1	54	12	58	1	110	4	2.3	1	6
MAGNESIUM	µg/L	6	65000	62000	71000	4	520000	60000	700000	4	69000	65000	73000
MANGANESE	µg/L	5	120	60	260	4	35000	33000	38000	4	320	150	460
MERCURY	µg/L	5	0.15	0.1	0.3	12	0.14	0.1	0.38	4	0.19	0.1	0.4
MOLYBDENUM	µg/L	4	19	10	40	4	76	17	200	4	20	10	33
NICKEL	µg/L	6	270	6.2	520	4	220	6.2	600	4	20	6.2	38
OSMIUM	µg/L	1	59	59	59	--	--	--	--	--	--	--	--
POTASSIUM	µg/L	5	2400	2100	3000	4	93000	75000	110000	4	2600	2100	3100
SELENIUM	µg/L	5	1.5	1	5	12	5	0.9	50	4	2.2	0.9	5
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	6	7.9	2.2	20	12	13	2.2	50	4	3.1	0.25	10
SODIUM	µg/L	5	17000	10000	20000	4	1100000	980000	1300000	4	34000	2100	89000
THALLIUM	µg/L	2	1.3	0.5	4.1	1	U	U	U	1	U	U	U
TIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
VANADIUM	µg/L	3	17	1.7	25	1	U	U	U	1	4.3	4.3	4.3
ZINC	µg/L	3	55	14	130	1	58	58	58	1	53	53	53
ALKALINITY AS CACO3	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
AMMONIA	mg/L	4	0.14	0.05	0.5	4	190	140	250	4	0.46	0.1	1.3

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1074				MONITORING WELL 1075				MONITORING WELL 1076			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	6	130	110	160	4	6100	5900	6300	4	14	2.5	33
CYANIDE	mg/L	2	6.3	2.5	20	1	U	U	U	1	U	U	U
FLUORIDE	mg/L	6	1.2	1.1	1.5	4	2.3	1	3	4	0.71	0.22	1.1
NITRATE	mg/L	6	0.12	0.02	0.39	4	70	2.5	160	4	0.11	0.05	0.22
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	4	0.023	0.005	0.06	4	0.02	0.005	0.06	4	0.014	0.005	0.05
PHOSPHORUS	mg/L	3	0.36	0.01	0.77	4	0.37	0.02	0.73	3	0.38	0.09	0.89
SULFATE	mg/L	6	120	44	410	4	730	670	820	4	93	1	140
SULFIDE	mg/L	2	0.38	0.25	0.5	--	--	--	--	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	2	0.28	0.25	0.5	2	200	140	260	3	0.89	0.25	1.7
TOTAL ORGANIC CARBON	mg/L	2	2.5	1.8	3.3	--	--	--	--	--	--	--	--
TOTAL ORGANIC HALIDES	mg/L	5	0.024	0.005	0.05	3	0.3	0.09	0.64	3	0.033	0.025	0.05
TOTAL ORGANIC NITROGEN	mg/L	4	0.29	0	0.59	2	21	2	40	4	0.27	0.1	0.5

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1078				MONITORING WELL 1079				MONITORING WELL 1080			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	1	70	70	70	2	170	160	180	2	310	17	600
ANTIMONY	µg/L	1	47	47	47	1	U	U	U	1	U	U	U
ARSENIC	µg/L	4	89	0.008	340	5	41	1	200	5	24	4	200
BARIUM	µg/L	4	110	0.14	140	6	120	41	470	6	56	38	200
BERYLLIUM	µg/L	1	U	U	U	2	1.3	1	1.5	2	1.5	1	2
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	4	0.59	0.007	2	5	4.8	1	10	5	4.7	1.5	12
CALCIUM	µg/L	4	200000	310	300000	6	140000	110000	220000	6	120000	94000	150000
CHROMIUM	µg/L	4	5.2	0.04	20	6	22	10	39	6	25	5	62
COBALT	µg/L	1	U	U	U	2	U	U	U	2	2.8	0.5	10
COPPER	µg/L	4	3.3	0.01	10	6	7	5	17	6	6.8	0.5	30
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	4	22	0.12	85	6	200	5	690	6	220	2.5	550
LEAD	µg/L	4	8.2	0.002	50	6	13	2	50	6	12	1	60
MAGNESIUM	µg/L	4	77000	110	110000	6	54000	30000	65000	6	74000	66000	88000
MANGANESE	µg/L	4	200	0.48	400	5	130	83	170	5	48	34	70
MERCURY	µg/L	4	0.14	0.0002	0.3	5	0.26	0.1	0.8	5	0.11	0.1	0.3
MOLYBDENUM	µg/L	4	13	0.03	33	4	16	10	22	4	19	10	50
NICKEL	µg/L	4	6.5	0.04	20	6	21	2.3	53	6	59	10	250
OSMIUM	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
POTASSIUM	µg/L	4	2200	3	3200	5	1900	1600	2300	5	1600	250	2400
SELENIUM	µg/L	4	25	0.002	200	5	43	1	200	5	22	1	200
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	4	4.3	0.01	20	6	7.1	0.25	17	6	35	5	170
SODIUM	µg/L	4	20000	36	31000	5	17000	14000	20000	5	31000	21000	51000
THALLIUM	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
VANADIUM	µg/L	1	U	U	U	2	26	25	27	2	29	28	30
ZINC	µg/L	1	25	25	25	2	28	24	32	2	34	31	37
ALKALINITY AS CACO3	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
AMMONIA	mg/L	3	0.12	0.05	0.5	4	0.34	0.05	0.6	4	0.26	0.15	0.4

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1078				MONITORING WELL 1079				MONITORING WELL 1080			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	4	250	220	270	5	3.3	0.5	10	6	4.1	0.5	8.3
CYANIDE	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORIDE	mg/L	4	0.99	0.6	2	6	1.1	0.99	1.2	6	1.1	0.92	1.3
NITRATE	mg/L	3	9	1.7	18	6	0.14	0.05	0.23	5	0.056	0.03	0.11
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	4	0.028	0.01	0.06	4	0.015	0.005	0.03	4	0.0085	0.005	0.012
PHOSPHORUS	mg/L	3	0.39	0.15	0.83	4	2.2	0.08	7.7	4	0.46	0.02	0.95
SULFATE	mg/L	4	150	130	170	6	290	110	860	6	180	99	240
SULFIDE	mg/L	--	--	--	--	--	--	--	--	1	U	U	U
TOTAL KJELDAHL NITROGEN	mg/L	2	0.43	0.25	0.6	2	0.39	0.38	0.75	2	0.31	0.22	0.43
TOTAL ORGANIC CARBON	mg/L	--	--	--	--	2	1.4	0.5	4.5	2	1.9	1.3	5
TOTAL ORGANIC HALIDES	mg/L	2	0.038	0.025	0.05	4	0.012	0.005	0.05	4	0.024	0.005	0.05
TOTAL ORGANIC NITROGEN	mg/L	4	0.45	0.2	1	4	0.21	0.05	0.4	4	0.13	0	0.28

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	2	1100	20	2200	2	100	0.3	210	2	990	19	2000
ANTIMONY	µg/L	--	--	--	--	1	U	U	U	1	23	23	47
ARSENIC	µg/L	3	34	1	200	3	34	1	200	3	0.98	0.95	2
BARIUM	µg/L	5	420	3.2	2000	4	50	0.09	100	5	420	74	1800
BERYLLIUM	µg/L	2	27	1.3	52	2	0.75	0.001	1.5	3	16	0.5	47
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	3	1.5	1	5	3	4.7	1	11	3	0.78	0.35	2
CALCIUM	µg/L	5	220000	150000	250000	4	110000	160	180000	5	150000	140000	160000
CHROMIUM	µg/L	5	60	10	220	4	14	0.042	37	5	53	0.85	210
COBALT	µg/L	2	250	5	490	2	2.5	0.01	10	3	150	2.6	440
COPPER	µg/L	5	51	5	240	4	3.8	0.01	10	5	46	3.4	210
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	5	340	2.5	1300	4	59	0.28	120	5	250	5	1200
LEAD	µg/L	5	6.7	1	50	4	6.8	0.002	50	5	1.4	1	3
MAGNESIUM	µg/L	5	87000	66000	97000	4	53000	80	79000	5	51000	44000	66000
MANGANESE	µg/L	3	19	3	41	3	14	8	20	3	66	54	80
MERCURY	µg/L	3	U	U	U	3	U	U	U	2	0.55	0.1	2
MOLYBDENUM	µg/L	3	19	10	36	2	38	33	43	3	18	10	33
NICKEL	µg/L	5	110	10	500	4	12	0.027	27	5	110	6.2	460
OSMIUM	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
POTASSIUM	µg/L	3	3200	3000	3400	3	2200	1800	2400	3	800	200	1400
SELENIUM	µg/L	3	34	1	200	3	4.3	1	20	3	0.97	0.9	2
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	5	17	0.25	60	4	5	0.015	15	5	17	0.25	62
SODIUM	µg/L	3	73000	35000	140000	3	11000	130	19000	3	16000	8600	22000
THALLIUM	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
TIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
VANADIUM	µg/L	2	270	39	510	2	15	0.031	30	3	160	1.7	460
ZINC	µg/L	2	260	18	500	2	11	0.079	21	3	170	27	450
ALKALINITY AS CACO3	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
AMMONIA	mg/L	3	0.08	0.05	0.14	2	0.075	0.05	0.1	3	0.15	0.05	0.3

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	5	22	3	34	4	28	2	49	5	46	31	62
CYANIDE	mg/L	--	--	--	--	1	U	U	U	--	--	--	--
FLUORIDE	mg/L	5	0.68	0.42	0.96	4	0.95	0.58	1.3	5	0.39	0.3	0.55
NITRATE	mg/L	5	26	12	56	4	0.16	0.05	0.24	5	3.4	0.3	9.4
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	3	0.01	0.005	0.02	2	U	U	U	3	0.01	0.005	0.02
PHOSPHORUS	mg/L	3	2.2	0.53	5.3	2	2	0.12	3.8	3	0.29	0.069	0.63
SULFATE	mg/L	5	500	360	600	4	320	200	510	5	150	130	190
SULFIDE	mg/L	--	--	--	--	1	U	U	U	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	1	0.95	0.95	0.95	1	0.99	0.99	0.99	1	0.98	0.98	0.98
TOTAL ORGANIC CARBON	mg/L	2	3.1	1.3	4.9	2	3.1	2.5	3.8	2	1.9	1	2.8
TOTAL ORGANIC HALIDES	mg/L	4	0.019	0.005	0.05	3	0.018	0.01	0.05	4	0.02	0.012	0.05
TOTAL ORGANIC NITROGEN	mg/L	3	0.32	0.05	0.81	2	0.55	0.1	0.99	3	1.5	0.3	3.4

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1084				MONITORING WELL 1643				MONITORING WELL 1644			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	--	--	--	--	6	16000	4	52000	4	210	30	440
ANTIMONY	µg/L	--	--	--	--	6	63	15	130	4	32	15	40
ARSENIC	µg/L	2	U	U	U	6	12	4.2	22	4	180	97	240
BARIUM	µg/L	2	120	110	120	6	190	61	450	4	230	30	300
BERYLLIUM	µg/L	--	--	--	--	6	2.1	1	4.5	4	U	U	U
BORON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CADMIUM	µg/L	2	U	U	U	6	14	5	33	4	6.8	1	11
CALCIUM	µg/L	2	150000	150000	150000	6	220000	110000	430000	4	61000	7900	82000
CHROMIUM	µg/L	2	U	U	U	6	69	21	190	4	18	5	25
COBALT	µg/L	--	--	--	--	6	21	5	59	4	7.2	5	14
COPPER	µg/L	2	U	U	U	6	45	5	100	4	8	5	12
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	2	9.3	2.5	16	6	31000	25	100000	4	2000	72	6300
LEAD	µg/L	2	U	U	U	6	12	1	34	4	1.4	1	2.6
MAGNESIUM	µg/L	2	69000	68000	70000	6	89000	36000	170000	4	46000	6400	61000
MANGANESE	µg/L	2	140	23	250	6	1200	61	1800	4	380	54	510
MERCURY	µg/L	2	U	U	U	6	U	U	U	4	U	U	U
MOLYBDENUM	µg/L	2	41	25	57	6	66	5	270	4	100	14	140
NICKEL	µg/L	2	33	22	44	6	77	24	170	4	32	10	44
OSMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
POTASSIUM	µg/L	2	2800	2400	3200	6	5300	330	16000	4	28000	28000	28000
SELENIUM	µg/L	2	U	U	U	6	2.5	1	15	4	1.5	1	3
SILICON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SILVER	µg/L	2	2.6	0.25	10	5	31	12	67	2	12	5	18
SODIUM	µg/L	2	41000	41000	42000	6	62000	30000	120000	4	460000	450000	460000
THALLIUM	µg/L	--	--	--	--	6	3.1	1	13	4	3	1	10
TIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	µg/L	--	--	--	--	6	53	5	150	4	11	5	14
ZINC	µg/L	--	--	--	--	6	98	18	240	4	14	2.5	23
ALKALINITY AS CACO3	mg/L	--	--	--	--	3	710	480	1100	2	360	350	380
AMMONIA	mg/L	2	0.23	0.2	0.26	2	0.58	0.13	1	1	7.2	7.2	7.2

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1084				MONITORING WELL 1643				MONITORING WELL 1644			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	2	2.4	0.7	4	3	84	47	150	2	740	730	750
CYANIDE	mg/L	--	--	--	--	1	U	U	U	2	1.4	1	2
FLUORIDE	mg/L	2	1.4	1.3	1.6	3	0.71	0.22	0.99	2	3.3	0.37	6.2
NITRATE	mg/L	2	0.2	0.17	0.23	2	0.12	0.05	0.19	2	0.11	0.05	0.16
NITRATE/NITRITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOLS	mg/L	2	0.0075	0.005	0.01	3	0.16	0.005	0.47	2	0.015	0.01	0.02
PHOSPHORUS	mg/L	2	1.2	0.12	2.2	3	1.1	0.099	1.9	2	0.28	0.23	0.33
SULFATE	mg/L	2	640	500	780	3	180	120	210	2	13	6.6	19
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	1	2.7	2.7	2.7	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	--	--	--	--	3	4.8	1.2	8.6	2	21	18	24
TOTAL ORGANIC HALIDES	mg/L	2	U	U	U	2	0.024	0.016	0.032	2	0.3	0.21	0.4
TOTAL ORGANIC NITROGEN	mg/L	2	1.3	0.3	2.4	1	0.22	0.22	0.22	1	7.1	7.1	7.1

4783

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1645				MONITORING WELL 1646				MONITORING WELL 1836			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	2	10000	6200	14000	2	2700	1600	3800	1	U	U	U
ANTIMONY	µg/L	2	50	40	60	2	U	U	U	--	--	--	--
ARSENIC	µg/L	2	6	2.9	9.1	2	1.9	1	2.7	1	U	U	U
BARIUM	µg/L	2	100	83	120	2	44	40	48	--	--	--	--
BERYLLIUM	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
BORON	µg/L	2	650	620	670	--	--	--	--	--	--	--	--
CADMIUM	µg/L	2	11	9.7	12	2	U	U	U	1	U	U	U
CALCIUM	µg/L	2	200000	200000	210000	2	140000	140000	140000	--	--	--	--
CHROMIUM	µg/L	2	60	50	70	2	U	U	U	1	U	U	U
COBALT	µg/L	2	12	5	20	2	U	U	U	--	--	--	--
COPPER	µg/L	2	35	26	45	2	U	U	U	1	U	U	U
HEXAVALENT CHROMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IRON	µg/L	2	17000	8700	26000	2	4000	2600	5500	1	U	U	U
LEAD	µg/L	2	13	4.6	21	2	3.1	2.2	3.9	1	U	U	U
MAGNESIUM	µg/L	2	80000	70000	91000	2	81000	80000	82000	--	--	--	--
MANGANESE	µg/L	2	470	430	500	2	110	76	150	--	--	--	--
MERCURY	µg/L	2	U	U	U	2	U	U	U	1	U	U	U
MOLYBDENUM	µg/L	2	33	26	40	2	U	U	U	1	U	U	U
NICKEL	µg/L	2	69	52	86	2	U	U	U	1	U	U	U
OSMIUM	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
POTASSIUM	µg/L	2	8700	7000	10000	2	2900	2600	3300	--	--	--	--
SELENIUM	µg/L	2	U	U	U	2	U	U	U	1	U	U	U
SILICON	µg/L	2	20000	15000	24000	--	--	--	--	--	--	--	--
SILVER	µg/L	2	37	35	39	2	U	U	U	1	U	U	U
SODIUM	µg/L	2	16000	15000	16000	2	18000	18000	18000	--	--	--	--
THALLIUM	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
TIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	µg/L	2	44	35	54	2	U	U	U	1	U	U	U
ZINC	µg/L	2	60	49	71	2	22	21	23	--	--	--	--
ALKALINITY AS CACO3	mg/L	2	410	400	430	2	350	350	360	--	--	--	--
AMMONIA	mg/L	2	U	U	U	3	0.11	0.05	0.14	--	--	--	--

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1645				MONITORING WELL 1646				MONITORING WELL 1836			
Chemical Parameters	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	2	46	39	54	3	25	0.25	39	--	--	--	--
CYANIDE	mg/L	1	U	U	U	2	U	U	U	--	--	--	--
FLUORIDE	mg/L	2	0.75	0.62	0.88	3	0.61	0.05	0.9	--	--	--	--
NITRATE	mg/L	2	0.13	0.05	0.21	1	U	U	U	--	--	--	--
NITRATE/NITRITE	mg/L	--	--	--	--	2	U	U	U	--	--	--	--
PHENOLS	mg/L	2	U	U	U	3	0.01	0.005	0.02	1	U	U	U
PHOSPHORUS	mg/L	2	3.2	0.12	6.3	3	0.4	0.01	0.71	--	--	--	--
SULFATE	mg/L	2	280	230	330	3	140	1	370	--	--	--	--
SULFIDE	mg/L	--	--	--	--	--	--	--	--	1	U	U	U
TOTAL KJELDAHL NITROGEN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	2	0.86	0.5	1.2	3	U	U	U	1	U	U	U
TOTAL ORGANIC HALIDES	mg/L	2	0.089	0.022	0.16	3	0.012	0.005	0.016	1	U	U	U
TOTAL ORGANIC NITROGEN	mg/L	1	2.1	2.1	2.1	--	--	--	--	--	--	--	--

4783

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1838			
Chemical Parameters	Units	Count	Avg	Min	Max
ALUMINUM	µg/L	1	47	47	47
ANTIMONY	µg/L	--	--	--	--
ARSENIC	µg/L	1	3.2	3.2	3.2
BARIUM	µg/L	1	93	93	93
BERYLLIUM	µg/L	--	--	--	--
BORON	µg/L	--	--	--	--
CADMIUM	µg/L	1	U	U	U
CALCIUM	µg/L	1	100000	100000	100000
CHROMIUM	µg/L	1	U	U	U
COBALT	µg/L	--	--	--	--
COPPER	µg/L	1	U	U	U
HEXAVALENT CHROMIUM	µg/L	--	--	--	--
IRON	µg/L	1	U	U	U
LEAD	µg/L	1	U	U	U
MAGNESIUM	µg/L	1	49000	49000	49000
MANGANESE	µg/L	1	290	290	290
MERCURY	µg/L	1	U	U	U
MOLYBDENUM	µg/L	1	13	13	13
NICKEL	µg/L	1	U	U	U
OSMIUM	µg/L	--	--	--	--
POTASSIUM	µg/L	1	2700	2700	2700
SELENIUM	µg/L	1	U	U	U
SILICON	µg/L	1	8100	8100	8100
SILVER	µg/L	1	U	U	U
SODIUM	µg/L	1	13000	13000	13000
THALLIUM	µg/L	--	--	--	--
TIN	µg/L	--	--	--	--
VANADIUM	µg/L	1	U	U	U
ZINC	µg/L	--	--	--	--
ALKALINITY AS CACO3	mg/L	--	--	--	--
AMMONIA	mg/L	1	0.32	0.32	0.32

TABLE 4-23
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1838			
Chemical Parameters	Units	Count	Avg	Min	Max
CHLORIDE	mg/L	1	47	47	47
CYANIDE	mg/L	--	--	--	--
FLUORIDE	mg/L	1	1.1	1.1	1.1
NITRATE	mg/L	1	U	U	U
NITRATE/NITRITE	mg/L	--	--	--	--
PHENOLS	mg/L	1	U	U	U
PHOSPHORUS	mg/L	1	1.7	1.7	1.7
SULFATE	mg/L	1	27	27	27
SULFIDE	mg/L	1	1.3	1.3	1.3
TOTAL KJELDAHL NITROGEN	mg/L	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	1	1.2	1.2	1.2
TOTAL ORGANIC HALIDES	mg/L	1	24	24	24
TOTAL ORGANIC NITROGEN	mg/L	1	0.19	0.19	0.19

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	6	0.13	0.1	0.5	–	–	–	–	2	U	U	U
ANTIMONY, (DISSD.)	mg/L	3	0.011	0.01	0.025	–	–	–	–	2	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	6	0.015	0.0013	0.082	–	–	–	–	2	0.0019	0.0013	0.005
BARIUM, (DISSD.)	mg/L	6	0.5	0.22	0.79	–	–	–	–	2	0.18	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	6	0.016	0.0025	0.082	–	–	–	–	2	0.015	0.005	0.05
CADMIUM, (DISSD.)	mg/L	6	0.012	0.0005	0.072	–	–	–	–	2	U	U	U
CALCIUM, (DISSD.)	mg/L	6	85	66	95	–	–	–	–	2	120	110	130
CHROMIUM, TOTAL (DISSD.)	mg/L	6	0.078	0.001	0.44	–	–	–	–	2	0.0018	0.001	0.005
COBALT, (DISSD.)	mg/L	6	0.012	0.0025	0.05	–	–	–	–	2	0.0075	0.0025	0.025
COPPER, (DISSD.)	mg/L	6	0.029	0.01	0.12	–	–	–	–	2	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	6	0.079	0.025	0.25	–	–	–	–	2	0.81	0.025	1.6
LEAD, (DISSD.)	mg/L	6	0.017	0.0015	0.094	–	–	–	–	2	U	U	U
MAGNESIUM, (DISSD.)	mg/L	6	36	25	41	–	–	–	–	2	55	49	60
MANGANESE, (DISSD.)	mg/L	6	0.042	0.0075	0.12	–	–	–	–	2	0.5	0.01	0.98
MERCURY, (DISSD.)	mg/L	6	0.00063	0.0001	0.0033	–	–	–	–	2	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	6	0.026	0.005	0.11	–	–	–	–	2	0.0088	0.005	0.025
NICKEL, (DISSD.)	mg/L	6	0.022	0.0025	0.11	–	–	–	–	2	0.0038	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	3	0.98	0.5	1.3	–	–	–	–	2	U	U	U
SELENIUM, (DISSD.)	mg/L	6	0.013	0.0013	0.066	–	–	–	–	2	0.0019	0.0013	0.005
SILVER, (DISSD.)	mg/L	6	0.0078	0.0005	0.044	–	–	–	–	2	U	U	U
SODIUM, (DISSD.)	mg/L	3	12	8	15	–	–	–	–	2	81	71	91
THALLIUM, (DISSD.)	mg/L	3	U	U	U	–	–	–	–	2	U	U	U
TIN, (DISSD.)	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM, (DISSD.)	mg/L	6	0.031	0.025	0.059	–	–	–	–	2	U	U	U
ZINC, (DISSD.)	mg/L	6	0.042	0.01	0.17	–	–	–	–	2	0.018	0.01	0.05
ALUMINUM	mg/L	6	9.9	3.8	19	1	U	U	U	2	0.52	0.25	0.79
ANTIMONY	mg/L	3	0.011	0.01	0.025	1	U	U	U	2	0.011	0.01	0.025
ARSENIC	mg/L	6	0.14	0.0025	0.77	1	0.036	0.036	0.036	2	0.0038	0.0025	0.005
BARIUM	mg/L	6	0.66	0.5	1.2	1	0.41	0.41	0.41	2	0.18	0.1	0.5
BERYLLIUM	mg/L	6	0.03	0.0025	0.17	1	U	U	U	2	0.015	0.005	0.05
CADMIUM	mg/L	6	0.022	0.0005	0.13	1	U	U	U	2	U	U	U
CALCIUM	mg/L	6	110	100	130	1	160	160	160	2	180	170	190
CHROMIUM	mg/L	6	0.27	0.032	0.84	1	U	U	U	2	0.0048	0.0016	0.008
COBALT	mg/L	6	0.028	0.0025	0.11	1	U	U	U	2	0.0075	0.0025	0.025
COPPER	mg/L	6	0.071	0.01	0.22	1	U	U	U	2	0.018	0.013	0.025
IRON	mg/L	6	16	4.6	40	1	31	31	31	2	2	0.77	3.3
LEAD	mg/L	6	0.043	0.004	0.17	1	U	U	U	2	0.0043	0.0025	0.006
MAGNESIUM	mg/L	6	44	36	51	1	85	85	85	2	57	54	59

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	6	0.42	0.11	0.73	1	1.9	1.9	1.9	2	0.83	0.7	0.96
MERCURY	mg/L	6	0.00083	0.0001	0.0045	1	U	U	U	2	U	U	U
MOLYBDENUM	mg/L	6	0.047	0.01	0.21	1	U	U	U	2	0.0088	0.005	0.025
NICKEL	mg/L	6	0.09	0.005	0.26	1	U	U	U	2	0.0038	0.0025	0.01
POTASSIUM	mg/L	6	3	2	4.7	1	U	U	U	2	0.95	0.5	1.4
SELENIUM	mg/L	6	0.018	0.0013	0.095	1	U	U	U	2	0.0019	0.0013	0.005
SILVER	mg/L	6	0.017	0.0005	0.098	1	U	U	U	2	0.0005	0.0005	0.001
SODIUM	mg/L	6	14	9.5	30	1	7.1	7.1	7.1	2	74	65	82
THALLIUM	mg/L	3	U	U	U	1	U	U	U	2	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	6	0.054	0.025	0.14	1	U	U	U	2	U	U	U
ZINC	mg/L	6	0.12	0.028	0.34	1	U	U	U	2	0.032	0.01	0.054
ALKALINITY AS CACO3	mg/L	6	340	320	370	2	630	620	650	2	430	430	430
AMMONIA AS NITROGEN	mg/L	6	3.6	0.06	21	2	0.46	0.42	0.49	2	0.13	0.08	0.18
CHLORIDE	mg/L	8	21	9	74	4	14	10	23	2	76	64	88
CYANIDE	mg/L	6	0.0025	0.0025	0.005	2	U	U	U	2	0.0025	0.0025	0.005
FLUORIDE	mg/L	7	0.87	0.76	1	2	0.3	0.28	0.32	2	0.42	0.39	0.44
NITROGEN, NITRATE	mg/L	7	1.8	0.01	12	3	0.03	0.01	0.07	2	0.035	0.03	0.04
NITROGEN, NITRATE + NITRITE	mg/L	1	0.12	0.12	0.12	1	U	U	U	--	--	--	--
PH	S.U.	6	7.4	7.1	7.5	2	6.8	6.8	6.9	2	6.8	6.8	6.9
PHENOLS	mg/L	7	0.0029	0.0025	0.005	2	U	U	U	2	U	U	U
PHOSPHORUS, TOTAL	mg/L	6	2.5	0.05	12	2	1	0.67	1.4	2	0.05	0.05	0.1
SPECIFIC CONDUCTANCE	S.U.	6	750	630	970	2	1200	1200	1300	2	1400	1200	1500
SULFATE	mg/L	8	39	24	61	4	150	110	180	2	370	250	500
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
SULFITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	8	21	1	86	4	25	6	70	2	33	20	45
TOTAL DISSOLVED SOLIDS	mg/L	6	450	350	700	2	810	730	880	2	910	810	1000
TOTAL ORGANIC HALIDES	mg/L	8	9.9	5	44	4	90	13	160	2	76	63	88

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	2	4.8	0.25	9.4	2	U	U	U	12	0.16833333	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	2	0.011	0.01	0.025	2	0.011	0.01	0.025	9	0.01111111	0.01	0.025
ARSENIC, (DISSD.)	mg/L	2	0.034	0.011	0.057	2	0.0019	0.0013	0.005	12	0.00197917	0.00125	0.005
BARIUM, (DISSD.)	mg/L	2	0.74	0.49	1	2	0.23	0.2	0.5	12	0.16966667	0.1	0.51
BERYLLIUM, (DISSD.)	mg/L	2	0.015	0.005	0.05	2	0.015	0.005	0.05	12	0.00729167	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	2	U	U	U	2	U	U	U	11	U	U	U
CALCIUM, (DISSD.)	mg/L	2	95	71	120	2	140	140	150	12	385.541666	30.5	500
CHROMIUM, TOTAL (DISSD.)	mg/L	2	0.016	0.0025	0.03	2	0.0018	0.001	0.005	12	0.00851667	0.001	0.056
COBALT, (DISSD.)	mg/L	2	0.017	0.013	0.025	2	0.0075	0.0025	0.025	12	0.00710833	0.0025	0.025
COPPER, (DISSD.)	mg/L	2	0.029	0.013	0.046	2	0.011	0.01	0.025	12	0.01254167	0.01	0.028
IRON, (DISSD.)	mg/L	2	9.3	4.4	14	2	0.17	0.025	0.31	12	0.12041667	0.025	0.96
LEAD, (DISSD.)	mg/L	2	0.02	0.0025	0.038	2	U	U	U	12	0.00208333	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	2	29	21	36	2	46	42	49	12	172.25	135	220
MANGANESE, (DISSD.)	mg/L	2	3.5	2.1	4.9	2	0.45	0.34	0.56	12	0.16125	0.03	0.27
MERCURY, (DISSD.)	mg/L	2	U	U	U	2	U	U	U	11	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	2	0.0088	0.005	0.025	2	0.0088	0.005	0.025	11	0.00836364	0.005	0.025
NICKEL, (DISSD.)	mg/L	2	0.032	0.0025	0.061	2	0.0038	0.0025	0.01	12	0.10426667	0.005	0.47
POTASSIUM, (DISSD.)	mg/L	2	2.5	1.8	3.2	2	2.1	2.1	2.2	9	6.40555555	5.6	7.4
SELENIUM, (DISSD.)	mg/L	2	0.0019	0.0013	0.005	2	0.0019	0.0013	0.005	11	0.00204545	0.00125	0.005
SILVER, (DISSD.)	mg/L	2	U	U	U	2	U	U	U	12	U	U	U
SODIUM, (DISSD.)	mg/L	2	26	26	26	2	22	21	24	10	182.2	139	270
THALLIUM, (DISSD.)	mg/L	2	U	U	U	2	U	U	U	9	U	U	U
TIN, (DISSD.)	mg/L	–	–	–	–	–	–	–	–	–			–
VANADIUM, (DISSD.)	mg/L	2	U	U	U	2	U	U	U	12	U	U	U
ZINC, (DISSD.)	mg/L	2	0.1	0.036	0.17	2	0.018	0.01	0.05	12	0.04583333	0.01	0.14
ALUMINUM	mg/L	2	84	64	100	2	9.5	0.25	19	12	13.3883333	1.13	47
ANTIMONY	mg/L	2	0.011	0.01	0.025	2	0.011	0.01	0.025	9	0.01111111	0.01	0.025
ARSENIC	mg/L	2	0.064	0.059	0.069	2	0.0053	0.0025	0.008	12	0.00894583	0.00125	0.034
BARIUM	mg/L	2	1.8	1.6	2.1	2	0.38	0.25	0.51	12	0.42416667	0.1	1.2
BERYLLIUM	mg/L	2	0.015	0.005	0.05	2	0.015	0.005	0.05	12	0.00729167	0.0025	0.05
CADMIUM	mg/L	2	0.0018	0.0005	0.003	2	U	U	U	11	U	U	U
CALCIUM	mg/L	2	380	280	480	2	270	230	300	12	531.583333	394	720
CHROMIUM	mg/L	2	0.34	0.18	0.5	2	0.027	0.012	0.041	12	0.36758333	0.0416	2.6
COBALT	mg/L	2	0.028	0.024	0.032	2	0.0075	0.0025	0.025	12	0.01256667	0.0025	0.038
COPPER	mg/L	2	0.15	0.11	0.2	2	0.041	0.031	0.051	12	0.03608333	0.01	0.085
IRON	mg/L	2	230	120	340	2	16	3.2	29	12	22.2083333	2.79	70
LEAD	mg/L	2	0.069	0.067	0.071	2	0.0098	0.0025	0.017	12	0.01408333	0.0015	0.084
MAGNESIUM	mg/L	2	120	83	170	2	75	68	82	12	211.333333	167	280

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	2	8.6	6.1	11	2	0.95	0.8	1.1	12	0.85991667	0.287	2.6
MERCURY	mg/L	2	U	U	U	2	0.0001	0.0001	0.0002	11	U	U	U
MOLYBDENUM	mg/L	2	0.03	0.005	0.054	2	0.0088	0.005	0.025	11	0.03790909	0.005	0.22
NICKEL	mg/L	2	0.16	0.1	0.22	2	0.0038	0.0025	0.01	12	0.22483333	0.026	1.5
POTASSIUM	mg/L	2	18	18	19	2	4.4	3.3	5.6	11	9.52181818	6	16
SELENIUM	mg/L	2	0.0019	0.0013	0.005	2	0.0019	0.0013	0.005	11	0.00204545	0.00125	0.005
SILVER	mg/L	2	0.0013	0.0005	0.002	2	U	U	U	12	U	U	U
SODIUM	mg/L	2	25	24	26	2	20	20	21	12	199.5	156	260
THALLIUM	mg/L	2	U	U	U	2	U	U	U	9	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--			--
VANADIUM	mg/L	2	1.7	0.18	3.3	2	0.054	0.025	0.082	12	0.058	0.025	0.18
ZINC	mg/L	2	0.69	0.45	0.93	2	0.092	0.068	0.12	12	0.08716667	0.01	0.19
ALKALINITY AS CACO3	mg/L	2	410	340	490	2	400	360	440	9	339.666666	253	370
AMMONIA AS NITROGEN	mg/L	2	0.46	0.44	0.48	2	0.11	0.03	0.18	9	1.31666666	0.01	11
CHLORIDE	mg/L	2	15	12	17	2	2	1	3	12	821.083333	740	890
CYANIDE	mg/L	2	0.0038	0.0025	0.01	2	0.0025	0.0025	0.005	10	0.0025	0.0025	0.005
FLUORIDE	mg/L	2	0.83	0.79	0.86	2	0.67	0.61	0.73	12	0.56166667	0.36	0.97
NITROGEN, NITRATE	mg/L	2	U	U	U	2	0.64	0.33	0.94	11	122.4	16.4	160
NITROGEN, NITRATE + NITRITE	mg/L	--	--	--	--	--	--	--	--	1	142	142	140
PH	S.U.	2	6.7	6.6	6.7	2	6.9	6.8	7.1	9	6.83777777	6.68	7
PHENOLS	mg/L	2	--	--	--	2	0.0025	0.0025	0.005	12	U	U	U
PHOSPHORUS, TOTAL	mg/L	2	1.9	0.73	3.1	2	0.33	0.14	0.52	9	0.41888889	0.05	1.2
SPECIFIC CONDUCTANCE	S.U.	2	780	680	880	2	1600	1500	1600	9	4655.55555	4100	4900
SULFATE	mg/L	2	85	63	110	2	880	560	1200	12	407.166666	197	610
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--			--
SULFITE	mg/L	--	--	--	--	--	--	--	--	--			--
TOTAL ORGANIC CARBON	mg/L	2	40	18	61	2	25	15	35	12	12.5	2	29
TOTAL DISSOLVED SOLIDS	mg/L	2	440	270	610	2	1200	1100	1300	9	3835	2620	4700
TOTAL ORGANIC HALIDES	mg/L	2	17	5	28	2	--	--	--	12	58.25	16	290

647

4783

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	12	0.16	0.025	0.5	1	U	U	U	–	–	–	–
ANTIMONY, (DISSD.)	mg/L	9	U	U	U	1	U	U	U	–	–	–	–
ARSENIC, (DISSD.)	mg/L	12	0.005	0.0013	0.013	1	U	U	U	–	–	–	–
BARIUM, (DISSD.)	mg/L	12	0.11	0.1	0.5	1	0.26	0.26	0.26	–	–	–	–
BERYLLIUM, (DISSD.)	mg/L	12	0.0073	0.0025	0.05	1	U	U	U	–	–	–	–
CADMIUM, (DISSD.)	mg/L	11	U	U	U	1	U	U	U	–	–	–	–
CALCIUM, (DISSD.)	mg/L	12	77	42	120	1	550	550	550	–	–	–	–
CHROMIUM, TOTAL (DISSD.)	mg/L	12	0.0024	0.001	0.01	1	U	U	U	–	–	–	–
COBALT, (DISSD.)	mg/L	12	0.0067	0.0025	0.025	1	U	U	U	–	–	–	–
COPPER, (DISSD.)	mg/L	12	U	U	U	1	U	U	U	–	–	–	–
IRON, (DISSD.)	mg/L	12	0.61	0.025	2.1	1	0.44	0.44	0.44	–	–	–	–
LEAD, (DISSD.)	mg/L	12	0.0021	0.0015	0.005	1	U	U	U	–	–	–	–
MAGNESIUM, (DISSD.)	mg/L	12	30	3.8	53	1	260	260	260	–	–	–	–
MANGANESE, (DISSD.)	mg/L	12	0.12	0.052	0.25	1	0.53	0.53	0.53	–	–	–	–
MERCURY, (DISSD.)	mg/L	11	U	U	U	1	U	U	U	–	–	–	–
MOLYBDENUM, (DISSD.)	mg/L	11	0.0077	0.005	0.025	1	0.041	0.041	0.041	–	–	–	–
NICKEL, (DISSD.)	mg/L	12	0.004	0.0025	0.01	1	0.45	0.45	0.45	–	–	–	–
POTASSIUM, (DISSD.)	mg/L	9	5.5	4	8.2	1	6	6	6	–	–	–	–
SELENIUM, (DISSD.)	mg/L	11	0.002	0.0013	0.005	1	U	U	U	–	–	–	–
SILVER, (DISSD.)	mg/L	12	U	U	U	1	U	U	U	–	–	–	–
SODIUM, (DISSD.)	mg/L	10	27	9.8	80	1	340	340	340	–	–	–	–
THALLIUM, (DISSD.)	mg/L	9	U	U	U	1	U	U	U	–	–	–	–
TIN, (DISSD.)	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM, (DISSD.)	mg/L	12	U	U	U	1	U	U	U	–	–	–	–
ZINC, (DISSD.)	mg/L	12	0.016	0.01	0.05	1	U	U	U	–	–	–	–
ALUMINUM	mg/L	12	0.8	0.1	3.4	1	U	U	U	–	–	–	–
ANTIMONY	mg/L	9	0.011	0.01	0.025	1	U	U	U	–	–	–	–
ARSENIC	mg/L	12	0.0056	0.0025	0.012	1	0.006	0.006	0.006	–	–	–	–
BARIUM	mg/L	12	0.11	0.1	0.5	1	0.24	0.24	0.24	–	–	–	–
BERYLLIUM	mg/L	12	0.006	0.0025	0.05	1	U	U	U	–	–	–	–
CADMIUM	mg/L	11	U	U	U	1	U	U	U	–	–	–	–
CALCIUM	mg/L	12	88	48	120	1	320	320	320	–	–	–	–
CHROMIUM	mg/L	12	0.0069	0.0022	0.024	1	0.049	0.049	0.049	–	–	–	–
COBALT	mg/L	12	0.007	0.0025	0.025	1	U	U	U	–	–	–	–
COPPER	mg/L	12	0.011	0.01	0.025	1	0.073	0.073	0.073	–	–	–	–
IRON	mg/L	12	2.3	0.87	7	1	21	21	21	–	–	–	–
LEAD	mg/L	12	0.0023	0.0015	0.005	1	1.2	1.2	1.2	–	–	–	–
MAGNESIUM	mg/L	12	36	4.2	56	1	220	220	220	–	–	–	–

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	12	0.13	0.055	0.23	1	0.7	0.7	0.7	–	–	–	–
MERCURY	mg/L	11	U	U	U	1	U	U	U	–	–	–	–
MOLYBDENUM	mg/L	11	0.0077	0.005	0.025	1	0.11	0.11	0.11	–	–	–	–
NICKEL	mg/L	12	0.0048	0.0025	0.016	1	0.83	0.83	0.83	–	–	–	–
POTASSIUM	mg/L	11	6.1	4.3	9	1	7.7	7.7	7.7	–	–	–	–
SELENIUM	mg/L	11	0.002	0.0013	0.005	1	U	U	U	–	–	–	–
SILVER	mg/L	12	U	U	U	1	U	U	U	–	–	–	–
SODIUM	mg/L	12	28	9.1	110	1	350	350	350	–	–	–	–
THALLIUM	mg/L	9	U	U	U	1	0.005	0.005	0.01	–	–	–	–
TIN	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM	mg/L	12	U	U	U	1	0.06	0.06	0.06	–	–	–	–
ZINC	mg/L	12	0.02	0.01	0.05	1	U	U	U	–	–	–	–
ALKALINITY AS CACO3	mg/L	9	300	190	370	–	–	–	–	1	350	350	350
AMMONIA AS NITROGEN	mg/L	9	0.13	0.06	0.21	–	–	–	–	1	0.05	0.05	0.05
CHLORIDE	mg/L	12	5.5	0.5	9	1	690	690	690	2	3	3	3
CYANIDE	mg/L	10	U	U	U	–	–	–	–	1	U	U	U
FLUORIDE	mg/L	12	0.77	0.52	1.6	1	0.22	0.22	0.22	1	0.86	0.86	0.86
NITROGEN, NITRATE	mg/L	11	0.032	0.01	0.13	1	250	250	250	1	0.08	0.08	0.08
NITROGEN, NITRATE + NITRITE	mg/L	1	0.03	0.03	0.03	–	–	–	–	1	0.03	0.03	0.03
PH	S.U.	9	7.4	7.1	7.7	–	–	–	–	1	7.3	7.3	7.3
PHENOLS	mg/L	12	U	U	U	1	U	U	U	1	U	U	U
PHOSPHORUS, TOTAL	mg/L	9	0.87	0.45	1.8	–	–	–	–	1	2.5	2.5	2.5
SPECIFIC CONDUCTANCE	S.U.	9	740	490	990	–	–	–	–	1	720	720	720
SULFATE	mg/L	12	120	41	170	1	570	570	570	2	60	56	64
SULFIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFITE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL ORGANIC CARBON	mg/L	12	10	2	21	1	6	6	6	2	2	1	3
TOTAL DISSOLVED SOLIDS	mg/L	9	480	240	700	–	–	–	–	1	460	460	460
TOTAL ORGANIC HALIDES	mg/L	12	14	5	110	2	110	63	160	2	10	5	15

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1031 COUNT	AVG	MIN	MAX	MONITORING WELL 1074 COUNT	AVG	MIN	MAX	MONITORING WELL 1076 COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	13	0.15	0.025	0.5	12	0.15	0.025	0.5	1	U	U	U
ANTIMONY, (DISSD.)	mg/L	10	0.011	0.01	0.025	9	0.011	0.01	0.025	1	U	U	U
ARSENIC, (DISSD.)	mg/L	13	0.0019	0.0013	0.005	12	0.0022	0.0013	0.005	1	U	U	U
BARIUM, (DISSD.)	mg/L	13	0.19	0.1	0.5	12	0.13	0.1	0.5	1	U	U	U
BERYLLIUM, (DISSD.)	mg/L	13	0.0071	0.0025	0.05	12	0.0075	0.0025	0.05	1	U	U	U
CADMIUM, (DISSD.)	mg/L	12	U	U	U	11	0.00055	0.0005	0.001	1	U	U	U
CALCIUM, (DISSD.)	mg/L	13	200	81	360	12	110	63	130	1	120	120	120
CHROMIUM, TOTAL (DISSD.)	mg/L	13	0.005	0.001	0.035	12	0.0066	0.001	0.047	1	U	U	U
COBALT, (DISSD.)	mg/L	13	0.0095	0.0025	0.034	12	0.0078	0.0025	0.025	1	U	U	U
COPPER, (DISSD.)	mg/L	13	0.013	0.01	0.027	12	0.013	0.01	0.025	1	U	U	U
IRON, (DISSD.)	mg/L	13	0.045	0.025	0.14	12	0.077	0.025	0.31	1	0.59	0.59	0.59
LEAD, (DISSD.)	mg/L	13	0.0021	0.0015	0.005	12	0.0022	0.0015	0.005	1	U	U	U
MAGNESIUM, (DISSD.)	mg/L	13	10	3	17	12	45	1.1	66	1	71	71	71
MANGANESE, (DISSD.)	mg/L	13	0.089	0.0075	0.9	12	0.058	0.019	0.082	1	0.5	0.5	0.5
MERCURY, (DISSD.)	mg/L	12	0.00014	0.0001	0.0004	11	0.00011	0.0001	0.0002	1	–	–	–
MOLYBDENUM, (DISSD.)	mg/L	12	68	0.06	800	11	0.047	0.043	0.05	1	0.013	0.013	0.013
NICKEL, (DISSD.)	mg/L	13	0.16	0.013	1.4	12	0.87	0.4	1.5	1	–	–	–
POTASSIUM, (DISSD.)	mg/L	10	100	12	170	9	2.6	2	3.6	1	3.3	3.3	3.3
SELENIUM, (DISSD.)	mg/L	12	0.0022	0.0013	0.005	11	0.0023	0.0013	0.005	1	U	U	U
SILVER, (DISSD.)	mg/L	13	U	U	U	12	0.00054	0.0005	0.001	1	U	U	U
SODIUM, (DISSD.)	mg/L	11	190	110	380	10	19	8.9	31	1	72	72	72
THALLIUM, (DISSD.)	mg/L	10	U	U	U	9	U	U	U	1	U	U	U
TIN, (DISSD.)	mg/L	1	U	U	U	–	–	–	–	–	–	–	–
VANADIUM, (DISSD.)	mg/L	13	U	U	U	12	0.027	0.025	0.05	1	U	U	U
ZINC, (DISSD.)	mg/L	13	0.03	0.01	0.26	12	0.022	0.01	0.053	1	0.026	0.026	0.026
ALUMINUM	mg/L	13	0.44	0.1	2.2	12	4.1	0.25	12	1	6.6	6.6	6.6
ANTIMONY	mg/L	10	0.011	0.01	0.025	9	0.011	0.01	0.025	1	U	U	U
ARSENIC	mg/L	13	0.0021	0.0013	0.005	12	0.0047	0.0013	0.016	1	0.0064	0.0064	0.0064
BARIUM	mg/L	13	0.22	0.1	0.5	12	0.17	0.1	0.5	1	U	U	U
BERYLLIUM	mg/L	13	0.0071	0.0025	0.05	12	0.0075	0.0025	0.05	1	U	U	U
CADMIUM	mg/L	12	U	U	U	11	0.00055	0.0005	0.001	1	U	U	U
CALCIUM	mg/L	13	230	110	350	12	140	63	300	1	140	140	140
CHROMIUM	mg/L	13	0.9	0.15	4.2	12	1.6	0.13	10	1	0.036	0.036	0.036
COBALT	mg/L	13	0.021	0.0086	0.09	12	0.016	0.0072	0.041	1	0.007	0.007	0.007
COPPER	mg/L	13	0.025	0.01	0.059	12	0.061	0.01	0.36	1	U	U	U
IRON	mg/L	13	3.9	1	14	12	17	0.66	87	1	14	14	14
LEAD	mg/L	13	0.0026	0.0015	0.0089	12	0.0054	0.0015	0.014	1	0.0062	0.0062	0.0062
MAGNESIUM	mg/L	13	11	3.7	20	12	66	32	78	1	78	78	78

650
4783

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	13	0.15	0.036	0.95	12	0.19	0.051	0.48	1	0.71	0.71	0.71
MERCURY	mg/L	12	0.0012	0.0001	0.007	11	0.00011	0.0001	0.0002	1	U	U	U
MOLYBDENUM	mg/L	12	60	0.005	710	11	0.19	0.081	0.71	1	0.018	0.018	0.018
NICKEL	mg/L	13	0.56	0.058	2.9	12	1.2	0.45	2.6	1	0.042	0.042	0.042
POTASSIUM	mg/L	12	99	13	150	11	3.6	2	6.4	1	4.6	4.6	4.6
SELENIUM	mg/L	12	0.0024	0.0013	0.005	11	0.0023	0.0013	0.005	1	U	U	U
SILVER	mg/L	13	0.00074	0.0005	0.0028	12	0.0011	0.0005	0.0073	1	U	U	U
SODIUM	mg/L	13	230	120	440	12	21	13	31	1	73	73	73
THALLIUM	mg/L	10	U	U	U	9	U	U	U	1	U	U	U
TIN	mg/L	1	U	U	U	–	–	–	–	–	–	–	–
VANADIUM	mg/L	13	0.029	0.025	0.071	12	0.035	0.025	0.079	1	U	U	U
ZINC	mg/L	13	0.14	0.01	1.6	12	0.038	0.01	0.094	1	0.034	0.034	0.034
ALKALINITY AS CACO3	mg/L	9	130	67	190	9	330	260	360	1	600	600	600
AMMONIA AS NITROGEN	mg/L	9	120	97	140	9	0.057	0.01	0.12	1	0.7	0.7	0.7
CHLORIDE	mg/L	13	890	750	1100	12	140	130	150	1	9	9	9
CYANIDE	mg/L	10	0.0025	0.0025	0.005	10	0.0028	0.0025	0.005	1	U	U	U
FLUORIDE	mg/L	13	1.7	1.1	2.2	12	1.1	0.86	1.6	1	1.1	1.1	1.1
NITROGEN, NITRATE	mg/L	12	11	0.01	30	11	0.024	0.01	0.1	1	U	U	U
NITROGEN, NITRATE + NITRITE	mg/L	1	31	31	31	1	0.04	0.04	0.04	–	–	–	–
PH	S.U.	9	9	8.2	9.2	9	7.3	7.1	7.5	1	7.2	7.2	7.2
PHENOLS	mg/L	13	0.0047	0.0025	0.014	12	0.004	0.0025	0.012	1	U	U	U
PHOSPHORUS, TOTAL	mg/L	9	0.19	0.05	0.44	9	0.33	0.05	0.91	1	0.84	0.84	0.84
SPECIFIC CONDUCTANCE	S.U.	9	3400	2300	4100	9	1100	900	1300	1	1300	1300	1300
SULFATE	mg/L	13	260	150	460	12	86	29	120	1	110	110	110
SULFIDE	mg/L	1	U	U	U	–	–	–	–	–	–	–	–
SULFITE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL ORGANIC CARBON	mg/L	13	9.2	8	11	12	9.9	0.5	20	1	28	28	28
TOTAL DISSOLVED SOLIDS	mg/L	9	2000	1500	2500	9	650	560	800	1	800	800	800
TOTAL ORGANIC HALIDES	mg/L	13	630	390	890	12	16	5	51	1	U	U	U

651

4783

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	1	U	U	U	12	0.13	0.025	0.5	12	0.14	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	1	U	U	U	9	0.011	0.01	0.025	10	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	1	U	U	U	12	0.0022	0.0013	0.005	12	0.0024	0.0013	0.005
BARIUM, (DISSD.)	mg/L	1	U	U	U	12	0.12	0.1	0.5	12	0.11	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	1	U	U	U	12	0.0075	0.0025	0.05	12	0.0073	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	1	U	U	U	11	0.00055	0.0005	0.001	11	U	U	U
CALCIUM, (DISSD.)	mg/L	1	120	120	120	12	120	41	160	12	120	8.2	160
CHROMIUM, TOTAL (DISSD.)	mg/L	1	U	U	U	12	0.0023	0.001	0.005	12	0.0024	0.001	0.0067
COBALT, (DISSD.)	mg/L	1	0.0066	0.0066	0.0066	12	0.0069	0.0025	0.025	12	0.0067	0.0025	0.025
COPPER, (DISSD.)	mg/L	1	U	U	U	12	0.012	0.01	0.025	12	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	1	0.99	0.99	0.99	12	0.11	0.025	0.4	12	0.047	0.025	0.11
LEAD, (DISSD.)	mg/L	1	U	U	U	12	0.0022	0.0015	0.005	12	0.0021	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	1	57	57	57	12	53	25	75	12	61	25	88
MANGANESE, (DISSD.)	mg/L	1	0.37	0.37	0.37	12	0.052	0.015	0.077	12	0.016	0.0075	0.04
MERCURY, (DISSD.)	mg/L	1	U	U	U	11	0.00011	0.0001	0.0002	11	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	1	U	U	U	11	0.011	0.005	0.027	11	0.0077	0.005	0.025
NICKEL, (DISSD.)	mg/L	1	U	U	U	12	0.0044	0.0025	0.01	12	0.0043	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	1	1.8	1.8	1.8	9	1.9	1.2	3	10	2.1	1.9	2.5
SELENIUM, (DISSD.)	mg/L	1	U	U	U	11	0.0023	0.0013	0.005	11	0.002	0.0013	0.005
SILVER, (DISSD.)	mg/L	1	U	U	U	12	0.00054	0.0005	0.001	12	U	U	U
SODIUM, (DISSD.)	mg/L	1	19	19	19	10	22	9.2	42	11	20	5.6	43
THALLIUM, (DISSD.)	mg/L	1	U	U	U	9	U	U	U	10	U	U	U
TIN, (DISSD.)	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM, (DISSD.)	mg/L	1	U	U	U	12	0.027	0.025	0.05	12	U	U	U
ZINC, (DISSD.)	mg/L	1	U	U	U	12	0.021	0.01	0.05	12	0.033	0.01	0.11
ALUMINUM	mg/L	1	44	44	44	12	7.7	0.56	35	12	7.4	0.1	29
ANTIMONY	mg/L	1	U	U	U	9	0.011	0.01	0.025	10	0.011	0.01	0.025
ARSENIC	mg/L	1	0.22	0.22	0.22	12	0.0071	0.0013	0.019	12	0.011	0.0025	0.027
BARIUM	mg/L	1	1.4	1.4	1.4	12	0.15	0.1	0.5	12	0.14	0.1	0.5
BERYLLIUM	mg/L	1	U	U	U	12	0.0075	0.0025	0.05	12	0.0073	0.0025	0.05
CADMIUM	mg/L	1	0.002	0.002	0.002	11	0.00055	0.0005	0.001	11	U	U	U
CALCIUM	mg/L	1	770	770	770	12	160	80	220	12	170	110	400
CHROMIUM	mg/L	1	0.21	0.21	0.21	12	0.028	0.006	0.092	12	0.034	0.0025	0.1
COBALT	mg/L	1	0.16	0.16	0.16	12	0.0082	0.0025	0.025	12	0.0093	0.0005	0.027
COPPER	mg/L	1	0.18	0.18	0.18	12	0.023	0.01	0.044	12	0.021	0.01	0.044
IRON	mg/L	1	230	230	230	12	12	0.66	43	12	9.5	0.25	35
LEAD	mg/L	1	0.11	0.11	0.11	12	0.0053	0.0015	0.019	12	0.012	0.0015	0.035
MAGNESIUM	mg/L	1	290	290	290	12	74	30	130	12	96	61	240

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	1	10	10	10	12	0.3	0.02	0.82	12	0.33	0.018	0.88
MERCURY	mg/L	1	U	U	U	11	0.00011	0.0001	0.0002	11	U	U	U
MOLYBDENUM	mg/L	1	0.04	0.04	0.04	11	0.019	0.011	0.064	11	0.011	0.005	0.037
NICKEL	mg/L	1	0.2	0.2	0.2	12	0.016	0.0025	0.046	12	0.012	0.0025	0.05
POTASSIUM	mg/L	1	18	18	18	11	4.3	2	13	11	4.5	2	18
SELENIUM	mg/L	1	U	U	U	11	0.0023	0.0013	0.005	11	0.002	0.0013	0.005
SILVER	mg/L	1	U	U	U	12	0.00054	0.0005	0.001	12	U	U	U
SODIUM	mg/L	1	19	19	19	12	23	15	47	12	24	13	49
THALLIUM	mg/L	1	U	U	U	9	U	U	U	10	U	U	U
TIN	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM	mg/L	1	0.21	0.21	0.21	12	0.034	0.025	0.11	12	0.054	0.025	0.26
ZINC	mg/L	1	0.44	0.44	0.44	12	0.049	0.01	0.12	12	0.049	0.01	0.14
ALKALINITY AS CACO3	mg/L	1	400	400	400	9	400	360	430	9	520	360	590
AMMONIA AS NITROGEN	mg/L	1	0.03	0.03	0.03	9	0.35	0.09	0.51	9	0.033	0.01	0.07
CHLORIDE	mg/L	1	5	5	5	12	3	0.5	6	12	5.8	4	7
CYANIDE	mg/L	1	U	U	U	10	0.003	0.0025	0.01	10	0.0028	0.0025	0.01
FLUORIDE	mg/L	1	0.52	0.52	0.52	12	1.1	0.61	1.3	12	0.75	0.57	1
NITROGEN, NITRATE	mg/L	1	U	U	U	11	0.17	0.06	0.33	11	0.11	0.01	0.6
NITROGEN, NITRATE + NITRITE	mg/L	–	–	–	–	1	0.28	0.28	0.28	1	0.06	0.06	0.06
PH	S.U.	1	7.2	7.2	7.2	9	7.2	6.8	7.3	9	7	6.5	7.2
PHENOLS	mg/L	1	U	U	U	12	0.0027	0.0025	0.005	12	U	U	U
PHOSPHORUS, TOTAL	mg/L	1	U	U	U	9	0.33	0.04	0.77	9	0.76	0.33	1.7
SPECIFIC CONDUCTANCE	S.U.	1	1000	1000	1000	9	1100	780	1300	9	1200	1100	1400
SULFATE	mg/L	1	130	130	130	12	270	190	380	12	210	160	250
SULFIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFITE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL ORGANIC CARBON	mg/L	1	58	58	58	12	13	0.5	30	12	15	1	25
TOTAL DISSOLVED SOLIDS	mg/L	1	770	770	770	9	810	750	940	9	790	690	900
TOTAL ORGANIC HALIDES	mg/L	1	–	–	–	12	6.6	5	19	12	15	5	27

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	12	0.16	0.096	0.5	12	0.2	0.1	0.5	13	0.13	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	9	0.011	0.01	0.025	9	0.011	0.01	0.025	10	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	12	0.0022	0.0013	0.005	12	0.0022	0.0013	0.005	13	0.002	0.0013	0.005
BARIUM, (DISSD.)	mg/L	12	0.15	0.1	0.5	12	0.14	0.1	0.5	13	0.12	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	12	0.0075	0.0025	0.05	12	0.0075	0.0025	0.05	13	0.0069	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	11	0.00055	0.0005	0.001	11	0.00055	0.0005	0.001	12	U	U	U
CALCIUM, (DISSD.)	mg/L	12	220	160	280	12	150	92	170	13	110	37	150
CHROMIUM, TOTAL (DISSD.)	mg/L	12	0.0037	0.001	0.009	12	0.0032	0.001	0.0066	13	0.0018	0.001	0.005
COBALT, (DISSD.)	mg/L	12	0.0069	0.0025	0.025	12	0.0069	0.0025	0.025	13	0.0063	0.0025	0.025
COPPER, (DISSD.)	mg/L	12	0.013	0.01	0.029	12	0.013	0.01	0.027	13	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	12	0.064	0.025	0.19	12	0.15	0.025	0.88	13	0.051	0.025	0.13
LEAD, (DISSD.)	mg/L	12	0.0022	0.0015	0.005	12	0.0022	0.0015	0.005	13	0.002	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	12	74	26	110	12	56	15	74	13	37	16	49
MANGANESE, (DISSD.)	mg/L	12	0.017	0.0075	0.075	12	0.074	0.0075	0.75	13	0.041	0.0075	0.11
MERCURY, (DISSD.)	mg/L	11	0.00011	0.0001	0.0002	11	0.00011	0.0001	0.0002	12	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	11	0.0082	0.005	0.025	11	0.0082	0.005	0.025	12	0.0075	0.005	0.025
NICKEL, (DISSD.)	mg/L	12	0.0045	0.0025	0.012	12	0.0044	0.0025	0.01	13	0.0045	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	9	2.9	2.4	3.9	9	2.6	1.7	5.9	10	0.88	0.5	1.3
SELENIUM, (DISSD.)	mg/L	11	0.0023	0.0013	0.005	11	0.0023	0.0013	0.005	12	0.0021	0.0013	0.005
SILVER, (DISSD.)	mg/L	12	0.00054	0.0005	0.001	12	0.00054	0.0005	0.001	13	U	U	U
SODIUM, (DISSD.)	mg/L	10	51	13	85	10	20	8.8	31	11	24	6.7	33
THALLIUM, (DISSD.)	mg/L	9	U	U	U	9	U	U	U	10	U	U	U
TIN, (DISSD.)	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM, (DISSD.)	mg/L	12	0.027	0.025	0.05	12	0.027	0.025	0.05	13	U	U	U
ZINC, (DISSD.)	mg/L	12	0.022	0.01	0.072	12	0.02	0.01	0.051	13	0.012	0.01	0.05
ALUMINUM	mg/L	12	2.8	0.25	13	12	7.3	0.31	37	13	5.4	0.25	30
ANTIMONY	mg/L	9	0.011	0.01	0.025	9	0.011	0.01	0.025	10	0.011	0.01	0.025
ARSENIC	mg/L	12	0.0027	0.0013	0.0083	12	0.005	0.0013	0.023	13	0.0049	0.0013	0.025
BARIUM	mg/L	12	0.13	0.1	0.5	12	0.18	0.1	0.5	13	0.25	0.1	0.55
BERYLLIUM	mg/L	12	0.0075	0.0025	0.05	12	0.0075	0.0025	0.05	13	0.0069	0.0025	0.05
CADMIUM	mg/L	11	0.00055	0.0005	0.001	11	0.00055	0.0005	0.001	12	U	U	U
CALCIUM	mg/L	12	280	190	330	12	180	95	300	13	160	120	280
CHROMIUM	mg/L	12	0.029	0.01	0.079	12	0.029	0.0039	0.11	13	0.028	0.004	0.088
COBALT	mg/L	12	0.0073	0.0025	0.025	12	0.0094	0.0025	0.026	13	0.0063	0.0025	0.025
COPPER	mg/L	12	0.024	0.01	0.065	12	0.026	0.01	0.089	13	0.018	0.01	0.058
IRON	mg/L	12	4	0.4	17	12	10	0.36	49	13	12	0.44	96
LEAD	mg/L	12	0.0023	0.0015	0.005	12	0.0047	0.0015	0.02	13	0.0059	0.0015	0.026
MAGNESIUM	mg/L	12	100	66	140	12	81	53	100	13	59	39	120

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	12	0.12	0.029	0.5	12	0.18	0.015	0.89	13	0.34	0.028	1.7
MERCURY	mg/L	11	0.00011	0.0001	0.0002	11	0.00011	0.0001	0.0002	12	U	U	U
MOLYBDENUM	mg/L	11	0.0086	0.005	0.025	11	0.01	0.005	0.028	12	0.0075	0.005	0.025
NICKEL	mg/L	12	0.011	0.0025	0.046	12	0.027	0.0025	0.14	13	0.019	0.0025	0.066
POTASSIUM	mg/L	11	3.8	2.6	6.8	11	5.7	1.9	26	12	5.2	1	25
SELENIUM	mg/L	11	0.0023	0.0013	0.005	11	0.0023	0.0013	0.005	12	0.0021	0.0013	0.005
SILVER	mg/L	12	0.00054	0.0005	0.001	12	0.00054	0.0005	0.001	13	U	U	U
SODIUM	mg/L	12	62	46	89	12	21	18	27	13	28	23	35
THALLIUM	mg/L	9	U	U	U	9	U	U	U	10	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	12	0.027	0.025	0.05	12	0.036	0.025	0.14	13	0.036	0.025	0.084
ZINC	mg/L	12	0.036	0.01	0.099	12	0.051	0.01	0.17	13	0.05	0.01	0.15
ALKALINITY AS CACO3	mg/L	9	580	300	710	9	460	330	550	10	350	290	390
AMMONIA AS NITROGEN	mg/L	9	0.038	0.01	0.07	9	0.073	0.01	0.37	10	0.044	0.01	0.11
CHLORIDE	mg/L	12	37	34	40	12	39	31	47	13	54	47	67
CYANIDE	mg/L	10	0.0028	0.0025	0.005	10	0.0028	0.0025	0.005	11	U	U	U
FLUORIDE	mg/L	12	0.47	0.25	0.91	12	0.81	0.47	2.3	13	0.35	0.26	0.54
NITROGEN, NITRATE	mg/L	11	8.1	0.58	15	11	0.023	0.01	0.05	12	0.68	0.09	1.5
NITROGEN, NITRATE + NITRITE	mg/L	1	11	11	11	1	U	U	U	1	2.2	2.2	2.2
PH	S.U.	9	6.9	6.5	7.1	9	7.2	6.6	7.4	10	7.1	6.7	7.3
PHENOLS	mg/L	12	0.0029	0.0025	0.005	12	0.0027	0.0025	0.005	13	U	U	U
PHOSPHORUS, TOTAL	mg/L	9	0.24	0.05	0.51	9	0.42	0.05	2.1	10	0.25	0.05	0.55
SPECIFIC CONDUCTANCE	S.U.	9	1900	1600	2100	9	1200	1200	1300	10	1000	960	1100
SULFATE	mg/L	12	530	400	640	12	200	19	300	13	140	120	170
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
SULFITE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	12	22	2	44	12	18	2	39	13	13	1	27
TOTAL DISSOLVED SOLIDS	mg/L	9	1400	1000	1500	9	850	650	1100	10	660	570	880
TOTAL ORGANIC HALIDES	mg/L	12	34	5	98	12	17	5	35	13	7	5	24

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	5	U	U	U	5	U	U	U	5	U	U	U
ANTIMONY, (DISSD.)	mg/L	4	U	U	U	4	U	U	U	4	U	U	U
ARSENIC, (DISSD.)	mg/L	6	0.003	0.0025	0.0054	6	0.16	0.11	0.25	6	U	U	U
BARIUM, (DISSD.)	mg/L	6	0.21	0.1	0.78	6	0.39	0.28	0.68	6	0.22	0.1	0.84
BERYLLIUM, (DISSD.)	mg/L	6	0.0063	0.0025	0.05	6	0.0063	0.0025	0.05	6	0.0063	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	6	0.00063	0.0005	0.0013	6	U	U	U	6	U	U	U
CALCIUM, (DISSD.)	mg/L	6	140	120	160	6	71	57	93	6	150	140	180
CHROMIUM, TOTAL (DISSD.)	mg/L	6	0.002	0.001	0.0036	6	U	U	U	6	0.0016	0.001	0.003
COBALT, (DISSD.)	mg/L	6	U	U	U	6	0.0043	0.0025	0.0068	6	U	U	U
COPPER, (DISSD.)	mg/L	6	U	U	U	6	U	U	U	6	0.018	0.01	0.056
IRON, (DISSD.)	mg/L	5	0.092	0.05	0.18	5	0.066	0.05	0.13	5	0.066	0.05	0.13
LEAD, (DISSD.)	mg/L	6	0.0017	0.0015	0.005	6	0.0017	0.0015	0.005	6	0.0017	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	5	61	51	69	5	47	37	55	5	61	52	72
MANGANESE, (DISSD.)	mg/L	5	0.1	0.05	0.2	5	0.36	0.15	0.54	5	0.046	0.031	0.059
MERCURY, (DISSD.)	mg/L	6	U	U	U	6	U	U	U	6	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	5	U	U	U	5	0.15	0.11	0.2	5	0.0062	0.005	0.011
NICKEL, (DISSD.)	mg/L	6	U	U	U	6	0.0063	0.005	0.013	6	0.0072	0.005	0.018
POTASSIUM, (DISSD.)	mg/L	3	2.7	2.6	2.7	3	30	19	35	3	2.2	2	2.5
SELENIUM, (DISSD.)	mg/L	6	U	U	U	6	U	U	U	6	U	U	U
SILVER, (DISSD.)	mg/L	6	U	U	U	6	U	U	U	6	U	U	U
SODIUM, (DISSD.)	mg/L	3	28	25	32	3	400	340	440	3	16	15	16
THALLIUM, (DISSD.)	mg/L	4	U	U	U	4	U	U	U	4	U	U	U
TIN, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
VANADIUM, (DISSD.)	mg/L	6	U	U	U	6	U	U	U	6	U	U	U
ZINC, (DISSD.)	mg/L	6	0.019	0.01	0.045	6	0.015	0.01	0.025	6	0.029	0.01	0.11
ALUMINUM	mg/L	5	11	1.9	25	5	1.3	0.1	5.7	5	1.9	0.7	4.4
ANTIMONY	mg/L	4	U	U	U	4	U	U	U	4	U	U	U
ARSENIC	mg/L	6	0.011	0.0025	0.026	6	0.21	0.14	0.3	6	0.0036	0.0025	0.0067
BARIUM	mg/L	6	0.27	0.1	0.66	6	0.32	0.1	0.5	6	0.13	0.1	0.29
BERYLLIUM	mg/L	6	0.0063	0.0025	0.05	6	0.0063	0.0025	0.05	6	0.0063	0.0025	0.05
CADMIUM	mg/L	6	U	U	U	6	U	U	U	6	U	U	U
CALCIUM	mg/L	6	220	140	320	6	74	62	85	6	170	160	230
CHROMIUM	mg/L	6	0.057	0.0065	0.14	6	0.0049	0.003	0.0093	6	0.018	0.0054	0.044
COBALT	mg/L	6	0.01	0.0025	0.028	6	0.0064	0.0025	0.0098	6	0.0044	0.0025	0.014
COPPER	mg/L	6	0.036	0.01	0.059	6	U	U	U	6	0.016	0.01	0.043
IRON	mg/L	5	23	2.5	45	5	2	0.57	6.6	5	2.9	1.2	6.8
LEAD	mg/L	6	0.0095	0.0015	0.025	6	0.0029	0.0015	0.0087	6	0.0022	0.0015	0.0057
MAGNESIUM	mg/L	5	120	63	200	5	55	47	64	5	70	59	78

4783

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	5	0.53	0.15	1	5	0.4	0.31	0.53	5	0.12	0.066	0.2
MERCURY	mg/L	6	0.00013	0.0001	0.0003	6	U	U	U	6	U	U	U
MOLYBDENUM	mg/L	5	0.0084	0.005	0.015	5	0.16	0.14	0.2	5	0.0068	0.005	0.014
NICKEL	mg/L	6	0.056	0.005	0.14	6	0.01	0.005	0.027	6	0.022	0.005	0.084
POTASSIUM	mg/L	5	6.4	2.9	11	5	33	23	41	5	3	2.1	4.9
SELENIUM	mg/L	6	U	U	U	6	U	U	U	6	U	U	U
SILVER	mg/L	6	U	U	U	6	0.00063	0.0005	0.0013	6	U	U	U
SODIUM	mg/L	5	35	27	45	5	480	410	570	5	18	16	23
THALLIUM	mg/L	4	U	U	U	4	U	U	U	4	U	U	U
TIN	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
VANADIUM	mg/L	6	0.03	0.025	0.057	6	U	U	U	6	U	U	U
ZINC	mg/L	6	0.073	0.01	0.15	6	0.043	0.01	0.15	6	0.019	0.01	0.034
ALKALINITY AS CACO3	mg/L	6	490	460	520	6	350	310	380	6	380	200	440
AMMONIA AS NITROGEN	mg/L	6	0.052	0.01	0.16	6	7	5.8	7.8	6	0.043	0.01	0.09
CHLORIDE	mg/L	6	78	63	93	6	830	750	870	6	52	42	60
CYANIDE	mg/L	6	–	–	–	6	U	U	U	6	U	U	U
FLUORIDE	mg/L	6	2.4	0.95	5.2	6	7.2	6.1	8.1	6	0.68	0.59	0.88
NITROGEN, NITRATE	mg/L	6	0.017	0.01	0.03	6	0.018	0.01	0.05	6	0.033	0.01	0.08
NITROGEN, NITRATE + NITRITE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
PH	S.U.	6	7.2	7.1	7.3	6	7	7	7.1	6	7.2	7.1	7.2
PHENOLS	mg/L	6	U	U	U	6	0.0043	0.0025	0.01	6	U	U	U
PHOSPHORUS, TOTAL	mg/L	6	0.36	0.05	0.7	6	0.3	0.05	0.43	6	0.41	0.05	1.6
SPECIFIC CONDUCTANCE	S.U.	6	1400	1300	1500	6	3300	3100	3600	6	1300	1200	1400
SULFATE	mg/L	6	170	160	190	6	9	4	15	6	270	230	300
SULFIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFITE	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
TOTAL ORGANIC CARBON	mg/L	6	24	17	29	6	38	33	49	6	20	12	33
TOTAL DISSOLVED SOLIDS	mg/L	6	850	670	980	6	1700	1600	1900	6	870	750	940
TOTAL ORGANIC HALIDES	mg/L	6	11	5	40	6	230	46	380	6	12	5	41

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	6	U	U	U
ANTIMONY, (DISSD.)	mg/L	4	U	U	U
ARSENIC, (DISSD.)	mg/L	6	U	U	U
BARIUM, (DISSD.)	mg/L	6	U	U	U
BERYLLIUM, (DISSD.)	mg/L	6	0.0063	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	6	U	U	U
CALCIUM, (DISSD.)	mg/L	6	150	140	170
CHROMIUM, TOTAL (DISSD.)	mg/L	6	0.0019	0.001	0.0034
COBALT, (DISSD.)	mg/L	6	U	U	U
COPPER, (DISSD.)	mg/L	6	U	U	U
IRON, (DISSD.)	mg/L	6	0.085	0.05	0.26
LEAD, (DISSD.)	mg/L	6	0.0021	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	6	71	48	89
MANGANESE, (DISSD.)	mg/L	6	0.084	0.0075	0.36
MERCURY, (DISSD.)	mg/L	6	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	6	0.0078	0.005	0.022
NICKEL, (DISSD.)	mg/L	6	U	U	U
POTASSIUM, (DISSD.)	mg/L	4	2.8	2.3	3.5
SELENIUM, (DISSD.)	mg/L	6	U	U	U
SILVER, (DISSD.)	mg/L	6	U	U	U
SODIUM, (DISSD.)	mg/L	4	18	13	23
THALLIUM, (DISSD.)	mg/L	4	U	U	U
TIN, (DISSD.)	mg/L	1	U	U	U
VANADIUM, (DISSD.)	mg/L	6	U	U	U
ZINC, (DISSD.)	mg/L	6	0.019	0.01	0.049
ALUMINUM	mg/L	6	5.4	0.5	19
ANTIMONY	mg/L	4	U	U	U
ARSENIC	mg/L	6	0.0034	0.0025	0.0079
BARIUM	mg/L	6	0.14	0.1	0.31
BERYLLIUM	mg/L	6	0.0063	0.0025	0.05
CADMIUM	mg/L	6	U	U	U
CALCIUM	mg/L	6	180	150	270
CHROMIUM	mg/L	6	0.02	0.0057	0.038
COBALT	mg/L	6	0.0051	0.0025	0.013
COPPER	mg/L	6	0.022	0.01	0.053
IRON	mg/L	6	10	0.78	37
LEAD	mg/L	6	0.0031	0.0015	0.0098
MAGNESIUM	mg/L	6	99	73	140

4783

TABLE 4-24
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	6	0.3	0.03	0.74
MERCURY	mg/L	6	U	U	U
MOLYBDENUM	mg/L	6	0.036	0.005	0.18
NICKEL	mg/L	6	0.025	0.005	0.11
POTASSIUM	mg/L	6	4.1	2.2	8.7
SELENIUM	mg/L	6	U	U	U
SILVER	mg/L	6	U	U	U
SODIUM	mg/L	6	20	18	24
THALLIUM	mg/L	4	U	U	U
TIN	mg/L	1	U	U	U
VANADIUM	mg/L	6	U	U	U
ZINC	mg/L	6	0.032	0.01	0.09
ALKALINITY AS CACO3	mg/L	6	380	340	420
AMMONIA AS NITROGEN	mg/L	6	0.032	0.01	0.07
CHLORIDE	mg/L	6	48	30	62
CYANIDE	mg/L	6	U	U	U
FLUORIDE	mg/L	6	0.87	0.78	0.91
NITROGEN, NITRATE	mg/L	6	0.21	0.12	0.38
NITROGEN, NITRATE + NITRITE	mg/L	--	--	--	--
PH	S.U.	6	7.3	7.1	7.4
PHENOLS	mg/L	6	U	U	U
PHOSPHORUS, TOTAL	mg/L	6	0.53	0.05	1.5
SPECIFIC CONDUCTANCE	S.U.	6	1400	1200	1500
SULFATE	mg/L	6	330	280	470
SULFIDE	mg/L	1	U	U	U
SULFITE	mg/L	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	6	19	13	31
TOTAL DISSOLVED SOLIDS	mg/L	6	910	730	1000
TOTAL ORGANIC HALIDES	mg/L	6	U	U	U

NOTE:
DISSD = FILTER SAMPLE
BLANK = UNFILTERED SAMPLE
S.U. = STANDARD UNITS
COUNT = NUMBER OF SAMPLES ANALYZED
U = NOT DETECTED
-- = NOT ANALYZED

659

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	2.3	2	5
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,1-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,2-DICHLOROETHYLENE	µg/L	1	25	25	25	1	U	U	U	1	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,7,8-TCDD	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2,4-D	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2,4-DINITROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-BUTANONE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-CHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2-HEXANONE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-NITROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4,4-DDD	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
4,4-DDE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
4,4-DDT	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-NITROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ACETONE	µg/L	1	7	7	7	1	U	U	U	3	5.2	5	11
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ALDRIN	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ALPHA-BHC	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ALPHA-CHLORDANE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR-1016	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AROCLOR-1221	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AROCLOR-1232	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AROCLOR-1242	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AROCLOR-1248	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AROCLOR-1254	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AROCLOR-1260	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
AZINPHOSMETHYL	µg/L	2	0.63	0.25	2	1	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BETA-BHC	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BROMOFORM	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CARBON DISULFIDE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROFORM	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
DEMETON	µg/L	2	0.31	0.13	1	1	U	U	U	1	U	U	U
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	2	0.19	0.13	0.5	1	U	U	U	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIELDRIN	µg/L	--	--	--	--	1	U	U	U	2	0.038	0.025	0.1
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	4	3	10
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DISULFOTON	µg/L	2	0.19	0.13	0.5	1	U	U	U	2	0.31	0.13	7
ENDOSULFAN II	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ENDOSULFAN SULFATE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ENDOSULFAN-I	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ENDRIN	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ENDRIN KETONE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ETHION	µg/L	2	0.19	0.13	0.5	1	U	U	U	1	U	U	U
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYLBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
GAMMA-CHLORDANE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
HEPTACHLOR	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISODRIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
MALATHION	µg/L	2	0.31	0.13	1	1	U	U	U	1	U	U	U
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHOXYCHLOR	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYLENE CHLORIDE	µg/L	1	U	U	U	1	U	U	U	3	6	5	16
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	2	13	1.5	50
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PARATHION, ETHYL	µg/L	2	0.19	0.13	0.5	1	U	U	U	2	U	U	U
PARATHION, METHYL	µg/L	2	0.31	0.13	1	1	U	U	U	2	U	U	U
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
PHENOL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
PHORATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
SAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
STYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1019				MONITORING WELL 1021				MONITORING WELL 1025			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TETRACHLORETHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TOLUENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
TOXAPHENE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TRICHLOROETHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
VINYL CHLORIDE	µg/L	1	2	2	2	1	U	U	U	2	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,1-DICHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	2	31	30	31
1,1-DICHLOROETHENE	µg/L	--	--	--	--	1	U	U	U	1	5	5	5
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,2-DICHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	2	2	2
1,2-DICHLOROETHYLENE	µg/L	--	--	--	--	1	U	U	U	1	120	120	120
1,2-DICHLOROPROPANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	8	8	8
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4-D	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DINITROTOLUENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-BUTANONE	µg/L	--	--	--	--	1	U	U	U	1	2	2	2
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-HEXANONE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-NITROANILINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-NITROANILINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4,4-DDD	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4,4-DDE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4,4-DDT	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-METHYL-2-PENTANONE	µg/L	--	--	--	--	1	U	U	U	1	6	6	6
4-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACENAPHTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ACENAPHTHYLENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ACETONE	µg/L	2	U	U	U	2	U	U	U	2	10	5	15
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ALDRIN	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ALPHA-CHLORDANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR-1016	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AROCLOR-1221	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AROCLOR-1232	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AROCLOR-1242	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AROCLOR-1248	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AROCLOR-1254	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AROCLOR-1260	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	--	--	--	--	1	U	U	U	1	3	3	3
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(A)PYRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BROMODICHLOROMETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BROMOFORM	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BROMOMETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CARBON DISULFIDE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CARBON TETRACHLORIDE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CHLOROFORM	µg/L	--	--	--	--	1	U	U	U	1	2	2	2
CHLOROMETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CHRYSENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DEMETON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	1	10	10	10	1	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

4788

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIBROMOCHLOROMETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIELDRIN	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIETHYL PHTHALATE	µg/L	--	--	--	--	1	2	2	2	1	U	U	U
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIMETHYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	2	2	2
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ENDOSULFAN II	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ENDOSULFAN-I	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ENDRIN	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ENDRIN KETONE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ETHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYLBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
FLUORENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
GAMMA-CHLORDANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

4788

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISODRIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOPHORONE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
KEPONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
MALATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHOXYCHLOR	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYLENE CHLORIDE	µg/L	2	4	2.5	11	2	3.8	2.5	10	2	2.8	2.5	6
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	4	4	4
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	1	U	U	U	1	3	3	3
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
NAPHTHALENE	µg/L	--	--	--	--	1	U	U	U	1	2	2	2
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PARATHION, ETHYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PARATHION, METHYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	1	5	5	5
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PHENANTHRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
PHENOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
PHORATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PYRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
SAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
STYRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1031			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TETRACHLORETHENE	µg/L	2	U	U	U	2	U	U	U	2	280	260	290
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TOLUENE	µg/L	2	U	U	U	2	U	U	U	2	7.3	2	25
TOTAL XYLENES	µg/L	--	--	--	--	1	U	U	U	1	2	2	2
TOXAPHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	1	18	18	18
TRANS-1,3-DICHLOROPROPENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TRICHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	1	540	540	540
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
VINYL ACETATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
VINYL CHLORIDE	µg/L	--	--	--	--	1	U	U	U	1	16	16	16

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	5	5	5	1	U	U	U	1	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,1-DICHLOROETHANE	µg/L	1	76	76	76	3	U	U	U	1	U	U	U
1,1-DICHLOROETHENE	µg/L	1	2	2	2	2	U	U	U	1	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2,4-D	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2,4-DINITROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2,4-DINITROTOLUENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2,6-DINITROTOLUENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2-BUTANONE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
2-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
2-NITROANILINE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4,4-DDD	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4,4-DDE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4,4-DDT	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--

677

4788

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
4-NITROANILINE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ACENAPHTHENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ACETONE	µg/L	1	U	U	U	3	U	U	U	1	U	U	U
ACETONITRILE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ALDRIN	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ALPHA-CHLORDANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ANILINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ANTHRACENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ARAMITE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1016	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AROCLOR-1221	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AROCLOR-1232	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AROCLOR-1242	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AROCLOR-1248	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AROCLOR-1254	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AROCLOR-1260	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
AZINPHOSMETHYL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BETA-BHC	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	2	U	U	U	1	4	4	4
BROMODICHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BROMOFORM	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	3	3	3	2	U	U	U	1	U	U	U
CARBON DISULFIDE	µg/L	1	U	U	U	2	2.3	2	5	1	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CHLOROFORM	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CHRYSENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DEMETON	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DIALLATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DIELDRIN	µg/L	1	U	U	U	2	0.038	0.025	0.1	1	U	U	U
DIETHYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DIMETHOATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
DINOSEB	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DISULFOTON	µg/L	1	U	U	U	2	0.38	0.25	1	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ENDOSULFAN-I	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ENDRIN	µg/L	1	U	U	U	2	0.038	0.025	0.1	1	U	U	U
ENDRIN KETONE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ETHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ETHYL CYANIDE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ETHYLBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
FAMPHUR	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
FLUORENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
GAMMA-CHLORDANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
IODOMETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ISODRIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ISOPHORONE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
KEPONE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
MALATHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHACRYLONITRILE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
METHOXYCHLOR	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
METHYLENE CHLORIDE	µg/L	1	U	U	U	3	3.2	2.5	9	1	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	2	14	2	50	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
NAPHTHALENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PARATHION, ETHYL	µg/L	1	U	U	U	2	0.14	0.025	0.5	1	U	U	U
PARATHION, METHYL	µg/L	1	U	U	U	2	0.26	0.025	1	1	U	U	U
PENTACHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PENTACHLOROPHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PHENANTHRENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
PHENOL	µg/L	1	U	U	U	2	U	U	U	--	--	--	--
PHORATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
PYRENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
PYRIDINE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
SAFROLE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
STYRENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1073				MONITORING WELL 1074				MONITORING WELL 1075			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TETRACHLORETHENE	µg/L	1	U	U	U	3	U	U	U	1	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TOLUENE	µg/L	1	U	U	U	3	U	U	U	1	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
TOXAPHENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TRICHLOROETHENE	µg/L	1	U	U	U	3	U	U	U	1	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U
VINYL CHLORIDE	µg/L	1	U	U	U	2	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,1-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,7,8-TCDD	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,3,7,8-TCDF	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-D	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-BUTANONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-HEXANONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4-DDD	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4-DDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4-DDT	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALPHA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR-1016	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1221	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1232	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1242	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1248	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1254	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1260	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AZINPHOSMETHYL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BROMOFORM	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	3	3	3	1	U	U	U
CARBON DISULFIDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CARBON TETRACHLORIDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CHLOROFORM	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DEMETON	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	4	4	4
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DISULFOTON	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN-I	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ENDRIN KETONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ETHION	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYLBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
GAMMA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLORODIBENZO-P-DIOXINS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLORODIBENZOFURANS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
KEPONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
MALATHION	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHOXYCHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYLENE CHLORIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
OCTACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PARATHION, ETHYL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PARATHION, METHYL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZO-P-DIOXINS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZOFURANS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
STYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1076				MONITORING WELL 1078				MONITORING WELL 1079			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORETHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TETRACHLORODIBENZOFURANS	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
VINYL CHLORIDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
1,1-DICHLOROETHANE	µg/L	2	3.8	2.5	5	2	U	U	U	2	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,2-DIBROMOETHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
1,2-DICHLOROETHYLENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,4-DIOXANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,7,8-TCDD	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,4-D	µg/L	1	U	U	U	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-BUTANONE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-HEXANONE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-CHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-NITROANILINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4,4-DDD	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4,4-DDE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4,4-DDT	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ACETONE	µg/L	2	4	3	10	2	U	U	U	2	U	U	U
ACETONITRILE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACROLEIN	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ACRYLONITRILE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ALDRIN	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ALPHA-CHLORDANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR-1016	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AROCLOR-1221	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AROCLOR-1232	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AROCLOR-1242	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AROCLOR-1248	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AROCLOR-1254	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AROCLOR-1260	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BETA-BHC	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
BROMOFORM	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	--	--	--	--	2	7.5	5	10
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
CARBON DISULFIDE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	2	7.5	5	10
CHLOROFORM	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	--	--	--	--	2	7.5	5	10
CHRYSENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DEMETON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIELDRIN	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIMETHOATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DIMETHYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DISULFOTON	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ENDOSULFAN-I	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ENDRIN	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ENDRIN KETONE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ETHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYL METHACRYLATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYLBENZENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
FAMPHUR	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
FLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
GAMMA-CHLORDANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	1	0.32	0.32	0.32	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
IODOMETHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ISODRIN	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ISOPHORONE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
KEPONE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
MALATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHOXYCHLOR	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
METHYL METHACRYLATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYLENE CHLORIDE	µg/L	2	U	U	U	2	3.5	2.5	9	2	3	2.5	7
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PARATHION, ETHYL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
PARATHION, METHYL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	1	0.35	0.35	0.35	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PHENANTHRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PHENOL	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
PHORATE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PYRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PYRIDINE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
SAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
STYRENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1080				MONITORING WELL 1081				MONITORING WELL 1082			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
TETRACHLORETHENE	µg/L	2	U	U	U	2	U	U	U	1	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	1	0.12	0.12	0.12	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
THIONAZIN	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
TOLUENE	µg/L	2	U	U	U	2	1.8	1	5	2	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
TOXAPHENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
TRICHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	--	--	--	--	2	U	U	U
VINYL CHLORIDE	µg/L	1	U	U	U	--	--	--	--	2	7.5	5	10

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,1-DICHLOROETHANE	µg/L	3	2.3	2	5	1	U	U	U	2	3.8	2.5	10
1,1-DICHLOROETHENE	µg/L	1	U	U	U	1	U	U	U	2	2.8	2.5	5
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	3.5	2.5	9
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	1	U	U	U	2	3.8	2.5	10
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-HEXADECYNE	µg/L	--	--	--	--	1	54	54	54	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	1	U	U	U	1	U	U	U	2	2.8	0.5	10
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4,4-DDD	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4,4-DDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4,4-DDT	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACETONE	µg/L	3	U	U	U	1	U	U	U	2	U	U	U
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ALPHA-BHC	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ALPHA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1221	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1232	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1242	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1248	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1254	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1260	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AZINPHOSMETHYL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BROMODICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BROMOFORM	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CARBON DISULFIDE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	15	5	25
CHLOROFORM	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DEMETON	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DINOSEB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ENDOSULFAN-I	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ENDRIN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ENDRIN KETONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ETHION	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
FLUORENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
GAMMA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEPTACHLOR	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MALATHION	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	3	3.2	2.5	9	1	U	U	U	2	5.3	5	11
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
STYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1083				MONITORING WELL 1084				MONITORING WELL 1643			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORETHENE	µg/L	3	U	U	U	1	U	U	U	2	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	3	U	U	U	1	U	U	U	2	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	3	11	2.5	29	1	U	U	U	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
VINYL CHLORIDE	µg/L	1	U	U	U	1	U	U	U	2	4.5	4	10

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	1	2	2	2	2	U	U	U	3	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	2	U	U	U	2	U	U	U	3	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDT	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
4-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETONE	µg/L	2	13	5.5	21	2	U	U	U	3	3.7	2	10
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALPHA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1221	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1232	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1242	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1248	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1254	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1260	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	3	2	1	5
BROMOFORM	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBON DISULFIDE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHLOROETHANE	µg/L	1	2	2	2	2	U	U	U	3	U	U	U
CHLOROFORM	µg/L	1	U	U	U	2	U	U	U	3	3.3	2.5	5
CHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHRYSENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CUMENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DEMETON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DINOSEB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN-I	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
GAMMA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MALATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	2	4.8	4.5	9	2	3.5	2.5	9	3	2.8	2.5	7
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITRITE, AS N	µg/L	1	2	2	2.03	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
STYRENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1644				MONITORING WELL 1645				MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORETHENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	1	U	U	U	2	U	U	U	3	2	1	5
TOTAL XYLENES	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
VINYL CHLORIDE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1836				MONITORING WELL 1838			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	2	U	U	U	3	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	2	U	U	U	3	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	2	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	2	U	U	U	3	U	U	U
1,1-DICHLOROETHENE	µg/L	2	U	U	U	3	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	µg/L	2	U	U	U	3	U	U	U
1,2-DICHLOROETHYLENE	µg/L	2	U	U	U	3	U	U	U
1,2-DICHLOROPROPANE	µg/L	2	U	U	U	3	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--
1-HEXADECYNE	µg/L	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1836				MONITORING WELL 1838			
		Count	Avg	Min	Max	Count	Avg	Min	Max
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	2	6	5	10	3	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2-HEXANONE	µg/L	2	3.5	2	10	3	5.8	5	15
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--
2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	--	--	--	--
2-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	--	--	--	--
4,4-DDD	µg/L	--	--	--	--	--	--	--	--
4,4-DDE	µg/L	--	--	--	--	--	--	--	--
4,4-DDT	µg/L	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1836				MONITORING WELL 1838			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max
4-CHLOROANILINE	µg/L	--	--	--	--	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	2	U	U	U	3	5.7	5	10
4-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/L	--	--	--	--	--	--	--	--
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	--	--	--	--	--	--	--	--
ACETONE	µg/L	2	18	5	31	3	9.2	7	23
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--
ALPHA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1221	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1232	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1242	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1248	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1254	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1260	µg/L	--	--	--	--	--	--	--	--
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1836				MONITORING WELL 1838			
		Count	Avg	Min	Max	Count	Avg	Min	Max
BENZENE	µg/L	2	U	U	U	3	U	U	U
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	µg/L	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	--	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	µg/L	2	U	U	U	3	1.5	1	5
BROMOFORM	µg/L	2	U	U	U	3	U	U	U
BROMOMETHANE	µg/L	2	U	U	U	3	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--
CARBON DISULFIDE	µg/L	2	U	U	U	3	U	U	U
CARBON TETRACHLORIDE	µg/L	2	U	U	U	3	U	U	U
CHLOROBENZENE	µg/L	2	U	U	U	3	U	U	U
CHLOROETHANE	µg/L	2	U	U	U	3	U	U	U
CHLOROFORM	µg/L	2	U	U	U	3	2.3	1.5	5
CHLOROMETHANE	µg/L	2	U	U	U	3	U	U	U
CHRYSENE	µg/L	--	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	3	U	U	U
CUMENE	µg/L	--	--	--	--	1	U	U	U
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--
DEMETON	µg/L	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1836				MONITORING WELL 1838			
CHEMICAL PARAMETERS	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max
DIAZINON	µg/L	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	2	U	U	U	3	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--
DINOSEB	µg/L	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--
ENDOSULFAN-I	µg/L	--	--	--	--	--	--	--	--
ENDRIN	µg/L	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	--	--	--	--	--	--	--	--
ETHION	µg/L	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	2	U	U	U	3	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--
FLUORENE	µg/L	--	--	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	--	--	--	--
GAMMA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1836				MONITORING WELL 1838			
		Count	Avg	Min	Max	Count	Avg	Min	Max
HEPTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--
MALATHION	µg/L	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	1	2	2	2	3	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--

4783

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1836				MONITORING WELL 1838			
		Count	Avg	Min	Max	Count	Avg	Min	Max
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	--	--	--	--	--	--	--	--
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	--	--	--	--	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	--	--	--	--	--	--	--	--
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	--	--	--	--	--	--	--	--
PHENOL	µg/L	--	--	--	--	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--
PYRENE	µg/L	--	--	--	--	--	--	--	--
PYRIDINE	µg/L	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--
STYRENE	µg/L	2	U	U	U	3	U	U	U

TABLE 4-25
RI/FS GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1836				MONITORING WELL 1838			
		Count	Avg	Min	Max	Count	Avg	Min	Max
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--
TETRACHLORETHENE	µg/L	2	U	U	U	3	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXINS	µg/L	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURANS	µg/L	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	1	U	U	U	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--
TOLUENE	µg/L	2	1	1	1	3	1.2	0.5	5
TOTAL XYLENES	µg/L	2	U	U	U	3	U	U	U
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	3	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	2	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	2	U	U	U	3	U	U	U
VINYL CHLORIDE	µg/L	2	U	U	U	3	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-DINITROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-DINITROTOLUENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-NITROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)PYRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZOIC ACID	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZOFURAN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

725

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
M-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
M-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
M-METHYLPHENOL (CRESOL)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHAPYRILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL PARATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODI-N-PROPYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
O-METHYLPHENOL (CRESOL)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-CHLOROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
P-METHYLPHENOL (CRESOL)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDT	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALPHA-BHC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1016	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1221	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1232	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1242	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1248	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1254	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1260	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BETA-BHC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHLORDANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DELTA-BHC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIELDRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN II	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN SULFATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDRIN ALDEHYDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEPTACHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	5	U	U	U	4	U	U	U	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
1,1-DICHLORETHYLENE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	µg/L	8	U	U	U	4	U	U	U	2	2.1	1.9	2.3
1,1-DICHLOROETHENE	µg/L	5	U	U	U	4	U	U	U	2	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
1,2-DICHLOROETHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DICHLOROETHENE (TOTAL)	µg/L	3	U	U	U	4	U	U	U	2	12	8.5	14.5
1,2-DICHLOROPROPANE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	7	8.6	5	60	2	U	U	U	2	U	U	U
2-HEXANONE	µg/L	7	2.7	1	10	4	U	U	U	2	U	U	U
4-METHYL-2-PENTANONE	µg/L	7	2.7	1	10	4	U	U	U	2	U	U	U
ACETONE	µg/L	7	2.7	1	10	4	2	1	4.8	2	U	U	U
ACROLEIN	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
ALLYL CHLORIDE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
BENZENE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
BROMODICHLOROMETHANE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
BROMOFORM	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
BROMOMETHANE	µg/L	8	1.3	0.5	5	4	U	U	U	2	U	U	U
CARBON DISULFIDE	µg/L	7	U	U	U	4	U	U	U	2	U	U	U
CARBON TETRACHLORIDE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
CHLOROBENZENE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
CHLOROETHANE	µg/L	6	2.8	0.5	10	2	U	U	U	2	U	U	U
CHLOROFORM	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
CHLOROMETHANE	µg/L	8	2.2	0.5	10	4	U	U	U	2	U	U	U
CHLOROPRENE	µg/L	3	U	U	U	--	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1008				MONITORING WELL 1011				MONITORING WELL 1019			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
ETHYL BENZENE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
ETHYL METHACRYLATE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
METHACRYLONITRILE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
METHYL ETHYL KETONE	µg/L	7	2.7	1	10	4	U	U	U	2	U	U	U
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
METHYLENE BROMIDE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
METHYLENE CHLORIDE	µg/L	8	2.2	0.5	10	4	U	U	U	2	U	U	U
PENTACHLOROETHANE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
PROPIONITRILE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
STYRENE	µg/L	7	U	U	U	4	U	U	U	2	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
TETRACHLOROETHENE	µg/L	5	U	U	U	4	U	U	U	2	U	U	U
TETRACHLOROETHYLENE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
TOLUENE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	4	U	U	U	2	U	U	U	2	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
TRANS-1,3-DICHLOROPROPENE	µg/L	8	U	U	U	4	U	U	U	2	U	U	U
TRICHLOROETHENE	µg/L	5	U	U	U	4	U	U	U	2	U	U	U
TRICHLOROETHYLENE	µg/L	3	U	U	U	–	–	–	–	–	–	–	–
TRICHLOROFLUOROMETHANE	µg/L	4	U	U	U	–	–	–	–	–	–	–	–
VINYL ACETATE	µg/L	7	2.7	1	10	4	U	U	U	2	U	U	U
VINYL CHLORIDE	µg/L	8	1.3	0.5	5	4	U	U	U	2	U	U	U
XYLENES, TOTAL	µg/L	7	U	U	U	4	U	U	U	2	U	U	U

729

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DINITROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DINITROTOLUENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-CHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-NITROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-NITROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(A)PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZOIC ACID	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
CHRYSENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZOFURAN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIETHYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIMETHYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
		–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
NITROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
P-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PYRIDINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4,4'-DDE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4,4'-DDT	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ALPHA-BHC	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1016	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1221	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1232	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1242	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1248	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1254	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1260	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BETA-BHC	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
CHLORDANE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DELTA-BHC	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIELDRIN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDOSULFAN II	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDOSULFAN SULFATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDRIN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDRIN ALDEHYDE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEPTACHLOR	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	9	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
1,1-DICHLORETHYLENE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
1,1-DICHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	12	U	U	U
1,1-DICHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	9	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
1,2-DIBROMOETHANE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
1,2-DICHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	12	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	2	U	U	U	2	U	U	U	9	U	U	U
1,2-DICHLOROPROPANE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	2	U	U	U	2	U	U	U	9	U	U	U
2-HEXANONE	µg/L	2	U	U	U	2	U	U	U	11	1.7	1	10
4-METHYL-2-PENTANONE	µg/L	2	U	U	U	2	U	U	U	11	1.7	1	10
ACETONE	µg/L	2	U	U	U	2	U	U	U	12	2	1	10
ACROLEIN	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
ACRYLONITRILE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
ALLYL CHLORIDE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
BENZENE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
BROMODICHLOROMETHANE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
BROMOFORM	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
BROMOMETHANE	µg/L	2	U	U	U	2	U	U	U	11	0.86	0.5	5
CARBON DISULFIDE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
CARBON TETRACHLORIDE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
CHLOROBENZENE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
CHLOROETHANE	µg/L	2	0.95	0.5	1.4	2	U	U	U	9	U	U	U
CHLOROFORM	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
CHLOROMETHANE	µg/L	2	U	U	U	2	U	U	U	11	1.3	0.5	10
CHLOROPRENE	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1021				MONITORING WELL 1022				MONITORING WELL 1025			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ETHYL BENZENE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
FLUOROTRICHLOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHYL ETHYL KETONE	µg/L	2	U	U	U	2	U	U	U	11	1.7	1	10
METHYL ISOBUTYL KETONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHYLENE BROMIDE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHYLENE CHLORIDE	µg/L	2	1.8	0.5	3	2	U	U	U	12	1.3	0.5	10
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PROPIONITRILE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
STYRENE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TETRACHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	10	U	U	U
TETRACHLOROETHYLENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TOLUENE	µg/L	2	U	U	U	2	U	U	U	12	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	7	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	2	U	U	U	11	U	U	U
TRICHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	10	U	U	U
TRICHLOROETHYLENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
VINYL ACETATE	µg/L	2	U	U	U	2	U	U	U	11	1.7	1	10
VINYL CHLORIDE	µg/L	2	U	U	U	2	U	U	U	11	0.86	0.5	5
XYLENES, TOTAL	µg/L	2	U	U	U	2	U	U	U	11	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4-DINITROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4-DINITROTOLUENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-CHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-NITROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-NITROANILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-NITROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZO(A)PYRENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZOIC ACID	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZYL ALCOHOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIBENZOFURAN	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
FLUORENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROETHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-DICHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
NITROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
O-DICHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	1	U	U	U
O-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
P-DICHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PYRIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDT	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
ALPHA-BHC	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1016	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1221	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1232	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1242	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1248	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1254	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1260	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
BETA-BHC	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
CHLORDANE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
DELTA-BHC	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
DIELDRIN	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN II	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN SULFATE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
ENDRIN	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
ENDRIN ALDEHYDE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
HEPTACHLOR	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	9	U	U	U	1	U	U	U	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
1,1-DICHLORETHYLENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
1,1-DICHLOROETHANE	µg/L	12	U	U	U	1	U	U	U	2	U	U	U
1,1-DICHLOROETHENE	µg/L	9	U	U	U	1	U	U	U	2	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
1,2-DIBROMOETHANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
1,2-DICHLOROETHANE	µg/L	12	U	U	U	1	U	U	U	2	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
1,2-DICHLOROETHENE (TOTAL)	µg/L	8	U	U	U	1	U	U	U	–	–	–	–
1,2-DICHLOROPROPANE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	9	U	U	U	–	–	–	–	2	18	5	60
2-HEXANONE	µg/L	11	1.7	1	10	1	U	U	U	1	U	U	U
4-METHYL-2-PENTANONE	µg/L	11	1.7	0.5	10	1	U	U	U	1	U	U	U
ACETONE	µg/L	12	2.3	1	10	1	U	U	U	1	U	U	U
ACROLEIN	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ACRYLONITRILE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ALLYL CHLORIDE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BENZENE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
BROMODICHLOROMETHANE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
BROMOFORM	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
BROMOMETHANE	µg/L	11	0.86	0.5	5	1	U	U	U	2	U	U	U
CARBON DISULFIDE	µg/L	11	–	–	–	1	U	U	U	1	U	U	U
CARBON TETRACHLORIDE	µg/L	11	–	–	–	1	U	U	U	2	U	U	U
CHLOROBENZENE	µg/L	11	–	–	–	1	U	U	U	2	U	U	U
CHLOROETHANE	µg/L	9	1.5	0.5	10	–	–	–	–	1	U	U	U
CHLOROFORM	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
CHLOROMETHANE	µg/L	11	1.3	0.5	10	1	U	U	U	2	U	U	U
CHLOROPRENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
CIS-1,3-DICHLOROPROPENE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1027				MONITORING WELL 1028				MONITORING WELL 1029			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ETHYL BENZENE	µg/L	11	U	U	U	1	U	U	U	2	U	U	U
ETHYL METHACRYLATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
METHACRYLONITRILE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
METHYL ETHYL KETONE	µg/L	11	1.7	1	10	1	U	U	U	1	U	U	U
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
METHYLENE BROMIDE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
METHYLENE CHLORIDE	µg/L	12	1.3	0.5	10	1	U	U	U	2	U	U	U
PENTACHLOROETHANE	µg/L	2	–	–	–	–	–	–	–	–	–	–	–
PROPIONITRILE	µg/L	2	–	–	–	–	–	–	–	–	–	–	–
STYRENE	µg/L	11	–	–	–	1	U	U	U	1	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	2	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROETHENE	µg/L	10	–	–	–	1	U	U	U	2	U	U	U
TETRACHLOROETHYLENE	µg/L	2	–	–	–	–	–	–	–	–	–	–	–
TOLUENE	µg/L	12	–	–	–	1	U	U	U	2	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	7	–	–	–	–	–	–	–	2	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,3-DICHLOROPROPENE	µg/L	11	–	–	–	1	U	U	U	2	U	U	U
TRICHLOROETHENE	µg/L	10	–	–	–	1	U	U	U	2	U	U	U
TRICHLOROETHYLENE	µg/L	2	–	–	–	–	–	–	–	–	–	–	–
TRICHLOROFLUOROMETHANE	µg/L	2	–	–	–	–	–	–	–	1	U	U	U
VINYL ACETATE	µg/L	11	1.7	0.5	10	1	U	U	U	1	U	U	U
VINYL CHLORIDE	µg/L	11	0.86	0.5	5	1	U	U	U	2	U	U	U
XYLENES, TOTAL	µg/L	11	U	U	U	1	U	U	U	1	U	U	U

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	1	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
2,4-DINITROPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
2,4-DINITROTOLUENE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	2	2.3	2	5.2	1	U	U	U	–	–	–	–
2-CHLOROPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
2-NITROPHENOL	µg/L	2	4.9	2.7	7.2	1	U	U	U	–	–	–	–
2-PICOLINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
4-AMINOBIPHENYL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
4-NITROANILINE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
4-NITROPHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
ACETOPHENONE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ANILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
ARAMITE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
BENZO(A)PYRENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BENZYL ALCOHOL	µg/L	2	23	20	53	1	U	U	U	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
CHLOROBENZILATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIALLATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
DIBENZOFURAN	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
DIMETHOATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	2	8.8	7.5	20	1	U	U	U	–	–	–	–
DISULFOTON	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
FLUORENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
HEXACHLOROBENZENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
HEXACHLOROETHANE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
HEXACHLOROPHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
ISODRIN	µg/L	1	U	U	U	--	--	--		--	--	--	--
ISOPHORONE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
ISOSAFROLE	µg/L	1	U	U	U	--	--	--		--	--	--	--
KEPONE	µg/L	1	U	U	U	--	--	--		--	--	--	--
M-DICHLOROBENZENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
M-DINITROBENZENE	µg/L	1	U	U	U	--	--	--		--	--	--	--
M-METHYLPHENOL (CRESOL)	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
METHAPYRILINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
METHYL METHANESULFONATE	µg/L	1	U	U	U	--	--	--		--	--	--	--
METHYL PARATHION	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSODI-N-PROPYLAMINE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSOMORPHOLINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSOPIPERIDINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
NAPHTHALENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
NITROBENZENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
O-DICHLOROBENZENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
O-METHYLPHENOL (CRESOL)	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
O-TOLUIDINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
P-CHLOROANILINE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
P-DICHLOROBENZENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
P-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	--	--	--		--	--	--	--
P-PHENYLENEDIAMINE	µg/L	1	U	U	U	--	--	--		--	--	--	--
PARATHION	µg/L	1	U	U	U	--	--	--		--	--	--	--
PENTACHLOROBENZENE	µg/L	1	U	U	U	--	--	--		--	--	--	--
PENTACHLORONITROBENZENE	µg/L	1	U	U	U	--	--	--		--	--	--	--
PENTACHLOROPHENOL	µg/L	2	3.8	2.7	5.3	1	U	U	U	--	--	--	--
PHENACETIN	µg/L	1	U	U	U	--	--	--		--	--	--	--
PHENANTHRENE	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
PHENOL	µg/L	2	2.3	2	5.3	1	U	U	U	--	--	--	--
PHORATE	µg/L	1	U	U	U	--	--	--		--	--	--	--

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	1	U	U	U	–	–	–		–	–	–	–
PYRENE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
PYRIDINE	µg/L	2	2.3	2	5.3	1	U	U	U	–	–	–	–
SAFROLE	µg/L	1	U	U	U	–	–	–		–	–	–	–
SULFOTEPP	µg/L	1	U	U	U	–	–	–		–	–	–	–
SYM-TRINITROBENZENE	µg/L	1	U	U	U	–	–	–		–	–	–	–
TETRACHLOROPHENOL	µg/L	1	4.2	4.2	4.2	–	–	–		–	–	–	–
THIONAZIN	µg/L	1	U	U	U	–	–	–		–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	1	U	U	U	–	–	–		–	–	–	–
2,4,5-T	µg/L	1	U	U	U	–	–	–		–	–	–	–
2,4,5-TP (SILVEX)	µg/L	1	U	U	U	–	–	–		–	–	–	–
2,4-D	µg/L	1	U	U	U	–	–	–		–	–	–	–
4,4'-DDD	µg/L	2	1.1	0.1	4	1	U	U	U	–	–	–	–
4,4'-DDE	µg/L	2	1.1	0.1	4	1	U	U	U	–	–	–	–
4,4'-DDT	µg/L	2	1.1	0.1	4	1	U	U	U	–	–	–	–
ACETONITRILE	µg/L	1	U	U	U	–	–	–		–	–	–	–
ALDRIN	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
ALPHA-BHC	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1016	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1221	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1232	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1242	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1248	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1254	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
AROCLOR 1260	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
BETA-BHC	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
CHLORDANE	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
DELTA-BHC	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
DIELDRIN	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
DINOSEB	µg/L	1	U	U	U	–	–	–		–	–	–	–
ENDOSULFAN I	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
ENDOSULFAN II	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
ENDOSULFAN SULFATE	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
ENDRIN	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
ENDRIN ALDEHYDE	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
HEPTACHLOR	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	2	U	U	U	1	U	U	U	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	1	U	U	U	–	–	–		–	–	–	–
METHOXYCHLOR	µg/L	1	U	U	U	–	–	–		–	–	–	–
P-DIOXANE	µg/L	1	U	U	U	–	–	–		–	–	–	–
TOXAPHENE	µg/L	2	U	U	U	1	U	U	U	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	–	–	–		–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	12	1.8	0.5	5	11	0.55	0.5	1	1	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	10	1.8	0.5	5	9	U	U	U	1	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
1,1-DICHLORETHYLENE	µg/L	2	2.8	0.5	5.1	2	0.75	0.5	1	–	–	–	
1,1-DICHLOROETHANE	µg/L	13	21	14	37.2	12	0.54	0.5	1	1	U	U	U
1,1-DICHLOROETHENE	µg/L	10	2.9	1.3	5.6	9	U	U	U	1	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	1	U	U	U	–	–	–	
1,2,3-TRICHLOROPROPANE	µg/L	3	U	U	U	2	3.8	2.5	5	–	–	–	
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	3	17	1	100	2	1.5	1	2	–	–	–	
1,2-DIBROMOETHANE	µg/L	3	17	1	100	2	1.5	1	2	–	–	–	
1,2-DICHLOROETHANE	µg/L	13	1.8	0.5	5	12	0.54	0.5	1	1	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	
1,2-DICHLOROETHENE (TOTAL)	µg/L	9	42	1	77.7	8	U	U	U	1	U	U	U
1,2-DICHLOROPROPANE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	8	16	5	50	9	5.6	5	10	1	U	U	U
2-HEXANONE	µg/L	12	3.9	1	10	11	2.2	1	10	1	U	U	U
4-METHYL-2-PENTANONE	µg/L	11	4.2	1	10	11	2.1	0.5	10	1	U	U	U
ACETONE	µg/L	13	12	1	78	12	2.1	1	10	1	U	U	U
ACROLEIN	µg/L	3	33	25	100	2	38	25	50	–	–	–	
ACRYLONITRILE	µg/L	3	33	25	100	2	38	25	50	–	–	–	
ALLYL CHLORIDE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
BENZENE	µg/L	12	1.9	0.5	5	11	0.55	0.5	1	1	U	U	U
BROMODICHLOROMETHANE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
BROMOFORM	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
BROMOMETHANE	µg/L	12	1.9	0.5	5	11	1.1	0.5	5	1	U	U	U
CARBON DISULFIDE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
CARBON TETRACHLORIDE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
CHLOROBENZENE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
CHLOROETHANE	µg/L	9	2.7	0.5	10	9	2.1	0.5	10	1	U	U	U
CHLOROFORM	µg/L	12	1.8	0.5	5	11	0.55	0.5	1	1	U	U	U
CHLOROMETHANE	µg/L	12	2.4	0.5	10	11	1.8	0.5	10	1	U	U	U
CHLOROPRENE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
CIS-1,3-DICHLOROPROPENE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1031				MONITORING WELL 1074				MONITORING WELL 1076			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	
DICHLORODIFLUOROMETHANE	µg/L	3	5.8	5	10	2	7.5	5	10	–	–	–	
ETHYL BENZENE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
ETHYL METHACRYLATE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
FLUOROTRICHLOROMETHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	
IODOMETHANE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
METHACRYLONITRILE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
METHYL ETHYL KETONE	µg/L	12	3.9	1	10	11	2.2	1	10	1	U	U	U
METHYL ISOBUTYL KETONE	µg/L	1	U	U	U	1	U	U	U	–	–	–	
METHYL METHACRYLATE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
METHYLENE BROMIDE	µg/L	2	U	U	U	2	0.75	0.5	1	–	–	–	
METHYLENE CHLORIDE	µg/L	13	3.3	1.3	10	12	1.7	0.5	10	1	U	U	U
PENTACHLOROETHANE	µg/L	3	18	2.5	100	2	3.8	2.5	5	–	–	–	
PROPIONITRILE	µg/L	3	23	10	100	2	15	10	20	–	–	–	
STYRENE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	3	23	10	100	2	15	10	20	–	–	–	
TETRACHLOROETHENE	µg/L	11	170	130	205	10	U	U	U	1	U	U	U
TETRACHLOROETHYLENE	µg/L	2	160	120	189	2	0.75	0.5	1	–	–	–	
TOLUENE	µg/L	13	1.7	0.5	5	12	0.54	0.5	1	1	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	7	7.8	6	11.2	7	U	U	U	1	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	3.5	0.5	6.5	2	0.75	0.5	1	–	–	–	
TRANS-1,3-DICHLOROPROPENE	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U
TRICHLOROETHENE	µg/L	11	270	140	344	10	U	U	U	1	U	U	U
TRICHLOROETHYLENE	µg/L	2	280	250	312	2	0.75	0.5	1	–	–	–	
TRICHLOROFLUOROMETHANE	µg/L	2	U	U	U	2	0.75	0.5	1	–	–	–	
VINYL ACETATE	µg/L	12	3.9	1	10	11	2.2	1	10	1	U	U	U
VINYL CHLORIDE	µg/L	12	4.3	1.3	7	11	1.1	0.5	5	1	U	U	U
XYLENES, TOTAL	µg/L	12	1.6	0.5	5	11	0.55	0.5	1	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	3	U	U	U	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	3	U	U	U	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BENZO(A)PYRENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	–	–	–	–	4	10	2	35.4	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	3	U	U	U	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–	2	4.8	2	15	1	U	U	U
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
FLUORENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
HEXACHLOROBENZENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
HEXACHLOROETHANE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

749

4289

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-DICHLOROBENZENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
NITROBENZENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
O-DICHLOROBENZENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
P-DICHLOROBENZENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
PHENOL	µg/L	–	–	–	–	4	U	U	U	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	--	--	--	--	4	U	U	U	1	U	U	U
PYRIDINE	µg/L	--	--	--	--	2	U	U	U	1	U	U	U
SAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SYM-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRIETHYL PHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDD	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
4,4'-DDE	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
4,4'-DDT	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1016	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1221	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1232	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1242	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1248	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1254	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
AROCLOR 1260	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
BETA-BHC	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
CHLORDANE	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
DELTA-BHC	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
DIELDRIN	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN I	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
ENDOSULFAN II	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
ENDRIN	µg/L	--	--	--	--	3	0.08	0.04	0.2	1	U	U	U
ENDRIN ALDEHYDE	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	--	--	--	--	3	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	3	U	U	U	1	U	U	U

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	3	U	U	U	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	9	U	U	U	10	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
1,1-DICHLORETHYLENE	µg/L	–	–	–	–	2	0.75	0.5	1	1	U	U	U
1,1-DICHLOROETHANE	µg/L	1	U	U	U	12	0.54	0.5	1	12	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	9	U	U	U	10	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	–	–	–	–	2	1.5	1	2	1	U	U	U
1,2-DIBROMOETHANE	µg/L	–	–	–	–	2	1.5	1	2	1	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	12	0.54	0.5	1	12	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	1	U	U	U	9	U	U	U	10	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	1	U	U	U	9	5.6	5	10	9	U	U	U
2-HEXANONE	µg/L	1	U	U	U	11	2.2	1	10	11	1.4	1	10
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	11	2.2	1	10	11	1.3	0.5	10
ACETONE	µg/L	1	U	U	U	12	2.1	1	10	12	2.6	U	15.8
ACROLEIN	µg/L	–	–	–	–	2	38	25	50	1	U	U	U
ACRYLONITRILE	µg/L	–	–	–	–	2	38	25	50	1	U	U	U
ALLYL CHLORIDE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
BENZENE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
BROMOFORM	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	11	1.1	0.5	5	11	0.68	0.5	5
CARBON DISULFIDE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	9	2.1	0.5	10	9	1	0.5	10
CHLOROFORM	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	11	1.8	0.5	10	11	0.91	U	U
CHLOROPRENE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1077				MONITORING WELL 1079				MONITORING WELL 1080			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	–	–	–	–	2	7.5	5	10	1	U	U	U
ETHYL BENZENE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
ETHYL METHACRYLATE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
METHACRYLONITRILE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
METHYL ETHYL KETONE	µg/L	1	U	U	U	11	2.2	1	10	11	1.3	0.5	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
METHYLENE BROMIDE	µg/L	–	–	–	–	2	0.75	0.5	1	1	U	U	U
METHYLENE CHLORIDE	µg/L	1	U	U	U	12	1.7	0.5	10	12	0.88	0.5	10
PENTACHLOROETHANE	µg/L	–	–	–	–	2	3.8	2.5	5	1	U	U	U
PROPIONITRILE	µg/L	–	–	–	–	2	15	10	20	1	U	U	U
STYRENE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	–	–	–	–	2	15	10	20	1	U	U	U
TETRACHLOROETHENE	µg/L	1	U	U	U	10	U	U	U	11	U	U	U
TETRACHLOROETHYLENE	µg/L	–	–	–	–	2	0.75	0.5	1	1	U	U	U
TOLUENE	µg/L	1	U	U	U	12	0.54	0.5	1	12	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	1	U	U	U	7	U	U	U	8	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	–	–	–	–	2	0.75	0.5	1	1	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U
TRICHLOROETHENE	µg/L	1	U	U	U	10	U	U	U	11	U	U	U
TRICHLOROETHYLENE	µg/L	–	–	–	–	2	0.75	0.5	1	1	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	–	–	–	–	2	0.75	0.5	1	1	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	11	2.1	0.5	10	11	1.4	1	10
VINYL CHLORIDE	µg/L	1	U	U	U	11	1.1	0.5	5	11	0.68	0.5	5
XYLENES, TOTAL	µg/L	1	U	U	U	11	0.55	0.5	1	11	U	U	U

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDT	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1016	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1221	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1232	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1242	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1248	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1254	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1260	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN ALDEHYDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	9	U	U	U	9	U	U	U	10	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
1,1-DICHLORETHYLENE	µg/L	2	0.75	0.5	1	2	0.75	0.5	1	2	U	U	U
1,1-DICHLOROETHANE	µg/L	12	0.54	0.5	1	12	0.54	0.5	1	13	U	U	U
1,1-DICHLOROETHENE	µg/L	9	U	U	U	9	U	U	U	10	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	2	1.5	1	2	2	1.5	1	2	2	U	U	U
1,2-DIBROMOETHANE	µg/L	2	1.5	1	2	2	1.5	1	2	2	U	U	U
1,2-DICHLOROETHANE	µg/L	12	0.54	0.5	1	12	0.54	0.5	1	13	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	8	U	U	U	8	U	U	U	10	U	U	U
1,2-DICHLOROPROPANE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	9	5.6	5	10	9	5.6	5	10	10	U	U	U
2-HEXANONE	µg/L	11	2.2	1	10	11	2.2	1	10	12	1.7	1	10
4-METHYL-2-PENTANONE	µg/L	11	2.2	1	10	11	2.2	1	10	12	1.7	1	10
ACETONE	µg/L	12	2.2	1	10	12	2.1	1	10	13	1.6	1	10
ACROLEIN	µg/L	2	38	25	50	2	38	25	50	2	U	U	U
ACRYLONITRILE	µg/L	2	38	25	50	2	38	25	50	2	U	U	U
ALLYL CHLORIDE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
BENZENE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
BROMODICHLOROMETHANE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
BROMOFORM	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
BROMOMETHANE	µg/L	11	1.1	0.5	5	11	1.1	0.5	5	12	0.83	0.5	5
CARBON DISULFIDE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
CARBON TETRACHLORIDE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
CHLOROBENZENE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
CHLOROETHANE	µg/L	9	2.1	0.5	10	9	2.1	0.5	10	10	1.4	0.5	10
CHLOROFORM	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
CHLOROMETHANE	µg/L	11	1.8	0.5	10	11	1.8	0.5	10	12	1.3	0.5	10
CHLOROPRENE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1081				MONITORING WELL 1082				MONITORING WELL 1083			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	2	7.5	5	10	2	7.5	5	10	2	U	U	U
ETHYL BENZENE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
ETHYL METHACRYLATE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
METHACRYLONITRILE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
METHYL ETHYL KETONE	µg/L	11	2.2	1	10	11	2.2	1	10	12	1.7	1	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
METHYLENE BROMIDE	µg/L	2	0.75	0.5	1	2	0.75	0.5	1	2	U	U	U
METHYLENE CHLORIDE	µg/L	12	1.7	0.5	10	12	1.7	0.5	10	13	1.2	0.5	10
PENTACHLOROETHANE	µg/L	2	3.8	2.5	5	2	3.8	2.5	5	2	U	U	U
PROPIONITRILE	µg/L	2	15	10	20	2	15	10	20	2	U	U	U
STYRENE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	2	15	10	20	2	15	10	20	2	U	U	U
TETRACHLOROETHENE	µg/L	10	U	U	U	10	U	U	U	11	U	U	U
TETRACHLOROETHYLENE	µg/L	2	0.75	0.5	1	2	0.75	0.5	1	2	U	U	U
TOLUENE	µg/L	12	0.54	0.5	1	12	0.54	0.5	1	13	0.58	0.5	1.5
TRANS-1,2-DICHLOROETHENE	µg/L	7	U	U	U	7	U	U	U	8	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	0.75	0.5	1	2	0.75	0.5	1	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U
TRICHLOROETHENE	µg/L	10	U	U	U	10	U	U	U	11	U	U	U
TRICHLOROETHYLENE	µg/L	2	0.75	0.5	1	2	0.75	0.5	1	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	2	0.75	0.5	1	2	0.75	0.5	1	2	U	U	U
VINYL ACETATE	µg/L	11	2.2	1	10	11	2.2	1	10	12	1.7	1	10
VINYL CHLORIDE	µg/L	11	1.1	0.5	5	11	1.1	0.5	5	12	0.83	0.5	5
XYLENES, TOTAL	µg/L	11	0.55	0.5	1	11	0.55	0.5	1	12	U	U	U

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1-NAPHTHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NAPHTHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETOPHENONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ARAMITE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHLOROBENZILATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIALLATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHOATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYLBENZ(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DISULFOTON	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ETHYL METHANESULFONATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FAMPHUR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

761

4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISODRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
KEPONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
M-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
M-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHAPYRILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL METHANESULFONATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL PARATHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMORPHOLINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-TOLUIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PARATHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PENTACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENACETIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHORATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SAFROLE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SULFOTEPP	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SYM-TRINITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TETRACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
THIONAZIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TRIETHYL PHOSPHOROTHIOATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDT	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1016	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1221	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1232	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1242	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1248	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1254	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1260	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN ALDEHYDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	4	U	U	U	4	U	U	U	4	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
1,1-DICHLORETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
1,1-DICHLOROETHANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
1,1-DICHLOROETHENE	µg/L	4	U	U	U	4	U	U	U	4	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	3	1.8	0.5	5	3	1.8	0.5	5	3	1.8	0.5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	3	4	1	20	3	4	1	20	3	4	1	20
1,2-DIBROMOETHANE	µg/L	3	4	1	20	3	4	1	20	3	4	1	20
1,2-DICHLOROETHANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHENE (TOTAL)	µg/L	3	U	U	U	3	0.7	0.5	1.1	3	U	U	U
1,2-DICHLOROPROPANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	5	U	U	U	5	U	U	U	5	U	U	U
2-HEXANONE	µg/L	6	2.3	1	10	6	2.3	1	10	6	2.3	1	10
4-METHYL-2-PENTANONE	µg/L	5	2.6	1	10	5	2.6	1	10	5	2.6	1	10
ACETONE	µg/L	6	3	1	10	6	2.5	1	10	6	2.3	1	10
ACROLEIN	µg/L	3	20	10	50	3	20	10	50	3	20	10	50
ACRYLONITRILE	µg/L	3	20	10	50	3	20	10	50	3	20	10	50
ALLYL CHLORIDE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
BENZENE	µg/L	6	U	U	U	6	1.9	0.5	4.6	6	U	U	U
BROMODICHLOROMETHANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
BROMOFORM	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
BROMOMETHANE	µg/L	6	1.2	0.5	5	6	1.2	0.5	5	6	1.2	0.5	5
CARBON DISULFIDE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
CARBON TETRACHLORIDE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
CHLOROBENZENE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
CHLOROETHANE	µg/L	6	2	0.5	10	6	2	0.5	10	6	2	0.5	10
CHLOROFORM	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
CHLOROMETHANE	µg/L	6	2	0.5	10	6	2	0.5	10	6	2	0.5	10
CHLOROPRENE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
CIS-1,3-DICHLOROPROPENE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1643				MONITORING WELL 1644				MONITORING WELL 1645			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	3	3.5	0.5	10	3	3.5	0.5	10	3	3.5	0.5	10
ETHYL BENZENE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
ETHYL METHACRYLATE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
FLUOROTRICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
IODOMETHANE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
METHACRYLONITRILE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
METHYL ETHYL KETONE	µg/L	6	2.3	1	10	6	2.3	1	10	6	2.3	1	10
METHYL ISOBUTYL KETONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL METHACRYLATE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
METHYLENE BROMIDE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
METHYLENE CHLORIDE	µg/L	6	2	0.5	10	6	2	0.5	10	6	2	0.5	10
PENTACHLOROETHANE	µg/L	3	5	2.5	20	3	5	2.5	20	3	5	2.5	20
PROPIONITRILE	µg/L	3	U	U	U	3	U	U	U	3	U	U	U
STYRENE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	3	10	10	20	3	U	U	U	3	U	U	U
TETRACHLOROETHENE	µg/L	4	U	U	U	4	U	U	U	4	U	U	U
TETRACHLOROETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
TOLUENE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	4	U	U	U	4	U	U	U	4	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	6	U	U	U	6	U	U	U	6	U	U	U
TRICHLOROETHENE	µg/L	4	U	U	U	4	U	U	U	4	U	U	U
TRICHLOROETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
VINYL ACETATE	µg/L	6	2.3	1	10	6	2.3	1	10	6	2.3	1	10
VINYL CHLORIDE	µg/L	6	1.2	0.5	5	6	1.2	0.5	5	6	1.2	0.5	5
XYLENES, TOTAL	µg/L	6	U	U	U	6	0.83	0.5	2.5	6	U	U	U

D-4783

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1646 COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	1	U	U	U
1-NAPHTHYLAMINE	µg/L	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	1	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U
2-NAPHTHYLAMINE	µg/L	1	U	U	U
2-NITROANILINE	µg/L	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U
2-PICOLINE	µg/L	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	1	U	U	U
3-NITROANILINE	µg/L	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U
4-AMINOBIPHENYL	µg/L	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	1	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U
ACETOPHENONE	µg/L	1	U	U	U
ANILINE	µg/L	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1646 COUNT	AVG	MIN	MAX
ANTHRACENE	µg/L	1	U	U	U
ARAMITE	µg/L	1	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U
BENZOIC ACID	µg/L	–	–	–	–
BENZYL ALCOHOL	µg/L	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U
CHLOROBENZILATE	µg/L	1	U	U	U
CHRYSENE	µg/L	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	1	U	U	U
DIALLATE	µg/L	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	1	U	U	U
DIETHYL PHTHALATE	µg/L	1	U	U	U
DIMETHOATE	µg/L	1	U	U	U
DIMETHYL PHTHALATE	µg/L	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	1	U	U	U
DIMETHYLBENZ(A)ANTHRACENE	µg/L	1	U	U	U
DIPHENYLAMINE	µg/L	1	U	U	U
DISULFOTON	µg/L	1	U	U	U
ETHYL METHANESULFONATE	µg/L	1	U	U	U
FAMPHUR	µg/L	1	U	U	U
FLUORANTHENE	µg/L	1	U	U	U
FLUORENE	µg/L	1	U	U	U
HEXACHLOROBENZENE	µg/L	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U
HEXACHLOROETHANE	µg/L	1	U	U	U
HEXACHLOROPHENE	µg/L	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 1646			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX
HEXACHLOROPROPENE	µg/L	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U
ISODRIN	µg/L	1	U	U	U
ISOPHORONE	µg/L	1	U	U	U
ISOSAFROLE	µg/L	1	U	U	U
KEPONE	µg/L	1	U	U	U
M-DICHLOROBENZENE	µg/L	1	U	U	U
M-DINITROBENZENE	µg/L	1	U	U	U
M-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U
METHAPYRILINE	µg/L	1	U	U	U
METHYL METHANESULFONATE	µg/L	1	U	U	U
METHYL PARATHION	µg/L	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	1	U	U	U
N-NITROSODI-N-PROPYLAMINE	µg/L	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	1	U	U	U
N-NITROSOMORPHOLINE	µg/L	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	1	U	U	U
NAPHTHALENE	µg/L	1	U	U	U
NITROBENZENE	µg/L	1	U	U	U
O-DICHLOROBENZENE	µg/L	1	U	U	U
O-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U
O-TOLUIDINE	µg/L	1	U	U	U
P-CHLOROANILINE	µg/L	1	U	U	U
P-DICHLOROBENZENE	µg/L	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	1	U	U	U
PARATHION	µg/L	1	U	U	U
PENTACHLOROBENZENE	µg/L	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	1	U	U	U
PENTACHLOROPHENOL	µg/L	1	U	U	U
PHENACETIN	µg/L	1	U	U	U
PHENANTHRENE	µg/L	1	U	U	U
PHENOL	µg/L	1	U	U	U
PHORATE	µg/L	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1646 COUNT	AVG	MIN	MAX
PRONAMIDE	µg/L	1	U	U	U
PYRENE	µg/L	1	U	U	U
PYRIDINE	µg/L	1	U	U	U
SAFROLE	µg/L	1	U	U	U
SULFOTEPP	µg/L	1	U	U	U
SYM-TRINITROBENZENE	µg/L	1	U	U	U
TETRACHLOROPHENOL	µg/L	1	U	U	U
THIONAZIN	µg/L	1	U	U	U
TRIETHYL PHOSPHOROTHIOATE	µg/L	1	U	U	U
2,4,5-T	µg/L	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	1	U	U	U
2,4-D	µg/L	1	U	U	U
4,4'-DDD	µg/L	1	U	U	U
4,4'-DDE	µg/L	1	U	U	U
4,4'-DDT	µg/L	1	U	U	U
ACETONITRILE	µg/L	1	U	U	U
ALDRIN	µg/L	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U
AROCLOR 1016	µg/L	1	U	U	U
AROCLOR 1221	µg/L	1	U	U	U
AROCLOR 1232	µg/L	1	U	U	U
AROCLOR 1242	µg/L	1	U	U	U
AROCLOR 1248	µg/L	1	U	U	U
AROCLOR 1254	µg/L	1	U	U	U
AROCLOR 1260	µg/L	1	U	U	U
BETA-BHC	µg/L	1	U	U	U
CHLORDANE	µg/L	1	U	U	U
DELTA-BHC	µg/L	1	U	U	U
DIELDRIN	µg/L	1	U	U	U
DINOSEB	µg/L	1	U	U	U
ENDOSULFAN I	µg/L	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U
ENDRIN	µg/L	1	U	U	U
ENDRIN ALDEHYDE	µg/L	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1646 COUNT	AVG	MIN	MAX
ISOBUTYL ALCOHOL	µg/L	1	U	U	U
METHOXYCHLOR	µg/L	1	U	U	U
P-DIOXANE	µg/L	1	U	U	U
TOXAPHENE	µg/L	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	6	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	4	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	6	U	U	U
1,1-DICHLORETHYLENE	µg/L	2	U	U	U
1,1-DICHLOROETHANE	µg/L	6	U	U	U
1,1-DICHLOROETHENE	µg/L	4	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	3	1.8	0.5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	3	4	1	20
1,2-DIBROMOETHANE	µg/L	3	4	1	20
1,2-DICHLOROETHANE	µg/L	6	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	3	U	U	U
1,2-DICHLOROPROPANE	µg/L	6	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	5	U	U	U
2-HEXANONE	µg/L	6	2.3	1	10
4-METHYL-2-PENTANONE	µg/L	5	2.6	1	10
ACETONE	µg/L	6	2.3	1	10
ACROLEIN	µg/L	3	20	10	50
ACRYLONITRILE	µg/L	3	20	10	50
ALLYL CHLORIDE	µg/L	3	5	2.5	20
BENZENE	µg/L	6	U	U	U
BROMODICHLOROMETHANE	µg/L	6	U	U	U
BROMOFORM	µg/L	6	U	U	U
BROMOMETHANE	µg/L	6	1.2	0.5	5
CARBON DISULFIDE	µg/L	6	U	U	U
CARBON TETRACHLORIDE	µg/L	6	U	U	U
CHLOROBENZENE	µg/L	6	U	U	U
CHLOROETHANE	µg/L	6	2	0.5	10
CHLOROFORM	µg/L	6	U	U	U
CHLOROMETHANE	µg/L	6	2	0.5	10
CHLOROPRENE	µg/L	3	5	2.5	20
CIS-1,3-DICHLOROPROPENE	µg/L	6	U	U	U

TABLE 4-26
RCRA GROUNDWATER 1000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 1646 COUNT	AVG	MIN	MAX
DIBROMOCHLOROMETHANE	µg/L	6	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	3	3.5	0.5	10
ETHYL BENZENE	µg/L	6	U	U	U
ETHYL METHACRYLATE	µg/L	3	5	2.5	20
FLUOROTRICHLOROMETHANE	µg/L	1	U	U	U
IODOMETHANE	µg/L	3	5	2.5	20
METHACRYLONITRILE	µg/L	3	5	2.5	20
METHYL ETHYL KETONE	µg/L	6	2.3	1	10
METHYL ISOBUTYL KETONE	µg/L	1	U	U	U
METHYL METHACRYLATE	µg/L	3	5	2.5	20
METHYLENE BROMIDE	µg/L	2	U	U	U
METHYLENE CHLORIDE	µg/L	6	2	0.5	10
PENTACHLOROETHANE	µg/L	3	5	2.5	20
PROPIONITRILE	µg/L	3	U	U	U
STYRENE	µg/L	6	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	3	U	U	U
TETRACHLOROETHENE	µg/L	4	U	U	U
TETRACHLOROETHYLENE	µg/L	2	U	U	U
TOLUENE	µg/L	6	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	4	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	6	U	U	U
TRICHLOROETHENE	µg/L	4	U	U	U
TRICHLOROETHYLENE	µg/L	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	2	U	U	U
VINYL ACETATE	µg/L	6	2.3	1	10
VINYL CHLORIDE	µg/L	6	1.2	0.5	5
XYLENES, TOTAL	µg/L	6	U	U	U

NOTE:
BLANK = UNFILTERED SAMPLE
COUNT = NUMBER OF SAMPLES ANALYZED
U = NOT DETECTED
-- = NOT ANALYZED

TABLE 4-27
RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
NEPTUNIUM-237	pCi/L	4	0.63	0.5	1	4	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
RADIUM-226	pCi/L	3	U	U	U	4	U	U	U	4	U	U	U
RADIUM-228	pCi/L	4	U	U	U	4	U	U	U	4	1.5	1.4	3
RUTHENIUM-106	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
STRONTIUM-90	pCi/L	4	3.9	2.5	7.9	4	U	U	U	4	U	U	U
TECHNETIUM-99	pCi/L	5	U	U	U	6	U	U	U	7	1500	15	3010
THORIUM-228	pCi/L	5	U	U	U	6	U	U	U	7	U	U	U
THORIUM-230	pCi/L	5	0.92	0.5	1.61	6	U	U	U	7	U	U	U
THORIUM-232	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
THORIUM-TOTAL	µg/L	3	1.7	1	5	3	1.5	1	4	3	2.3	2	6
URANIUM-234	pCi/L	4	2.3	1.5	3.9	5	0.76	0.5	1.8	7	0.59	0.5	1.1
URANIUM-235	pCi/L	1	U	U	U	2	U	U	U	1	U	U	U
URANIUM-235/236	pCi/L	4	U	U	U	3	U	U	U	6	U	U	U
URANIUM-238	pCi/L	5	4.1	2.4	5.8	5	0.66	0.5	1.3	7	0.8	0.5	2.6
URANIUM-TOTAL	µg/L	5	12	7	18	6	1.3	0.5	5	7	1.9	0.5	9

TABLE 4-27

RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
NEPTUNIUM-237	pCi/L	4	U	U	U	4	U	U	U	5	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	4	U	U	U	5	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	4	U	U	U	5	U	U	U
RADIUM-226	pCi/L	3	U	U	U	3	U	U	U	5	0.86	0.5	1.6
RADIUM-228	pCi/L	3	U	U	U	2	U	U	U	4	U	U	U
RUTHENIUM-106	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
STRONTIUM-90	pCi/L	4	27	18	38.5	4	U	U	U	5	U	U	U
TECHNETIUM-99	pCi/L	7	3200	15	5510	5	120	6.7	237	10	U	U	U
THORIUM-228	pCi/L	7	U	U	U	5	U	U	U	10	U	U	U
THORIUM-230	pCi/L	7	U	U	U	5	U	U	U	10	U	U	U
THORIUM-232	pCi/L	4	U	U	U	4	U	U	U	5	U	U	U
THORIUM-TOTAL	µg/L	3	2.2	1.5	6	3	1.8	1.5	5	4	3	2	11
URANIUM-234	pCi/L	7	1.7	0.5	7.7	4	1.7	1.4	2.2	9	5.6	1.6	18.7
URANIUM-235	pCi/L	2	U	U	U	1	U	U	U	–	–	–	–
URANIUM-235/236	pCi/L	5	U	U	U	4	U	U	U	10	U	U	U
URANIUM-238	pCi/L	7	4.1	0.5	24.8	5	1.6	1	2.2	9	5.2	2	15.4
URANIUM-TOTAL	µg/L	7	13	1	78	5	5.9	4	10	10	14	6	46

TABLE 4-27
RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 2028				MONITORING WELL 2084				MONITORING WELL 2643			
Chemical Parameters	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
NEPTUNIUM-237	pCi/L	1	U	U	U	4	U	U	U	1	U	U	U
PLUTONIUM-238	pCi/L	2	U	U	U	4	U	U	U	1	U	U	U
PLUTONIUM-239/240	pCi/L	2	U	U	U	4	U	U	U	1	U	U	U
RADIUM-226	pCi/L	1	U	U	U	4	0.65	0.5	1.1	1	U	U	U
RADIUM-228	pCi/L	1	U	U	U	2	2.6	1.5	3.7	1	U	U	U
RUTHENIUM-106	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
STRONTIUM-90	pCi/L	2	U	U	U	4	U	U	U	1	U	U	U
TECHNETIUM-99	pCi/L	1	330	330	326	7	U	U	U	–	–	–	–
THORIUM-228	pCi/L	2	1.8	0.5	3.1	8	U	U	U	1	U	U	U
THORIUM-230	pCi/L	2	U	U	U	8	0.58	0.5	1.1	1	U	U	U
THORIUM-232	pCi/L	2	U	U	U	4	U	U	U	1	U	U	U
THORIUM-TOTAL	µg/L	2	2	1.5	5	3	2.8	2	7	1	U	U	U
URANIUM-234	pCi/L	2	1.3	1.2	1.35	8	9.5	6.4	16.9	1	3.2	3.2	3.17
URANIUM-235	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
URANIUM-235/236	pCi/L	2	U	U	U	7	U	U	U	1	U	U	U
URANIUM-238	pCi/L	2	1.1	1.1	1.08	8	7.8	5	13.5	1	2.6	2.6	2.57
URANIUM-TOTAL	µg/L	2	3.3	3.2	3.41	8	23	16	32	2	17	6.3	27.7

TABLE 4-27

RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 2648				MONITORING WELL 2649				MONITORING WELL 2821			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
NEPTUNIUM-237	pCi/L	1	1	1	1	1	U	U	U	–	–	–	–
PLUTONIUM-238	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
PLUTONIUM-239/240	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
RADIUM-226	pCi/L	1	1	1	1	1	U	U	U	–	–	–	–
RADIUM-228	pCi/L	1	3	3	3	1	3.4	3.4	3.4	–	–	–	–
RUTHENIUM-106	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
STRONTIUM-90	pCi/L	–	–	–	–	1	6.8	6.8	6.8	–	–	–	–
TECHNETIUM-99	pCi/L	1	34	34	34	–	–	–	–	–	–	–	–
THORIUM-228	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
THORIUM-230	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
THORIUM-232	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
THORIUM-TOTAL	µg/L	1	11	11	11	1	U	U	U	–	–	–	–
URANIUM-234	pCi/L	–	–	–	–	1	2.1	2.1	2.1	–	–	–	–
URANIUM-235	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
URANIUM-235/236	pCi/L	–	–	–	–	1	U	U	U	–	–	–	–
URANIUM-238	pCi/L	1	9.2	9.2	9.2	1	2.6	2.6	2.6	–	–	–	–
URANIUM-TOTAL	µg/L	3	18	1	28.1	2	6.5	6	6.94	–	–	–	–

TABLE 4-27
RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 2822				MONITORING WELL 3001				MONITORING WELL 3003			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
NEPTUNIUM-237	pCi/L	–	–	–	–	5	U	U	U	5	U	U	U
PLUTONIUM-238	pCi/L	–	–	–	–	5	U	U	U	5	U	U	U
PLUTONIUM-239/240	pCi/L	–	–	–	–	5	U	U	U	5	U	U	U
RADIUM-226	pCi/L	–	–	–	–	5	U	U	U	5	U	U	U
RADIUM-228	pCi/L	–	–	–	–	3	U	U	U	4	U	U	U
RUTHENIUM-106	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
STRONTIUM-90	pCi/L	–	–	–	–	5	U	U	U	5	U	U	U
TECHNETIUM-99	pCi/L	–	–	–	–	9	U	U	U	6	U	U	U
THORIUM-228	pCi/L	–	–	–	–	9	U	U	U	6	0.6	0.5	1.1
THORIUM-230	pCi/L	–	–	–	–	9	U	U	U	6	0.7	0.5	1.7
THORIUM-232	pCi/L	–	–	–	–	5	U	U	U	5	U	U	U
THORIUM-TOTAL	µg/L	–	–	–	–	4	1.9	1	6	3	1.2	1	3
URANIUM-234	pCi/L	–	–	–	–	8	6.2	4.1	6.9	5	2	1.2	4.4
URANIUM-235	pCi/L	–	–	–	–	2	0.4	0.3	1	1	U	U	U
URANIUM-235/236	pCi/L	–	–	–	–	6	U	U	U	5	U	U	U
URANIUM-238	pCi/L	–	–	–	–	8	5.1	4	5.62	6	2.9	0.5	11.8
URANIUM-TOTAL	µg/L	–	–	–	–	9	16	13	25	6	8.5	3	34

TABLE 4-27

RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 3004				MONITORING WELL 3005				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
NEPTUNIUM-237	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
RADIUM-226	pCi/L	4	U	U	U	4	U	U	U	4	U	U	U
RADIUM-228	pCi/L	3	U	U	U	2	2.8	1.5	4	4	U	U	U
RUTHENIUM-106	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
STRONTIUM-90	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
TECHNETIUM-99	pCi/L	5	U	U	U	6	U	U	U	6	U	U	U
THORIUM-228	pCi/L	5	U	U	U	6	U	U	U	6	U	U	U
THORIUM-230	pCi/L	5	U	U	U	6	U	U	U	6	U	U	U
THORIUM-232	pCi/L	4	U	U	U	5	U	U	U	4	U	U	U
THORIUM-TOTAL	µg/L	3	2.5	1.5	6	4	2	1	6	3	2.5	1.5	6
URANIUM-234	pCi/L	4	4.9	4.2	5.9	5	1.4	1.2	1.5	5	U	U	U
URANIUM-235	pCi/L	1	U	U	U	1	U	U	U	2	U	U	U
URANIUM-235/236	pCi/L	4	U	U	U	5	U	U	U	3	U	U	U
URANIUM-238	pCi/L	5	3.8	3.4	4.7	6	1.4	1	2.2	5	U	U	U
URANIUM-TOTAL	µg/L	5	12	10	15.6	6	4.6	3	10	6	1	0.5	2

TABLE 4-27

RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
NEPTUNIUM-237	pCi/L	4	U	U	U	5	U	U	U	–	–	–	–
PLUTONIUM-238	pCi/L	4	U	U	U	5	U	U	U	–	–	–	–
PLUTONIUM-239/240	pCi/L	4	U	U	U	5	U	U	U	–	–	–	–
RADIUM-226	pCi/L	4	U	U	U	5	0.72	0.5	1.6	–	–	–	–
RADIUM-228	pCi/L	4	U	U	U	4	U	U	U	–	–	–	–
RUTHENIUM-106	pCi/L	–	–	–	–	–	–	–	–	–	–	–	–
STRONTIUM-90	pCi/L	4	U	U	U	5	U	U	U	–	–	–	–
TECHNETIUM-99	pCi/L	7	U	U	U	8	U	U	U	–	–	–	–
THORIUM-228	pCi/L	7	U	U	U	8	U	U	U	–	–	–	–
THORIUM-230	pCi/L	7	U	U	U	8	U	U	U	–	–	–	–
THORIUM-232	pCi/L	4	U	U	U	5	U	U	U	–	–	–	–
THORIUM-TOTAL	µg/L	3	1.7	1.5	4	4	2	1.5	5	–	–	–	–
URANIUM-234	pCi/L	7	8.7	6.8	10.3	8	13	9.6	22.5	–	–	–	–
URANIUM-235	pCi/L	1	U	U	U	1	U	U	U	–	–	–	–
URANIUM-235/236	pCi/L	6	U	U	U	7	0.8	0.5	1.3	–	–	–	–
URANIUM-238	pCi/L	7	13	7.9	20.8	8	21	7.5	79.7	–	–	–	–
URANIUM-TOTAL	µg/L	7	38	20	56	8	57	21	218	–	–	–	–

TABLE 4-27

RI/FS GROUNDWATER 2000- TO 4000- SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

Chemical Parameters	UNIT	MONITORING WELL 4001				MONITORING WELL 4011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CESIUM-137	pCi/L	–	–	–	–	2	U	U	U
NEPTUNIUM-237	pCi/L	4	U	U	U	2	U	U	U
PLUTONIUM-238	pCi/L	4	U	U	U	2	U	U	U
PLUTONIUM-239/240	pCi/L	4	U	U	U	2	U	U	U
RADIUM-226	pCi/L	4	U	U	U	1	U	U	U
RADIUM-228	pCi/L	3	U	U	U	1	U	U	U
RUTHENIUM-106	pCi/L	–	–	–	–	2	U	U	U
STRONTIUM-90	pCi/L	4	U	U	U	2	U	U	U
TECHNETIUM-99	pCi/L	8	U	U	U	2	U	U	U
THORIUM-228	pCi/L	8	U	U	U	2	U	U	U
THORIUM-230	pCi/L	8	0.6	0.5	1.3	2	U	U	U
THORIUM-232	pCi/L	4	U	U	U	2	U	U	U
THORIUM-TOTAL	µg/L	3	U	U	U	2	1.2	0.95	3
URANIUM-234	pCi/L	8	U	U	U	2	2.4	2.4	2.45
URANIUM-235	pCi/L	2	U	U	U	–	–	–	–
URANIUM-235/236	pCi/L	6	U	U	U	2	U	U	U
URANIUM-238	pCi/L	8	U	U	U	2	2.2	2.1	2.37
URANIUM-TOTAL	µg/L	8	U	U	U	2	U	U	U

Count = Number of samples analyzed

U = Not detected

– = Not analyzed

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	1	U	U	U	2	3.3	3.1	7.2	2	4.2	4	8.9
GROSS ALPHA	pCi/L	4	7.1	2.9	13.2	3	32	30	33.8	2	100	13	192
GROSS BETA	pCi/L	4	18	7.5	91	3	24	12	36.8	2	13	13	25
NP-237	pCi/L	2	1.2	0.022	4.9	2	0.024	0.021	0.042	2	0.063	0.055	0.14
PU-238	pCi/L	2	0.04	0.025	0.11	2	0.075	0.024	0.127	2	0.069	0.018	0.24
PU-239/240	pCi/L	2	0.16	0.055	0.269	2	0.061	0.032	0.0908	2	0.032	0.017	0.094
RA-226	pCi/L	5	0.23	0.08	0.627	4	0.39	0.055	1.1	3	0.48	0.26	0.758
RA-228	pCi/L	5	1.3	0.5	3.78	4	1.2	0.55	3.2	3	2.7	0.65	13
RU-106	pCi/L	1	U	U	U	2	34	33	72	2	38	30	90
SR-90	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
TC-99	pCi/L	2	6.8	6.5	14	2	9.3	6	25	2	12	11	25
TH-228	pCi/L	5	0.72	0.11	1.58	4	0.53	0.095	1.43	4	0.62	0.43	1
TH-230	pCi/L	5	0.35	0.12	0.871	4	0.61	0.29	0.893	4	0.44	0.35	1
TH-232	pCi/L	5	0.16	0.11	0.46	4	0.17	0.095	0.57	3	0.27	0.15	0.85
TH-TOTAL	µg/L	5	1.5	1	4.1	4	1.5	0.9	5.1	3	2.4	1.4	7.7
U-234	pCi/L	5	2.2	1.2	3.43	4	5.5	5.1	6.67	4	5.2	3	6.92
U-235	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
U-235/236	pCi/L	5	0.24	0.095	0.79	4	0.46	0.3	0.632	3	0.16	0.12	0.49
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	5	4.3	2.8	6.2	4	6	5.3	7.05	4	4.6	2.4	7.69
U-TOTAL	µg/L	6	9.3	6.9	13.9	7	17	13	21	10	10	4.7	16

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	3	4.5	3.2	11	5	3.6	2.4	9.5	3	4.1	2.7	12
GROSS ALPHA	pCi/L	5	25	0.85	119	5	34	4.1	72.8	3	53	10	135
GROSS BETA	pCi/L	5	36	0.7	173	5	1200	940	1900	3	640	460	983
NP-237	pCi/L	3	0.058	0.027	0.24	5	0.062	0.055	0.18	3	0.043	0.021	0.17
PU-238	pCi/L	3	0.14	0.04	0.326	5	0.064	0.03	0.133	3	0.064	0.025	0.118
PU-239/240	pCi/L	3	0.26	0.03	0.675	5	0.064	0.047	0.119	3	0.029	0.02	0.081
RA-226	pCi/L	6	0.42	0.075	1.62	6	0.28	0.05	0.69	4	0.087	0.044	0.17
RA-228	pCi/L	6	0.81	0.34	2.2	6	0.84	0.55	1.8	4	2	0.6	2.95
RU-106	pCi/L	3	36	24	87	5	34	24	92	3	36	29	81
SR-90	pCi/L	--	--	--	--	1	0.73	0.73	0.731	1	21	21	20.9
TC-99	pCi/L	3	10	9	22	6	2900	2000	6860	4	2000	580	5080
TH-228	pCi/L	6	0.69	0.19	1.32	6	0.67	0.17	1.22	4	0.43	0.18	0.865
TH-230	pCi/L	6	0.38	0.09	1	7	0.35	0.13	0.714	5	0.25	0.14	0.474
TH-232	pCi/L	6	0.16	0.09	0.48	6	0.24	0.15	0.513	4	0.2	0.18	0.46
TH-TOTAL	µg/L	6	1.5	0.8	4.3	6	2	0.6	4.63	4	1.9	1.6	4.2
U-234	pCi/L	7	0.31	0.13	1	7	1.2	0.26	2.17	5	1.8	1.1	2.56
U-235	pCi/L	1	U	U	U	--	--	--	--	--	--	--	--
U-235/236	pCi/L	6	0.13	0.11	0.3	7	0.25	0.09	0.86	5	0.14	0.07	0.36
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	7	0.21	0.11	1	7	3.7	0.5	8.1	5	3.7	0.65	5.77
U-TOTAL	µg/L	8	0.49	0.2	1	12	6	0.9	21.3	11	7.5	2.4	15.8

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	--	--	--	--	4	3.7	0.4	12	2	3.7	3.4	8.1
GROSS ALPHA	pCi/L	3	22	0.0015	49.9	4	11	0.02	23	3	57	8.5	109
GROSSBETA	pCi/L	3	340	0.51	559	4	8.4	0.013	21.6	3	42	27	70
NP-237	pCi/L	--	--	--	--	3	0.043	0.025	0.11	2	0.056	0.046	0.13
PU-238	pCi/L	--	--	--	--	4	0.054	0.026	0.118	2	0.051	0.022	0.16
PU-239/240	pCi/L	--	--	--	--	4	0.032	0.026	0.084	2	0.043	0.031	0.11
RA-226	pCi/L	3	0.068	0.055	0.16	5	0.99	0.4	1.78	4	0.42	0.25	0.727
RA-228	pCi/L	3	0.62	0.042	1.38	5	1	0.15	3.4	4	1.1	0.6	2
RU-106	pCi/L	--	--	--	--	4	45	2.5	170	2	35	31	80
SR-90	pCi/L	--	--	--	--	2	0.12	0.085	0.31	--	--	--	--
TC-99	pCi/L	--	--	--	--	6	7.5	2	26	3	11	6.5	18.5
TH-228	pCi/L	3	0.55	0.18	0.867	5	0.74	0.2	1.45	5	1.3	0.5	2
TH-230	pCi/L	3	0.22	0.18	0.47	5	0.61	0.2	1.28	5	0.41	0.27	1.2
TH-232	pCi/L	3	0.18	0.12	0.47	5	0.31	0.2	0.85	4	0.56	0.27	1.2
TH-TOTAL	µg/L	3	1.6	1.1	4.2	5	2.8	1.8	7.7	4	5.1	2.5	11
U-234	pCi/L	4	2.6	0.084	7.87	7	3.6	1.9	4.9	5	9.9	7.8	14.5
U-235	pCi/L	1	0.053	0.053	0.0533	--	--	--	--	1	U	U	U
U-235/236	pCi/L	3	0.29	0.16	0.502	5	0.34	0.14	0.672	4	0.52	0.1	1.23
U-236	pCi/L	1	0.0087	0.0087	0.0087	--	--	--	--	--	--	--	--
U-238	pCi/L	4	3.7	0.84	11.6	7	3.1	1.6	4.3	5	8.7	6.2	14.4
U-TOTAL	µg/L	7	7.7	2.5	35.1	14	9	1.3	16	10	20	12	30.4

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	2	3.8	3.4	8.6	2	3.4	2.5	8.7	2	4	3.1	10
GROSS ALPHA	pCi/L	2	23	12	35.1	2	34	24	43.2	2	29	28	61
GROSSBETA	pCi/L	2	89	73	105	2	69	62	74.8	2	190	38	347
NP-237	pCi/L	2	0.08	0.039	0.24	2	0.042	0.013	0.14	2	0.086	0.065	0.13
PU-238	pCi/L	2	0.044	0.023	0.13	2	0.062	0.034	0.0899	2	0.15	0.055	0.241
PU-239/240	pCi/L	2	0.044	0.023	0.13	2	0.03	0.027	0.067	2	0.06	0.055	0.13
RA-226	pCi/L	2	0.58	0.32	0.846	2	0.68	0.55	0.819	2	0.62	0.38	0.859
RA-228	pCi/L	2	1.7	0.99	2.4	2	1.6	0.9	2.36	2	1.7	1.3	2.08
RU-106	pCi/L	2	45	41	100	2	38	34	84	2	36	30	86
SR-90	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
TC-99	pCi/L	2	110	91	137	2	68	20	116	2	810	510	1110
TH-228	pCi/L	2	0.54	0.39	0.77	2	0.83	0.5	1.15	2	4.3	1.7	6.92
TH-230	pCi/L	2	0.32	0.25	0.77	2	0.77	0.5	1.04	2	1.6	1.2	1.92
TH-232	pCi/L	2	0.32	0.25	0.77	2	0.26	0.018	1	2	0.45	0.34	1.1
TH-TOTAL	µg/L	2	2.9	2.2	7	2	3.1	1.6	9.2	2	3.9	3.1	9.6
U-234	pCi/L	2	6.4	5.3	7.55	2	6.2	4.4	7.99	2	3.6	2.7	4.55
U-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-235/236	pCi/L	2	0.35	0.31	0.398	2	0.29	0.28	0.307	2	0.3	0.1	0.496
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	2	6	4.5	7.47	2	5.2	4	6.34	2	4.4	2.9	5.88
U-TOTAL	µg/L	7	10	5.1	15.4	7	15	9.6	27	7	8.2	6.7	9.3

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3004			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	2	3.8	3.4	8.4	--	--	--	--	--	--	--	--
GROSSALPHA	pCi/L	3	0.94	0.011	2.2	3	2.4	1.3	6.8	2	11	8	16
GROSSBETA	pCi/L	3	1.6	0.012	2.56	3	9.8	6.6	22	2	110	68	154
NP-237	pCi/L	2	0.065	0.06	0.14	--	--	--	--	--	--	--	--
PU-238	pCi/L	2	0.062	0.05	0.1	--	--	--	--	--	--	--	--
PU-239/240	pCi/L	2	0.032	0.023	0.083	--	--	--	--	--	--	--	--
RA-226	pCi/L	3	0.16	0.055	0.266	3	0.065	0.055	0.16	2	0.11	0.085	0.27
RA-228	pCi/L	3	11	0.5	59	3	0.78	0.5	1.4	2	0.68	0.55	1.6
RU-106	pCi/L	2	33	31	69	--	--	--	--	--	--	--	--
SR-90	pCi/L	1	U	U	U	--	--	--	--	--	--	--	--
TC-99	pCi/L	3	13	9.5	30	--	--	--	--	--	--	--	--
TH-228	pCi/L	3	0.27	0.11	0.472	3	0.86	0.6	1.06	2	0.61	0.54	0.687
TH-230	pCi/L	4	0.19	0.11	0.38	3	1.4	0.11	3.5	2	0.12	0.11	0.27
TH-232	pCi/L	3	0.13	0.11	0.35	3	0.14	0.11	0.41	2	0.12	0.11	0.27
TH-TOTAL	µg/L	3	1.2	0.95	3.2	3	1.3	0.95	3.7	2	1.1	0.95	2.5
U-234	pCi/L	4	3.7	0.1	7.9	3	1.6	1.3	1.83	2	6.7	5.9	7.5
U-235	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-235/236	pCi/L	4	0.25	0.1	0.413	3	0.13	0.1	0.203	2	0.14	0.1	0.35
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	4	3	0.1	6.61	3	1.1	0.43	1.68	2	5.3	4.6	5.99
U-TOTAL	µg/L	12	9.5	0.29	23.9	3	3.5	3.4	3.75	2	17	16	17.9

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 3005				MONITORING WELL 3008				MONITORING WELL 3010			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	2	3.9	3.7	8.1	3	4.3	3.7	10	3	5	4.1	13
GROSSALPHA	pCi/L	6	4	2.4	14	4	2.1	0.0045	6.6	3	8	4.9	9.8
GROSSBETA	pCi/L	6	7.6	1.8	23	4	5.8	0.015	26	3	15	13	30
NP-237	pCi/L	2	0.052	0.029	0.15	3	0.13	0.05	0.27	2	0.058	0.055	0.12
PU-238	pCi/L	2	0.045	0.041	0.1	3	0.12	0.075	0.24	3	0.073	0.06	0.16
PU-239/240	pCi/L	2	0.038	0.036	0.081	3	0.12	0.024	0.24	3	0.05	0.025	0.12
RA-226	pCi/L	6	0.13	0.085	0.32	4	0.13	0.055	0.32	4	0.12	0.06	0.227
RA-228	pCi/L	6	0.77	0.49	1.8	4	1.2	0.9	3.8	4	0.62	0.44	1.5
RU-106	pCi/L	2	25	21	56	3	43	35	99.5	3	41	39	85
SR-90	pCi/L	--	--	--	--	2	0.19	0.16	0.227	2	0.27	0.11	0.42
TC-99	pCi/L	2	U	U	U	4	10	5.5	27	3	10	7	32
TH-228	pCi/L	6	1.1	0.28	2.21	5	0.56	0.11	1	5	0.75	0.5	1.3
TH-230	pCi/L	6	0.55	0.09	1.46	5	0.32	0.23	1	5	0.53	0.4	1.3
TH-232	pCi/L	6	0.11	0.09	0.28	4	0.21	0.11	0.66	4	0.45	0.24	1.3
TH-TOTAL	µg/L	6	0.98	0.8	2.5	4	1.9	0.95	6	4	4.1	2.1	12
U-234	pCi/L	6	0.82	0.28	1.29	6	1.8	0.5	6.972	5	4.7	1.6	6.02
U-235	pCi/L	--	--	--	--	2	0.28	0.051	1	1	U	U	U
U-235/236	pCi/L	6	0.11	0.095	0.24	4	0.16	0.095	0.307	4	0.26	0.09	0.631
U-236	pCi/L	--	--	--	--	1	0.099	0.099	0.0987	--	--	--	--
U-238	pCi/L	6	0.54	0.22	0.746	6	0.83	0.5	1.2409	5	3.5	1.3	4.53
U-TOTAL	µg/L	6	1.7	0.8	2.27	12	1.8	0.1	4.7	12	10	3.6	14

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 3011				MONITORING WELL 3019				MONITORING WELL 3043			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	1	U	U	U	3	5.1	4.1	13	3	5	3.7	14
GROSSALPHA	pCi/L	2	9.6	3.2	16.1	3	580	460	649	3	4.1	2.8	12
GROSSBETA	pCi/L	2	7.4	2.8	24	3	720	380	920	3	7.1	4.9	22
NP-237	pCi/L	1	U	U	U	3	0.049	0.022	0.14	3	0.08	0.023	0.163
PU-238	pCi/L	1	U	U	U	3	0.022	0.021	0.052	3	0.091	0.06	0.15
PU-239/240	pCi/L	1	U	U	U	3	0.047	0.021	0.13	3	0.14	0.046	0.292
RA-226	pCi/L	3	0.51	0.27	0.928	3	0.31	0.18	0.505	4	0.56	0.52	0.6
RA-228	pCi/L	3	0.85	0.12	2	3	1.5	0.43	3.06	4	0.67	0.38	2
RU-106	pCi/L	1	U	U	U	3	51	43	110	3	38	26	96
SR-90	pCi/L	--	--	--	--	2	0.5	0.41	0.58	1	0.36	0.36	0.36
TC-99	pCi/L	1	U	U	U	4	10	8	30	4	9.6	7.5	24
TH-228	pCi/L	3	0.29	0.16	0.52	5	0.6	0.2	1.16	5	1.4	0.18	5.22
TH-230	pCi/L	3	0.44	0.18	0.734	6	1.2	0.41	2.55	5	0.43	0.15	1.14
TH-232	pCi/L	3	0.15	0.11	0.35	5	0.76	0.15	2.29	4	0.16	0.13	0.36
TH-TOTAL	µg/L	3	1.3	0.95	3.1	5	6.7	0.8	20.6	4	1.4	1.2	3.2
U-234	pCi/L	3	0.49	0.095	1.29	6	73	1.1	222	5	0.59	0.09	1.7
U-235	pCi/L	--	--	--	--	--	--	--	--	1	U	U	U
U-235/236	pCi/L	3	0.14	0.095	0.222	6	28	0.11	106	4	0.13	0.09	0.35
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	3	0.61	0.095	1.46	6	310	0.88	1200	5	0.64	0.16	1.88
U-TOTAL	µg/L	7	1.5	0.1	4.2	12	830	2.6	2520	12	1.1	0.1	5.7

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 3084				MONITORING WELL 4001				MONITORING WELL 4008			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	3	4.6	4.1	11	5	4.2	3.2	12	3	3.9	3.8	8
GROSSALPHA	pCi/L	4	4700	98	6880	6	1.7	0.0053	6.7	3	1.2	0.015	3.7
GROSSBETA	pCi/L	4	5900	110	9090	6	1.9	0.012	3.19	3	0.77	0.012	2.7
NP-237	pCi/L	3	0.045	0.02	0.15	5	0.055	0.013	0.2	3	0.046	0.023	0.12
PU-238	pCi/L	3	0.084	0.047	0.17	5	0.084	0.019	0.245	3	0.042	0.024	0.15
PU-239/240	pCi/L	3	0.35	0.047	0.943	5	0.23	0.023	1.02	3	0.12	0.03	0.256
RA-226	pCi/L	5	0.13	0.06	0.274	6	0.11	0.049	0.28	4	0.071	0.049	0.2
RA-228	pCi/L	5	2.4	0.46	6.66	6	7	0.43	78	4	0.79	0.4	3.7
RU-106	pCi/L	3	40	39	87	5	39	31	88	3	33	30	69
SR-90	pCi/L	--	--	--	--	1	U	U	U	1	U	U	U
TC-99	pCi/L	4	12	8	20.7	6	9.1	5.5	30	4	6.9	0.75	27
TH-228	pCi/L	7	0.69	0.34	1.36	6	0.73	0.11	1.37	5	0.48	0.37	1
TH-230	pCi/L	7	0.97	0.28	1.47	7	0.28	0.11	0.972	5	0.52	0.19	1.14
TH-232	pCi/L	6	3	0.24	14.5	6	0.19	0.11	0.65	4	0.14	0.095	0.38
TH-TOTAL	µg/L	6	27	2.2	131	6	1.7	1	5.9	4	1.3	0.9	3.4
U-234	pCi/L	4	18	11	23.2	7	0.22	0.1	0.52	5	0.51	0.11	1
U-235	pCi/L	1	1.1	1.1	1.1	--	--	--	--	1	U	U	U
U-235/236	pCi/L	3	0.8	0.4	1.13	7	0.14	0.095	0.52	4	0.26	0.1	0.71
U-236	pCi/L	--	--	--	--	--	--	--	--	--	--	--	--
U-238	pCi/L	4	30	10	40	7	0.29	0.095	0.698	5	0.44	0.13	1
U-TOTAL	µg/L	14	5300	30	22500	13	0.95	0.1	2.5	11	0.95	0.2	4

4783

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
CS-137	pCi/L	1	U	U	U	2	3.2	2.9	7	1	U	U	U
GROSSALPHA	pCi/L	1	U	U	U	4	5.2	3.2	12	2	4.3	3.1	11
GROSS BETA	pCi/L	1	U	U	U	4	4.6	3.5	7.9	2	2.5	1.4	7.2
NP-237	pCi/L	1	U	U	U	2	0.075	0.07	0.16	1	U	U	U
PU-238	pCi/L	1	U	U	U	2	0.084	0.039	0.129	1	U	U	U
PU-239/240	pCi/L	1	U	U	U	2	0.11	0.039	0.172	1	U	U	U
RA-226	pCi/L	1	0.28	0.28	0.277	4	0.35	0.24	0.503	2	1	0.28	1.77
RA-228	pCi/L	1	U	U	U	4	0.8	0.55	2.4	2	1	0.6	1.4
RU-106	pCi/L	1	U	U	U	2	33	28	78	1	U	U	U
SR-90	pCi/L	--	--	--	--	2	0.07	0.065	0.15	1	0.26	0.26	0.263
TC-99	pCi/L	1	U	U	U	2	7.8	7.5	16	1	U	U	U
TH-228	pCi/L	1	1.5	1.5	1.53	4	0.82	0.28	1.64	2	0.72	0.24	1.2
TH-230	pCi/L	1	0.38	0.38	0.379	4	0.33	0.24	0.49	2	0.16	0.12	0.42
TH-232	pCi/L	1	U	U	U	4	0.5	0.11	1.53	2	0.16	0.12	0.42
TH-TOTAL	µg/L	1	U	U	U	4	4.5	0.95	13.8	2	1.5	1.1	3.8
U-234	pCi/L	1	1.2	1.2	1.19	7	1.6	0.08	7.77	4	0.54	0.13	3.3
U-235	pCi/L	--	--	--	--	1	U	U	U	--	--	--	--
U-235/236	pCi/L	1	0.24	0.24	0.238	6	0.33	0.09	1.9	4	0.51	0.12	3.3
U-236	pCi/L	--	--	--	--	1	U	U	U	--	--	--	--
U-238	pCi/L	1	1.2	1.2	1.19	7	1.5	0.085	7.46	4	0.56	0.13	3.3
U-TOTAL	µg/L	7	2.2	0.1	5.3	12	0.51	0.05	6.4	8	0.24	0.05	1.1

TABLE 4-28
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - RADIOLOGICAL SUMMARY

		MONITORING WELL 4103			
PARAMETER	UNIT	COUNT	AVG	MIN	MAX
CS-137	pCi/L	1	U	U	U
GROSSALPHA	pCi/L	2	3.7	3.6	7.7
GROSS BETA	pCi/L	2	2.5	2.3	4.6
NP-237	pCi/L	1	U	U	U
PU-238	pCi/L	1	U	U	U
PU-239/240	pCi/L	1	U	U	U
RA-226	pCi/L	2	0.11	0.075	0.15
RA-228	pCi/L	2	0.74	0.37	2.2
RU-106	pCi/L	1	U	U	U
SR-90	pCi/L	1	U	U	U
TC-99	pCi/L	1	U	U	U
TH-228	pCi/L	2	0.53	0.33	0.739
TH-230	pCi/L	2	0.24	0.15	0.329
TH-232	pCi/L	2	0.12	0.1	0.29
TH-TOTAL	µg/L	2	1.1	0.9	2.6
U-234	pCi/L	4	0.34	0.1	1.8
U-235	pCi/L	--	--	--	--
U-235/236	pCi/L	4	0.31	0.1	1.8
U-236	pCi/L	--	--	--	--
U-238	pCi/L	4	0.31	0.1	1.8
U-TOTAL	µg/L	11	0.4	0.05	6

Count = Number of samples analyzed
U = Not detected
-- = Not analyzed

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	1	U	U	U	1	U	U	U	3	110	25	160
ANTIMONY	µg/L	1	U	U	U	1	U	U	U	2	7.6	0.25	30
ARSENIC	µg/L	5	21	0.1	200	4	26	1	200	5	81	1	400
BARIUM	µg/L	5	37	22	46	3	140	130	140	6	60	53	76.6
BERYLLIUM	µg/L	1	U	U	U	1	U	U	U	3	0.8	0.5	1.4
CADMIUM	µg/L	5	1.7	0.35	5	4	1.8	1	4	5	1.8	1	5
CALCIUM	µg/L	4	86000	75000	100000	4	78000	10000	105000	6	150000	120000	178000
CHROMIUM	µg/L	5	8.2	0.85	20	3	15	10	24	6	20	10	40.4
COBALT	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
COPPER	µg/L	5	4.7	3.4	10	3	7	5	11	6	5.8	5	10
HEXAVALENT CHROMIUM	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
IRON	µg/L	5	220	120	411	4	1600	2.5	2260	6	49	2.5	100
LEAD	µg/L	5	6.2	1	50	4	7	1	50	6	5.9	1	50
MAGNESIUM	µg/L	4	23000	20000	26000	4	26000	22000	28400	6	27000	14000	31000
MANGANESE	µg/L	5	74	12	251	4	150	40	190	4	13	2.5	40
MERCURY	µg/L	4	0.16	0.1	0.3	4	0.11	0.1	0.3	4	U	U	U
MOLYBDENUM	µg/L	5	9.4	0.5	33.3	4	11	10	31	4	16	5	38
NICKEL	µg/L	5	13	6.2	30	4	41	10	134	6	13	10	30
OSMIUM	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
POTASSIUM	µg/L	4	3100	2800	3200	4	1300	1000	1700	4	3400	1900	4000
SELENIUM	µg/L	5	22	0.9	200	4	26	1	200	4	26	1	200
SILICON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SILVER	µg/L	5	5.4	2.2	20	4	2	0.25	10	6	8.2	0.25	20.5
SODIUM	µg/L	5	13000	12000	17000	4	9800	9500	10100	4	24000	23000	25000
THALLIUM	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM	µg/L	1	3.4	3.4	3.4	1	U	U	U	3	21	10	28.3
ZINC	µg/L	1	39	39	38.9	1	U	U	U	3	33	5	61.3
ALKALINITY AS CACO3	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
AMMONIA	mg/L	5	0.23	0.05	0.41	4	0.38	0.1	0.875	4	2.1	0.25	3.49
BROMIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	5	23	1.5	38	4	18	9.6	25	6	47	38	51.5
CYANIDE	mg/L	2	7.5	5	20	1	U	U	U	1	U	U	U
FLUORIDE	mg/L	5	0.28	0.2	0.41	4	0.23	0.17	0.28	6	0.32	0.24	0.41
NITRATE	mg/L	6	0.77	0.05	2.5	3	0.067	0.05	0.1	6	29	17	60.6
PHENOLS	mg/L	6	0.021	0.005	0.06	4	0.013	0.005	0.03	4	0.0088	0.005	0.02
PHOSPHATE	mg/L	1	0.75	0.75	0.75	–	–	–	–		–	–	–
PHOSPHORUS	mg/L	4	0.62	0.05	1.28	4	0.15	0.01	0.499	4	0.079	0.02	0.24
SULFATE	mg/L	5	91	34	236	4	52	1	80	6	63	14	88.5
SULFIDE	mg/L	–	–	–	–	–	–	–	–	1	U	U	U
TOTAL KJELDAHL NITROGEN	mg/L	3	0.83	0.21	1.39	2	0.53	0.47	1.17	2	1.7	0.05	3.4
TOTAL ORGANIC CARBON	mg/L	–	–	–	–	–	–	–	–	2	10	1.6	19.3
TOTAL ORGANIC HALIDES	mg/L	3	0.018	0.005	0.05	2	0.016	0.0073	0.05	5	0.024	0.005	0.05
TOTAL ORGANIC NITROGEN	mg/L	5	0.76	0.21	2.2	4	0.09	0.05	0.21	3	0.48	0.25	0.9

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	3	100	12	173	1	13	13	13.2	4	190	5.7	287
ANTIMONY	µg/L	1	U	U	U	1	U	U	U	3	18	15	46.7
ARSENIC	µg/L	4	27	1	200	4	27	1	200	7	2.2	0.95	10
BARIUM	µg/L	6	130	67	425	4	81	52	120	8	81	54	200
BERYLLIUM	µg/L	3	1.2	0.5	2.4	1	U	U	U	4	1.6	0.5	2.4
CADMIUM	µg/L	4	1.2	0.35	5	4	1.6	0.35	5	7	5.6	0.35	19.3
CALCIUM	µg/L	6	180000	140000	277000	4	170000	120000	212000	8	290000	110000	519000
CHROMIUM	µg/L	6	17	0.85	36.8	4	13	0.85	30	8	22	0.85	52.7
COBALT	µg/L	3	4.2	2.6	10	1	U	U	U	4	8.6	2.6	13.8
COPPER	µg/L	6	16	5	69.7	4	7.6	5	15.4	8	7.3	3.4	30
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IRON	µg/L	6	2900	4	14800	4	36	8.5	80	8	5900	3300	9610
LEAD	µg/L	6	5.2	1	50	3	9	1	50	8	2	1	5.7
MAGNESIUM	µg/L	6	38000	12000	78700	4	52000	40000	67300	8	54000	27000	81900
MANGANESE	µg/L	4	110	3	420	4	77	0	300	7	860	460	1940
MERCURY	µg/L	4	0.13	0.1	0.2	3	U	U	U	6	0.12	0.1	0.3
MOLYBDENUM	µg/L	4	19	5	44	3	8.3	5	20	4	20	5	50
NICKEL	µg/L	6	14	6.2	30	4	10	6.2	30	8	25	6.2	40
OSMIUM	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
POTASSIUM	µg/L	4	12000	7900	15300	4	5500	4000	6800	7	3900	2500	6400
SELENIUM	µg/L	4	30	1	200	4	26	0.9	200	7	1.6	0.9	5
SILICON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SILVER	µg/L	6	7.3	0.25	18.6	4	3.1	0.25	10	8	5.8	0.25	18.7
SODIUM	µg/L	4	50000	44000	59400	4	41000	29000	56100	7	29000	11000	35100
THALLIUM	µg/L	1	U	U	U	1	U	U	U	3	1	0.5	4.1
TIN	µg/L	–	–	–	–	–	–	–	–	2	U	U	U
VANADIUM	µg/L	3	16	1.7	23.4	1	U	U	U	3	45	44	47.9
ZINC	µg/L	3	46	17	63.7	1	42	42	42	4	110	26	228
ALKALINITY AS CACO3	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
AMMONIA	mg/L	2	5	0.05	9.89	2	1.9	0.5	3.3	5	0.47	0.1	0.643
BROMIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	6	56	42	75.5	4	140	58	265	8	98	75	140
CYANIDE	mg/L	–	–	–	–	–	–	–	–	2	U	U	U
FLUORIDE	mg/L	6	0.27	0.2	0.35	4	0.61	0.5	0.69	8	0.63	0.12	1.8
NITRATE	mg/L	6	21	0.1	53	3	19	0.1	58	8	0.066	0.02	0.11
PHENOLS	mg/L	4	0.019	0.005	0.1	4	0.018	0.005	0.1	5	0.02	0.005	0.05
PHOSPHATE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHOSPHORUS	mg/L	4	0.025	0.021	0.05	4	0.049	0.01	0.13	3	9	0.02	26.4
SULFATE	mg/L	6	120	52	293	4	95	67	123	8	530	160	1320
SULFIDE	mg/L	–	–	–	–	–	–	–	–	2	U	U	U
TOTAL KJELDAHL NITROGEN	mg/L	2	3.6	2.7	4.5	2	5.9	3.2	8.5	4	5.4	1.6	15
TOTAL ORGANIC CARBON	mg/L	2	1.2	1	2.839	–	–	–	–	3	2.2	1.3	3.33
TOTAL ORGANIC HALIDES	mg/L	5	0.028	0.005	0.05	3	0.033	0.025	0.05	5	0.028	0.005	0.05
TOTAL ORGANIC NITROGEN	mg/L	2	2.5	1.4	3.6	1	0.4	0.4	0.4	3	1.8	0.05	4.36

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2028				MONITORING WELL 2084				MONITORING WELL 2643			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	2	84	81	86	3	240	230	252	4	170	91	266
ANTIMONY	µg/L	–	–	–	–	1	U	U	U	4	43	37	48.1
ARSENIC	µg/L	2	U	U	U	5	21	1	200	4	U	U	U
BARIUM	µg/L	2	83	83	83	7	79	70	88	4	94	79	108
BERYLLIUM	µg/L	–	–	–	–	3	2.6	1.6	3.4	4	U	U	U
CADMIUM	µg/L	2	7	7	7	5	5.5	1	13.4	4	12	11	13.8
CALCIUM	µg/L	2	200000	180000	213000	7	290000	160000	381000	4	190000	170000	213000
CHROMIUM	µg/L	2	34	29	38	7	41	10	86.2	4	39	30	47.7
COBALT	µg/L	–	–	–	–	3	7	5	11	4	6.9	5	12.4
COPPER	µg/L	2	14	13	14	7	11	5	40	4	15	12	16.8
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IRON	µg/L	2	61	36	85	7	2200	170	4200	4	450	160	1140
LEAD	µg/L	2	3.5	1	6	7	8.1	1	50	4	1.3	1	2
MAGNESIUM	µg/L	2	53000	45000	60400	7	78000	27000	100000	4	83000	78000	88100
MANGANESE	µg/L	2	64	42	85	5	540	10	1030	4	930	310	1560
MERCURY	µg/L	2	U	U	U	5	U	U	U	4	0.2	0.1	0.51
MOLYBDENUM	µg/L	2	U	U	U	4	13	10	20	4	8.8	5	13
NICKEL	µg/L	2	14	10	20	7	23	10	43.1	4	34	29	37.7
OSMIUM	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
POTASSIUM	µg/L	2	1900	550	3230	5	14000	11000	16000	4	12000	11000	12000
SELENIUM	µg/L	2	U	U	U	5	22	1	200	4	1.3	1	3
SILICON	µg/L	2	4800	4800	4850	–	–	–	–	–	–	–	–
SILVER	µg/L	2	22	19	24	7	11	5	20	3	31	26	40.1
SODIUM	µg/L	2	46000	41000	51800	5	59000	43000	66500	4	75000	71000	79100
THALLIUM	µg/L	–	–	–	–	1	1.2	1.2	1.2	4	U	U	U
TIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
VANADIUM	µg/L	2	17	17	17	3	51	39	57.8	4	23	18	28.1
ZINC	µg/L	–	–	–	–	3	86	55	135.1	4	15	7.5	22.3
ALKALINITY AS CACO3	mg/L	–	–	–	–	–	–	–	–	2	360	310	403
AMMONIA	mg/L	2	2.3	1.7	2.87	4	1.8	0.44	4	2	0.5	0.05	0.95
BROMIDE	mg/L	–	–	–	–		–	–	–	–	–	–	–

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2028				MONITORING WELL 2084				MONITORING WELL 2643			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	2	82	76	88.1	7	190	150	250	3	120	0.25	186
CYANIDE	mg/L	–	–	–	–	1	U	U	U	2	U	U	U
FLUORIDE	mg/L	2	0.29	0.22	0.37	7	0.16	0.1	0.21	3	0.17	0.05	0.29
NITRATE	mg/L	2	52	25	79.4	6	7.2	0.1	16	3	38	0.18	77.73
PHENOLS	mg/L	2	U	U	U	4	0.0075	0.005	0.01	3	U	U	U
PHOSPHATE	mg/L	–	–	–	–	1	0.48	0.48	0.48	–	–	–	–
PHOSPHORUS	mg/L	1	0.03	0.03	0.03	3	0.052	0.01	0.125	3	0.16	0.01	0.38
SULFATE	mg/L	2	110	110	113	7	450	200	628	3	150	1	259
SULFIDE	mg/L	2	U	U	U	1	U	U	U	1	U	U	U
TOTAL KJELDAHL NITROGEN	mg/L	–	–	–	–	2	1	0.5	1.51	–	–	–	–
TOTAL ORGANIC CARBON	mg/L	2	1.9	1.2	2.51	3	3	1.6	4.03	3	1.7	0.5	3.466
TOTAL ORGANIC HALIDES	mg/L	2	U	U	U	6	0.028	0.005	0.05	3	0.012	0.005	0.02
TOTAL ORGANIC NITROGEN	mg/L	2	0.25	0.11	0.38	4	0.39	0	1.07	2	U	U	U

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2648				MONITORING WELL 2649				MONITORING WELL 2821			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	6	1100	30	5030	4	1500	95	5720	1	U	U	U
ANTIMONY	µg/L	6	20	15	44.3	4	47	32	81.8	1	U	U	U
ARSENIC	µg/L	6	4.6	1	13.1	4	4.2	1	13.8	1	U	U	U
BARIUM	µg/L	6	45	1	96.5	4	82	58	108	–	–	–	–
BERYLLIUM	µg/L	6	U	U	U	4	1.3	1	2.1	–	–	–	–
CADMIUM	µg/L	6	5.6	1	15.4	4	8.8	4.7	10.8	–	–	–	–
CALCIUM	µg/L	6	130000	10	301000	4	330000	270000	381000	–	–	–	–
CHROMIUM	µg/L	6	41	5	134	4	410	27	1520	–	–	–	–
COBALT	µg/L	6	8.5	5	26	4	10	5	26.6	–	–	–	–
COPPER	µg/L	6	23	5	83.7	4	53	18	97.1	–	–	–	–
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IRON	µg/L	6	5500	5	24800	4	8400	45	32500	–	–	–	–
LEAD	µg/L	6	11	1	24.2	4	6.2	1	19.3	–	–	–	–
MAGNESIUM	µg/L	6	32000	25	85800	4	53000	42000	83300	–	–	–	–
MANGANESE	µg/L	6	590	1	1470	4	210	13	738	–	–	–	–
MERCURY	µg/L	6	U	U	U	4	U	U	U	–	–	–	–
MOLYBDENUM	µg/L	6	9.7	5	32.9	4	450	360	618	–	–	–	–
NICKEL	µg/L	6	42	10	169	4	68	30	175	–	–	–	–
OSMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
POTASSIUM	µg/L	6	4700	50	7970	4	43000	40000	46000	–	–	–	–
SELENIUM	µg/L	6	1.3	1	3	3	1.2	1	3	–	–	–	–
SILICON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SILVER	µg/L	2	23	18	26.8	4	41	29	59.8	–	–	–	–
SODIUM	µg/L	6	16000	50	27700	4	110000	99000	110000	–	–	–	–
THALLIUM	µg/L	6	1.2	1	2.3	4	3	1	10	–	–	–	–
TIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM	µg/L	6	16	5	33.8	4	32	15	71.4	–	–	–	–
ZINC	µg/L	6	22	2.5	102	4	100	47	164	–	–	–	–
ALKALINITY AS CACO3	mg/L	3	220	2.5	340	2	300	260	340	–	–	–	–
AMMONIA	mg/L	3	0.37	0.13	0.5	1	0.12	0.12	0.12	–	–	–	–
BROMIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–

4783

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2648				MONITORING WELL 2649				MONITORING WELL 2821			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	3	33	0.25	53.2	2	330	230	418.07	–	–	–	–
CYANIDE	mg/L	3	U	U	U	2	2	1	2.9	–	–	–	–
FLUORIDE	mg/L	3	0.19	0.05	0.35	2	1.1	0.89	1.25	1	220	220	219
NITRATE	mg/L	3	1.6	0.05	3.62	2	64	60	66.87	–	–	–	–
PHENOLS	mg/L	3	0.012	0.005	0.02	2	U	U	U	–	–	–	–
PHOSPHATE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHOSPHORUS	mg/L	3	0.43	0.01	1.1	2	0.58	0.04	1.12	–	–	–	–
SULFATE	mg/L	3	130	2.1	217	2	180	160	199.3	–	–	–	–
SULFIDE	mg/L	–	–	–	–	–	–	–	–	1	600	600	600
TOTAL KJELDAHL NITROGEN	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL ORGANIC CARBON	mg/L	3	1.8	0.5	3.44	2	3.4	1.9	4.866	1	U	U	U
TOTAL ORGANIC HALIDES	mg/L	3	0.0058	0.005	0.015	2	0.14	0.12	0.15	1	U	U	U
TOTAL ORGANIC NITROGEN	mg/L	–	–	–	–	1	0.2	0.2	0.2	–	–	–	–

797

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2822				MONITORING WELL 3001				MONITORING WELL 3003			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	1	U	U	U	4	110	20	167	–	–	–	–
ANTIMONY	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ARSENIC	µg/L	1	U	U	U	5	5.2	0.95	20	5	43	1.5	200
BARIUM	µg/L	1	U	U	U	8	53	24	85	5	180	50	620
BERYLLIUM	µg/L	1	U	U	U	4	1.6	1	2.4	–	–	–	–
CADMIUM	µg/L	1	U	U	U	5	1.7	0.35	5	5	2.2	1	5
CALCIUM	µg/L	–	–	–	–	8	100000	87000	173000	5	86000	79000	95000
CHROMIUM	µg/L	1	U	U	U	8	27	0.85	202	5	9	5	20
COBALT	µg/L	1	U	U	U	4	8.2	2.6	10	–	–	–	–
COPPER	µg/L	–	–	–	–	8	6.7	3.4	10	5	7	5	30
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IRON	µg/L	–	–	–	–	8	3100	2500	4500	5	710	490	900
LEAD	µg/L	1	U	U	U	8	7.8	1	43	5	14	1	50
MAGNESIUM	µg/L	–	–	–	–	8	27000	24000	37900	5	23000	22000	24000
MANGANESE	µg/L	–	–	–	–	5	1600	360	6100	5	420	290	580
MERCURY	µg/L	1	U	U	U	5	0.11	0.1	0.29	5	0.11	0.1	0.3
MOLYBDENUM	µg/L	–	–	–	–	5	12	5	33.3	5	15	10	50
NICKEL	µg/L	1	U	U	U	8	15	6.2	30	5	18	10	40
OSMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
POTASSIUM	µg/L	–	–	–	–	5	2800	1800	5560	5	2800	2500	5000
SELENIUM	µg/L	–	–	–	–	5	2.6	0.9	5	5	44	2.5	200
SILICON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SILVER	µg/L	–	–	–	–	8	8.8	2.2	20	5	6.6	5	20
SODIUM	µg/L	–	–	–	–	5	13000	9400	24400	5	12000	11000	14000
THALLIUM	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
TIN	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
VANADIUM	µg/L	–	–	–	–	4	12	1.7	19	–	–	–	–
ZINC	µg/L	–	–	–	–	4	72	21	131	–	–	–	–
ALKALINITY AS CACO3	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
AMMONIA	mg/L	–	–	–	–	5	0.2	0.1	0.41	5	0.23	0.17	0.4
BROMIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2822				MONITORING WELL 3001				MONITORING WELL 3003			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	–	–	–	–	8	20	15	25	5	30	24	43.8
CYANIDE	mg/L	–	–	–	–	1	U	U	U	–	–	–	–
FLUORIDE	mg/L	–	–	–	–	8	0.16	0.08	0.29	5	0.47	0.2	1.2
NITRATE	mg/L	–	–	–	–	6	0.26	0.005	2.5	3	0.14	0.02	0.2
PHENOLS	mg/L	–	–	–	–	5	0.25	0.005	1.2	5	0.014	0.0025	0.05
PHOSPHATE	mg/L	–	–	–	–	1	0.48	0.48	0.48	–	–	–	–
PHOSPHORUS	mg/L	–	–	–	–	4	0.048	0.02	0.12	4	0.034	0.005	0.06
SULFATE	mg/L	–	–	–	–	8	100	62	176	5	92	68	166
SULFIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL KJELDAHL NITROGEN	mg/L	–	–	–	–	4	0.39	0.21	0.6	3	2.7	0.3	15
TOTAL ORGANIC CARBON	mg/L	–	–	–	–	3	4.3	2.4	7.463	–	–	–	–
TOTAL ORGANIC HALIDES	mg/L	–	–	–	–	6	0.027	0.005	0.05	2	0.035	0.02	0.05
TOTAL ORGANIC NITROGEN	mg/L	–	–	–	–	5	0.87	0.2	3.3	4	0.1	0.05	0.163

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 3004				MONITORING WELL 3005				MONITORING WELL 3011			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANTIMONY	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ARSENIC	µg/L	4	27	1	200	5	21	1	200	4	51	1	200
BARIUM	µg/L	4	54	25	200	5	67	60	80	4	130	97	166
BERYLLIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CADMIUM	µg/L	4	2.1	1	5	5	3.7	1	10	4	2.9	1	6
CALCIUM	µg/L	4	85000	78000	90000	5	100000	96000	110000	4	86000	46000	105000
CHROMIUM	µg/L	4	11	5	20	5	14	10	30	4	14	10	26
COBALT	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
COPPER	µg/L	4	7.5	5	30	5	7.4	5	17	4	7.5	5	15
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IRON	µg/L	4	58	25	123	5	2200	1800	2700	4	970	220	1620
LEAD	µg/L	4	11	1.5	50	5	5.8	1	50	4	14	1	50
MAGNESIUM	µg/L	4	21000	13000	26000	5	21000	500	26200	4	26000	25000	28200
MANGANESE	µg/L	4	320	310	346	5	540	510	580	4	130	79	148
MERCURY	µg/L	4	23	0.1	93	5	U	U	U	4	0.35	0.1	1.1
MOLYBDENUM	µg/L	4	16	10	50	5	U	U	U	4	U	U	U
NICKEL	µg/L	4	14	10	40	5	11	10	30	4	13	10	23
OSMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
POTASSIUM	µg/L	4	2000	270	5000	5	2700	2600	2970	4	1600	1100	1940
SELENIUM	µg/L	4	27	1	200	5	21	1	200	4	51	1	200
SILICON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SILVER	µg/L	4	5.1	0.25	20	5	2.2	0.25	10	4	2.6	0.25	10
SODIUM	µg/L	4	21000	10000	42000	5	7400	940	9310	4	13000	9900	15900
THALLIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
VANADIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ZINC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALKALINITY AS CACO3	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
AMMONIA	mg/L	4	0.31	0.15	0.4	5	0.08	0.05	0.2	4	0.45	0.035	1.13
BROMIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 3004				MONITORING WELL 3005				MONITORING WELL 3011			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	4	22	15	29	5	85	18	333	4	23	15	37.5
CYANIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORIDE	mg/L	4	0.59	0.26	1.3	5	0.23	0.19	0.3	4	0.31	0.25	0.38
NITRATE	mg/L	3	0.097	0.04	0.2	2	0.07	0.01	0.13	2	0.2	0.05	0.34
PHENOLS	mg/L	4	0.018	0.005	0.05	5	0.015	0.005	0.1	4	0.0063	0.005	0.01
PHOSPHATE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHOSPHORUS	mg/L	3	0.37	0.3	0.5	5	0.029	0.005	0.095	4	0.94	0.21	2.83
SULFATE	mg/L	4	78	54	89	5	59	50	76	4	75	50	109
SULFIDE	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL KJELDAHL NITROGEN	mg/L	3	2.9	0.53	15	3	0.13	0.05	0.3	2	0.61	0.05	1.17
TOTAL ORGANIC CARBON	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL ORGANIC HALIDES	mg/L	2	U	U	U	4	0.031	0.025	0.05	2	0.015	0.0057	0.05
TOTAL ORGANIC NITROGEN	mg/L	3	0.19	0.05	0.3	5	0.06	0.05	0.1	4	0.25	0.05	0.6

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TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	2	200	180	218	2	200	190	212	3	98	41	164
ANTIMONY	µg/L	–	–	–	–	1	U	U	U	3	90	78	108
ARSENIC	µg/L	4	50	0.003	200	6	34	0	200	2	U	U	U
BARIUM	µg/L	6	23	0.026	50	7	32	25	50	3	60	52	65.5
BERYLLIUM	µg/L	2	0.9	0.5	1.3	2	2.5	1.8	3.1	3	U	U	U
CADMIUM	µg/L	4	1.1	0.005	5	6	6	1	10.7	3	U	U	U
CALCIUM	µg/L	6	210000	300	273000	7	260000	240000	284000	3	110000	85000	123000
CHROMIUM	µg/L	6	19	0.03	48.4	7	33	10	77.4	3	U	U	U
COBALT	µg/L	2	U	U	U	2	U	U	U	3	U	U	U
COPPER	µg/L	6	4.2	0.01	10	7	7.1	5	20	3	U	U	U
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IRON	µg/L	6	86	0.14	230	7	200	10	600	3	110	32	176
LEAD	µg/L	6	10	0.002	50	7	16	0	50	2	4.3	2.3	6.2
MAGNESIUM	µg/L	6	21000	33	31700	7	79000	71000	85800	3	32000	25000	35500
MANGANESE	µg/L	4	2200	3.2	3310	6	2600	2400	2800	3	190	55	338
MERCURY	µg/L	4	0.075	0.0002	0.2	5	0.062	0	0.2	2	U	U	U
MOLYBDENUM	µg/L	4	7.5	0.01	20	5	12	10	20	3	19	14	24.2
NICKEL	µg/L	6	8.3	0.03	20	7	23	10	43.7	3	U	U	U
OSMIUM	µg/L	1	U	U	U	1	94	94	94	–	–	–	–
POTASSIUM	µg/L	4	5300	7.7	7480	6	16000	14000	18800	3	5000	4400	5460
SELENIUM	µg/L	4	50	0.005	200	6	34	0	200	2	1	0.95	2.1
SILICON	µg/L	–	–	–	–	–	–	–	–	3	3700	3400	4040
SILVER	µg/L	6	7.2	0.01	20.8	7	8	0	19.7	3	U	U	U
SODIUM	µg/L	4	33000	49	50400	6	64000	58000	68000	3	29000	18000	36400
THALLIUM	µg/L	–	–	–	–	1	U	U	U	2	U	U	U
TIN	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
VANADIUM	µg/L	2	34	31	36.2	2	41	34	48.8	3	U	U	U
ZINC	µg/L	2	32	30	34.8	2	35	29	40.6	3	26	5.6	39
ALKALINITY AS CACO3	mg/L	–	–	–	–	–	–	–	–	–	–	–	–
AMMONIA	mg/L	4	0.11	0.05	0.3	5	0.36	0.05	1.6	1	260	260	260
BROMIDE	mg/L	–	–	–	–	–	–	–	–	1	U	U	U

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	6	78	12	170	7	210	150	235	1	24000	24000	24000
CYANIDE	mg/L	–	–	–	–	1	U	U	U	–	–	–	–
FLUORIDE	mg/L	6	0.11	0.05	0.21	7	0.13	0.05	0.29	1	250	250	248
NITRATE	mg/L	5	16	0.43	36.4	6	9.4	0.87	18.1	1	U	U	U
PHENOLS	mg/L	4	0.011	0.005	0.02	5	0.012	0.005	0.024	1	U	U	U
PHOSPHATE	mg/L	–	–	–	–	1	0.45	0.45	0.45	–	–	–	–
PHOSPHORUS	mg/L	4	0.039	0.01	0.06	4	0.064	0.01	0.155	1	130	130	130
SULFATE	mg/L	6	390	88	650	7	460	340	722	1	67000	67000	67000
SULFIDE	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
TOTAL KJELDAHL NITROGEN	mg/L	2	0.68	0.05	1.3	3	1	0.12	2.8	–	–	–	–
TOTAL ORGANIC CARBON	mg/L	2	3.3	2.8	5.52	2	2.8	2.7	2.972	1	1000	1000	1000
TOTAL ORGANIC HALIDES	mg/L	5	0.039	0.005	0.088	6	0.021	0.005	0.05	1	10	10	10
TOTAL ORGANIC NITROGEN	mg/L	4	0.3	0.05	1	5	1.2	0.12	4.4	1	U	U	U

TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 4001				MONITORING WELL 4011			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max
ALUMINUM	µg/L	3	110	97	147	4	65	20	96
ANTIMONY	µg/L	–	–	–	–	4	21	15	38.4
ARSENIC	µg/L	3	36	1.5	200	4	1.3	1	2
BARIUM	µg/L	7	150	41	610	4	300	37	408
BERYLLIUM	µg/L	3	1.2	0.5	2	4	1.1	0.5	2.3
CADMIUM	µg/L	4	4.4	2.5	10	4	4.6	2.5	8.2
CALCIUM	µg/L	7	110000	90000	122000	4	110000	85000	127000
CHROMIUM	µg/L	7	18	5	32.7	4	13	5	22.8
COBALT	µg/L	3	6.7	5	10	4	7.5	5	20
COPPER	µg/L	7	10	5	30	4	9.1	5	11.3
HEXAVALENT CHROMIUM	µg/L	–	–	–	–	–	–	–	–
IRON	µg/L	7	5100	4600	5790	3	3100	40	5500
LEAD	µg/L	7	6.8	1	50	4	U	U	U
MAGNESIUM	µg/L	7	28000	22000	33200	3	25000	20000	29300
MANGANESE	µg/L	4	400	370	425	4	120	16	154
MERCURY	µg/L	4	0.34	0.1	2	3	0.23	0.1	1
MOLYBDENUM	µg/L	4	23	5	50	4	U	U	U
NICKEL	µg/L	7	16	10	40	4	14	10	27.9
OSMIUM	µg/L	–	–	–	–	–	–	–	–
POTASSIUM	µg/L	4	3000	7	8750	4	1300	660	3000
SELENIUM	µg/L	4	27	1	200	4	U	U	U
SILICON	µg/L	–	–	–	–	–	–	–	–
SILVER	µg/L	7	270	0.25	1820	4	7.3	2.5	12.6
SODIUM	µg/L	4	15000	15000	16000	4	23000	14000	30300
THALLIUM	µg/L	–	–	–	–	4	11	1	40
TIN	µg/L	–	–	–	–	–	–	–	–
VANADIUM	µg/L	3	20	19	21.1	4	8.3	5	11.7
ZINC	µg/L	3	15	7.2	22	4	760	8.7	3000
ALKALINITY AS CACO3	mg/L	–	–	–	–	2	380	370	383
AMMONIA	mg/L	4	0.25	0.1	0.4	2	0.99	0.92	1.06
BROMIDE	mg/L	–	–	–	–	–	–	–	–

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TABLE 4-29
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 4001				MONITORING WELL 4011			
CHEMICAL PARAMETERS	Units	Count	Avg	Min	Max	Count	Avg	Min	Max
CHLORIDE	mg/L	7	28	20	35.6	2	38	38	38.8
CYANIDE	mg/L	--	--	--	--	2	U	U	U
FLUORIDE	mg/L	7	0.3	0.1	1.1	2	0.25	0.14	0.36
NITRATE	mg/L	6	0.087	0.02	0.1	1	U	U	U
PHENOLS	mg/L	4	0.014	0.0025	0.05	2	0.006	0.005	0.014
PHOSPHATE	mg/L	--	--	--	--	--	--	--	--
PHOSPHORUS	mg/L	3	0.17	0.023	0.321	2	0.83	0.38	1.27
SULFATE	mg/L	7	65	5	247	2	56	49	62.8
SULFIDE	mg/L	--	--	--	--	--	--	--	--
TOTAL KJELDAHL NITROGEN	mg/L	3	2.8	0.4	15	--	--	--	--
TOTAL ORGANIC CARBON	mg/L	3	12	2.9	20.63	2	3.2	2.3	4.12
TOTAL ORGANIC HALIDES	mg/L	3	0.022	0.005	0.05	2	U	U	U
TOTAL ORGANIC NITROGEN	mg/L	3	0.18	0.01	0.43	--	--	--	--

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	4	U	U	U	8	0.18	0.1	0.5	12	0.14	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	4	0.012	0.01	0.025	6	0.011	0.01	0.025	9	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	4	0.0016	0.0013	0.005	8	0.002	0.0013	0.005	12	0.0026	0.0013	0.01
BARIUM, (DISSD.)	mg/L	4	0.14	0.1	0.5	8	0.16	0.1	0.5	12	0.11	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	4	0.01	0.005	0.05	8	0.0063	0.0025	0.05	12	0.0073	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	4	U	U	U	8	U	U	U	11	U	U	U
CALCIUM, (DISSD.)	mg/L	4	54	33	66	8	76	15	96	12	140	87	200
CHROMIUM, TOTAL (DISSD.)	mg/L	4	0.0021	0.001	0.005	8	0.0026	0.001	0.0089	12	0.0016	0.001	0.005
COBALT, (DISSD.)	mg/L	4	0.01	0.0025	0.025	8	0.0063	0.0025	0.025	12	0.0067	0.0025	0.025
COPPER, (DISSD.)	mg/L	4	0.012	0.01	0.025	8	0.011	0.01	0.025	12	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	4	0.043	0.025	0.1	8	0.041	0.025	0.1	12	1.7	0.025	3.9
LEAD, (DISSD.)	mg/L	4	U	U	U	8	0.002	0.0015	0.005	12	0.0021	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	4	19	18	20	8	19	6.6	26	12	29	15	50
MANGANESE, (DISSD.)	mg/L	4	0.056	0.02	0.12	8	0.01	0.0075	0.04	12	0.64	0.31	1
MERCURY, (DISSD.)	mg/L	4	U	U	U	8	U	U	U	11	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	4	0.011	0.005	0.025	8	0.0078	0.005	0.025	11	0.0077	0.005	0.025
NICKEL, (DISSD.)	mg/L	4	0.0031	0.0025	0.01	8	0.0069	0.0025	0.018	12	0.004	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	4	3.5	3.2	4.2	6	2.8	2.3	3	9	3.5	2.8	5
SELENIUM, (DISSD.)	mg/L	4	0.0016	0.0013	0.005	8	0.002	0.0013	0.005	11	0.002	0.0013	0.005
SILVER, (DISSD.)	mg/L	4	U	U	U	8	U	U	U	12	U	U	U
SODIUM, (DISSD.)	mg/L	4	13	8.1	16	6	15	11	20	10	15	9.9	20
THALLIUM, (DISSD.)	mg/L	4	U	U	U	6	U	U	U	9	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	4	U	U	U	8	U	U	U	12	U	U	U
ZINC, (DISSD.)	mg/L	4	0.014	0.01	0.05	8	0.033	0.01	0.15	12	0.024	0.01	0.063
ALUMINUM	mg/L	4	U	U	U	8	0.83	0.1	2.4	12	1.2	0.1	5.1
ANTIMONY	mg/L	4	0.012	0.01	0.025	6	0.011	0.01	0.025	9	0.011	0.01	0.025
ARSENIC	mg/L	4	0.0016	0.0013	0.005	8	0.0039	0.0025	0.007	12	0.0082	0.0025	0.017
BARIUM	mg/L	4	0.14	0.1	0.5	8	0.19	0.1	0.5	12	0.13	0.1	0.5
BERYLLIUM	mg/L	4	0.01	0.005	0.05	8	0.0063	0.0025	0.05	12	0.0073	0.0025	0.05
CADMIUM	mg/L	4	0.00088	0.0005	0.002	8	0.00051	0.0005	0.0011	11	U	U	U
CALCIUM	mg/L	4	62	45	79	8	97	70	130	12	150	90	220
CHROMIUM, TOTAL	mg/L	4	0.0073	0.0025	0.021	8	0.064	0.001	0.29	12	0.013	0.001	0.048
COBALT	mg/L	4	0.01	0.0025	0.025	8	0.0063	0.0025	0.025	12	0.0067	0.0025	0.025
COPPER	mg/L	4	0.012	0.01	0.025	8	0.013	0.01	0.025	12	0.013	0.01	0.039
IRON	mg/L	4	26	0.66	100	8	2.1	0.05	9.4	12	18	4.1	34
LEAD	mg/L	4	0.011	0.0025	0.031	8	0.0048	0.0015	0.019	12	0.0055	0.0015	0.015
MAGNESIUM	mg/L	4	21	20	22	8	26	15	41	12	34	23	45

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	4	0.1	0.044	0.21	8	0.43	0.0075	1.4	12	0.82	0.46	1.4
MERCURY	mg/L	4	U	U	U	8	U	U	U	11	U	U	U
MOLYBDENUM	mg/L	4	0.011	0.005	0.025	8	0.0078	0.005	0.025	11	0.0085	0.005	0.025
NICKEL	mg/L	4	0.014	0.005	0.028	8	0.026	0.005	0.066	12	0.0082	0.0025	0.023
POTASSIUM	mg/L	4	3.8	3.4	4.5	8	3.1	2.4	3.9	11	3.6	3	5.9
SELENIUM	mg/L	4	0.0016	0.0013	0.005	8	0.002	0.0013	0.005	11	0.002	0.0013	0.005
SILVER	mg/L	4	U	U	U	8	U	U	U	12	U	U	U
SODIUM	mg/L	4	15	13	18	8	14	12	16	12	17	8.3	39
THALLIUM	mg/L	4	U	U	U	6	U	U	U	9	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	4	U	U	U	8	U	U	U	12	U	U	U
ZINC	mg/L	4	0.05	0.025	0.086	8	0.028	0.01	0.062	12	0.032	0.01	0.055
ALKALINITY AT CACO3	mg/L	5	230	210	260	7	210	170	230	9	280	200	330
AMMONIA, AS NITROGEN	mg/L	3	0.02	0.01	0.03	7	0.013	0.01	0.03	9	0.06	0.01	0.13
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	8	24	18	36	9	27	18	33	12	33	30	39
CYANIDE	mg/L	3	U	U	U	7	U	U	U	10	0.0028	0.0025	0.01
FLUORIDE	mg/L	6	0.31	0.21	0.67	8	0.25	0.18	0.32	12	0.17	0.1	0.25
NITROGEN, NITRATE	mg/L	7	2.3	1.2	4.7	8	1.8	0.01	2.3	11	0.018	0.01	0.05
NITROGEN, NITRATE+NITRITE	mg/L	1	2.3	2.3	2.3	1	2.9	2.9	2.9	1	U	U	U
PH	S.U.	5	7.5	7.3	7.9	7	7.3	6.8	7.5	9	7.1	6.9	7.3
PHENOLS	mg/L	6	U	U	U	8	U	U	U	12	0.0031	0.0025	0.01
PHOSPHORUS, TOTAL	mg/L	3	0.023	0.01	0.1	7	0.16	0.05	0.48	9	0.18	0.05	0.37
SPECIFIC CONDUCTANCE	S.U.	5	600	580	640	7	650	490	710	9	970	740	1300
SULFATE	mg/L	8	69	50	87	9	88	58	120	12	240	110	600
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	8	5.3	1	13	9	8.3	1	16	12	9.5	0.5	19
TOTAL DISSOLVED SOLIDS	mg/L	5	370	350	390	7	420	370	580	9	670	510	1000
TOX	mg/L	8	8.3	5	22	9	U	U	U	12	13	5	69

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2121			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	5	U	U	U	13	0.15	0.025	0.5	12	0.16	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	5	0.012	0.01	0.025	11	0.011	0.01	0.025	10	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	5	0.0015	0.0013	0.005	13	0.002	0.0013	0.005	12	0.0022	0.0013	0.005
BARIUM, (DISSD.)	mg/L	5	U	U	U	13	0.12	0.1	0.5	12	0.13	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	5	0.009	0.005	0.05	13	0.0075	0.0025	0.05	12	0.0094	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	5	U	U	U	12	0.00054	0.0005	0.001	11	0.00055	0.0005	0.001
CALCIUM, (DISSD.)	mg/L	5	25	4.9	100	13	110	56	170	12	100	41	140
CHROMIUM, TOTAL (DISSD.)	mg/L	5	0.0022	0.001	0.005	13	0.0019	0.001	0.005	12	0.0018	0.001	0.005
COBALT, (DISSD.)	mg/L	5	0.011	0.0025	0.025	13	0.0081	0.0025	0.025	12	0.0069	0.0025	0.025
COPPER, (DISSD.)	mg/L	5	0.012	0.01	0.025	13	0.013	0.01	0.029	12	0.012	0.01	0.025
IRON, (DISSD.)	mg/L	5	0.44	0.025	2.1	13	0.044	0.025	0.1	12	0.049	0.025	0.11
LEAD, (DISSD.)	mg/L	5	U	U	U	13	0.0025	0.0015	0.005	12	0.0023	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	5	18	14	31	13	21	1.8	33	12	20	13	29
MANGANESE, (DISSD.)	mg/L	5	0.05	0.01	0.2	13	0.014	0.0075	0.04	12	0.013	0.0075	0.04
MERCURY, (DISSD.)	mg/L	5	U	U	U	12	0.00011	0.0001	0.0002	11	0.00011	0.0001	0.0002
MOLYBDENUM, (DISSD.)	mg/L	5	0.011	0.005	0.025	12	0.0092	0.005	0.025	11	0.0082	0.005	0.025
NICKEL, (DISSD.)	mg/L	5	0.003	0.0025	0.01	13	0.004	0.0025	0.01	12	0.0044	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	5	1.8	1.4	2.3	11	7.1	6.2	8.7	10	7	6.1	10
SELENIUM, (DISSD.)	mg/L	5	0.0015	0.0013	0.005	12	0.0021	0.0013	0.005	11	0.0023	0.0013	0.005
SILVER, (DISSD.)	mg/L	5	U	U	U	13	0.00054	0.0005	0.001	12	0.00054	0.0005	0.001
SODIUM, (DISSD.)	mg/L	5	10	6.2	16	12	49	37	63	11	34	19	48
THALLIUM, (DISSD.)	mg/L	5	U	U	U	11	U	U	U	10	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	5	U	U	U	13	0.027	0.025	0.05	12	0.027	0.025	0.05
ZINC, (DISSD.)	mg/L	5	0.013	0.01	0.05	13	0.015	0.01	0.05	12	0.034	0.01	0.23
ALUMINUM	mg/L	5	U	U	U	13	0.17	0.025	0.5	12	0.2	0.055	0.5
ANTIMONY	mg/L	5	0.012	0.01	0.025	11	0.011	0.01	0.025	10	0.016	0.01	0.06
ARSENIC	mg/L	5	0.0026	0.0013	0.005	13	0.002	0.0013	0.005	12	0.0022	0.0013	0.005
BARIUM	mg/L	5	U	U	U	13	0.12	0.1	0.5	12	0.13	0.1	0.5
BERYLLIUM	mg/L	5	0.009	0.005	0.05	13	0.0075	0.0025	0.05	12	0.0094	0.0025	0.05
CADMIUM	mg/L	5	U	U	U	12	0.00054	0.0005	0.001	11	0.00055	0.0005	0.001
CALCIUM	mg/L	5	27	5.6	93	13	140	78	270	12	110	43	160
CHROMIUM, TOTAL	mg/L	5	0.0031	0.001	0.007	13	0.0058	0.0017	0.011	12	0.0054	0.001	0.01
COBALT	mg/L	5	0.011	0.0025	0.025	13	0.0081	0.0025	0.025	12	0.0069	0.0025	0.025
COPPER	mg/L	5	0.032	0.01	0.066	13	0.014	0.01	0.029	12	0.038	0.01	0.18
IRON	mg/L	5	6.2	0.83	14	13	0.14	0.025	0.5	12	0.37	0.079	0.86
LEAD	mg/L	5	0.036	0.0025	0.11	13	0.0058	0.0015	0.017	12	0.011	0.0015	0.042
MAGNESIUM	mg/L	5	17	12	28	13	22	2	30	12	22	16	27

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2121			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	5	0.089	0.02	0.18	13	0.023	0.0075	0.053	12	0.018	0.0075	0.054
MERCURY	mg/L	5	U	U	U	12	0.00011	0.0001	0.0002	11	0.00011	0.0001	0.0002
MOLYBDENUM	mg/L	5	0.011	0.005	0.025	12	0.0088	0.0005	0.025	11	0.0082	0.005	0.025
NICKEL	mg/L	5	0.003	0.0025	0.01	13	0.005	0.0025	0.01	12	0.0044	0.0025	0.01
POTASSIUM	mg/L	5	1.7	1.4	1.9	12	7.1	4.7	8.6	11	6.9	5.3	8.7
SELENIUM	mg/L	5	0.0015	0.0013	0.005	12	0.0021	0.0013	0.005	11	0.0023	0.0013	0.005
SILVER	mg/L	5	U	U	U	13	0.00054	0.0005	0.001	12	0.00063	0.0005	0.0015
SODIUM	mg/L	5	10	6.5	13	13	50	33	69	12	36	19	53
THALLIUM	mg/L	5	U	U	U	11	U	U	U	10	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	5	U	U	U	13	0.027	0.025	0.05	12	0.027	0.025	0.05
ZINC	mg/L	5	0.028	0.01	0.051	13	0.016	0.01	0.05	12	0.029	0.01	0.063
ALKALINITY AT CACO3	mg/L	4	78	74	83	10	230	200	280	9	240	230	250
AMMONIA, AS NITROGEN	mg/L	4	0.28	0.21	0.32	10	2.3	1.5	2.9	9	1.9	0.49	3.2
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	7	20	10	24	13	51	41	62	12	39	0.5	50
CYANIDE	mg/L	4	0.0031	0.0025	0.01	11	0.0027	0.0025	0.005	10	0.003	0.0025	0.01
FLUORIDE	mg/L	5	0.14	0.1	0.21	13	0.33	0.26	0.47	12	0.38	0.26	0.48
NITROGEN, NITRATE	mg/L	5	U	U	U	10	36	21	54	11	17	7.4	44
NITROGEN, NITRATE+NITRITE	mg/L	2	U	U	U	3	17	0.01	50	1	8.9	8.9	8.9
PH	S.U.	4	8.9	8.7	9.4	10	7.3	7.2	7.4	9	7.4	7.2	7.9
PHENOLS	mg/L	5	0.0078	0.0025	0.029	13	0.0027	0.0025	0.005	12	0.0027	0.0025	0.005
PHOSPHORUS, TOTAL	mg/L	4	0.2	0.04	0.29	10	0.079	0.01	0.21	9	0.21	0.01	1.3
SPECIFIC CONDUCTANCE	S.U.	4	190	170	210	10	1000	910	1200	9	830	660	1100
SULFATE	mg/L	7	44	7	95	13	98	68	150	12	86	67	110
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	7	5.3	3	10	13	6.4	0.5	14	12	7.8	0.5	16
TOTAL DISSOLVED SOLIDS	mg/L	4	100	25	160	10	650	530	860	9	520	370	880
TOX	mg/L	7	21	5	52	13	7.4	5	31	12	14	5	50

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM,(DISSD.)	mg/L	3	0.15	0.1	0.5	15	0.12	0.025	0.5	12	0.19	0.025	0.64
ANTIMONY, (DISSD.)	mg/L	3	U	U	U	11	0.011	0.01	0.025	9	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	3	U	U	U	15	0.0019	0.0013	0.005	12	0.0022	0.0013	0.005
BARIUM, (DISSD.)	mg/L	3	0.1	0.1	0.22	15	0.13	0.1	0.5	12	0.22	0.1	1.2
BERYLLIUM, (DISSD.)	mg/L	3	U	U	U	15	0.0067	0.0025	0.05	12	0.0075	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	3	U	U	U	13	U	U	U	11	0.00055	0.0005	0.001
CALCIUM, (DISSD.)	mg/L	3	190	150	240	15	170	61	250	12	210	38	370
CHROMIUM, TOTAL (DISSD.)	mg/L	3	0.0019	0.001	0.0037	15	0.0017	0.001	0.005	12	0.0035	0.001	0.022
COBALT, (DISSD.)	mg/L	3	0.0025	0.0025	0.005	15	0.0072	0.0025	0.025	12	0.0069	0.0025	0.025
COPPER, (DISSD.)	mg/L	3	0.01	0.01	0.02	15	0.011	0.01	0.025	12	0.013	0.01	0.027
IRON, (DISSD.)	mg/L	3	0.05	0.05	0.1	15	2.6	0.22	7.6	12	2.2	0.13	10
LEAD, (DISSD.)	mg/L	3	0.0015	0.0015	0.003	15	0.0021	0.0015	0.005	12	0.0022	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	3	53	41	75	15	43	3.5	67	12	58	18	82
MANGANESE, (DISSD.)	mg/L	3	0.0075	0.0075	0.015	15	0.53	0.21	0.79	12	0.98	0.64	1.5
MERCURY, (DISSD.)	mg/L	3	0.0001	0.0001	0.0002	13	U	U	U	11	0.00011	0.0001	0.0002
MOLYBDENUM, (DISSD.)	mg/L	3	0.005	0.005	0.01	13	0.0079	0.005	0.025	11	0.0082	0.005	0.025
NICKEL, (DISSD.)	mg/L	3	0.005	0.005	0.01	15	0.0038	0.0025	0.01	12	0.0046	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	3	5.5	4.8	6.2	11	5.2	2.6	7.5	9	14	10	18
SELENIUM, (DISSD.)	mg/L	3	0.0025	0.0025	0.005	13	0.002	0.0013	0.005	11	0.0026	0.0013	0.005
SILVER, (DISSD.)	mg/L	3	0.0005	0.0005	0.001	15	U	U	U	12	0.00054	0.0005	0.001
SODIUM, (DISSD.)	mg/L	3	66	61	70	13	36	10	52	10	65	41	83
THALLIUM, (DISSD.)	mg/L	3	0.005	0.005	0.01	11	U	U	U	9	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	3	0.025	0.025	0.05	15	U	U	U	12	0.027	0.025	0.05
ZINC, (DISSD.)	mg/L	3	0.022	0.01	0.036	15	0.023	0.01	0.074	12	0.021	0.01	0.056
ALUMINUM	mg/L	--	--	--	--	15	1.5	0.1	4.2	12	0.81	0.1	2.5
ANTIMONY	mg/L	--	--	--	--	11	0.026	0.01	0.18	9	0.011	0.01	0.025
ARSENIC	mg/L	--	--	--	--	15	0.06	0.0025	0.58	12	0.0041	0.0013	0.012
BARIUM	mg/L	--	--	--	--	15	0.33	0.1	0.69	12	0.16	0.1	0.5
BERYLLIUM	mg/L	--	--	--	--	15	0.0071	0.0025	0.05	12	0.0075	0.0025	0.05
CADMIUM	mg/L	--	--	--	--	13	U	U	U	11	0.00055	0.0005	0.001
CALCIUM	mg/L	--	--	--	--	15	210	120	300	12	270	190	400
CHROMIUM, TOTAL	mg/L	--	--	--	--	15	0.011	0.001	0.025	12	0.014	0.0029	0.03
COBALT	mg/L	--	--	--	--	15	0.0072	0.0025	0.025	12	0.0069	0.0025	0.025
COPPER	mg/L	--	--	--	--	15	0.016	0.01	0.037	12	0.018	0.01	0.042
IRON	mg/L	--	--	--	--	15	43	3.5	96	12	8.3	0.79	27
LEAD	mg/L	--	--	--	--	15	0.0059	0.0015	0.015	12	0.0074	0.0015	0.03
MAGNESIUM	mg/L	--	--	--	--	15	53	4.4	70	12	73	52	100

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	--	--	--	--	15	1	0.24	1.8	12	1.2	0.61	3.3
MERCURY	mg/L	--	--	--	--	13	U	U	U	11	0.00011	0.0001	0.0002
MOLYBDENUM	mg/L	--	--	--	--	13	0.0079	0.005	0.025	11	0.0082	0.005	0.025
NICKEL	mg/L	--	--	--	--	15	0.0095	0.005	0.022	12	0.011	0.005	0.031
POTASSIUM	mg/L	--	--	--	--	13	5.2	1.8	7.5	11	14	11	16
SELENIUM	mg/L	--	--	--	--	13	0.002	0.0013	0.005	11	0.0028	0.0013	0.005
SILVER	mg/L	--	--	--	--	15	U	U	U	12	0.00054	0.0005	0.001
SODIUM	mg/L	--	--	--	--	15	35	20	52	12	68	52	85
THALLIUM	mg/L	--	--	--	--	11	0.0046	0.0005	0.01	9	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	--	--	--	--	15	U	U	U	12	0.033	0.025	0.092
ZINC	mg/L	--	--	--	--	15	0.054	0.01	0.32	12	0.038	0.01	0.086
ALKALINITY AT CACO3	mg/L	4	220	210	230	11	360	300	410	9	390	320	450
AMMONIA, AS NITROGEN	mg/L	4	0.2	0.01	0.74	11	0.22	0.01	0.48	9	2.2	0.52	3.8
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	6	84	42	150	15	75	31	120	12	150	100	190
CYANIDE	mg/L	1	0.044	0.044	0.044	12	U	U	U	10	0.0028	0.0025	0.005
FLUORIDE	mg/L	4	0.39	0.31	0.51	15	0.5	0.31	0.97	12	0.17	0.11	0.27
NITROGEN, NITRATE	mg/L	5	34	28	41	13	0.18	0.08	0.79	11	14	0.67	33
NITROGEN, NITRATE+NITRITE	mg/L	1	24	24	24	2	0.13	0.07	0.18	1	2.3	2.3	2.3
PH	S.U.	4	7.3	7.2	7.5	11	6.9	6.5	7.1	9	6.8	6.3	7
PHENOLS	mg/L	1	U	U	U	15	0.0033	0.0025	0.008	12	0.0027	0.0025	0.005
PHOSPHORUS, TOTAL	mg/L	4	0.068	0.05	0.12	11	2.4	0.05	7.6	9	0.26	0.05	0.49
SPECIFIC CONDUCTANCE	S.U.	4	1200	920	1500	11	1400	950	1800	9	1800	1500	2200
SULFATE	mg/L	6	98	69	120	15	330	180	640	12	480	300	1100
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	6	7	1	10	15	10	1	28	12	13	0.5	31
TOTAL DISSOLVED SOLIDS	mg/L	4	750	660	940	11	950	630	1200	9	1300	840	1800
TOX	mg/L	6	14	5	30	15	19	5	110	12	11	5	51

4783

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	10	0.16	0.1	0.5	8	0.11	0.025	0.5	10	0.13	0.1	0.5
ANTIMONY, (DISSD.)	mg/L	7	0.011	0.01	0.025	6	0.011	0.01	0.025	7	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	10	0.0032	0.0013	0.0098	8	0.0022	0.0013	0.005	10	0.0023	0.0013	0.005
BARIUM, (DISSD.)	mg/L	10	0.15	0.1	0.5	8	0.21	0.1	0.82	10	0.3	0.1	1.3
BERYLLIUM, (DISSD.)	mg/L	10	0.0078	0.0025	0.05	8	0.0059	0.0025	0.05	10	0.0075	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	10	0.00055	0.0005	0.001	8	U	U	U	10	U	U	U
CALCIUM, (DISSD.)	mg/L	10	130	50	200	8	130	75	180	10	210	140	310
CHROMIUM, TOTAL (DISSD.)	mg/L	10	0.0019	0.001	0.0058	8	0.0014	0.001	0.005	10	0.011	0.001	0.024
COBALT, (DISSD.)	mg/L	10	0.0048	0.0025	0.025	8	0.005	0.0025	0.025	10	0.0045	0.0025	0.025
COPPER, (DISSD.)	mg/L	10	0.012	0.01	0.025	8	0.011	0.01	0.025	10	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	10	0.22	0.05	1.2	8	0.23	0.025	1	10	0.073	0.025	0.23
LEAD, (DISSD.)	mg/L	10	0.0021	0.0015	0.005	8	0.0019	0.0015	0.005	10	0.0019	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	10	58	34	81	8	30	23	39	10	41	34	46
MANGANESE, (DISSD.)	mg/L	10	0.58	0.031	1.3	8	0.36	0.069	0.59	10	0.033	0.0075	0.17
MERCURY, (DISSD.)	mg/L	10	0.00011	0.0001	0.0002	8	U	U	U	10	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	10	0.007	0.005	0.025	8	0.0069	0.005	0.025	10	38	0.37	380
NICKEL, (DISSD.)	mg/L	10	0.0056	0.0025	0.01	8	0.0058	0.0025	0.014	10	0.065	0.005	0.36
POTASSIUM, (DISSD.)	mg/L	7	12	2.7	23	6	7.8	6.2	11	7	48	2.6	79
SELENIUM, (DISSD.)	mg/L	10	0.0025	0.0013	0.005	8	0.0022	0.0013	0.005	10	0.0024	0.0013	0.005
SILVER, (DISSD.)	mg/L	10	0.00055	0.0005	0.001	8	U	U	U	10	U	U	U
SODIUM, (DISSD.)	mg/L	7	73	48	86	6	25	15	34	7	120	52	190
THALLIUM, (DISSD.)	mg/L	7	U	U	U	6	U	U	U	7	U	U	U
TIN, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
VANADIUM, (DISSD.)	mg/L	10	0.028	0.025	0.05	8	U	U	U	10	U	U	U
ZINC, (DISSD.)	mg/L	10	0.017	0.01	0.05	8	0.017	0.01	0.035	10	0.03	0.01	0.07
ALUMINUM	mg/L	10	0.31	0.1	1.3	8	1.4	0.1	7.9	10	1.4	0.1	5.4
ANTIMONY	mg/L	7	0.011	0.01	0.025	6	0.011	0.01	0.025	7	0.011	0.01	0.025
ARSENIC	mg/L	10	0.0049	0.0025	0.011	8	0.012	0.0025	0.061	10	0.0057	0.0025	0.017
BARIUM	mg/L	10	0.19	0.1	0.51	8	0.12	0.1	0.28	10	0.25	0.1	0.46
BERYLLIUM	mg/L	10	0.0078	0.0025	0.05	8	0.0059	0.0025	0.05	10	0.0075	0.0025	0.05
CADMIUM	mg/L	10	0.00055	0.0005	0.001	8	U	U	U	10	U	U	U
CALCIUM	mg/L	10	160	120	200	8	160	120	190	10	240	180	290
CHROMIUM, TOTAL	mg/L	10	0.054	0.0026	0.41	8	0.016	0.001	0.066	10	1.7	0.017	5.9
COBALT	mg/L	10	0.0048	0.0025	0.025	8	0.005	0.0025	0.025	10	0.0065	0.0025	0.025
COPPER	mg/L	10	0.013	0.01	0.025	8	0.023	0.01	0.075	10	0.04	0.01	0.1
IRON	mg/L	10	1.6	0.05	9.5	8	4.6	0.05	15	10	13	0.05	42
LEAD	mg/L	10	0.003	0.0015	0.008	8	0.011	0.0015	0.058	10	0.0064	0.0015	0.024
MAGNESIUM	mg/L	10	74	45	110	8	34	29	53	10	49	35	68

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	10	0.68	0.19	1.5	8	0.73	0.26	2.1	10	0.15	0.0075	0.56
MERCURY	mg/L	10	0.00011	0.0001	0.0002	8	U	U	U	10	U	U	U
MOLYBDENUM	mg/L	10	0.0094	0.005	0.036	8	0.0092	0.005	0.031	10	58	0.42	570
NICKEL	mg/L	10	0.015	0.005	0.076	8	0.014	0.005	0.064	10	0.14	0.012	0.7
POTASSIUM	mg/L	10	12	2.9	26	8	8.6	6.4	15	10	49	26	100
SELENIUM	mg/L	10	0.0025	0.0013	0.005	8	0.0024	0.0013	0.005	10	0.0024	0.0013	0.005
SILVER	mg/L	10	0.00085	0.0005	0.0035	8	0.00088	0.0005	0.0035	10	U	U	U
SODIUM	mg/L	10	75	46	92	8	33	21	51	10	120	54	210
THALLIUM	mg/L	7	U	U	U	6	U	U	U	7	U	U	U
TIN	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
VANADIUM	mg/L	10	0.028	0.025	0.05	8	0.042	0.025	0.16	10	U	U	U
ZINC	mg/L	10	0.026	0.01	0.062	8	0.039	0.01	0.18	10	0.051	0.01	0.12
ALKALINITY AT CACO3	mg/L	10	330	270	410	8	290	270	320	10	310	220	380
AMMONIA, AS NITROGEN	mg/L	10	11	1.3	20	8	0.85	0.06	3.6	10	0.13	0.01	1
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	10	160	140	200	8	54	37	71	10	340	180	610
CYANIDE	mg/L	10	0.0028	0.0025	0.005	8	U	U	U	10	0.0041	0.0025	0.018
FLUORIDE	mg/L	10	0.23	0.18	0.3	8	0.23	0.16	0.31	10	1.2	0.73	1.4
NITROGEN, NITRATE	mg/L	9	58	8.3	100	7	15	0.12	40	9	82	47	110
NITROGEN, NITRATE+NITRITE	mg/L	1	59	59	59	1	0.9	0.9	0.9	1	74	74	74
PH	S.U.	10	7.1	7	7.2	8	7.1	7	7.2	10	6.9	6.8	7
PHENOLS	mg/L	10	0.0032	0.0025	0.007	8	U	U	U	10	U	U	U
PHOSPHORUS, TOTAL	mg/L	10	0.3	0.05	0.84	8	0.69	0.05	2.3	10	0.84	0.05	3.6
SPECIFIC CONDUCTANCE	S.U.	10	1800	1400	2200	8	1100	690	1400	10	2500	1800	3500
SULFATE	mg/L	10	210	140	340	8	180	110	350	10	190	150	280
SULFIDE	mg/L	1	U	U	U	1	U	U	U	1	U	U	U
TOC	mg/L	10	16	7	26	8	12	4	19	10	18	7	31
TOTAL DISSOLVED SOLIDS	mg/L	10	1200	950	1500	8	720	440	1000	10	1800	1200	2500
TOX	mg/L	10	32	5	130	8	U	U	U	10	180	56	310

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

		MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.13	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	11	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.0021	0.0013	0.005
BARIUM, (DISSD.)	mg/L	1	0.61	0.61	0.61	1	0.38	0.38	0.38	15	0.11	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.0078	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	14	U	U	U
CALCIUM, (DISSD.)	mg/L	1	120	120	120	1	120	120	120	15	58	5.5	120
CHROMIUM, TOTAL (DISSD.)	mg/L	1	U	U	U	1	0.011	0.011	0.011	15	0.0015	0.001	0.005
COBALT, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.0058	0.0025	0.025
COPPER, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	1.5	0.025	3
LEAD, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.002	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	1	30	30	30	1	29	29	29	15	24	8.2	52
MANGANESE, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.35	0.15	0.53
MERCURY, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	14	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	14	0.0071	0.005	0.025
NICKEL, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.0042	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	11	2.5	2.2	3.1
SELENIUM, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	14	0.0021	0.0013	0.005
SILVER, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	U	U	U
SODIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	12	8.8	6.3	11
THALLIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	11	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	U	U	U
ZINC, (DISSD.)	mg/L	1	U	U	U	1	U	U	U	15	0.013	0.01	0.05
ALUMINUM	mg/L	1	1.7	1.7	1.7	1	0.72	0.72	0.72	15	0.13	0.025	0.5
ANTIMONY	mg/L	--	--	--	--	--	--	--	--	11	0.011	0.01	0.025
ARSENIC	mg/L	1	U	U	U	1	0.0096	0.0096	0.0096	15	0.0021	0.0013	0.005
BARIUM	mg/L	1	U	U	U	1	0.44	0.44	0.44	15	0.11	0.1	0.5
BERYLLIUM	mg/L	1	U	U	U	1	U	U	U	15	0.0078	0.0025	0.05
CADMIUM	mg/L	1	U	U	U	1	U	U	U	14	U	U	U
CALCIUM	mg/L	1	150	150	150	1	150	150	150	15	47	5.8	99
CHROMIUM, TOTAL	mg/L	1	0.023	0.023	0.023	1	0.014	0.014	0.014	15	0.0034	0.001	0.017
COBALT	mg/L	1	U	U	U	1	U	U	U	15	0.0058	0.0025	0.025
COPPER	mg/L	1	0.032	0.032	0.032	1	U	U	U	15	0.011	0.01	0.025
IRON	mg/L	1	4.6	4.6	4.6	1	2	2	2	15	2.2	0.67	3.2
LEAD	mg/L	1	0.0051	0.0051	0.0051	1	0.0031	0.0031	0.0031	15	0.0061	0.0015	0.05
MAGNESIUM	mg/L	1	37	37	37	1	38	38	38	15	25	19	50

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	1	0.64	0.64	0.64	1	0.09	0.09	0.09	15	0.33	0.081	0.54
MERCURY	mg/L	1	U	U	U	1	U	U	U	14	U	U	U
MOLYBDENUM	mg/L	1	U	U	U	1	U	U	U	14	0.0071	0.005	0.025
NICKEL	mg/L	1	0.02	0.02	0.02	1	0.011	0.011	0.011	15	0.0042	0.0025	0.01
POTASSIUM	mg/L	1	3	3	3	1	3.2	3.2	3.2	14	2.3	1.7	2.6
SELENIUM	mg/L	1	U	U	U	1	U	U	U	14	0.0021	0.0013	0.005
SILVER	mg/L	1	U	U	U	1	U	U	U	15	0.00079	0.0005	0.0049
SODIUM	mg/L	1	25	25	25	1	23	23	23	15	9.5	7.5	14
THALLIUM	mg/L	--	--	--	--	--	--	--	--	11	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	1	U	U	U	1	U	U	U	15	U	U	U
ZINC	mg/L	1	0.036	0.036	0.036	1	U	U	U	15	0.037	0.01	0.22
ALKALINITY AT CACO3	mg/L	1	290	290	290	1	310	310	310	12	89	73	110
AMMONIA, AS NITROGEN	mg/L	1	U	U	U	1	U	U	U	12	0.042	0.01	0.12
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	1	51	51	51	1	44	44	44	15	20	16	25
CYANIDE	mg/L	1	U	U	U	1	U	U	U	13	0.0027	0.0025	0.01
FLUORIDE	mg/L	1	0.26	0.26	0.26	1	0.33	0.33	0.33	15	0.88	0.06	12
NITROGEN, NITRATE	mg/L	1	4.3	4.3	4.3	1	4	4	4	14	U	U	U
NITROGEN, NITRATE+NITRITE	mg/L	--	--	--	--	--	--	--	--	1	U	U	U
PH	S.U.	1	7.2	7.2	7.2	1	7.2	7.2	7.2	12	8.8	7.8	9.2
PHENOLS	mg/L	1	U	U	U	1	U	U	U	15	0.0036	0.0025	0.011
PHOSPHORUS, TOTAL	mg/L	1	U	U	U	1	U	U	U	12	0.059	0.01	0.21
SPECIFIC CONDUCTANCE	S.U.	1	910	910	910	1	940	940	940	12	240	220	260
SULFATE	mg/L	1	96	96	96	1	110	110	110	15	15	2	78
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	1	10	10	10	1	9	9	9	15	8.4	4	40
TOTAL DISSOLVED SOLIDS	mg/L	1	510	510	510	1	480	480	480	12	120	79	270
TOX	mg/L	1	U	U	U	1	U	U	U	15	7.5	5	34

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	0.21	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
ARSENIC, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
BARIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
BERYLLIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
CADMIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
CALCIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	40	27	57
CHROMIUM, TOTAL (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
COBALT, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
COPPER, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
IRON, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	0.57	0.11	1.3
LEAD, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
MAGNESIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	20	16	24
MANGANESE, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	0.23	0.094	0.36
MERCURY, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
NICKEL, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
POTASSIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	3.1	2.6	3.3
SELENIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
SILVER, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
SODIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	9	5	11
THALLIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
ZINC, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	5	0.025	0.01	0.039
ALUMINUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
ANTIMONY	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
ARSENIC	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
BARIUM	mg/L	--	--	--	--	--	--	--	--	5	0.082	0.01	0.2
BERYLLIUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
CADMIUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
CALCIUM	mg/L	--	--	--	--	--	--	--	--	5	44	33	59
CHROMIUM, TOTAL	mg/L	--	--	--	--	--	--	--	--	5	0.0075	0.0025	0.015
COBALT	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
COPPER	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
IRON	mg/L	--	--	--	--	--	--	--	--	5	2	1.2	2.5
LEAD	mg/L	--	--	--	--	--	--	--	--	5	0.0056	0.0025	0.018
MAGNESIUM	mg/L	--	--	--	--	--	--	--	--	5	23	19	24

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	--	--	--	--	--	--	--	--	5	0.24	0.093	0.38
MERCURY	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
MOLYBDENUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
NICKEL	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
POTASSIUM	mg/L	--	--	--	--	--	--	--	--	5	3.2	2.9	3.6
SELENIUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
SILVER	mg/L	--	--	--	--	--	--	--	--	5	0.026	0.0005	0.071
SODIUM	mg/L	--	--	--	--	--	--	--	--	5	10	7.1	12
THALLIUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	--	--	--	--	--	--	--	--	5	U	U	U
ZINC	mg/L	--	--	--	--	--	--	--	--	5	0.086	0.032	0.15
ALKALINITY AT CACO3	mg/L	2	170	160	170	1	270	270	270	3	230	220	260
AMMONIA, AS NITROGEN	mg/L	2	0.035	0.01	0.06	--	--	--	--	3	0.027	0.01	0.04
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	3	24	21	31	3	39	29	52	7	21	19	23
CYANIDE	mg/L	2	U	U	U	--	--	--	--	3	U	U	U
FLUORIDE	mg/L	2	0.23	0.19	0.26	1	0.25	0.25	0.25	5	0.16	0.14	0.2
NITROGEN, NITRATE	mg/L	1	U	U	U	3	16	11	22	6	0.028	0.01	0.07
NITROGEN, NITRATE+NITRITE	mg/L	2	0.02	0.01	0.03	--	--	--	--	1	0.04	0.04	0.04
PH	S.U.	2	7.6	7.6	7.6	1	7.8	7.8	7.8	3	7.9	7.7	8.1
PHENOLS	mg/L	2	U	U	U	1	U	U	U	5	U	U	U
PHOSPHORUS, TOTAL	mg/L	2	U	U	U	--	--	--	--	3	0.043	0.01	0.07
SPECIFIC CONDUCTANCE	S.U.	2	560	560	560	1	1100	1100	1100	3	490	470	520
SULFATE	mg/L	3	75	66	84	3	92	84	97	7	26	7	110
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	3	8	4	16	3	9.3	4	17	7	11	7	14
TOTAL DISSOLVED SOLIDS	mg/L	2	380	360	390	1	710	710	710	3	260	210	340
TOX	mg/L	3	7	5	11	3	U	U	U	7	6.3	5	14

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	13	0.14	0.025	0.5	13	0.13	0.025	0.5	9	0.14	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	10	0.012	0.01	0.025	10	0.011	0.01	0.025	7	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	13	0.0018	0.0013	0.005	13	0.002	0.0013	0.005	9	0.0024	0.0013	0.005
BARIUM, (DISSD.)	mg/L	13	0.11	0.1	0.5	13	0.11	0.1	0.5	9	0.16	0.1	0.24
BERYLLIUM, (DISSD.)	mg/L	13	0.0073	0.0025	0.05	13	0.0069	0.0025	0.05	9	0.0061	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	12	U	U	U	12	U	U	U	9	0.00056	0.0005	0.001
CALCIUM, (DISSD.)	mg/L	13	25	7.9	72	13	170	48	240	9	83	65	99
CHROMIUM, TOTAL (DISSD.)	mg/L	13	0.0018	0.001	0.005	13	0.002	0.001	0.005	9	0.0016	0.001	0.005
COBALT, (DISSD.)	mg/L	13	0.0079	0.0025	0.025	13	0.0063	0.0025	0.025	9	0.0061	0.0025	0.025
COPPER, (DISSD.)	mg/L	13	0.011	0.01	0.025	13	0.011	0.01	0.025	9	0.012	0.01	0.025
IRON, (DISSD.)	mg/L	13	0.13	0.025	0.41	13	6.6	1.2	31	9	0.86	0.05	1.4
LEAD, (DISSD.)	mg/L	13	0.0022	0.0015	0.005	13	0.002	0.0015	0.005	9	0.0021	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	13	21	11	26	13	25	12	35	9	23	15	26
MANGANESE, (DISSD.)	mg/L	13	0.17	0.025	0.26	13	2.4	1.8	2.8	9	0.15	0.13	0.16
MERCURY, (DISSD.)	mg/L	12	U	U	U	12	0.00018	0.0001	0.002	9	0.00011	0.0001	0.0002
MOLYBDENUM, (DISSD.)	mg/L	12	0.0088	0.005	0.025	12	0.0075	0.005	0.025	9	0.0081	0.005	0.025
NICKEL, (DISSD.)	mg/L	13	0.0042	0.0025	0.012	13	0.004	0.0025	0.01	9	0.0047	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	10	3.4	2.8	4.3	10	13	9.8	15	7	1.6	1.1	2.5
SELENIUM, (DISSD.)	mg/L	12	0.0019	0.0013	0.005	12	0.0021	0.0013	0.005	9	0.0024	0.0013	0.005
SILVER, (DISSD.)	mg/L	13	U	U	U	13	U	U	U	9	0.00056	0.0005	0.001
SODIUM, (DISSD.)	mg/L	11	11	6.7	19	11	62	52	82	7	12	8.7	14
THALLIUM, (DISSD.)	mg/L	10	U	U	U	10	U	U	U	7	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	13	U	U	U	13	U	U	U	9	0.028	0.025	0.05
ZINC, (DISSD.)	mg/L	13	0.019	0.01	0.11	13	0.018	0.01	0.072	9	0.023	0.01	0.085
ALUMINUM	mg/L	13	0.16	0.025	0.5	13	0.13	0.025	0.5	9	0.19	0.1	0.5
ANTIMONY	mg/L	10	0.014	0.01	0.039	10	0.011	0.01	0.025	7	0.011	0.01	0.025
ARSENIC	mg/L	13	0.0018	0.0013	0.005	13	0.002	0.0013	0.005	9	0.0026	0.0013	0.005
BARIUM	mg/L	13	0.11	0.1	0.5	13	0.12	0.1	0.5	9	0.19	0.1	0.36
BERYLLIUM	mg/L	13	0.0073	0.0025	0.05	13	0.0069	0.0025	0.05	9	0.0061	0.0025	0.05
CADMIUM	mg/L	12	U	U	U	12	0.0062	0.0005	0.069	9	0.00056	0.0005	0.001
CALCIUM	mg/L	13	37	13	95	13	200	140	250	9	92	73	130
CHROMIUM, TOTAL	mg/L	13	0.014	0.0025	0.036	13	0.0055	0.001	0.016	9	0.0066	0.001	0.03
COBALT	mg/L	13	0.0081	0.0025	0.025	13	0.0063	0.0025	0.025	9	0.0061	0.0025	0.025
COPPER	mg/L	13	0.16	0.01	1.3	13	0.012	0.01	0.025	9	0.014	0.01	0.025
IRON	mg/L	13	18	5.2	52	13	10	1.6	53	9	3.5	1.4	7.2
LEAD	mg/L	13	0.022	0.0025	0.07	13	0.0035	0.0015	0.017	9	0.0025	0.0015	0.006
MAGNESIUM	mg/L	13	22	14	24	13	28	23	32	9	24	22	28

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	13	0.36	0.13	0.66	13	2.6	2	3.3	9	0.16	0.13	0.19
MERCURY	mg/L	12	0.00011	0.0001	0.0002	12	U	U	U	9	0.00011	0.0001	0.0002
MOLYBDENUM	mg/L	12	0.0088	0.005	0.025	12	0.0075	0.005	0.025	9	0.0081	0.005	0.025
NICKEL	mg/L	13	0.0068	0.0025	0.028	13	0.0051	0.0025	0.011	9	0.0047	0.0025	0.01
POTASSIUM	mg/L	12	3.3	2.8	4.4	12	13	11	16	9	1.6	1	2.7
SELENIUM	mg/L	12	0.0019	0.0013	0.005	12	0.0021	0.0013	0.005	9	0.0024	0.0013	0.005
SILVER	mg/L	13	U	U	U	13	U	U	U	9	0.00056	0.0005	0.001
SODIUM	mg/L	13	12	9.2	18	13	65	49	110	9	12	7.6	17
THALLIUM	mg/L	10	U	U	U	10	U	U	U	7	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	13	U	U	U	13	U	U	U	9	0.028	0.025	0.05
ZINC	mg/L	13	0.17	0.023	0.49	13	0.033	0.01	0.094	9	0.018	0.01	0.027
ALKALINITY AT CACO3	mg/L	9	130	100	190	10	220	120	340	8	270	250	280
AMMONIA, AS NITROGEN	mg/L	9	0.046	0.01	0.16	10	0.099	0.04	0.16	8	0.89	0.13	1.4
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	13	20	18	23	13	70	52	82	10	24	21	28
CYANIDE	mg/L	9	U	U	U	11	U	U	U	8	0.0031	0.0025	0.01
FLUORIDE	mg/L	13	0.1	0.025	0.26	13	0.082	0.025	0.18	9	0.24	0.19	0.28
NITROGEN, NITRATE	mg/L	11	0.03	0.01	0.14	12	0.018	0.01	0.06	9	0.046	0.01	0.17
NITROGEN, NITRATE+NITRITE	mg/L	2	0.05	0.05	0.05	1	U	U	U	1	0.07	0.07	0.07
PH	S.U.	9	8.2	7.8	8.6	10	6.9	6.7	7.3	8	7.3	7.1	7.5
PHENOLS	mg/L	13	0.007	0.0025	0.055	13	0.0042	0.0025	0.014	9	0.0095	0.0025	0.063
PHOSPHORUS, TOTAL	mg/L	9	0.073	0.01	0.21	10	0.11	0.01	0.51	8	0.44	0.12	0.87
SPECIFIC CONDUCTANCE	S.U.	9	350	230	530	10	1200	1100	1400	8	670	610	720
SULFATE	mg/L	13	36	16	75	13	340	300	410	10	65	45	88
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	13	4.4	0.5	11	13	7.7	2	13	10	9.6	4	19
TOTAL DISSOLVED SOLIDS	mg/L	9	190	130	320	10	850	650	1000	8	410	350	550
TOX	mg/L	13	7	5	22	13	17	5	61	10	30	5	230

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	13	0.14	0.025	0.5	13	0.15	0.025	0.5	16	0.15	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	11	0.011	0.01	0.025	10	0.011	0.01	0.025	13	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	13	0.0021	0.0013	0.005	13	0.0098	0.0013	0.014	16	0.0021	0.0013	0.005
BARIUM, (DISSD.)	mg/L	13	0.12	0.1	0.5	13	0.3	0.22	0.5	16	0.12	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	13	0.0073	0.0025	0.05	13	0.0087	0.0025	0.05	16	0.0066	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	12	0.00054	0.0005	0.001	12	U	U	U	15	0.00053	0.0005	0.001
CALCIUM, (DISSD.)	mg/L	13	180	110	270	13	73	36	91	16	180	68	280
CHROMIUM, TOTAL (DISSD.)	mg/L	13	0.0018	0.001	0.005	13	0.0016	0.001	0.005	16	0.0039	0.001	0.011
COBALT, (DISSD.)	mg/L	13	0.0073	0.0025	0.025	13	0.0063	0.0025	0.025	16	0.007	0.0025	0.025
COPPER, (DISSD.)	mg/L	13	0.012	0.01	0.025	13	0.011	0.01	0.025	16	0.012	0.01	0.025
IRON, (DISSD.)	mg/L	13	0.061	0.025	0.27	13	3	0.8	3.9	16	0.059	0.025	0.11
LEAD, (DISSD.)	mg/L	13	0.0022	0.0015	0.005	13	0.0021	0.0015	0.005	16	0.0022	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	13	26	11	37	13	24	9	29	16	61	28	94
MANGANESE, (DISSD.)	mg/L	13	1.3	0.0075	3.1	13	0.056	0.042	0.069	16	1.1	0.011	3.4
MERCURY, (DISSD.)	mg/L	12	0.00011	0.0001	0.0002	12	U	U	U	15	0.00011	0.0001	0.0002
MOLYBDENUM, (DISSD.)	mg/L	12	0.0085	0.005	0.025	12	0.0075	0.005	0.025	15	0.0083	0.005	0.025
NICKEL, (DISSD.)	mg/L	13	0.0048	0.0025	0.01	13	0.004	0.0025	0.01	16	0.0059	0.0025	0.032
POTASSIUM, (DISSD.)	mg/L	11	5.7	0.5	11	10	0.94	0.5	1.3	13	13	8.6	17
SELENIUM, (DISSD.)	mg/L	12	0.0022	0.0013	0.005	12	0.0021	0.0013	0.005	15	0.0022	0.0013	0.005
SILVER, (DISSD.)	mg/L	13	0.00054	0.0005	0.001	13	U	U	U	16	0.00053	0.0005	0.001
SODIUM, (DISSD.)	mg/L	12	45	16	70	11	22	13	29	14	59	24	91
THALLIUM, (DISSD.)	mg/L	11	U	U	U	10	U	U	U	13	U	U	U
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	13	0.027	0.025	0.05	13	U	U	U	16	0.027	0.025	0.05
ZINC, (DISSD.)	mg/L	13	0.016	0.01	0.05	13	0.017	0.01	0.05	16	0.019	0.01	0.05
ALUMINUM	mg/L	13	0.15	0.025	0.5	13	0.15	0.055	0.5	16	0.23	0.025	0.64
ANTIMONY	mg/L	11	0.011	0.01	0.025	10	0.011	0.01	0.025	13	0.011	0.01	0.025
ARSENIC	mg/L	13	0.0021	0.0013	0.005	13	0.011	0.0013	0.014	16	0.0021	0.0013	0.005
BARIUM	mg/L	13	0.13	0.1	0.5	13	0.31	0.23	0.5	16	0.12	0.1	0.5
BERYLLIUM	mg/L	13	0.0073	0.0025	0.05	13	0.0087	0.0025	0.05	16	0.0066	0.0025	0.05
CADMIUM	mg/L	12	0.00054	0.0005	0.001	12	U	U	U	15	0.00053	0.0005	0.001
CALCIUM	mg/L	13	200	130	400	13	80	39	98	16	190	95	290
CHROMIUM, TOTAL	mg/L	13	0.004	0.001	0.012	13	0.0057	0.001	0.024	16	0.03	0.0025	0.099
COBALT	mg/L	13	0.0073	0.0025	0.025	13	0.0063	0.0025	0.025	16	0.007	0.0025	0.025
COPPER	mg/L	13	0.016	0.01	0.073	13	0.012	0.01	0.025	16	0.013	0.01	0.025
IRON	mg/L	13	0.56	0.05	1.4	13	3.8	3.5	4	16	0.86	0.08	5.6
LEAD	mg/L	13	0.0029	0.0015	0.0075	13	0.0021	0.0015	0.005	16	0.0053	0.0015	0.02
MAGNESIUM	mg/L	13	30	18	38	13	25	20	30	16	66	41	94

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	13	1.8	0.54	3.2	13	0.062	0.047	0.073	16	1.8	0.16	4.8
MERCURY	mg/L	12	0.00011	0.0001	0.0002	12	U	U	U	15	0.00011	0.0001	0.0002
MOLYBDENUM	mg/L	12	0.0085	0.005	0.025	12	0.0075	0.005	0.025	15	0.0087	0.005	0.025
NICKEL	mg/L	13	0.0048	0.0025	0.01	13	0.0047	0.0025	0.013	16	0.014	0.0025	0.034
POTASSIUM	mg/L	12	6.2	0.5	11	12	0.91	0.5	1.5	15	13	6.7	19
SELENIUM	mg/L	12	0.0022	0.0013	0.005	12	0.0021	0.0013	0.005	15	0.0022	0.0013	0.005
SILVER	mg/L	13	0.00058	0.0005	0.0011	13	0.00069	0.0005	0.003	16	0.00053	0.0005	0.001
SODIUM	mg/L	13	46	15	75	13	22	14	33	16	60	26	100
THALLIUM	mg/L	11	U	U	U	10	U	U	U	13	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	13	0.026	0.01	0.05	13	0.028	0.025	0.07	16	0.027	0.025	0.05
ZINC	mg/L	13	0.043	0.01	0.33	13	0.024	0.01	0.061	16	0.03	0.01	0.065
ALKALINITY AT CACO3	mg/L	9	350	270	400	10	340	320	360	12	340	150	460
AMMONIA, AS NITROGEN	mg/L	9	0.03	0.01	0.07	10	3	2.4	3.4	12	0.052	0.01	0.19
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	13	17	5	54	13	23	4	32	16	81	11	220
CYANIDE	mg/L	10	0.0028	0.0025	0.005	11	U	U	U	13	0.0027	0.0025	0.005
FLUORIDE	mg/L	13	0.54	0.1	0.81	13	0.34	0.23	0.63	16	0.77	0.11	1.2
NITROGEN, NITRATE	mg/L	11	5.2	0.17	24	12	0.048	0.01	0.45	14	5.6	1.6	17
NITROGEN, NITRATE+NITRITE	mg/L	2	31	2	61	1	U	U	U	2	4.3	3.9	4.8
PH	S.U.	9	7.3	7.1	7.5	10	7.3	7.2	7.4	12	7.7	7.1	8.2
PHENOLS	mg/L	13	0.0027	0.0025	0.005	13	U	U	U	16	0.0034	0.0025	0.012
PHOSPHORUS, TOTAL	mg/L	9	0.15	0.01	0.4	10	0.4	0.16	0.71	12	0.86	0.1	1.7
SPECIFIC CONDUCTANCE	S.U.	9	910	750	1000	10	680	650	700	12	1300	900	1500
SULFATE	mg/L	13	190	120	350	13	8.8	2	43	16	360	240	540
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	13	10	1	19	13	10	3	17	16	12	0.5	21
TOTAL DISSOLVED SOLIDS	mg/L	9	510	6.2	750	10	370	340	480	12	940	620	1300
TOX	mg/L	13	24	5	190	13	7.3	5	24	16	15	5	40

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	1	U	U	U	14	0.15	0.025	0.5	11	0.14	0.025	0.5
ANTIMONY, (DISSD.)	mg/L	--	--	--	--	11	0.011	0.01	0.025	8	0.011	0.01	0.025
ARSENIC, (DISSD.)	mg/L	1	U	U	U	14	0.0019	0.0013	0.005	11	0.0021	0.0013	0.005
BARIUM, (DISSD.)	mg/L	1	U	U	U	14	0.11	0.1	0.5	11	0.11	0.1	0.5
BERYLLIUM, (DISSD.)	mg/L	1	U	U	U	14	0.007	0.0025	0.05	11	0.0077	0.0025	0.05
CADMIUM, (DISSD.)	mg/L	1	U	U	U	13	U	U	U	10	U	U	U
CALCIUM, (DISSD.)	mg/L	1	81	81	81	14	61	9.1	120	11	53	34	80.6
CHROMIUM, TOTAL (DISSD.)	mg/L	1	U	U	U	14	0.0018	0.001	0.005	11	0.0017	0.001	0.005
COBALT, (DISSD.)	mg/L	1	U	U	U	14	0.0075	0.0025	0.025	11	0.007	0.0025	0.025
COPPER, (DISSD.)	mg/L	1	U	U	U	14	0.011	0.01	0.025	11	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	1	U	U	U	14	2.5	0.025	6.13	11	5.6	0.84	14.5
LEAD, (DISSD.)	mg/L	1	U	U	U	14	0.0021	0.0015	0.005	11	0.0021	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	1	20	20	20	14	22	7	34.8	11	17	1.1	23.6
MANGANESE, (DISSD.)	mg/L	1	0.64	0.64	0.64	14	0.31	0.16	0.435	11	0.45	0.32	0.557
MERCURY, (DISSD.)	mg/L	1	U	U	U	13	U	U	U	10	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	1	U	U	U	13	0.0085	0.005	0.025	10	0.008	0.005	0.025
NICKEL, (DISSD.)	mg/L	1	U	U	U	14	0.0038	0.0025	0.01	11	0.0039	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	--	--	--	--	11	1.5	0.5	3.1	8	1.5	1.2	1.83
SELENIUM, (DISSD.)	mg/L	1	U	U	U	13	0.0019	0.0013	0.005	10	0.002	0.0013	0.005
SILVER, (DISSD.)	mg/L	1	U	U	U	14	U	U	U	11	U	U	U
SODIUM, (DISSD.)	mg/L	--	--	--	--	12	18	15	26.1	9	11	9.4	18.9
THALLIUM, (DISSD.)	mg/L	--	--	--	--	11	U	U	U	8	0.0059	0.005	0.025
TIN, (DISSD.)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	1	U	U	U	14	U	U	U	11	U	U	U
ZINC, (DISSD.)	mg/L	1	U	U	U	14	0.012	0.01	0.05	11	0.029	0.01	0.077
ALUMINUM	mg/L	1	0.86	0.86	0.86	14	0.16	0.025	0.5	11	0.14	0.025	0.5
ANTIMONY	mg/L	--	--	--	--	11	0.011	0.01	0.025	8	0.011	0.01	0.025
ARSENIC	mg/L	1	U	U	U	14	0.0019	0.0013	0.005	11	0.0025	0.0013	0.005
BARIUM	mg/L	1	U	U	U	14	0.13	0.1	0.5	11	0.11	0.1	0.5
BERYLLIUM	mg/L	1	U	U	U	14	0.007	0.0025	0.05	11	0.0077	0.0025	0.05
CADMIUM	mg/L	1	U	U	U	13	0.001	0.0005	0.0076	10	U	U	U
CALCIUM	mg/L	1	78	78	78	14	55	9.1	123	11	61	43	129
CHROMIUM, TOTAL	mg/L	1	0.01	0.01	0.01	14	0.0063	0.001	0.027	11	0.0036	0.001	0.012
COBALT	mg/L	1	U	U	U	14	0.0075	0.0025	0.025	11	0.007	0.0025	0.025
COPPER	mg/L	1	U	U	U	14	0.015	0.01	0.025	11	0.011	0.01	0.025
IRON	mg/L	1	1.5	1.5	1.5	14	4.7	3.1	6.9	11	9.9	2.2	17.3
LEAD	mg/L	1	U	U	U	14	0.0092	0.0015	0.053	11	0.014	0.0025	0.043
MAGNESIUM	mg/L	1	18	18	18	14	24	15	32.6	11	22	17	38

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	1	0.59	0.59	0.59	14	0.34	0.24	0.465	11	0.46	0.3	0.6
MERCURY	mg/L	1	U	U	U	13	U	U	U	10	U	U	U
MOLYBDENUM	mg/L	1	U	U	U	13	0.0085	0.005	0.025	10	0.008	0.005	0.025
NICKEL	mg/L	1	U	U	U	14	0.0042	0.0025	0.01	11	0.0039	0.0025	0.01
POTASSIUM	mg/L	1	2	2	2	13	1.8	0.96	3.2	10	1.6	1.2	2
SELENIUM	mg/L	1	U	U	U	13	0.0019	0.0013	0.005	10	0.002	0.0013	0.005
SILVER	mg/L	1	U	U	U	14	U	U	U	11	0.0011	0.0005	0.0066
SODIUM	mg/L	1	18	18	18	14	20	14	24.9	11	14	10	31.6
THALLIUM	mg/L	--	--	--	--	11	U	U	U	8	U	U	U
TIN	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
VANADIUM	mg/L	1	U	U	U	14	U	U	U	11	U	U	U
ZINC	mg/L	1	0.021	0.021	0.021	14	0.17	0.01	0.654	11	0.18	0.01	0.335
ALKALINITY AT CACO3	mg/L	1	210	210	210	11	170	140	311	8	200	180	216
AMMONIA, AS NITROGEN	mg/L	1	0.16	0.16	0.16	11	0.62	0.43	0.72	8	0.3	0.22	0.41
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBONATE ION (CACO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLORIDE	mg/L	1	23	23	23	14	24	18	33	11	12	10	15
CYANIDE	mg/L	1	U	U	U	12	U	U	U	8	U	U	U
FLUORIDE	mg/L	1	0.24	0.24	0.24	14	0.13	0.07	0.22	11	0.18	0.13	0.36
NITROGEN, NITRATE	mg/L	1	0.09	0.09	0.09	12	0.031	0.01	0.15	10	0.037	0.01	0.25
NITROGEN, NITRATE+NITRITE	mg/L	--	--	--	--	2	0.03	0.03	0.03	1	U	U	U
PH	S.U.	1	7.5	7.5	7.5	11	7.8	7.3	8.24	8	7.3	6.9	7.49
PHENOLS	mg/L	1	U	U	U	14	0.0031	0.0025	0.006	11	U	U	U
PHOSPHORUS, TOTAL	mg/L	1	0.55	0.55	0.55	11	0.068	0.01	0.25	8	0.048	0.01	0.11
SPECIFIC CONDUCTANCE	S.U.	1	600	600	600	11	400	300	784	8	420	390	463
SULFATE	mg/L	1	81	81	81	14	12	0.5	98	11	5.7	0.5	11
SULFIDE	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOC	mg/L	1	5	5	5	14	7.9	4	14	11	6.8	0.5	15
TOTAL DISSOLVED SOLIDS	mg/L	1	300	300	300	11	220	150	504	8	230	170	318
TOX	mg/L	1	U	U	U	14	13	5	40	11	9.7	5	36

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	9	0.14	0.025	0.5	7	0.083	0.025	0.2	6	0.075	0.025	0.2
ANTIMONY, (DISSD.)	mg/L	7	0.011	0.01	0.025	4	U	U	U	3	U	U	U
ARSENIC, (DISSD.)	mg/L	9	0.0025	0.0013	0.005	6	0.0022	0.0015	0.005	5	0.0024	0.0015	0.005
BARIUM, (DISSD.)	mg/L	9	0.36	0.1	0.464	6	0.16	0.1	0.25	5	U	U	U
BERYLLIUM, (DISSD.)	mg/L	9	0.0083	0.0025	0.05	6	0.0033	0.0025	0.01	5	0.0035	0.0025	0.01
CADMIUM, (DISSD.)	mg/L	9	0.00056	0.0005	0.001	4	U	U	U	4	U	U	U
CALCIUM, (DISSD.)	mg/L	9	98	30	131	7	120	110	144	6	91	81	103
CHROMIUM, TOTAL (DISSD.)	mg/L	9	0.0021	0.001	0.008	7	0.0018	0.001	0.005	6	0.0015	0.001	0.005
COBALT, (DISSD.)	mg/L	9	0.005	0.0025	0.025	6	0.0058	0.0025	0.025	5	0.0065	0.0025	0.025
COPPER, (DISSD.)	mg/L	9	0.012	0.01	0.025	7	0.011	0.01	0.025	6	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	9	1.4	0.025	3.96	7	4.9	4.1	5.4	6	2.5	2.1	3.38
LEAD, (DISSD.)	mg/L	9	0.0021	0.0015	0.005	6	0.0018	0.0015	0.005	5	0.0019	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	9	30	23	34.5	6	33	31	36.4	5	26	24	28.7
MANGANESE, (DISSD.)	mg/L	9	0.15	0.055	0.193	7	0.43	0.39	0.482	6	0.39	0.34	0.406
MERCURY, (DISSD.)	mg/L	9	0.00011	0.0001	0.0002	4	U	U	U	3	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	9	0.0072	0.005	0.025	5	U	U	U	4	U	U	U
NICKEL, (DISSD.)	mg/L	9	0.0063	0.0025	0.014	7	0.0043	0.0025	0.01	6	0.0042	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	7	1.5	1	3.16	4	5.2	4.9	5.9	3	1.6	1.4	1.9
SELENIUM, (DISSD.)	mg/L	9	0.0025	0.0013	0.005	4	U	U	U	3	U	U	U
SILVER, (DISSD.)	mg/L	9	0.00056	0.0005	0.001	6	U	U	U	5	U	U	U
SODIUM, (DISSD.)	mg/L	7	44	26	86.3	6	42	38	46.8	5	17	13	21.4
THALLIUM, (DISSD.)	mg/L	7	U	U	U	4	U	U	U	3	U	U	U
TIN, (DISSD.)	mg/L	1	U	U	U	--	--	--	--	--	--	--	--
VANADIUM, (DISSD.)	mg/L	9	0.028	0.025	0.05	7	U	U	U	6	U	U	U
ZINC, (DISSD.)	mg/L	9	0.021	0.01	0.061	7	0.012	0.01	0.025	6	0.016	0.01	0.047
ALUMINUM	mg/L	9	0.24	0.1	0.5	5	0.13	0.025	0.5	4	0.1	0.025	0.5
ANTIMONY	mg/L	7	0.011	0.01	0.025	3	0.012	0.01	0.025	2	0.011	0.01	0.025
ARSENIC	mg/L	9	0.0027	0.0013	0.005	5	0.0016	0.0013	0.005	4	0.0038	0.0015	0.0075
BARIUM	mg/L	9	0.41	0.26	0.52	5	0.19	0.1	0.28	4	U	U	U
BERYLLIUM	mg/L	9	0.0083	0.0025	0.05	5	0.0045	0.0025	0.01	4	0.0044	0.0025	0.01
CADMIUM	mg/L	9	0.00056	0.0005	0.001	3	U	U	U	2	U	U	U
CALCIUM	mg/L	9	110	51	140	5	120	100	142	4	93	84	107
CHROMIUM, TOTAL	mg/L	9	0.011	0.0024	0.046	5	0.0022	0.001	0.005	4	0.0021	0.001	0.005
COBALT	mg/L	9	0.005	0.0025	0.025	5	0.011	0.0025	0.025	4	0.01	0.0025	0.025
COPPER	mg/L	9	0.016	0.01	0.034	5	0.016	0.01	0.034	4	0.012	0.01	0.025
IRON	mg/L	9	2.7	1.1	4.16	5	5.5	5	6.02	4	2.8	2.5	3.23
LEAD	mg/L	9	0.0029	0.0015	0.01	5	0.0023	0.0015	0.005	4	0.0026	0.0025	0.005
MAGNESIUM	mg/L	9	30	25	33.2	5	36	32	37.4	4	27	22	29.2

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
MANGANESE	mg/L	9	0.17	0.14	0.196	5	0.44	0.4	0.46	4	0.39	0.36	0.402
MERCURY	mg/L	9	0.00011	0.0001	0.0002	3	U	U	U	2	U	U	U
MOLYBDENUM	mg/L	9	0.0072	0.005	0.025	3	0.01	0.005	0.025	2	0.0088	0.005	0.025
NICKEL	mg/L	9	0.0092	0.005	0.027	5	0.003	0.0025	0.01	4	0.0031	0.0025	0.01
POTASSIUM	mg/L	9	1.4	1	2.24	3	5.8	5.3	6.08	2	1.7	1.6	1.7
SELENIUM	mg/L	9	0.0025	0.0013	0.005	3	0.0017	0.0013	0.005	2	0.0019	0.0013	0.005
SILVER	mg/L	9	0.00072	0.0005	0.002	5	U	U	U	4	U	U	U
SODIUM	mg/L	9	43	28	78.5	5	42	38	46.8	4	18	14	20.3
THALLIUM	mg/L	7	U	U	U	3	U	U	U	2	U	U	U
TIN	mg/L	1	U	U	U	--	--	--	--	--	--	--	--
VANADIUM	mg/L	9	0.028	0.025	0.05	5	U	U	U	4	U	U	U
ZINC	mg/L	9	0.03	0.01	0.077	5	U	U	U	4	U	U	U
ALKALINITY AT CACO3	mg/L	9	360	340	392	11	380	320	418	7	300	290	319
AMMONIA, AS NITROGEN	mg/L	9	0.77	0.51	0.92	4	6	5.1	6.36	2	0.43	0.42	0.43
BICARBONATE ION (CACO3)	mg/L	--	--	--	--	5	370	340	390	4	290	290	299
CARBONATE ION (CACO3)	mg/L	--	--	--	--	5	2.6	1	5	4	1.6	0.5	4
CHLORIDE	mg/L	9	35	9	42	13	35	30	37	9	26	20	29
CYANIDE	mg/L	9	0.0031	0.0025	0.01	4	U	U	U	2	U	U	U
FLUORIDE	mg/L	9	0.36	0.27	0.51	11	0.33	0.17	0.93	8	0.29	0.19	0.74
NITROGEN, NITRATE	mg/L	8	0.038	0.01	0.17	11	U	U	U	8	0.016	0.01	0.06
NITROGEN, NITRATE+NITRITE	mg/L	1	0.18	0.18	0.18	2	U	U	U	1	U	U	U
PH	S.U.	9	7.4	7.3	8.28	11	7.3	7.2	7.52	7	7.4	7.2	7.55
PHENOLS	mg/L	9	0.0028	0.0025	0.005	8	U	U	U	5	U	U	U
PHOSPHORUS, TOTAL	mg/L	9	0.73	0.19	2.54	4	0.15	0.11	0.2	2	0.18	0.16	0.19
SPECIFIC CONDUCTANCE	S.U.	9	910	820	1030	11	1000	970	1050	7	650	620	672
SULFATE	mg/L	9	86	56	120	13	140	110	165	9	26	11	52
SULFIDE	mg/L	1	U	U	U	--	--	--	--	--	--	--	--
TOC	mg/L	9	16	6	27	13	7	0.5	16	9	6.8	0.5	11
TOTAL DISSOLVED SOLIDS	mg/L	9	560	470	704	11	590	510	680	7	370	330	412
TOX	mg/L	9	12	5	40	13	7.4	5	36	9	8.6	5	37

TABLE 4-30
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
ALUMINUM, (DISSD.)	mg/L	9	0.099	0.025	0.24
ANTIMONY, (DISSD.)	mg/L	5	U	U	U
ARSENIC, (DISSD.)	mg/L	7	0.0022	0.0015	0.005
BARIUM, (DISSD.)	mg/L	7	U	U	U
BERYLLIUM, (DISSD.)	mg/L	7	0.0032	0.0025	0.01
CADMIUM, (DISSD.)	mg/L	5	U	U	U
CALCIUM, (DISSD.)	mg/L	9	75	15	88.2
CHROMIUM, TOTAL (DISSD.)	mg/L	9	0.0013	0.001	0.005
COBALT, (DISSD.)	mg/L	7	0.0054	0.0025	0.025
COPPER, (DISSD.)	mg/L	9	0.011	0.01	0.025
IRON, (DISSD.)	mg/L	9	2.1	0.05	2.78
LEAD, (DISSD.)	mg/L	7	0.0018	0.0015	0.005
MAGNESIUM, (DISSD.)	mg/L	7	21	14	24.1
MANGANESE, (DISSD.)	mg/L	9	0.37	0.0075	0.439
MERCURY, (DISSD.)	mg/L	5	U	U	U
MOLYBDENUM, (DISSD.)	mg/L	7	U	U	U
NICKEL, (DISSD.)	mg/L	9	0.0044	0.0025	0.01
POTASSIUM, (DISSD.)	mg/L	5	2	1.6	2.5
SELENIUM, (DISSD.)	mg/L	5	U	U	U
SILVER, (DISSD.)	mg/L	7	U	U	U
SODIUM, (DISSD.)	mg/L	7	7.9	6.3	11.2
THALLIUM, (DISSD.)	mg/L	5	0.0041	0.0005	0.01
TIN, (DISSD.)	mg/L	--	--	--	--
VANADIUM, (DISSD.)	mg/L	9	0.023	0.01	0.05
ZINC, (DISSD.)	mg/L	9	0.011	0.01	0.023
ALUMINUM	mg/L	5	0.11	0.025	0.5
ANTIMONY	mg/L	3	0.011	0.01	0.025
ARSENIC	mg/L	5	0.0022	0.0015	0.005
BARIUM	mg/L	5	U	U	U
BERYLLIUM	mg/L	5	0.004	0.0025	0.01
CADMIUM	mg/L	3	U	U	U
CALCIUM	mg/L	5	83	77	94.4
CHROMIUM, TOTAL	mg/L	5	0.0077	0.001	0.029
COBALT	mg/L	5	0.0085	0.0025	0.025
COPPER	mg/L	5	0.012	0.01	0.025
IRON	mg/L	5	2.5	2.1	2.74
LEAD	mg/L	5	0.0021	0.0015	0.005
MAGNESIUM	mg/L	5	23	20	25.4

TABLE 4-30

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - INORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
MANGANESE	mg/L	5	0.42	0.38	0.45
MERCURY	mg/L	3	U	U	U
MOLYBDENUM	mg/L	3	0.0075	0.005	0.025
NICKEL	mg/L	5	0.0035	0.0025	0.01
POTASSIUM	mg/L	3	1.7	1.6	1.8
SELENIUM	mg/L	3	0.0021	0.0013	0.005
SILVER	mg/L	5	U	U	U
SODIUM	mg/L	5	8.2	6.5	12.4
THALLIUM	mg/L	3	U	U	U
TIN	mg/L	--	--	--	--
VANADIUM	mg/L	5	U	U	U
ZINC	mg/L	5	0.015	0.01	0.036
ALKALINITY AT CACO3	mg/L	10	240	29	271
AMMONIA, AS NITROGEN	mg/L	2	0.2	0.19	0.2
BICARBONATE ION (CACO3)	mg/L	7	220	29	265
CARBONATE ION (CACO3)	mg/L	7	2.5	0.5	9
CHLORIDE	mg/L	12	13	10	17
CYANIDE	mg/L	2	U	U	U
FLUORIDE	mg/L	10	0.2	0.13	0.4
NITROGEN, NITRATE	mg/L	11	0.03	0.01	0.15
NITROGEN, NITRATE+NITRITE	mg/L	1	U	U	U
PH	S.U.	10	7.5	7.3	8.59
PHENOLS	mg/L	5	0.0059	0.0025	0.013
PHOSPHORUS, TOTAL	mg/L	2	0.14	0.14	0.14
SPECIFIC CONDUCTANCE	S.U.	10	560	240	621
SULFATE	mg/L	12	45	29	69
SULFIDE	mg/L	--	--	--	--
TOC	mg/L	12	5.4	0.5	10
TOTAL DISSOLVED SOLIDS	mg/L	10	310	120	385
TOX	mg/L	12	10	5	41

NOTE:
DISSD = FILTER SAMPLE
BLANK = UNFILTERED SAMPLE
S.U. = STANDARD UNITS

COUNT = NUMBER OF SAMPLES ANALYZED
U = NOT DETECTED
-- = NOT ANALYZED

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,1-DICHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	2	U	U	U
1,1-DICHLOROETHENE	µg/L	2	U	U	U	1	U	U	U	2	U	U	U
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,2-DICHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,2-DICHLOROETHYLENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,2-DICHLOROPROPANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2,4-D	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4-DB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	2	U	5	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-BUTANONE	µg/L	1	U	U	U	--	--	--	--	1	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-HEXANONE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4,4-DDD	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4-DDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4-DDT	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-METHYL-2-PENTANONE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ACETONE	µg/L	2	3	1	10	1	37	37	37	3	7	2	13
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ALDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALPHA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR-1016	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1221	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1232	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1242	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1248	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1254	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR-1260	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AZINPHOSMETHYL	µg/L	1	U	U	U	2	0.75	0.25	2.5	1	U	U	U
BENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	4.5	4	10
BROMODICHLOROMETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BROMOFORM	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BROMOMETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CARBAZOLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CARBON TETRACHLORIDE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHLOROFORM	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHLOROMETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DALAPON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DEMETON	µg/L	1	U	U	U	2	0.16	0.13	0.4	1	U	U	U
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIAZINON	µg/L	1	U	U	U	2	0.11	0.1	0.25	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIBROMOCHLOROMETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DICAMBA	µg/L	--	--	--	--	--	--	--	--	--	--	--	
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DICHLOROPROP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DISULFOTON	µg/L	1	U	U	U	2	0.11	0.1	0.25	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

832

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ETHION	µg/L	1	U	U	U	2	0.11	0.1	0.25	1	U	U	U
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ETHYLBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
FAMPHUR	µg/L	--	--	--		--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
GAMMA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	1	U	U	U	1	2	2	2	2	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MALATHION	µg/L	1	U	U	U	2	0.11	0.1	0.25	1	U	U	U
MCPA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHOXYCHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYLENE CHLORIDE	µg/L	2	U	U	U	1	U	U	U	3	6.5	4	22
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	10	10	10	2	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PARATHION, ETHYL	µg/L	1	U	U	U	2	0.11	0.1	0.25	1	U	U	U
PARATHION, METHYL	µg/L	1	U	U	U	2	0.11	0.1	0.25	1	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
PHENACETIN	µg/L	--	--	--	--	--	--	--		1	U	U	U
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
PHENOL	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
PYRENE	µg/L	1	U	U	U	1	U	U	U	2	U	U	U
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
SAFROLE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
STYRENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TETRACHLOROETHENE	µg/L	2	U	U	U	1	U	U	U	2	U	U	U
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	2	U	U	U	1	U	U	U	3	2.7	2.5	5
TOTAL XYLENES	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
TRICHLOROETHENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
VINYL ACETATE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2011				MONITORING WELL 2019			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	3	3.3	2.5	5	1	U	U	U	4	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2,4-DB	µg/L	--	--	--	--	--	--	--		--	--	--	--
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2-BUTANONE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4,4-DDD	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4,4-DDE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4,4-DDT	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
4-NITROPHENOL	µg/L	1	3	3	3	1	U	U	U	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ACETONE	µg/L	3	U	U	U	1	U	U	U	4	U	U	U
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ALDRIN	µg/L	1	U	U	U	1	0.11	0.11	0.11	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	1	U	U	U	1	0.1	0.1	0.1	3	U	U	U
ALPHA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	3	0.33	0.25	1
ANILINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	2	5	U	U
AROCLOR-1016	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AROCLOR-1221	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AROCLOR-1232	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AROCLOR-1242	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AROCLOR-1248	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AROCLOR-1254	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AROCLOR-1260	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
AZINPHOSMETHYL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	1	U	U	U	3	4.3	3	10
BROMODICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BROMOFORM	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CARBAZOLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	1	U	U	U	1	U	U	U	3	4.5	1	10
CARBON TETRACHLORIDE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CHLOROFORM	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DALAPON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DEMETON	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
DIAZINON	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
DICAMBA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
DICHLOROPROP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DIETHYL PHTHALATE	µg/L	1	1	1	1	1	U	U	U	3	U	U	U
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
DISULFOTON	µg/L	1	U	U	U	1	U	U	U	3	0.42	0.25	1
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	3	0.12	0.05	0.5

842

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ENDRIN	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	1	U	U	U	1	U	U	U	3	0.12	0.05	0.5
ETHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ETHYLBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
GAMMA-CHLORDANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	1	0.07	0.07	0.07	3	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ISODRIN	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
KEPONE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
MALATHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
MCPA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHOXYCHLOR	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
METHYLENE CHLORIDE	µg/L	3	2.8	2.5	7	1	U	U	U	4	3.1	2.5	10
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	3	4.3	3	10
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PARATHION, ETHYL	µg/L	1	U	U	U	1	U	U	U	3	0.1	0.025	0.5
PARATHION, METHYL	µg/L	1	U	U	U	1	U	U	U	3	0.18	0.025	1

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
PHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
PYRENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
SAFROLE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
STYRENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	3	3.3	2.5	5	1	U	U	U	4	U	U	U
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TOLUENE	µg/L	3	U	U	U	1	U	U	U	4	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	3	0.42	0.25	1
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
TRICHLOROETHENE	µg/L	3	3.3	2.5	5	1	U	U	U	4	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	2	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2021				MONITORING WELL 2022				MONITORING WELL 2027			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,2-DICHLOROETHYLENE	µg/L	--	--	--	--	2	U	U	U	3	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DIOXANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	1	U	U	U	2	2.5	2	4	3	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	2	9.5	2	17	3	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4-DDT	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	2	7.5	2	13	3	U	U	U
4-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETONE	µg/L	3	5.5	1	21	2	8.5	6.5	21	3	U	U	U
ACETONITRILE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALPHA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1221	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1232	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1242	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1248	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1254	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1260	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BROMOFORM	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CARBAZOLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

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TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHLOROFORM	µg/L	1	U	U	U	2	U	U	U	3	3.7	2.5	6
CHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
CHRYSENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
DALAPON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DEMETON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DICAMBA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLOROPROP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DINOSEB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
GAMMA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MALATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	3	2.8	2.5	6	2	10	9	22	3	5.8	2.5	18
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITRITE, AS N	µg/L	--	--	--	--	1	0.19	0.19	0.19	1	U	U	U
NITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRIDINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
STYRENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	3	U	U	U	2	2.3	2	5	3	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	3	U	U	U	2	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2084				MONITORING WELL 2643				MONITORING WELL 2648			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	1	U	U	U	2	U	U	U	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	2	9.5	9	10	1	U	U	U	3	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	2	5	4	6	1	U	U	U	3	U	U	U
1,1-DICHLOROETHENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	2	0.33	0.11	1.1	3	0.28	0.15	0.91
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	2	0.35	0.09	1.2	3	0.38	0.26	0.91
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	2	0.46	0.11	1.6	3	0.27	0.23	0.66
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	2	0.37	0.27	0.94	3	0.45	0.27	1.2
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	2	0.18	0.11	0.5	3	0.17	0.14	0.4
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	2	0.35	0.25	0.89	3	0.41	0.26	1.1
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	2	0.17	0.11	0.46	3	0.15	0.12	0.36
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	2	0.32	0.23	0.81	3	0.38	0.24	1
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	2	0.21	0.13	0.59	3	0.19	0.16	0.46
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	2	0.59	0.22	1.9	3	0.35	0.23	0.95
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	2	0.29	0.21	0.74	3	0.2	0.17	0.43
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
1,2-DICHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
1,2-DICHLOROETHYLENE	µg/L	2	5.5	3	8	1	U	U	U	3	U	U	U
1,2-DICHLOROPROPANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

655

4783

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	2	0.18	0.11	0.49	3	0.17	0.13	0.39
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	2	0.28	0.2	0.71	3	0.19	0.16	0.42
2,3,7,8-TCDD	µg/L	--	--	--	--	2	0.82	0.38	2.5	3	0.33	0.29	0.7
2,3,7,8-TCDF	µg/L	--	--	--	--	2	1.1	0.5	3.2	3	0.26	0.22	0.67
2,4,5-T	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2,4-D	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4-DB	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2,4-DINITROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2,4-DINITROTOLUENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-CHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-HEXANONE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-NITROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4,4-DDD	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
4,4-DDE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
4,4-DDT	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-CHLOROANILINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-METHYL-2-PENTANONE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
4-METHYLPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-NITROANILINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-NITROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
ACENAPHTHYLENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
ACETONE	µg/L	2	8	5	22	1	U	U	U	3	5.2	5	11
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ALPHA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AROCLOR-1221	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AROCLOR-1232	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AROCLOR-1242	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AROCLOR-1248	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AROCLOR-1254	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AROCLOR-1260	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
AZINPHOSMETHYL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
BENZENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BENZO(A)PYRENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BENZO(G,H,I)PERYLENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	--	--	--	--	1	1	1	1	3	U	U	U
BROMODICHLOROMETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
BROMOFORM	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
BROMOMETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	3	3	2	10
CARBAZOLE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U

4783

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
CARBON TETRACHLORIDE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
CHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
CHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
CHLOROFORM	µg/L	2	U	U	U	1	U	U	U	3	4	2	10
CHLOROMETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
CHRYSENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
DALAPON	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
DEMETON	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
DI-N-BUTYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
DI-N-OCTYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
DIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
DIBROMOCHLOROMETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICAMBA	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLOROPROP	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIELDRIN	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
DIETHYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
DINOSEB	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ENDRIN	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ENDRIN KETONE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
ETHION	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	10
FLUORENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
GAMMA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	2	0.33	0.11	1.1	3	0.29	0.15	0.91
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	2	0.53	0.36	1.4	3	0.42	0.29	1
HEXACHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	2	0.35	0.25	0.88	3	0.41	0.26	1.1
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	2	0.58	0.12	2.1	3	0.45	0.17	1.5
HEXACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MALATHION	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
MCPA	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
MCPP	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	2	2.8	2.5	6	1	U	U	U	3	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	2	0.26	0.17	0.7	3	0.23	0.16	0.74
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	2	0.2	0.09	0.6	3	0.13	0.01	0.43
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
PARATHION, METHYL	µg/L	--	--	--	--	1	U	U	U	2	U	U	U

4783
861

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	2	0.67	0.39	1.9	3	0.38	0.32	0.98
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	2	0.28	0.21	0.72	3	0.2	0.17	0.43
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
PHENOL	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	--	--	--	--	1	U	U	U	3	U	U	U
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
STYRENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	2	0.7	0.25	2.3	3	0.28	0.25	0.66
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	2	0.64	0.44	1.7	3	0.24	0.19	0.55
TETRACHLOROETHENE	µg/L	2	U	U	U	--	--	--	--	--	--	--	--
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	1	U	U	U	2	U	U	U
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	2	1.8	1	5	1	U	U	U	3	3.4	0.25	10
TOTAL XYLENES	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--	3	U	U	U
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	2	130	110	150	1	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	2	U	U	U	--	--	--	--	--	--	--	--

4783

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2649				MONITORING WELL 2821				MONITORING WELL 2822			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U

663

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,1-DICHLOROETHANE	µg/L	4	4.4	2.5	5	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,3,5-TRINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

4783

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-NITROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

665

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4,4-DDD	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4,4-DDE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4,4-DDT	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-CHLOROANILINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	1	3	3	3	--	--	--	--	--	--	--	--
4-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-NITROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ACETONE	µg/L	4	8.9	5	37	--	--	--	--	--	--	--	--
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ALPHA-CHLORDANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AROCLOR-1221	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AROCLOR-1232	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AROCLOR-1242	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AROCLOR-1248	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AROCLOR-1254	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AROCLOR-1260	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
AZINPHOSMETHYL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZENE	µg/L	1	4	4	4	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZO(A)PYRENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZOIC ACID	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BETA-BHC	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BROMOFORM	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BROMOMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CARBAZOLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CARBON TETRACHLORIDE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CHLOROFORM	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CHLOROMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CHRYSENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DALAPON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DEMETON	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIAZINON	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIBENZOFURAN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICAMBA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLOROPROP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DINOSEB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ENDRIN	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ETHION	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
FLUORENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
GAMMA-CHLORDANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEPTACHLOR	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U		--	--	--	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--		--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MALATHION	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
MCPA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	4	3.9	2.5	11	--	--	--	--	--	--	--	--
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PYRENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
PYRIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
STYRENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	4	4.4	2.5	5	--	--	--	--	--	--	--	--
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	4	5	2.5	10	--	--	--	--	--	--	--	--
TOTAL XYLENES	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TOXAPHENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	4	4.4	2.5	5	--	--	--	--	--	--	--	--
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

871

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3001				MONITORING WELL 3003				MONITORING WELL 3005			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	5	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
1,1-DICHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	6	U	U	U
1,1-DICHLOROETHENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	--	--	--	--	3	0.36	0.34	0.78
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	--	--	--	--	3	0.58	0.5	1.4
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	--	--	--	--	3	0.73	0.65	1.7
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	3	0.62	0.47	1.4
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	3	0.44	0.3	1.2
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	3	0.58	0.45	1.3
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	3	0.4	0.28	1.1
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--	3	0.54	0.41	1.2
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	3	0.51	0.35	1.4
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	--	--	--	--	3	1.5	0.8	5.3
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	3	0.73	0.55	2.1
1,2,3-TRICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,2-DICHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	5	U	U	U
1,2-DICHLOROETHYLENE	µg/L	--	--	--	--	--	--	--	--	6	U	U	U
1,2-DICHLOROPROPANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
1,3,5-TRINITROBENZENE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,3-DINITROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1,4-DIOXANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
1-NAPHTHYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--	3	0.43	0.3	1.2
2,3,4,6-TETRACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--	3	0.68	0.5	2
2,3,7,8-TCDD	µg/L	1	U	U	U	1	U	U	U	3	0.5	0.16	1.5
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--	3	0.84	0.26	2.3
2,4,5-T	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-D	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-BUTANONE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-HEXANONE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-NAPHTHYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
2-PICOLINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
3-CHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
3-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4,4-DDD	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
4,4-DDE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
4,4-DDT	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-AMINOBIPHENYL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACENAPHTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACETONE	µg/L	2	6.8	5.5	11	2	5.5	5	10	6	11	5	45
ACETONITRILE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACETOPHENONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACROLEIN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ACRYLONITRILE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ALDRIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

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TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ALPHA-CHLORDANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ANILINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ARAMITE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
AROCLOR-1016	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1221	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1232	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1242	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1248	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1254	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AROCLOR-1260	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BENZOIC ACID	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	2	2	2	1	U	U	U	--	--	--	--
BROMODICHLOROMETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
BROMOFORM	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
BROMOMETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CARBAZOLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
CARBON TETRACHLORIDE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
CHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
CHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
CHLOROFORM	µg/L	--	--	--	--	1	U	U	U	6	4.7	4	10
CHLOROMETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
DALAPON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DEMETON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	1	2	2	2	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIALLATE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIAZINON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DICAMBA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DICHLOROPROP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DINOSEB	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ENDOSULFAN SULFATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ENDRIN	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
ETHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	1	U	U	U	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	1	U	U	U	2	7.5	5	20	--	--	--	--
ETHYL METHANESULFONATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ETHYLBENZENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
FLUORENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
GAMMA-CHLORDANE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEPTACHLOR	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	3	0.36	0.34	0.78
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	3	0.95	0.6	2.5
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	1	U	U	U	3	0.58	0.44	1.3
HEXACHLORODIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	3	0.96	0.42	2.7
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
IODOMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ISODRIN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
		Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
ISOSAFROLE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
KEPONE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
MALATHION	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPA	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
MCPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
METHAPYRILENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
METHYL METHACRYLATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
METHYL METHANESULFONATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
METHYLENE CHLORIDE	µg/L	2	5	3	7	2	4.8	4.5	9	6	U	U	U
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSOMORPHOLINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
NITRITE, AS N	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
O-TOLUIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--	3	0.75	0.6	1.9
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	3	0.48	0.44	1.1
P-DIMETHYLAMINOAZOBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PARATHION, ETHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	1	U	U	U	3	1.5	0.8	5.3
PENTACHLORODIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	3	0.7	0.5	2.1
PENTACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHENACETIN	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHENOL	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PYRENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
PYRIDINE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
SAFROLE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
STYRENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXIN	µg/L	1	U	U	U	1	U	U	U	3	0.93	0.65	2.5
TETRACHLORODIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	3	1.1	0.8	3.4
TETRACHLOROETHENE	µg/L	2	U	U	U	2	U	U	U	--	--	--	--
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOLUENE	µg/L	2	3.3	2.5	5	2	U	U	U	6	U	U	U
TOTAL XYLENES	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
TOXAPHENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
TRICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U	6	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	1	U	U	U	1	U	U	U	--	--	--	--
VINYL ACETATE	µg/L	--	--	--	--	1	U	U	U	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3084				MONITORING WELL 3821			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	--	--	--	--	1	U	U	U	6	U	U	U

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TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001				MONITORING WELL 4011			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U
1,1-DICHLOROETHANE	µg/L	4	4.4	2.5	5	2	U	U	U
1,1-DICHLOROETHENE	µg/L	1	U	U	U	2	U	U	U
1,2,3,4,6,7,8-HPCDD	µg/L	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HPCDF	µg/L	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HEPTACHLORODIBEN	µg/L	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--
1,2,3,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZO-	µg/L	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZO-P	µg/L	--	--	--	--	--	--	--	--
1,2,3,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	--	--	--	--
1,2-DIBROMOETHANE	µg/L	--	--	--	--	--	--	--	--
1,2-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--
1,2-DICHLOROETHANE	µg/L	1	U	U	U	2	U	U	U
1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	2	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U
1,3,5-TRINITROBENZENE	µg/L	--	--	--		--	--	--	--
1,3-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--
1,3-DINITROBENZENE	µg/L	--	--	--	--	--	--	--	--
1,4-DICHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--
1,4-DIOXANE	µg/L	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001				MONITORING WELL 4011			
		Count	Avg	Min	Max	Count	Avg	Min	Max
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HEXACHLORODIBENZOF	µg/L	--	--	--	--	--	--	--	--
2,3,4,6-TETRACHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,3,4,7,8-PENTACHLORODIBENZOFU	µg/L	--	--	--	--	--	--	--	--
2,3,7,8-TCDD	µg/L	--	--	--	--	--	--	--	--
2,3,7,8-TCDF	µg/L	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--
2,4-DB	µg/L	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	--	--	--	--
2,4-DINITROPHENOL	µg/L	1	U	U	U	--	--	--	--
2,4-DINITROTOLUENE	µg/L	1	U	U	U	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	1	2	2	2	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--
2-BUTANONE	µg/L	--	--	--	--	1	U	U	U
2-CHLORO-1,3-BUTADIENE	µg/L	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	--	--	--	--
2-CHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--
2-HEXANONE	µg/L	1	U	U	U	2	U	U	U
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	--	--	--	--
2-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	1	U	U	U	--	--	--	--
2-NITROPHENOL	µg/L	1	U	U	U	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001 Count	Avg	Min	Max	MONITORING WELL 4011 Count	Avg	Min	Max
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--
3-CHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--
3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	--	--	--	--
4,4-DDD	µg/L	--	--	--	--	--	--	--	--
4,4-DDE	µg/L	--	--	--	--	--	--	--	--
4,4-DDT	µg/L	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--
4-CHLOROANILINE	µg/L	1	U	U	U	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	--	--	--	--
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	2	U	U	U
4-METHYLPHENOL	µg/L	1	U	U	U	--	--	--	--
4-NITROANILINE	µg/L	1	U	U	U	--	--	--	--
4-NITROPHENOL	µg/L	1	U	U	U	--	--	--	--
4-NITROQUINOLINE-1-OXIDE	µg/L	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--
7,12-DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	1	U	U	U	--	--	--	--
ACENAPHTHYLENE	µg/L	1	U	U	U	--	--	--	--
ACETONE	µg/L	4	9.4	5	35	2	4.3	3.5	10
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--
ACROLEIN	µg/L	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001				MONITORING WELL 4011			
		Count	Avg	Min	Max	Count	Avg	Min	Max
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--
ALPHA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	1	U	U	U	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1016	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1221	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1232	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1242	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1248	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1254	µg/L	--	--	--	--	--	--	--	--
AROCLOR-1260	µg/L	--	--	--	--	--	--	--	--
AZINPHOSMETHYL	µg/L	--	--	--	--	--	--	--	--
BENZENE	µg/L	1	U	U	U	2	U	U	U
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	--	--	--	--
BENZO(A)PYRENE	µg/L	1	U	U	U	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--
BENZO(G,H,I)PERYLENE	µg/L	1	U	U	U	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--
BENZOIC ACID	µg/L	1	U	U	U	--	--	--	--
BENZYL ALCOHOL	µg/L	1	U	U	U	--	--	--	--
BETA-BHC	µg/L	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	--	--	--	--
BIS(2-CHLOROISOPROPYL) ETHER	µg/L	1	U	U	U	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	µg/L	1	5	5	5	--	--	--	--
BROMODICHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U
BROMOFORM	µg/L	1	U	U	U	2	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	2	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--
CARBAZOLE	µg/L	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 4001				MONITORING WELL 4011			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max
CARBON DISULFIDE	µg/L	1	U	U	U	2	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	2	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	2	1.8	1	5
CHLOROETHANE	µg/L	1	U	U	U	2	U	U	U
CHLOROFORM	µg/L	1	U	U	U	2	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U
CHRYSENE	µg/L	1	U	U	U	--	--	--	--
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U
DALAPON	µg/L	--	--	--	--	--	--	--	--
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--
DEMETON	µg/L	--	--	--	--	--	--	--	--
DI-N-BUTYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--
DI-N-OCTYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--
DIAZINON	µg/L	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	--	--	--	--
DIBENZOFURAN	µg/L	1	U	U	U	--	--	--	--
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	2	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--
DICAMBA	µg/L	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--
DICHLOROPROP	µg/L	--	--	--	--	--	--	--	--
DIELDRIN	µg/L	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	1	U	U	U	--	--	--	--
DINOSEB	µg/L	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	--	--	--	--
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001 Count	Avg	Min	Max	MONITORING WELL 4011 Count	Avg	Min	Max
ENDOSULFAN-I	µg/L	--	--	--	--	--	--	--	--
ENDRIN	µg/L	--	--	--	--	--	--	--	--
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--
ENDRIN KETONE	µg/L	--	--	--	--	--	--	--	--
ETHION	µg/L	--	--	--	--	--	--	--	--
ETHYL CYANIDE	µg/L	--	--	--	--	--	--	--	--
ETHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--
ETHYLBENZENE	µg/L	1	U	U	U	2	U	U	U
FAMPHUR	µg/L	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	1	U	U	U	--	--	--	--
FLUORENE	µg/L	1	U	U	U	--	--	--	--
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	--	--	--	--
GAMMA-CHLORDANE	µg/L	--	--	--	--	--	--	--	--
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
HEPTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	1	U	U	U	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	--	--	--	--
HEXACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
HEXACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	1	U	U	U	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	--	--	--	--
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	1	U	U	U	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001 Count	Avg	Min	Max	MONITORING WELL 4011 Count	Avg	Min	Max
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--
MALATHION	µg/L	--	--	--	--	--	--	--	--
MCPA	µg/L	--	--	--	--	--	--	--	--
MCPP	µg/L	--	--	--	--	--	--	--	--
METHACRYLONITRILE	µg/L	--	--	--	--	--	--	--	--
METHAPYRILENE	µg/L	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	--	--	--	--	--	--	--	--
METHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--
METHYLENE CHLORIDE	µg/L	4	4.4	2.5	11	2	4.5	2.5	13
N-NITROSO-DI-N-PROPYLAMINE	µg/L	1	U	U	U	--	--	--	--
N-NITROSODI-N-BUTYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODIETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODIMETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	--	--	--	--
N-NITROSOMETHYLETHYLAMINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSOMORPHOLINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSOPIPERIDINE	µg/L	--	--	--	--	--	--	--	--
N-NITROSOPYRROLIDINE	µg/L	--	--	--	--	--	--	--	--
NAPHTHALENE	µg/L	1	U	U	U	--	--	--	--
NITRITE, AS N	µg/L	--	--	--	--	2	U	U	U
NITROBENZENE	µg/L	1	U	U	U	--	--	--	--
O,O,O-TRIETHYLPHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--
O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--
OCTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
OCTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
P-DIMETHYLAMINOAZOBENZENE	µg/L	--	--	--	--	--	--	--	--
P-PHENYLENEDIAMINE	µg/L	--	--	--	--	--	--	--	--
PARATHION, ETHYL	µg/L	--	--	--	--	--	--	--	--
PARATHION, METHYL	µg/L	--	--	--	--	--	--	--	--

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETER	UNIT	MONITORING WELL 4001				MONITORING WELL 4011			
		Count	Avg	Min	Max	Count	Avg	Min	Max
PENTACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--
PENTACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
PENTACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
PENTACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--
PENTACHLORONITROBENZENE	µg/L	--	--	--	--	--	--	--	--
PENTACHLOROPHENOL	µg/L	1	U	U	U	--	--	--	--
PHENACETIN	µg/L	--	--	--	--	--	--	--	--
PHENANTHRENE	µg/L	1	U	U	U	--	--	--	--
PHENOL	µg/L	1	U	U	U	--	--	--	--
PHORATE	µg/L	--	--	--	--	--	--	--	--
PRONAMIDE	µg/L	--	--	--	--	--	--	--	--
PYRENE	µg/L	1	U	U	U	--	--	--	--
PYRIDINE	µg/L	--	--	--	--	--	--	--	--
SAFROLE	µg/L	--	--	--	--	--	--	--	--
STYRENE	µg/L	1	U	U	U	2	U	U	U
SULFOTEPP	µg/L	--	--	--	--	--	--	--	--
TETRACHLORODIBENZO-P-DIOXIN	µg/L	--	--	--	--	--	--	--	--
TETRACHLORODIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--
TETRACHLOROETHENE	µg/L	3	5	5	5	1	U	U	U
TETRAETHYLPYROPHOSPHATE	µg/L	--	--	--	--	--	--	--	--
THIONAZIN	µg/L	--	--	--	--	--	--	--	--
TOLUENE	µg/L	4	2.3	2	5	2	U	U	U
TOTAL XYLENES	µg/L	1	U	U	U	2	U	U	U
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	2	U	U	U
TRANS-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	--	--	--	--
TRICHLOROETHENE	µg/L	4	4.4	2.5	5	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	--	--	--	--
VINYL ACETATE	µg/L	1	U	U	U	2	U	U	U

TABLE 4-31
RI/FS GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 4001				MONITORING WELL 4011			
CHEMICAL PARAMETER	UNIT	Count	Avg	Min	Max	Count	Avg	Min	Max
VINYL CHLORIDE	µg/L	1	U	U	U	2	U	U	U

Note: Count = Number of Samples Analyzed
U = Not Detected
-- = Not Analyzed

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DINITROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,4-DINITROTOLUENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-CHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-NITROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-NITROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-NITROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZOIC ACID	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BENZYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIBENZOFURAN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
FLUORENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
NITROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-DICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
P-DICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PYRIDINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4,4'-DDE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
4,4'-DDT	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ALPHA-BHC	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1016	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1221	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1232	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1242	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1248	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1254	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
AROCLOR 1260	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
BETA-BHC	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
CHLORDANE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DELTA-BHC	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DIELDRIN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDOSULFAN II	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDOSULFAN SULFATE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDRIN	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ENDRIN ALDEHYDE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEPTACHLOR	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	8	U	U	U	7	U	U	U	9	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
1,1-DICHLORETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
1,1-DICHLOROETHANE	µg/L	8	U	U	U	9	U	U	U	12	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	8	U	U	U	7	U	U	U	9	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
1,2-DIBROMOETHANE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
1,2-DICHLOROETHANE	µg/L	8	U	U	U	9	U	U	U	12	U	U	U
1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHENE (TOTAL)	µg/L	8	U	U	U	6	U	U	U	8	U	U	U
1,2-DICHLOROPROPANE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	5	U	U	U	8	8.1	5	60	9	U	U	U
2-HEXANONE	µg/L	8	U	U	U	8	2	1	10	11	1.7	1	10
4-METHYL-2-PENTANONE	µg/L	8	U	U	U	8	2	1	10	11	1.7	0.5	10
ACETONE	µg/L	8	U	U	U	8	2	1	10	12	1.7	1	10
ACROLEIN	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
ACRYLONITRILE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
ALLYL CHLORIDE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
BENZENE	µg/L	8	0.71	0.5	2.2	9	U	U	U	11	U	U	U
BROMODICHLOROMETHANE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
BROMOFORM	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
BROMOMETHANE	µg/L	8	U	U	U	9	0.94	0.5	5	11	0.86	0.5	5
CARBON DISULFIDE	µg/L	8	U	U	U	8	U	U	U	11	U	U	U
CARBON TETRACHLORIDE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
CHLOROBENZENE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
CHLOROETHANE	µg/L	5	U	U	U	7	1.8	0.5	10	9	1.5	0.5	10
CHLOROFORM	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
CHLOROMETHANE	µg/L	8	U	U	U	9	1.5	0.5	10	11	1.3	0.5	10
CHLOROPRENE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
DIBROMOCHLOROMETHANE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
ETHYL BENZENE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
ETHYL METHACRYLATE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
FLUOROTRICHLOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
METHACRYLONITRILE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
METHYL ETHYL KETONE	µg/L	8	U	U	U	8	2	1	10	11	1.7	1	10
METHYL ISOBUTYL KETONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
METHYL METHACRYLATE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
METHYLENE BROMIDE	µg/L	--	--	--	--	2	U	U	U	2	U	U	U
METHYLENE CHLORIDE	µg/L	8	U	U	U	9	1.5	0.5	10	12	1.3	0.5	10

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2004				MONITORING WELL 2008				MONITORING WELL 2010			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
PROPIONITRILE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
STYRENE	µg/L	8	U	U	U	8	U	U	U	11	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
TETRACHLOROETHENE	µg/L	8	U	U	U	7	U	U	U	10	U	U	U
TETRACHLOROETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
TOLUENE	µg/L	8	U	U	U	9	U	U	U	12	U	U	U
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,2-DICHLOROETHENE	µg/L	3	U	U	U	6	U	U	U	7	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	8	U	U	U	9	U	U	U	11	U	U	U
TRICHLOROETHENE	µg/L	8	U	U	U	7	U	U	U	10	U	U	U
TRICHLOROETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	–	–	–	–	3	U	U	U	2	U	U	U
VINYL ACETATE	µg/L	8	0.94	0.5	2	8	2	1	10	11	1.7	1	10
VINYL CHLORIDE	µg/L	8	U	U	U	9	0.94	0.5	5	11	0.86	0.5	5
XYLENES, TOTAL	µg/L	8	U	U	U	8	U	U	U	11	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	2	U	U	U	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	2	U	U	U	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U

897

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	2	4	2	6	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
FLUORENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

4793

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
NITROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
O-DICHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
O-METHYLPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
P-DICHLOROBENZENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
PHENOL	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDT	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1016	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1221	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1232	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1242	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1248	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1254	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1260	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
CHLORDANE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DELTA-BHC	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DIELDRIN	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN II	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ENDRIN	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ENDRIN ALDEHYDE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	2	U	U	U	1	U	U	U	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
1,1,2,2-TETRACHLOROETHANE	µg/L	7	U	U	U	11	U	U	U	10	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
1,1-DICHLORETHYLENE	µg/L	–	–	–	–	1	1	1	1	1	1	1	1
1,1-DICHLOROETHANE	µg/L	7	U	U	U	13	0.54	0.5	1	12	0.79	0.5	1.9

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	7	U	U	U	11	U	U	U	10	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	–	–	–	–	1	2	2	2	1	2	2	2
1,2-DIBROMOETHANE	µg/L	–	–	–	–	1	2	2	2	1	2	2	2
1,2-DICHLOROETHANE	µg/L	7	U	U	U	13	0.54	0.5	1	12	0.54	0.5	1
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	7	U	U	U	11	U	U	U	10	U	U	U
1,2-DICHLOROPROPANE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
2-CHLOROETHYL VINYL ETHER	µg/L	4	U	U	U	10	5.5	5	10	9	5.6	5	10
2-HEXANONE	µg/L	7	U	U	U	12	1.8	1	10	11	1.8	1	10
4-METHYL-2-PENTANONE	µg/L	7	U	U	U	12	1.8	1	10	11	1.8	1	10
ACETONE	µg/L	7	26	1	83	13	1.7	1	10	12	1.8	1	10
ACROLEIN	µg/L	–	–	–	–	1	50	50	50	1	50	50	50
ACRYLONITRILE	µg/L	–	–	–	–	1	50	50	50	1	50	50	50
ALLYL CHLORIDE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
BENZENE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
BROMODICHLOROMETHANE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
BROMOFORM	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
BROMOMETHANE	µg/L	7	U	U	U	12	0.88	0.5	5	11	0.91	0.5	5
CARBON DISULFIDE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
CARBON TETRACHLORIDE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
CHLOROBENZENE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
CHLOROETHANE	µg/L	4	U	U	U	10	1.5	0.5	10	9	1.6	0.5	10
CHLOROFORM	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
CHLOROMETHANE	µg/L	7	U	U	U	12	1.3	0.5	10	11	1.4	0.5	10
CHLOROPRENE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
CIS-1,3-DICHLOROPROPENE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
DIBROMOCHLOROMETHANE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	–	–	–	–	1	10	10	10	1	10	10	10
ETHYL BENZENE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
ETHYL METHACRYLATE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
METHACRYLONITRILE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
METHYL ETHYL KETONE	µg/L	7	U	U	U	12	1.8	1	10	11	1.8	1	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	–	–	–	–	1	5	5	5	1	5	5	5
METHYLENE BROMIDE	µg/L	–	–	–	–	1	1	1	1	1	1	1	1
METHYLENE CHLORIDE	µg/L	7	U	U	U	13	1.2	0.5	10	12	1.3	0.5	10

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2011				MONITORING WELL 2019				MONITORING WELL 2021			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	--	--	--	--	1	5	5	5	1	5	5	5
PROPIONITRILE	µg/L	--	--	--	--	1	20	20	20	1	20	20	20
STYRENE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
T-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--	1	20	20	20	1	20	20	20
TETRACHLOROETHENE	µg/L	7	U	U	U	12	U	U	U	11	U	U	U
TETRACHLOROETHYLENE	µg/L	--	--	--	--	1	1	1	1	1	1	1	1
TOLUENE	µg/L	7	U	U	U	13	0.54	0.5	1	12	0.54	0.5	1
TOTAL PETROLEUM HYDROCARB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	4	U	U	U	9	U	U	U	8	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	--	--	--	--	1	1	1	1	1	1	1	1
TRANS-1,3-DICHLOROPROPENE	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1
TRICHLOROETHENE	µg/L	7	U	U	U	12	U	U	U	11	U	U	U
TRICHLOROETHYLENE	µg/L	--	--	--	--	1	1	1	1	1	1	1	1
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--	1	1	1	1	1	1	1	1
VINYL ACETATE	µg/L	7	U	U	U	12	1.8	1	10	11	1.8	1	10
VINYL CHLORIDE	µg/L	7	U	U	U	12	0.88	0.5	5	11	0.91	0.5	5
XYLENES, TOTAL	µg/L	7	U	U	U	12	0.54	0.5	1	11	0.55	0.5	1

TABLE 4-32

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANTHRACENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
CHLOROBENZILATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
FLUORENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROBENZENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROETHANE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
NITROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
O-DICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
P-DICHLOROBENZENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
PHENOL	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4,4'-DDE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
4,4'-DDT	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1016	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1221	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1232	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1242	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1248	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1254	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
AROCLOR 1260	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
CHLORDANE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
DELTA-BHC	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
DIELDRIN	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ENDOSULFAN II	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ENDRIN	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ENDRIN ALDEHYDE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	1	U	U	U	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
1,1,2,2-TETRACHLOROETHANE	µg/L	6	U	U	U	11	U	U	U	9	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
1,1-DICHLORETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	0.75	0.5	1
1,1-DICHLOROETHANE	µg/L	6	U	U	U	15	U	U	U	12	0.54	0.5	1

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	6	U	U	U	11	U	U	U	9	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	–	–	–	–	2	U	U	U	2	1.5	1	2
1,2-DIBROMOETHANE	µg/L	–	–	–	–	2	U	U	U	2	1.5	1	2
1,2-DICHLOROETHANE	µg/L	6	U	U	U	15	U	U	U	12	0.54	0.5	1
1,2-DICHLOROETHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	5	U	U	U	10	U	U	U	9	U	U	U
1,2-DICHLOROPROPANE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
2-CHLOROETHYL VINYL ETHER	µg/L	4	U	U	U	11	U	U	U	9	5.6	5	10
2-HEXANONE	µg/L	6	U	U	U	13	1.6	1	10	11	2.2	1	10
4-METHYL-2-PENTANONE	µg/L	6	U	U	U	13	1.6	1	10	11	2.2	1	10
ACETONE	µg/L	6	U	U	U	15	1.5	1	10	12	2.1	1	10
ACROLEIN	µg/L	–	–	–	–	2	U	U	U	2	38	25	50
ACRYLONITRILE	µg/L	–	–	–	–	2	U	U	U	2	38	25	50
ALLYL CHLORIDE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
BENZENE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
BROMODICHLOROMETHANE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
BROMOFORM	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
BROMOMETHANE	µg/L	6	U	U	U	13	0.81	0.5	5	11	1.1	0.5	5
CARBON DISULFIDE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
CARBON TETRACHLORIDE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
CHLOROBENZENE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
CHLOROETHANE	µg/L	4	U	U	U	11	1.3	0.5	10	9	2.1	0.5	10
CHLOROFORM	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
CHLOROMETHANE	µg/L	6	U	U	U	13	1.2	0.5	10	11	1.8	0.5	10
CHLOROPRENE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
CIS-1,3-DICHLOROPROPENE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
DIBROMOCHLOROMETHANE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	–	–	–	–	2	U	U	U	2	7.5	5	10
ETHYL BENZENE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
ETHYL METHACRYLATE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
METHACRYLONITRILE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
METHYL ETHYL KETONE	µg/L	6	U	U	U	13	1.6	1	10	11	2.2	1	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
METHYLENE BROMIDE	µg/L	–	–	–	–	2	U	U	U	2	0.75	0.5	1
METHYLENE CHLORIDE	µg/L	6	U	U	U	15	1.1	0.5	10	12	1.7	0.5	10

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2022				MONITORING WELL 2027				MONITORING WELL 2084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	–	–	–	–	2	U	U	U	2	3.8	2.5	5
PROPIONITRILE	µg/L	–	–	–	–	2	U	U	U	2	15	10	20
STYRENE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
T-1,4-DICHLORO-2-BUTENE	µg/L	–	–	–	–	2	U	U	U	2	15	10	20
TETRACHLOROETHENE	µg/L	6	U	U	U	13	U	U	U	10	U	U	U
TETRACHLOROETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	0.75	0.5	1
TOLUENE	µg/L	6	U	U	U	15	U	U	U	12	0.54	0.5	1
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,2-DICHLOROETHENE	µg/L	4	U	U	U	9	U	U	U	7	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	0.75	0.5	1
TRANS-1,3-DICHLOROPROPENE	µg/L	6	U	U	U	13	U	U	U	11	0.55	0.5	1
TRICHLOROETHENE	µg/L	6	U	U	U	13	U	U	U	10	U	U	U
TRICHLOROETHYLENE	µg/L	–	–	–	–	2	U	U	U	2	0.75	0.5	1
TRICHLOROFLUOROMETHANE	µg/L	–	–	–	–	2	U	U	U	2	0.75	0.5	1
VINYL ACETATE	µg/L	6	U	U	U	13	1.6	1	10	11	2.2	1	10
VINYL CHLORIDE	µg/L	6	U	U	U	13	0.81	0.5	5	11	1.1	0.5	5
XYLENES, TOTAL	µg/L	6	0.62	0.5	1.2	13	U	U	U	11	0.55	0.5	1

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,2,4-TRICHLOROBENZENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
1,4-NAPHTHOQUINONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1-NAPHTHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,5-TRICHLOROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2,4-DICHLOROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2,4-DIMETHYLPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2,4-DINITROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2,4-DINITROTOLUENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2,6-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,6-DINITROTOLUENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-CHLORONAPHTHALENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2-CHLOROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2-METHYLNAPHTHALENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2-NAPHTHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NITROANILINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2-NITROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
2-PICOLINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3,3'-DICHLOROBENZIDINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3-METHYLCHOLANTHRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3-NITROANILINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4-AMINOBIPHENYL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-BROMOPHENYL PHENYL ETHER	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4-NITROANILINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4-NITROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
5-NITRO-O-TOLUIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
A,A-DIMETHYLPHENETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACENAPHTHENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
ACENAPHTHYLENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
ACETOPHENONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ANTHRACENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
ARAMITE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(A)ANTHRACENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BENZO(B)FLUORANTHENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BENZO(GHI)PERYLENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BENZO(K)FLUORANTHENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
CHLOROBENZILATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHRYSENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DIALLATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZO(A,H)ANTHRACENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DIBENZOFURAN	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIETHYL PHTHALATE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DIMETHOATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYL PHTHALATE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYLBENZ(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DISULFOTON	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ETHYL METHANESULFONATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FAMPHUR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORANTHENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
FLUORENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
HEXACHLOROBENZENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
HEXACHLOROBUTADIENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
HEXACHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
HEXACHLOROPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
INDENO(1,2,3-CD)PYRENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
ISODRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOPHORONE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
ISOSAFROLE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
KEPONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
M-DINITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
M-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
M-METHYLPHENOL (CRESOL)	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
METHAPYRILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL METHANESULFONATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHYL PARATHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODI-N-BUTYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODI-N-PROPYLAMINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
N-NITROSODIETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIMETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIPHENYLAMINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMORPHOLINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOPIPERIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOPYRROLIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
NAPHTHALENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
NITROBENZENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
O-DICHLOROBENZENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
O-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
O-METHYLPHENOL (CRESOL)	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
O-TOLUIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-CHLOROANILINE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
P-DICHLOROBENZENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-PHENYLENEDIAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PARATHION	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PENTACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PENTACHLORONITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PENTACHLOROPHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
PHENACETIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENANTHRENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
PHENOL	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
PHORATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PRONAMIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PYRENE	µg/L	2	U	U	U	2	U	U	U	2	U	U	U
PYRIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SAFROLE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SULFOTEPP	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SYM-TRINITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TETRACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TRIETHYL PHOSPHOROTHIOATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,5-T	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,5-TP (SILVEX)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-D	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDD	µg/L	2	1.1	0.1	4	2	1.1	0.1	4	2	1.1	0.1	4
4,4'-DDE	µg/L	2	1.1	0.1	4	2	1.1	0.1	4	2	1.1	0.1	4
4,4'-DDT	µg/L	2	1.1	0.1	4	2	1.1	0.1	4	2	1.1	0.1	4
ACETONITRILE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALDRIN	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
ALPHA-BHC	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1016	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1221	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1232	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1242	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1248	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1254	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
AROCLOR 1260	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
BETA-BHC	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
CHLORDANE	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
DELTA-BHC	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
DIELDRIN	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
DINOSEB	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN I	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
ENDOSULFAN II	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
ENDOSULFAN SULFATE	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
ENDRIN	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
ENDRIN ALDEHYDE	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
GAMMA-BHC (LINDANE)	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
HEPTACHLOR	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
HEPTACHLOR EPOXIDE	µg/L	2	0.3	0.1	1	2	U	U	U	2	U	U	U
ISOBUTYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHOXYCHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-DIOXANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
TOXAPHENE	µg/L	2	0.75	0.25	2.5	2	U	U	U	2	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,1,1-TRICHLOROETHANE	µg/L	10	0.55	0.5	1	8	U	U	U	10	15	14	16
1,1,2,2-TETRACHLOROETHANE	µg/L	7	0.5	0.5	1	6	U	U	U	7	1.4	0.5	5
1,1,2-TRICHLOROETHANE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
1,1-DICHLORETHYLENE	µg/L	3	0.67	0.5	1	2	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	10	1.1	0.5	4.2	8	U	U	U	10	5.2	0.5	11

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	7	U	U	U	6	U	U	U	7	1.4	0.5	5
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	4	2.6	0.5	5	3	1.8	0.5	5	4	2	0.5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	4	3.5	1	20	3	4	1	20	4	3.3	1	20
1,2-DIBROMOETHANE	µg/L	4	3.5	1	20	3	4	1	20	4	3.3	1	20
1,2-DICHLOROETHANE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	6	0.87	0.5	2.7	5	U	U	U	6	5.4	0.5	8.3
1,2-DICHLOROPROPANE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
2-CHLOROETHYL VINYL ETHER	µg/L	9	5.6	5	10	7	U	U	U	9	12	5	50
2-HEXANONE	µg/L	10	2.7	1	10	8	2	1	10	10	3.4	1	10
4-METHYL-2-PENTANONE	µg/L	9	2.9	1	10	7	2.1	1	10	9	3.4	1	10
ACETONE	µg/L	10	2.7	1	10	8	2	1	10	10	3.4	1	10
ACROLEIN	µg/L	4	28	10	50	3	20	10	50	4	21	10	50
ACRYLONITRILE	µg/L	4	28	10	50	3	20	10	50	4	21	10	50
ALLYL CHLORIDE	µg/L	4	5	2.5	20	3	5	2.5	20	4	4.4	2.5	20
BENZENE	µg/L	10	0.68	0.5	1.8	8	U	U	U	10	1.1	0.5	5
BROMODICHLOROMETHANE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
BROMOFORM	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
BROMOMETHANE	µg/L	10	1.4	0.5	5	8	1	0.5	5	10	1.7	0.5	5
CARBON DISULFIDE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
CARBON TETRACHLORIDE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
CHLOROBENZENE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
CHLOROETHANE	µg/L	10	2.4	0.5	10	8	1.6	0.5	10	10	2.5	0.5	10
CHLOROFORM	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.7	0.5	5
CHLOROMETHANE	µg/L	10	2.4	0.5	10	8	1.6	0.5	10	10	2.5	0.5	10
CHLOROPRENE	µg/L	4	5	2.5	20	3	5	2.5	20	4	4.4	2.5	20
CIS-1,3-DICHLOROPROPENE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
DIBROMOCHLOROMETHANE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
DIBROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DICHLORODIFLUOROMETHANE	µg/L	4	5.1	0.5	10	3	3.5	0.5	10	4	3.9	0.5	10
ETHYL BENZENE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
ETHYL METHACRYLATE	µg/L	4	5	2.5	20	3	5	2.5	20	4	2.1	1	5
FLUOROTRICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
IODOMETHANE	µg/L	4	5	2.5	20	3	5	2.5	20	4	4.4	2.5	20
METHACRYLONITRILE	µg/L	4	5	2.5	20	3	5	2.5	20	4	4.4	2.5	20
METHYL ETHYL KETONE	µg/L	10	2.7	1	10	8	2	1	10	10	3.4	1	10
METHYL ISOBUTYL KETONE	µg/L	1	U	U	U	–	–	–	–	1	U	U	U
METHYL METHACRYLATE	µg/L	4	5	2.5	20	3	2	1	5	4	4.4	2.5	20
METHYLENE BROMIDE	µg/L	3	0.67	0.5	1	2	U	U	U	3	U	U	U
METHYLENE CHLORIDE	µg/L	10	2.4	0.5	10	8	1.6	0.5	10	10	2.5	0.5	10

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 2643				MONITORING WELL 2648				MONITORING WELL 2649			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	4	5	2.5	20	3	5	2.5	20	4	4.4	2.5	20
PROPIONITRILE	µg/L	4	13	10	20	3	U	U	U	4	U	U	U
STYRENE	µg/L	10	0.55	0.5	1	8	1.7	0.5	20	10	1.1	0.5	5
T-1,4-DICHLORO-2-BUTENE	µg/L	4	13	10	20	3	U	U	U	4	U	U	U
TETRACHLOROETHENE	µg/L	7	U	U	U	6	U	U	U	7	1.5	0.5	5
TETRACHLOROETHYLENE	µg/L	3	0.67	0.5	1	2	U	U	U	3	U	U	U
TOLUENE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
TOTAL PETROLEUM HYDROCARB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	7	U	U	U	6	U	U	U	7	1.5	0.5	5
TRANS-1,2-DICHLOROETHYLENE	µg/L	3	0.67	0.5	1	2	U	U	U	3	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5
TRICHLOROETHENE	µg/L	7	U	U	U	6	U	U	U	7	190	150	240
TRICHLOROETHYLENE	µg/L	3	0.67	0.5	1	2	U	U	U	3	160	150	170
TRICHLOROFLUOROMETHANE	µg/L	3	0.67	0.5	1	2	U	U	U	3	U	U	U
VINYL ACETATE	µg/L	10	2.7	1	10	8	2	1	10	10	3.4	1	10
VINYL CHLORIDE	µg/L	10	1.4	0.5	5	8	1	0.5	5	10	1.7	0.5	5
XYLENES, TOTAL	µg/L	10	0.55	0.5	1	8	U	U	U	10	1.1	0.5	5

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-CHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
CHLOROBENZILATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
FLUORENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
NITROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
P-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHENOL	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
PYRIDINE	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

917

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRIETHYL PHOSPHOROTHIOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TP (SILVEX)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDD	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4,4'-DDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
4,4'-DDT	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ACETONITRILE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ALDRIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ALPHA-BHC	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1016	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1221	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1232	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1242	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1248	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1254	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
AROCLOR 1260	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
BETA-BHC	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
CHLORDANE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DELTA-BHC	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DIELDRIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
DINOSEB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ENDOSULFAN I	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ENDOSULFAN II	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ENDOSULFAN SULFATE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ENDRIN	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ENDRIN ALDEHYDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEPTACHLOR	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHOXYCHLOR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
P-DIOXANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TOXAPHENE	µg/L	--	--	--	--	--	--	--	--	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	11	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
1,1-DICHLORETHYLENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,1-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	15	U	U	U

TABLE 4-32

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	11	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	1	U	U	U
1,2,3-TRICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2-DIBROMOETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	15	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	10	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	1	U	U	U	1	U	U	U	12	U	U	U
2-HEXANONE	µg/L	1	U	U	U	1	U	U	U	14	1.9	1	10
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	1	U	U	U	14	2.1	1	10
ACETONE	µg/L	1	U	U	U	1	U	U	U	15	1.8	1	10
ACROLEIN	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ACRYLONITRILE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ALLYL CHLORIDE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
BENZENE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
BROMOFORM	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	1	U	U	U	14	0.93	0.5	5
CARBON DISULFIDE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	12	1.6	0.5	10
CHLOROFORM	µg/L	1	U	U	U	1	U	U	U	14	0.61	0.5	2.1
CHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	14	1.5	0.5	10
CHLOROPRENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
ETHYL BENZENE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
ETHYL METHACRYLATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
METHACRYLONITRILE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
METHYL ETHYL KETONE	µg/L	1	U	U	U	1	U	U	U	14	1.9	1	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
METHYLENE BROMIDE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
METHYLENE CHLORIDE	µg/L	1	U	U	U	1	U	U	U	15	1.5	0.5	10

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 2821				MONITORING WELL 2822				MONITORING WELL 3001			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
PROPIONITRILE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
STYRENE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TETRACHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	12	U	U	U
TETRACHLOROETHYLENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TOLUENE	µg/L	1	U	U	U	1	U	U	U	15	0.65	0.5	2.2
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	9	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	1	U	U	U	14	U	U	U
TRICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	12	U	U	U
TRICHLOROETHYLENE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	1	U	U	U	1	U	U	U	3	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	1	U	U	U	14	1.8	0.5	10
VINYL CHLORIDE	µg/L	1	U	U	U	1	U	U	U	14	0.93	0.5	5
XYLENES, TOTAL	µg/L	1	U	U	U	1	U	U	U	14	U	U	U

920
4788

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-TRICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DIMETHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4,6-DINITRO-2-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLORO-3-METHYLPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-CHLOROPHENYLPHENYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-NITROQUINOLINE 1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(B)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(GHI)PERYLENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(K)FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZOIC ACID	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZYL ALCOHOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHOXY)METHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROETHYL)ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROBENZILATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
CHRYSENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-BUTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DI-N-OCTYLPHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIALLATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZO(A,H)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIBENZOFURAN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIISOPROPYL ETHER	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHOATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYL PHTHALATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYLAMINO AZOBENENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIMETHYLBENZ(A)ANTHRACENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DIPHENYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DISULFOTON	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ETHYL METHANESULFONATE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FAMPHUR	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORANTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
FLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROBUTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROCYCLOPENTADIENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
HEXACHLOROPROPENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
INDENO(1,2,3-CD)PYRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISODRIN	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOPHORONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ISOSAFROLE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
KEPONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-32

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DICHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDT	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALPHA-BHC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1016	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1221	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1232	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1242	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1248	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1254	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
AROCLOR 1260	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BETA-BHC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHLORDANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DELTA-BHC	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIELDRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN II	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN SULFATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDRIN ALDEHYDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEPTACHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
1,1-DICHLORETHYLENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1-DICHLOROETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DIBROMOETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
1,2-DICHLOROETHENE	µg/L	2	U	U	U	–	U	U	U	–	U	U	U
1,2-DICHLOROETHENE (TOTAL)	µg/L	1	U	U	U	3	U	U	U	7	U	U	U
1,2-DICHLOROPROPANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
2-HEXANONE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
4-METHYL-2-PENTANONE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
ACETONE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
ACROLEIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACRYLONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALLYL CHLORIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
BROMODICHLOROMETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
BROMOFORM	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
BROMOMETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
CARBON DISULFIDE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
CARBON TETRACHLORIDE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
CHLOROBENZENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
CHLOROETHANE	µg/L	2	U	U	U	1	U	U	U	3	U	U	U
CHLOROFORM	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
CHLOROMETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
CHLOROPRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CIS-1,3-DICHLOROPROPENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
DIBROMOCHLOROMETHANE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL BENZENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
ETHYL METHACRYLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHACRYLONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL ETHYL KETONE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYLENE BROMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYLENE CHLORIDE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3003				MONITORING WELL 3004				MONITORING WELL 3005			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PROPIONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
STYRENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROETHENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
TETRACHLOROETHYLENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOLUENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–	–	–	–	–	–	1	20	20	20
TRANS-1,2-DICHLOROETHENE	µg/L	2	U	U	U	–	–	–	–	3	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,3-DICHLOROPROPENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
TRICHLOROETHENE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
TRICHLOROETHYLENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRICHLOROFLUOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
VINYL ACETATE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
VINYL CHLORIDE	µg/L	3	U	U	U	3	U	U	U	7	U	U	U
XYLENES, TOTAL	µg/L	3	U	U	U	3	U	U	U	7	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	1	U	U	U	–	U	U	U	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	1	U	U	U	–	U	U	U	–	–	–	–
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
FLUORENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
O-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
P-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
PHENOL	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
PYRIDINE	µg/L	1	U	U	U	1	U	U	U	–	–	–	–
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
4,4'-DDE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
4,4'-DDT	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ALPHA-BHC	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1016	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1221	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1232	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1242	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1248	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1254	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1260	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
BETA-BHC	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
CHLORDANE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DELTA-BHC	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DIELDRIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDOSULFAN II	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDOSULFAN SULFATE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDRIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDRIN ALDEHYDE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
HEPTACHLOR	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
1,1,2,2-TETRACHLOROETHANE	µg/L	10	U	U	U	10	1.5	0.5	20	8	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
1,1-DICHLORETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	0.75	0.5	1
1,1-DICHLOROETHANE	µg/L	13	U	U	U	13	1.2	0.5	20	10	0.55	0.5	1

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	10	U	U	U	10	1.5	0.5	20	8	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	2	U	U	U	2	U	U	U	2	1.5	1	2
1,2-DIBROMOETHANE	µg/L	2	U	U	U	2	U	U	U	2	1.5	1	2
1,2-DICHLOROETHANE	µg/L	13	U	U	U	13	1.2	0.5	20	10	0.55	0.5	1
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	10	U	U	U	9	U	U	U	8	U	U	U
1,2-DICHLOROPROPANE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
2-CHLOROETHYL VINYL ETHER	µg/L	9	U	U	U	10	U	U	U	8	5.6	5	10
2-HEXANONE	µg/L	12	1.7	1	10	12	3.3	1	40	10	2.3	1	10
4-METHYL-2-PENTANONE	µg/L	12	1.8	1	10	12	3.2	0.5	40	10	2.3	1	10
ACETONE	µg/L	13	1.6	1	10	13	3.1	1	40	10	2.3	1	10
ACROLEIN	µg/L	2	U	U	U	2	U	U	U	2	38	25	50
ACRYLONITRILE	µg/L	2	U	U	U	2	U	U	U	2	38	25	50
ALLYL CHLORIDE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
BENZENE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
BROMODICHLOROMETHANE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
BROMOFORM	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
BROMOMETHANE	µg/L	12	0.83	0.5	5	12	1.6	0.5	20	10	1.2	0.5	5
CARBON DISULFIDE	µg/L	12	4.3	0.5	27	12	1.6	0.5	20	10	0.55	0.5	1
CARBON TETRACHLORIDE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
CHLOROBENZENE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
CHLOROETHANE	µg/L	9	1.5	0.5	10	10	1.4	0.5	10	8	2.3	0.5	10
CHLOROFORM	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
CHLOROMETHANE	µg/L	12	1.3	0.5	10	12	2	0.5	20	10	1.9	0.5	10
CHLOROPRENE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
CIS-1,3-DICHLOROPROPENE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
DIBROMOCHLOROMETHANE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	2	U	U	U	2	U	U	U	2	7.5	5	10
ETHYL BENZENE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
ETHYL METHACRYLATE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
METHACRYLONITRILE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
METHYL ETHYL KETONE	µg/L	12	1.7	1	10	12	3.3	1	40	10	2.3	1	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
METHYL METHACRYLATE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
METHYLENE BROMIDE	µg/L	2	U	U	U	2	U	U	U	2	0.75	0.5	1
METHYLENE CHLORIDE	µg/L	13	1.2	0.5	10	13	1.9	0.5	20	10	1.9	0.5	10

4783

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3008				MONITORING WELL 3010				MONITORING WELL 3011			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	2	U	U	U	2	U	U	U	2	3.8	2.5	5
PROPIONITRILE	µg/L	2	U	U	U	2	U	U	U	2	15	10	20
STYRENE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
T-1,4-DICHLORO-2-BUTENE	µg/L	2	U	U	U	2	U	U	U	2	15	10	20
TETRACHLOROETHENE	µg/L	11	U	U	U	11	1.4	0.5	20	8	U	U	U
TETRACHLOROETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	0.75	0.5	1
TOLUENE	µg/L	13	0.65	0.5	2.5	13	1.2	0.5	20	10	0.55	0.5	1
TOTAL PETROLEUM HYDROCARB	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	7	U	U	U	8	U	U	U	6	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	0.75	0.5	1
TRANS-1,3-DICHLOROPROPENE	µg/L	12	U	U	U	12	1.3	0.5	20	10	0.55	0.5	1
TRICHLOROETHENE	µg/L	11	U	U	U	11	1.4	0.5	20	8	U	U	U
TRICHLOROETHYLENE	µg/L	2	U	U	U	2	U	U	U	2	0.75	0.5	1
TRICHLOROFLUOROMETHANE	µg/L	2	U	U	U	2	U	U	U	2	0.75	0.5	1
VINYL ACETATE	µg/L	12	1.7	1	10	12	3.3	1	40	10	2.3	1	10
VINYL CHLORIDE	µg/L	12	0.83	0.5	5	12	1.6	0.5	20	10	1.2	0.5	5
XYLENES, TOTAL	µg/L	12	0.55	0.5	1.1	12	1.3	0.5	20	10	0.55	0.5	1

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-TRICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,4-NAPHTHOQUINONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4,6-TRICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DICHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DIMETHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,4-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2,6-DICHLOROPHENOL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2,6-DINITROTOLUENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-ACETYLAMINOFLUORENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-CHLORONAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-CHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-METHYLNAPHTHALENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NAPHTHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
2-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
2-PICOLINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-DICHLOROBENZIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
3,3'-DIMETHYLBENZIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-METHYLCHOLANTHRENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
3-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,6-DINITRO-2-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-AMINOBIPHENYL	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
4-BROMOPHENYL PHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLORO-3-METHYLPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-CHLOROPHENYLPHENYL ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4-NITROQUINOLINE 1-OXIDE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
5-NITRO-O-TOLUIDINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
A,A-DIMETHYLPHENETHYLAMINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETOPHENONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANILINE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ARAMITE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
BENZO(A)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(B)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(GHI)PERYLENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZO(K)FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZOIC ACID	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BENZYL ALCOHOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHOXY)METHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROETHYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BUTYL BENZYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-BUTYLPHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIBENZOFURAN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
FLUORENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROBUTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROCYCLOPENTADIENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROETHANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
NITROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-DICHLOROBENZENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHENOL	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
PYRIDINE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

4783

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
4,4'-DDT	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ALPHA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1016	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1221	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1232	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1242	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1248	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1254	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
AROCLOR 1260	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
BETA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
CHLORDANE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DELTA-BHC	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DIELDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN II	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDOSULFAN SULFATE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ENDRIN ALDEHYDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
GAMMA-BHC (LINDANE)	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
HEPTACHLOR EPOXIDE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	1	U	U	U	1	U	U	U	1	U	U	U
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
1,1,2,2-TETRACHLOROETHANE	µg/L	11	U	U	U	10	U	U	U	13	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
1,1-DICHLORETHYLENE	µg/L	1	1	1	1	2	U	U	U	2	0.75	0.5	1
1,1-DICHLOROETHANE	µg/L	13	0.54	0.5	1	13	U	U	U	16	0.53	0.5	1

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	11	U	U	U	10	U	U	U	13	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-TRICHLOROPROPANE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	1	2	2	2	2	U	U	U	2	1.5	1	2
1,2-DIBROMOETHANE	µg/L	1	2	2	2	2	U	U	U	2	1.5	1	2
1,2-DICHLOROETHANE	µg/L	13	0.54	0.5	1	13	U	U	U	16	0.53	0.5	1
1,2-DICHLOROETHENE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHENE (TOTAL)	µg/L	11	U	U	U	10	U	U	U	13	U	U	U
1,2-DICHLOROPROPANE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
2-CHLOROETHYL VINYL ETHER	µg/L	9	5.6	5	10	10	U	U	U	12	5.4	5	10
2-HEXANONE	µg/L	12	1.8	1	10	12	1.7	1	10	15	1.9	1	10
4-METHYL-2-PENTANONE	µg/L	12	1.8	1	10	12	1.6	0.5	10	15	1.9	1	10
ACETONE	µg/L	13	1.7	1	10	13	1.6	1	10	16	4.1	1	37
ACROLEIN	µg/L	1	50	50	50	2	U	U	U	2	38	25	50
ACRYLONITRILE	µg/L	1	50	50	50	2	U	U	U	2	38	25	50
ALLYL CHLORIDE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
BENZENE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
BROMODICHLOROMETHANE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
BROMOFORM	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
BROMOMETHANE	µg/L	12	0.88	0.5	5	12	0.83	0.5	5	15	0.93	0.5	5
CARBON DISULFIDE	µg/L	12	0.54	0.5	1	12	2.7	0.5	16	15	0.53	0.5	1
CARBON TETRACHLORIDE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
CHLOROBENZENE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
CHLOROETHANE	µg/L	9	1.6	0.5	10	10	1.4	0.5	10	12	1.7	0.5	10
CHLOROFORM	µg/L	12	2.3	0.5	22	12	U	U	U	15	0.53	0.5	1
CHLOROMETHANE	µg/L	12	1.3	0.5	10	12	1.3	0.5	10	15	1.4	0.5	10
CHLOROPRENE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
CIS-1,3-DICHLOROPROPENE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
DIBROMOCHLOROMETHANE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
DIBROMOMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
DICHLORODIFLUOROMETHANE	µg/L	1	10	10	10	2	U	U	U	2	7.5	5	10
ETHYL BENZENE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
ETHYL METHACRYLATE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
FLUOROTRICHLOROMETHANE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
IODOMETHANE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
METHACRYLONITRILE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
METHYL ETHYL KETONE	µg/L	12	1.8	1	10	12	1.7	1	10	15	1.9	1	10
METHYL ISOBUTYL KETONE	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
METHYL METHACRYLATE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
METHYLENE BROMIDE	µg/L	1	1	1	1	2	U	U	U	2	0.75	0.5	1
METHYLENE CHLORIDE	µg/L	13	1.2	0.5	10	13	1.3	0.5	10	16	1.4	0.5	10

937

TABLE 4-32

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

		MONITORING WELL 3019				MONITORING WELL 3043				MONITORING WELL 3084			
CHEMICAL PARAMETERS	UNIT	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	1	5	5	5	2	U	U	U	2	3.8	2.5	5
PROPIONITRILE	µg/L	1	20	20	20	2	U	U	U	2	15	10	20
STYRENE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
T-1,4-DICHLORO-2-BUTENE	µg/L	1	20	20	20	2	U	U	U	2	15	10	20
TETRACHLOROETHENE	µg/L	12	0.5	0.5	1	11	U	U	U	14	U	U	U
TETRACHLOROETHYLENE	µg/L	1	1	1	1	2	U	U	U	2	0.75	0.5	1
TOLUENE	µg/L	13	0.54	0.5	1	13	U	U	U	16	0.53	0.5	1
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,2-DICHLOROETHENE	µg/L	8	U	U	U	8	U	U	U	10	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	1	1	1	1	2	U	U	U	2	0.75	0.5	1
TRANS-1,3-DICHLOROPROPENE	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1
TRICHLOROETHENE	µg/L	12	U	U	U	11	U	U	U	14	U	U	U
TRICHLOROETHYLENE	µg/L	1	1	1	1	2	U	U	U	2	0.75	0.5	1
TRICHLOROFLUOROMETHANE	µg/L	1	1	1	1	2	U	U	U	2	0.75	0.5	1
VINYL ACETATE	µg/L	12	1.8	1	10	12	1.7	1	10	15	1.9	1	10
VINYL CHLORIDE	µg/L	12	0.88	0.5	5	12	0.83	0.5	5	15	0.93	0.5	5
XYLENES, TOTAL	µg/L	12	0.54	0.5	1	12	U	U	U	15	0.53	0.5	1

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2,4-DINITROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2,4-DINITROTOLUENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2-CHLOROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2-NITROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
2-PICOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4-AMINOBIPHENYL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4-NITROANILINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4-NITROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
ACETOPHENONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ANTHRACENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
ARAMITE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BENZOIC ACID	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BENZYL ALCOHOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	–	–	–	–	2	6.2	2	10	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
CHLOROBENZILATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DIALLATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
DIBENZOFURAN	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
DIMETHOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–	2	4.8	2	15	–	–	–	–
DISULFOTON	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
FLUORENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
HEXACHLOROBENZENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
HEXACHLOROETHANE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
HEXACHLOROPHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
HEXACHLOROPROPENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
ISODRIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
ISOSAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
KEPONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
M-DINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
METHAPYRILINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
NITROBENZENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
O-DICHLOROBENZENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
O-METHYLPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
O-TOLUIDINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
P-DICHLOROBENZENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PARATHION	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
PHENACETIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
PHENOL	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
PHORATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
PYRENE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
PYRIDINE	µg/L	–	–	–	–	2	U	U	U	–	–	–	–
SAFROLE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–

4783

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
2,4-D	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
4,4'-DDE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
4,4'-DDT	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ACETONITRILE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ALDRIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ALPHA-BHC	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1016	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1221	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1232	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1242	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1248	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1254	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
AROCLOR 1260	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
BETA-BHC	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
CHLORDANE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DELTA-BHC	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DIELDRIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
DINOSEB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDOSULFAN II	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDOSULFAN SULFATE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDRIN	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ENDRIN ALDEHYDE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
HEPTACHLOR	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
ISOBUTYL ALCOHOL	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–	1	U	U	U	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	–	–	–	–	11	U	U	U	8	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
1,1-DICHLORETHYLENE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
1,1-DICHLOROETHANE	µg/L	1	U	U	U	14	U	U	U	11	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	–	–	–	–	11	U	U	U	8	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
1,2-DIBROMOETHANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
1,2-DICHLOROETHANE	µg/L	1	U	U	U	14	U	U	U	11	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	–	11	U	U	U	8	U	U	U
1,2-DICHLOROPROPANE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	1	U	U	U	11	U	U	U	8	U	U	U
2-HEXANONE	µg/L	1	U	U	U	13	1.6	1	10	10	1.8	1	10
4-METHYL-2-PENTANONE	µg/L	1	U	U	U	13	1.6	1	10	10	1.8	1	10
ACETONE	µg/L	1	U	U	U	14	1.9	1	10	11	1.7	1	10
ACROLEIN	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
ACRYLONITRILE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
ALLYL CHLORIDE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
BENZENE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
BROMODICHLOROMETHANE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
BROMOFORM	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
BROMOMETHANE	µg/L	1	U	U	U	13	0.81	0.5	5	10	0.9	0.5	5
CARBON DISULFIDE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
CARBON TETRACHLORIDE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
CHLOROBENZENE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
CHLOROETHANE	µg/L	1	U	U	U	11	1.3	0.5	10	8	1.6	0.5	10
CHLOROFORM	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
CHLOROMETHANE	µg/L	1	U	U	U	13	1.2	0.5	10	10	1.4	0.5	10
CHLOROPRENE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
CIS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
DIBROMOCHLOROMETHANE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
DIBROMOMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
ETHYL BENZENE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
ETHYL METHACRYLATE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
METHACRYLONITRILE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
METHYL ETHYL KETONE	µg/L	1	U	U	U	13	1.6	1	10	10	1.8	1	10
METHYL ISOBUTYL KETONE	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
METHYL METHACRYLATE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
METHYLENE BROMIDE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
METHYLENE CHLORIDE	µg/L	1	U	U	U	14	1.1	0.5	10	11	1.3	0.5	10

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 3821				MONITORING WELL 4001				MONITORING WELL 4008			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
PROPIONITRILE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
STYRENE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
TETRACHLOROETHENE	µg/L	–	–	–	–	12	U	U	U	9	U	U	U
TETRACHLOROETHYLENE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
TOLUENE	µg/L	1	U	U	U	14	U	U	U	11	U	U	U
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–	–	–	–	–	–	–	–	–	–
TRANS-1,2-DICHLOROETHENE	µg/L	–	–	–	–	9	U	U	U	6	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
TRANS-1,3-DICHLOROPROPENE	µg/L	1	U	U	U	13	U	U	U	10	U	U	U
TRICHLOROETHENE	µg/L	–	–	–	–	12	U	U	U	9	U	U	U
TRICHLOROETHYLENE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
TRICHLOROFLUOROMETHANE	µg/L	1	U	U	U	2	U	U	U	2	U	U	U
VINYL ACETATE	µg/L	1	U	U	U	13	1.6	1	10	10	1.8	1	10
VINYL CHLORIDE	µg/L	1	U	U	U	13	0.81	0.5	5	10	0.9	0.5	5
XYLENES, TOTAL	µg/L	1	U	U	U	13	U	U	U	10	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1-NAPHTHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2,4-DINITROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2,4-DINITROTOLUENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,6-DINITROTOLUENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2-CHLOROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2-NAPHTHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2-NITROANILINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2-NITROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
2-PICOLINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
3-NITROANILINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4-AMINOBIPHENYL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4-NITROANILINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4-NITROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ACENAPHTHENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ACENAPHTHYLENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ACETOPHENONE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ANILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ANTHRACENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ARAMITE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–

4783

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BENZOIC ACID	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BENZYL ALCOHOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
CHLOROBENZILATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
CHRYSENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DIALLATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DIBENZOFURAN	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIETHYL PHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DIMETHOATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIMETHYL PHTHALATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DIPHENYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
DISULFOTON	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ETHYL METHANESULFONATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
FAMPHUR	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
FLUORANTHENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
FLUORENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROBENZENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROETHANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROPHENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
HEXACHLOROPROPENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ISODRIN	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ISOPHORONE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ISOSAFROLE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
KEPONE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
M-DINITROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–		–	–	–	–	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
METHAPYRILINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
METHYL METHANESULFONATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
METHYL PARATHION	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
N-NITROSODIETHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
N-NITROSOMETHYLETHYLAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
NAPHTHALENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
NITROBENZENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
O-DICHLOROBENZENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
O-METHYLPHENOL	µg/L	–	–	–		–	–	–	–	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
O-TOLUIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
P-CHLOROANILINE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
P-DICHLOROBENZENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
P-METHYLPHENOL (CRESOL)	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PARATHION	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PENTACHLOROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PENTACHLOROPHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
PHENACETIN	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PHENANTHRENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
PHENOL	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
PHORATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PRONAMIDE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
PYRENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
PYRIDINE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
SAFROLE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
SULFOTEPP	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
SYM-TRINITROBENZENE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
TETRACHLOROPHENOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4,5-T	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
2,4-D	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
4,4'-DDD	µg/L	2	1.1	0.1	4	–	–	–	–	–	–	–	–
4,4'-DDE	µg/L	2	1.1	0.1	4	–	–	–	–	–	–	–	–
4,4'-DDT	µg/L	2	1.1	0.1	4	–	–	–	–	–	–	–	–
ACETONITRILE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ALDRIN	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ALPHA-BHC	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1016	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1221	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1232	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1242	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1248	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1254	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
AROCLOR 1260	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
BETA-BHC	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
CHLORDANE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DELTA-BHC	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DIELDRIN	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
DINOSEB	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
ENDOSULFAN I	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ENDOSULFAN II	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ENDOSULFAN SULFATE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ENDRIN	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ENDRIN ALDEHYDE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEPTACHLOR	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
ISOBUTYL ALCOHOL	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
METHOXYCHLOR	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
P-DIOXANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
TOXAPHENE	µg/L	2	U	U	U	–	–	–	–	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	7	U	U	U	11	U	U	U	7	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
1,1-DICHLORETHYLENE	µg/L	2	0.75	0.5	1	–	–	–	–	–	–	–	–
1,1-DICHLOROETHANE	µg/L	9	0.56	0.5	1	13	U	U	U	9	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	7	U	U	U	11	U	U	U	7	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–		–	–	–	–	–	–	–	–
1,2,3-TRICHLOROPROPANE	µg/L	3	2.7	0.5	5	–	–	–	–	–	–	–	–
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	3	4.3	1	20	–	–	–	–	–	–	–	–
1,2-DIBROMOETHANE	µg/L	3	4.3	1	20	–	–	–	–	–	–	–	–
1,2-DICHLOROETHANE	µg/L	9	0.56	0.5	1	13	U	U	U	9	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–		–	–	–	–	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	6	U	U	U	11	U	U	U	7	U	U	U
1,2-DICHLOROPROPANE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	8	5.6	5	10	11	U	U	U	7	U	U	U
2-HEXANONE	µg/L	9	2.4	1	10	11	U	U	U	7	U	U	U
4-METHYL-2-PENTANONE	µg/L	8	2.6	1	10	11	U	U	U	7	U	U	U
ACETONE	µg/L	9	6.7	1	38.9	13	U	U	U	9	U	U	U
ACROLEIN	µg/L	3	28	10	50	–	–	–	–	–	–	–	–
ACRYLONITRILE	µg/L	3	28	10	50	–	–	–	–	–	–	–	–
ALLYL CHLORIDE	µg/L	3	5.8	2.5	20	–	–	–	–	–	–	–	–
BENZENE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
BROMODICHLOROMETHANE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
BROMOFORM	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
BROMOMETHANE	µg/L	9	1.2	0.5	5	11	U	U	U	7	U	U	U
CARBON DISULFIDE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
CARBON TETRACHLORIDE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
CHLOROBENZENE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
CHLOROETHANE	µg/L	9	2.1	0.5	10	11	U	U	U	7	U	U	U
CHLOROFORM	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
CHLOROMETHANE	µg/L	9	2.1	0.5	10	11	U	U	U	7	U	U	U
CHLOROPRENE	µg/L	3	5.8	2.5	20	–	–	–	–	–	–	–	–
CIS-1,3-DICHLOROPROPENE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
DIBROMOCHLOROMETHANE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
DIBROMOMETHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	
DICHLORODIFLUOROMETHANE	µg/L	3	5.2	0.5	10	–	–	–	–	–	–	–	–
ETHYL BENZENE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
ETHYL METHACRYLATE	µg/L	3	5.8	2.5	20	–	–	–	–	–	–	–	–
FLUOROTRICHLOROMETHANE	µg/L	1	U	U	U	–	–	–	–	–	–	–	–
IODOMETHANE	µg/L	3	5.8	2.5	20	–	–	–	–	–	–	–	–
METHACRYLONITRILE	µg/L	3	5.8	2.5	20	–	–	–	–	–	–	–	–
METHYL ETHYL KETONE	µg/L	9	2.4	1	10	11	U	U	U	7	U	U	U
METHYL ISOBUTYL KETONE	µg/L	–	–	–		2	U	U	U	1	U	U	U
METHYL METHACRYLATE	µg/L	3	2.8	1	5	–	–	–	–	–	–	–	–
METHYLENE BROMIDE	µg/L	2	0.75	0.5	1	–	–	–	–	–	–	–	–
METHYLENE CHLORIDE	µg/L	9	2.1	0.5	10	13	U	U	U	9	U	U	U

TABLE 4-32

RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4011				MONITORING WELL 4101				MONITORING WELL 4102			
		COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX	COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	3	5.8	2.5	20	–	–	–	–	–	–	–	–
PROPIONITRILE	µg/L	3	13	10	20	–	–	–	–	–	–	–	–
STYRENE	µg/L	9	1.6	0.5	20	11	U	U	U	7	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	3	13	10	20	–	–	–	–	–	–	–	–
TETRACHLOROETHENE	µg/L	7	U	U	U	13	U	U	U	9	U	U	U
TETRACHLOROETHYLENE	µg/L	2	0.75	0.5	1	–	–	–	–	–	–	–	–
TOLUENE	µg/L	9	0.56	0.5	1	13	U	U	U	9	U	U	U
TOTAL PETROLEUM HYDROCARB	µg/L	–	–	–		–	–	–	–	–	–	–	–
TRANS-1,2-DICHLOROETHENE	µg/L	7	U	U	U	11	U	U	U	7	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	2	0.75	0.5	1	–	–	–	–	–	–	–	–
TRANS-1,3-DICHLOROPROPENE	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U
TRICHLOROETHENE	µg/L	7	U	U	U	13	U	U	U	9	U	U	U
TRICHLOROETHYLENE	µg/L	2	0.75	0.5	1	–	–	–	–	–	–	–	–
TRICHLOROFLUOROMETHANE	µg/L	2	0.75	0.5	1	–	–	–	–	–	–	–	–
VINYL ACETATE	µg/L	9	2.4	0.5	10	11	U	U	U	7	U	U	U
VINYL CHLORIDE	µg/L	9	1.3	0.5	5	11	U	U	U	7	U	U	U
XYLENES, TOTAL	µg/L	9	0.56	0.5	1	11	U	U	U	7	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
1,2,4,5-TETRACHLOROBENZENE	µg/L	–	–	–	–
1,2,4-TRICHLOROBENZENE	µg/L	–	–	–	–
1,4-NAPHTHOQUINONE	µg/L	–	–	–	–
1-NAPHTHYLAMINE	µg/L	–	–	–	–
2,4,5-TRICHLOROPHENOL	µg/L	–	–	–	–
2,4,6-TRICHLOROPHENOL	µg/L	–	–	–	–
2,4-DICHLOROPHENOL	µg/L	–	–	–	–
2,4-DIMETHYLPHENOL	µg/L	–	–	–	–
2,4-DINITROPHENOL	µg/L	–	–	–	–
2,4-DINITROTOLUENE	µg/L	–	–	–	–
2,6-DICHLOROPHENOL	µg/L	–	–	–	–
2,6-DINITROTOLUENE	µg/L	–	–	–	–
2-ACETYLAMINOFLUORENE	µg/L	–	–	–	–
2-CHLORONAPHTHALENE	µg/L	–	–	–	–
2-CHLOROPHENOL	µg/L	–	–	–	–
2-METHYLNAPHTHALENE	µg/L	–	–	–	–
2-NAPHTHYLAMINE	µg/L	–	–	–	–
2-NITROANILINE	µg/L	–	–	–	–
2-NITROPHENOL	µg/L	–	–	–	–
2-PICOLINE	µg/L	–	–	–	–
3,3'-DICHLOROBENZIDINE	µg/L	–	–	–	–
3,3'-DIMETHYLBENZIDINE	µg/L	–	–	–	–
3-METHYLCHOLANTHRENE	µg/L	–	–	–	–
3-NITROANILINE	µg/L	–	–	–	–
4,6-DINITRO-2-METHYLPHENOL	µg/L	–	–	–	–
4-AMINOBIPHENYL	µg/L	–	–	–	–
4-BROMOPHENYL PHENYL ETHER	µg/L	–	–	–	–
4-CHLORO-3-METHYLPHENOL	µg/L	–	–	–	–
4-CHLOROPHENYLPHENYL ETHER	µg/L	–	–	–	–
4-NITROANILINE	µg/L	–	–	–	–
4-NITROPHENOL	µg/L	–	–	–	–
4-NITROQUINOLINE 1-OXIDE	µg/L	–	–	–	–
5-NITRO-O-TOLUIDINE	µg/L	–	–	–	–
A,A-DIMETHYLPHENETHYLAMINE	µg/L	–	–	–	–
ACENAPHTHENE	µg/L	–	–	–	–
ACENAPHTHYLENE	µg/L	–	–	–	–
ACETOPHENONE	µg/L	–	–	–	–
ANILINE	µg/L	–	–	–	–
ANTHRACENE	µg/L	–	–	–	–
ARAMITE	µg/L	–	–	–	–
BENZO(A)ANTHRACENE	µg/L	–	–	–	–

951

4783

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
BENZO(A)PYRENE	µg/L	–	–	–	–
BENZO(B)FLUORANTHENE	µg/L	–	–	–	–
BENZO(GHI)PERYLENE	µg/L	–	–	–	–
BENZO(K)FLUORANTHENE	µg/L	–	–	–	–
BENZOIC ACID	µg/L	–	–	–	–
BENZYL ALCOHOL	µg/L	–	–	–	–
BIS(2-CHLOROETHOXY)METHANE	µg/L	–	–	–	–
BIS(2-CHLOROETHYL)ETHER	µg/L	–	–	–	–
BIS(2-CHLOROISOPROPYL)ETHER	µg/L	–	–	–	–
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	–	–	–	–
BUTYL BENZYL PHTHALATE	µg/L	–	–	–	–
CHLOROBENZILATE	µg/L	–	–	–	–
CHRYSENE	µg/L	–	–	–	–
DI-N-BUTYLPHTHALATE	µg/L	–	–	–	–
DI-N-OCTYLPHTHALATE	µg/L	–	–	–	–
DIALLATE	µg/L	–	–	–	–
DIBENZO(A,H)ANTHRACENE	µg/L	–	–	–	–
DIBENZOFURAN	µg/L	–	–	–	–
DICHLORODIISOPROPYL ETHER	µg/L	–	–	–	–
DIETHYL PHTHALATE	µg/L	–	–	–	–
DIMETHOATE	µg/L	–	–	–	–
DIMETHYL PHTHALATE	µg/L	–	–	–	–
DIMETHYLAMINO AZOBENENE	µg/L	–	–	–	–
DIMETHYLBENZ(A)ANTHRACENE	µg/L	–	–	–	–
DIPHENYLAMINE	µg/L	–	–	–	–
DISULFOTON	µg/L	–	–	–	–
ETHYL METHANESULFONATE	µg/L	–	–	–	–
FAMPHUR	µg/L	–	–	–	–
FLUORANTHENE	µg/L	–	–	–	–
FLUORENE	µg/L	–	–	–	–
HEXACHLOROBENZENE	µg/L	–	–	–	–
HEXACHLOROBUTADIENE	µg/L	–	–	–	–
HEXACHLOROCYCLOPENTADIENE	µg/L	–	–	–	–
HEXACHLOROETHANE	µg/L	–	–	–	–
HEXACHLOROPHENE	µg/L	–	–	–	–
HEXACHLOROPROPENE	µg/L	–	–	–	–
INDENO(1,2,3-CD)PYRENE	µg/L	–	–	–	–
ISODRIN	µg/L	–	–	–	–
ISOPHORONE	µg/L	–	–	–	–
ISOSAFROLE	µg/L	–	–	–	–
KEPONE	µg/L	–	–	–	–

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
M-DICHLOROBENZENE	µg/L	–	–	–	–
M-DINITROBENZENE	µg/L	–	–	–	–
M-METHYLPHENOL	µg/L	–	–	–	–
M-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–
METHAPYRILINE	µg/L	–	–	–	–
METHYL METHANESULFONATE	µg/L	–	–	–	–
METHYL PARATHION	µg/L	–	–	–	–
N-NITROSODI-N-BUTYLAMINE	µg/L	–	–	–	–
N-NITROSODI-N-PROPYLAMINE	µg/L	–	–	–	–
N-NITROSODIETHYLAMINE	µg/L	–	–	–	–
N-NITROSODIMETHYLAMINE	µg/L	–	–	–	–
N-NITROSODIPHENYLAMINE	µg/L	–	–	–	–
N-NITROSOMETHYLETHYLAMINE	µg/L	–	–	–	–
N-NITROSOMORPHOLINE	µg/L	–	–	–	–
N-NITROSOPIPERIDINE	µg/L	–	–	–	–
N-NITROSOPYRROLIDINE	µg/L	–	–	–	–
NAPHTHALENE	µg/L	–	–	–	–
NITROBENZENE	µg/L	–	–	–	–
O-DICHLOROBENZENE	µg/L	–	–	–	–
O-METHYLPHENOL	µg/L	–	–	–	–
O-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–
O-TOLUIDINE	µg/L	–	–	–	–
P-CHLOROANILINE	µg/L	–	–	–	–
P-DICHLOROBENZENE	µg/L	–	–	–	–
P-METHYLPHENOL (CRESOL)	µg/L	–	–	–	–
P-PHENYLENEDIAMINE	µg/L	–	–	–	–
PARATHION	µg/L	–	–	–	–
PENTACHLOROBENZENE	µg/L	–	–	–	–
PENTACHLORONITROBENZENE	µg/L	–	–	–	–
PENTACHLOROPHENOL	µg/L	–	–	–	–
PHENACETIN	µg/L	–	–	–	–
PHENANTHRENE	µg/L	–	–	–	–
PHENOL	µg/L	–	–	–	–
PHORATE	µg/L	–	–	–	–
PRONAMIDE	µg/L	–	–	–	–
PYRENE	µg/L	–	–	–	–
PYRIDINE	µg/L	–	–	–	–
SAFROLE	µg/L	–	–	–	–
SULFOTEPP	µg/L	–	–	–	–
SYM-TRINITROBENZENE	µg/L	–	–	–	–
TETRACHLOROPHENOL	µg/L	–	–	–	–

953

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TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
THIONAZIN	µg/L	–	–	–	–
TRIETHYL PHOSPHOROTHIOATE	µg/L	–	–	–	–
2,4,5-T	µg/L	–	–	–	–
2,4,5-TP (SILVEX)	µg/L	–	–	–	–
2,4-D	µg/L	–	–	–	–
4,4'-DDD	µg/L	–	–	–	–
4,4'-DDE	µg/L	–	–	–	–
4,4'-DDT	µg/L	–	–	–	–
ACETONITRILE	µg/L	–	–	–	–
ALDRIN	µg/L	–	–	–	–
ALPHA-BHC	µg/L	–	–	–	–
AROCLOR 1016	µg/L	–	–	–	–
AROCLOR 1221	µg/L	–	–	–	–
AROCLOR 1232	µg/L	–	–	–	–
AROCLOR 1242	µg/L	–	–	–	–
AROCLOR 1248	µg/L	–	–	–	–
AROCLOR 1254	µg/L	–	–	–	–
AROCLOR 1260	µg/L	–	–	–	–
BETA-BHC	µg/L	–	–	–	–
CHLORDANE	µg/L	–	–	–	–
DELTA-BHC	µg/L	–	–	–	–
DIELDRIN	µg/L	–	–	–	–
DINOSEB	µg/L	–	–	–	–
ENDOSULFAN I	µg/L	–	–	–	–
ENDOSULFAN II	µg/L	–	–	–	–
ENDOSULFAN SULFATE	µg/L	–	–	–	–
ENDRIN	µg/L	–	–	–	–
ENDRIN ALDEHYDE	µg/L	–	–	–	–
GAMMA-BHC (LINDANE)	µg/L	–	–	–	–
HEPTACHLOR	µg/L	–	–	–	–
HEPTACHLOR EPOXIDE	µg/L	–	–	–	–
ISOBUTYL ALCOHOL	µg/L	–	–	–	–
METHOXYCHLOR	µg/L	–	–	–	–
P-DIOXANE	µg/L	–	–	–	–
TOXAPHENE	µg/L	–	–	–	–
1,1,1,2-TETRACHLOROETHANE	µg/L	–	–	–	–
1,1,1-TRICHLOROETHANE	µg/L	10	U	U	U
1,1,2,2-TETRACHLOROETHANE	µg/L	10	U	U	U
1,1,2-TRICHLOROETHANE	µg/L	10	U	U	U
1,1-DICHLORETHYLENE	µg/L	–	–	–	–
1,1-DICHLOROETHANE	µg/L	12	U	U	U

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
1,1-DICHLOROETHENE	µg/L	10	U	U	U
1,1-DICHLOROETHENE (TOTAL)	µg/L	–	–	–	
1,2,3-TRICHLOROPROPANE	µg/L	–	–	–	–
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	–	–	–	–
1,2-DIBROMOETHANE	µg/L	–	–	–	–
1,2-DICHLOROETHANE	µg/L	12	U	U	U
1,2-DICHLOROETHENE	µg/L	–	–	–	–
1,2-DICHLOROETHENE (TOTAL)	µg/L	10	U	U	U
1,2-DICHLOROPROPANE	µg/L	10	U	U	U
2-CHLOROETHYL VINYL ETHER	µg/L	10	U	U	U
2-HEXANONE	µg/L	10	U	U	U
4-METHYL-2-PENTANONE	µg/L	10	U	U	U
ACETONE	µg/L	12	U	U	U
ACROLEIN	µg/L	–	–	–	–
ACRYLONITRILE	µg/L	–	–	–	–
ALLYL CHLORIDE	µg/L	–	–	–	–
BENZENE	µg/L	10	U	U	U
BROMODICHLOROMETHANE	µg/L	10	0.71	0.5	2.6
BROMOFORM	µg/L	10	0.99	0.5	5.4
BROMOMETHANE	µg/L	10	U	U	U
CARBON DISULFIDE	µg/L	10	U	U	U
CARBON TETRACHLORIDE	µg/L	10	U	U	U
CHLOROBENZENE	µg/L	10	U	U	U
CHLOROETHANE	µg/L	10	U	U	U
CHLOROFORM	µg/L	10	U	U	U
CHLOROMETHANE	µg/L	10	U	U	U
CHLOROPRENE	µg/L	–	–	–	–
CIS-1,3-DICHLOROPROPENE	µg/L	10	U	U	U
DIBROMOCHLOROMETHANE	µg/L	10	1.1	0.5	6.1
DIBROMOMETHANE	µg/L	–	–	–	–
DICHLORODIFLUOROMETHANE	µg/L	–	–	–	–
ETHYL BENZENE	µg/L	10	U	U	U
ETHYL METHACRYLATE	µg/L	–	–	–	–
FLUOROTRICHLOROMETHANE	µg/L	–	–	–	–
IODOMETHANE	µg/L	–	–	–	–
METHACRYLONITRILE	µg/L	–	–	–	–
METHYL ETHYL KETONE	µg/L	10	U	U	U
METHYL ISOBUTYL KETONE	µg/L	1	U	U	U
METHYL METHACRYLATE	µg/L	–	–	–	–
METHYLENE BROMIDE	µg/L	–	–	–	–
METHYLENE CHLORIDE	µg/L	12	U	U	U

955

4783

4783

TABLE 4-32
RCRA GROUNDWATER 2000- TO 4000-SERIES MONITORING WELLS - ORGANIC SUMMARY

CHEMICAL PARAMETERS	UNIT	MONITORING WELL 4103			
		COUNT	AVG	MIN	MAX
PENTACHLOROETHANE	µg/L	--	--	--	--
PROPIONITRILE	µg/L	--	--	--	--
STYRENE	µg/L	10	U	U	U
T-1,4-DICHLORO-2-BUTENE	µg/L	--	--	--	--
TETRACHLOROETHENE	µg/L	12	U	U	U
TETRACHLOROETHYLENE	µg/L	--	--	--	--
TOLUENE	µg/L	12	U	U	U
TOTAL PETROLEUM HYDROCARB	µg/L	--	--	--	--
TRANS-1,2-DICHLOROETHENE	µg/L	10	U	U	U
TRANS-1,2-DICHLOROETHYLENE	µg/L	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	µg/L	10	U	U	U
TRICHLOROETHENE	µg/L	12	U	U	U
TRICHLOROETHYLENE	µg/L	--	--	--	--
TRICHLOROFLUOROMETHANE	µg/L	--	--	--	--
VINYL ACETATE	µg/L	10	U	U	U
VINYL CHLORIDE	µg/L	10	U	U	U
XYLENES, TOTAL	µg/L	10	U	U	U

NOTE:
BLANK = UNFILTERED SAMPLE
COUNT = NUMBER OF SAMPLES ANALYZED
U = NOT DETECTED
-- = NOT ANALYZED

TABLE 4-33

SURFACE WATER ANALYTICAL RESULTS

Analyte	Units	DD-07	DD-09
Aluminum	µg/L	456	964
Barium	µg/L	320	209
TOC	mg/L	118	7.6
TOX	µg/L	260	37
TDS	mg/L	1190	414
TSS	mg/L	20.0	148
Chloride	mg/L	28.1	39.3
Fluoride	mg/L	1.2	1.3
Nitrate	mg/L	0.20	2.6
Gross Alpha	pCi/L	850 ± 50	420 ± 30
Gross Beta	pCi/L	560 ± 20	380 ± 10
Thorium-228	pCi/L	NR	0.1 ± 0.3
Thorium-230	pCi/L	NR	1.4 ± 0.5
Thorium-232	pCi/L	NR	0.1 ± 0.2
Uranium-234	pCi/L	160 ± 30	57 ± 30
Uranium-235	pCi/L	5 ± 10	1.0 ± 8.6
Uranium-238	pCi/L	740 ± 60	310 ± 40
Radium-226	pCi/L	NR	NR
Radium-228	pCi/L	NR	NR
Chromium	µg/L	10.0	10.0
Sulfate	mg/L	38.3	89.9

TABLE 4-34

CONCENTRATIONS OF URANIUM IN SURFACE WATER WITHIN OPERABLE UNIT 1

Sample Location	Concentration (mg/L)
RO-3	0.007
RO-4	28.0
RO-5	24.0
RO-6	4.0
RO-7	0.31
RO-8	34.0
RO-9	3.0
RO-12	0.34
RO-13	0.54
RO-14	0.48
RO-15	0.71
RO-16	0.62
RO-17	11.0

Source: Dames and Moore, 1985

TABLE 4-35
SUMMARY OF SURFACE WATER RADIOLOGICAL RESULTS, RI/FS DATA

Sample Location	Sample Date	Ra-226 (pCi/L)	Ra-228 (pCi/L)	Th-230 (pCi/L)	Tc-99 (pCi/L)	U-234 (pCi/L)	U-235/236 (pCi/L)	U-238 (pCi/L)	U-Total mg/L
Wet Season Surface Water Radiological Results									
ASIT-18	2/21/89	< 1.00	< 3.00	< 1.00	< 30.0	54.7 8.7	6.3 1.6	227 34	700 112
ASIT-19	2/21/89	< 1.00	< 3.00	< 1.00	41.3 18.5	65.9 12.1	5.6 1.9	345 58	944 156
ASIT-22	2/21/89	< 1.00	< 3.00	< 1.00	< 30.0	22.7 2.9	1.5 0.4	30.3 3.8	92 15
ASIT-23	2/21/89	< 1.00	< 3.00	< 1.00	34.9 16.5	80.3 12.7	4.9 1.4	165 25	465 82
ASIT-24	2/21/89	< 1.00	< 3.00	< 1.00	< 30.0	86.4 13.8	6.7 1.8	205 32	517 83
ASIT-27	NS[a]	--	--	--	--	--	--	--	--
ASIT-28	NS	--	--	--	--	--	--	--	--
ASIT-29	3/10/89	NA[b]	5.7 2	NA	NA	NA	NA	NA	1228 201
ASIT-30	2/21/89	< 1.00	< 3.00	< 1.00	54.3 19.7	514 200	43.8 12	2548 586	7030 1127
ASIT-31	2/21/89	< 1.00	< 3.1	< 1.00	175 30	419 69	41.5 7.8	2378 384	6853 1144
ASIT-38	3/29/89	NA	< 3.00	NA	NA	NA	NA	NA	3000 500
Dry Season Surface Water Radiological Results									
ASIT-18	7/10/88	1.1 0.1	1.2 0.1	NA	NA	NA	NA	NA	135 4
ASIT-19	7/10/88	1.1 0.1	1.3 0.1	NA	NA	NA	NA	NA	39 3
ASIT-22	7/10/88	1.0 0.1	1.1 0.1	NA	NA	NA	NA	NA	15 2
ASIT-23	NS	--	--	--	--	--	--	--	--
ASIT-24	NS	--	--	--	--	--	--	--	--
ASIT-27	5/9/89	< 1.00	< 3.00	NA	NA	NA	NA	NA	8148 1360
ASIT-28	5/9/89	< 1.00	< 3.00	NA	NA	NA	NA	NA	5067 835
ASIT-29	NS	--	--	--	--	--	--	--	--
ASIT-30	NS	--	--	--	--	--	--	--	--
ASIT-31	NS	--	--	--	--	--	--	--	--
ASIT-38	5/9/89	< 1.00	3.60 1.5	NA	NA	NA	NA	NA	7069 1126

[a]NS - Not sampled; surface water sampling location was dry
[b]NA - Not applicable; insufficient sample volume

4783

TABLE 4-36

SUMMARY OF FEMP ENVIRONMENTAL MONITORING PROGRAM SURFACE WATER SAMPLING RESULTS

Sample Location	1992 Number of Samples	1992 Concentration (pCi/L) Min	1992 Max	1992 Avg	1991 Number of Samples	1991 Concentration (pCi/L) Min	1991 Max	1991 Avg	1990 Number of Samples	1990 Concentration (pCi/L) Min	1990 Max	1990 Avg
Total Uranium[a]												
W5	48	0.47	1.2	0.74	47	0.41	1.6	0.78	52	0.68	1.1	0.75
W9	50	0.68	6.8	2.0	40	0.47	5.3	1.5	51	0.88	2.8	1.5
W10	38	0.81	730	86	25	1.0	1100	3.4[b]	44	1.1	1100	76
W11	21	1.3	12	6.3	24	2.5	11	5.7	38	1.4	81	8.9
W7	21	2.2	11	6.4	22	2.3	9.5	5.0	36	2.6	53	6.5
W8	48	1.2	19	2.8	50	1.1	8.1	3.9	20	1.4	26	4.5
Radium-226												
W5	6	<2.2	<2.2	<2.2	6	<0.1	<0.1	<0.1	6	0.078	0.58	0.25
W7	4	<2.2	<2.2	<2.2	6	<0.1	0.1	<0.1	9	0.00061	0.49	0.15[b]
W8	8	<2.2	2.2	<2.2	6	<0.1	0.1	<0.1	3	0.034	<0.15	0.052
Radium-228												
W5	6	<2.2	2.2	<2.2	6	<0.1	0.1	<0.1	6	0.89	<2.0	<1.5
W7	4	<2.2	2.2	<2.2	6	<0.1	0.2	0.1	9	1.0	<2.0	<1.7
W8	8	<2.2	2.2	<2.2	6	<0.1	0.2	0.1	3	0.77	1.2	0.8

TABLE 4-36
(Continued)

Sample Location	1989 Number of Samples	1989 Concentration (pCi/L) Min	1989 Max	1989 Avg	1988 Number of Samples	1988 Concentration (pCi/L) Min	1988 Max	1988 Avg	1987 Number of Samples	1987 Concentration (pCi/L) Min	1987 Max	1987 Avg
Total Uranium[a]												
W5	50	0.47	2.4	0.86	50	0.34	1.4	0.78	52	0.47	3.6	1.0
W9	47	0.61	4.3	1.5	33	0.27	21	2.6	49	0.68	5.9	1.7
W10	31	1.6	640	70	24	1.4	812	39	32	1.1	88	6.8
W11	24	2.8	28	6.7	16	2.7	13	5.7	18	1.8	15	5.8
W7	28	2.3	36	6.4	50	2.9	1.6	7.0	20	1.5	16	5.8
W8	20	1.4	26	4.5	22	1.0	4.8	2.1	32	0.74	4.7	1.9
Radium-226												
W5	6	<0.001	<0.001	<0.001	6	<0.45	<0.45	<0.45	6	<0.5	<0.5	<0.5
W7	8	<0.001	<0.001	<0.001	5	<0.45	<0.45	<0.45	9	<0.5	<0.5	<0.5
W8	4	<0.001	<0.001	<0.001	6	<0.45	0.90	0.53	3	<0.5	<0.5	<0.5
Radium-228												
W5	6	<0.001	<0.001	<0.001	6	<0.45	0.90	0.60	6	<0.5	<0.9	<0.6
W7	8	<0.001	<0.001	<0.001	5	<0.45	0.90	0.54	9	<0.5	<0.5	<0.5
W8	4	<0.001	<0.001	<0.001	6	<0.45	<0.45	<0.23	3	<0.5	<0.5	<0.5

[a]Units are reported as pCi/L in source text. To convert to ug/l multiply by 1.493.

[b]Results are reported for distribution median due to single outliner.

TABLE 4-37

RADIOISOTOPES IN PADDY'S RUN SEDIMENTS
FEMP ENVIRONMENTAL MONITORING PROGRAM

Paddy's Run North of the Storm Sewer Outfall Ditch
All Values in pCi/g (dry weight)

	Statistic	Pu--238	Pu--239/240	Ra--224	Ra--226	Ra--228	Tc--99	Th--228	Th--230	Th--232	U--234	U--235/236	U--238	U--Total
1992	Measurements	--[a]	--	--	12	--	--	12	12	12	--	--	--	12
	Minimum	--	--	--	0.32	--	--	0.30	0.27	0.21	--	--	--	0.95
	Maximum	--	--	--	2.30	--	--	1.0	2.0	1.1	--	--	--	4.1
	Average	--	--	--	0.78	--	--	0.67	0.98	0.58	--	--	--	2.3
1991	Measurements	--	--	--	12	--	--	10	10	10	--	--	--	12
	Minimum	--	--	--	0.40	--	--	0.34	0.46	0.34	--	--	--	0.61
	Maximum	--	--	--	0.90	--	--	1.0	1.2	1.0	--	--	--	3.7
	Average	--	--	--	0.63	--	--	0.66	0.73	0.66	--	--	--	1.4
1990	Measurements	70	70	70	70	70	70	70	70	70	70	70	70	--
	Minimum	<0.021	<0.014	0.26	<0.25	<0.18	<0.53	0.28	0.27	0.19	0.41	<0.075	<0.46	--
	Maximum	0.22	0.28	2.3	3.7	2.0	1.2	5.1	9.8	5.4	10	<2.6	8.7	--
	Average	<0.059	<0.060	0.57	0.89	0.54	0.71	1.3	1.1	0.75	0.86	<0.72	1.4	--
1989	Measurements	74	74	74	74	74	74	74	74	74	74	74	74	--
	Minimum	<0.012	<0.012	0.21	<0.21	<0.17	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
	Maximum	0.46	0.056	0.82	1.1	0.73	<0.90	4.3	2.6	2.1	2.2	<1.0	6.6	--
	Average	<0.024	<0.016	0.44	0.63	0.43	<0.90	<1.1	<1.1	<1.0	<1.1	<1.0	<1.2	--
1988	Measurements	24	24	24	24	24	24	24	24	24	24	24	24	--
	Minimum	<0.002	<0.002	0.26	0.14	0.19	<1.0	0.17	0.32	0.17	0.04	<0.01	0.24	--
	Maximum	<0.003	<0.003	0.80	1.4	1.1	<1.0	0.66	2.5	0.87	1.3	0.10	1.5	--
	Average	<0.003	<0.003	0.45	0.65	0.41	<1.0	0.36	0.63	0.35	0.53	<0.05	0.62	--
1987	Measurements	24	24	24	24	24	24	24	24	24	24	24	24	--
	Minimum	<0.02	<0.02	<0.0792	<0.217	<0.154	<1.0	0.18	0.34	0.17	0.24	<0.02	0.2	--
	Maximum	<0.04	<0.03	<0.511	<1.55	<0.523	<1.3	0.74	1.1	0.54	0.69	<0.14	0.82	--
	Average	<0.02	<0.02	<0.213	<0.573	<0.322	<1.1	0.35	0.63	0.33	0.41	<0.051	0.43	--

TABLE 4-37
(Continued)

Paddy's Run South of the Storm Sewer Outfall Ditch
All Values in pCi/g (dry weight)

	Statistic	Pu--238	Pu--239/240	Ra--224	Ra--226	Ra--228	Tc--99	Th--228	Th--230	Th--232	U--234	U--235/236	U--238	U--Total
1992	Measurements	--[a]	--	--	--	--	--	--	--	--	--	--	--	12
	Minimum	--	--	--	--	--	--	--	--	--	--	--	--	0.55
	Maximum	--	--	--	--	--	--	--	--	--	--	--	--	3.8
	Average	--	--	--	--	--	--	--	--	--	--	--	--	2.0
1991	Measurements	--	--	--	--	--	--	--	--	--	--	--	--	12
	Minimum	--	--	--	--	--	--	--	--	--	--	--	--	0.61
	Maximum	--	--	--	--	--	--	--	--	--	--	--	--	2.5
	Average	--	--	--	--	--	--	--	--	--	--	--	--	1.2
1990	Measurements	54	54	54	54	54	54	54	54	54	54	54	54	--
	Minimum	<0.019	<0.019	0.237	0.44	0.25	<0.58	0.27	0.21	0.13	0.49	<0.067	0.41	--
	Maximum	0.090	<0.12	1.1	1.2	0.95	<0.97	1.3	1.8	1.1	29	3.4	30	--
	Average	<0.047	<0.044	0.51	0.70	0.46	<0.77	0.58	0.84	0.44	0.83	<0.26	0.81	--
1989	Measurements	53	53	53	53	53	53	53	53	53	53	53	53	--
	Minimum	<0.012	<0.012	<0.032	<0.038	<0.15	<0.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
	Maximum	0.032	0.097	0.92	1.3	1.0	0.96	6.6	11	1.3	3.6	<1.0	3.9	--
	Average	<0.015	<0.016	0.41	0.50	0.42	<0.90	<1.2	<1.3	<1.0	<1.1	<1.0	<1.1	--
1988	Measurements	18	18	18	18	18	18	18	18	18	18	18	18	--
	Minimum	<0.01	<0.01	0.19	0.42	0.23	<0.90	0.10	0.21	0.07	0.06	<0.05	0.32	--
	Maximum	<0.05	<0.05	0.90	2.1	0.85	<0.90	0.74	4.8	1.0	2.8	0.23	3.1	--
	Average	<0.01	<0.01	0.44	0.69	0.41	<0.90	0.34	0.67	0.32	0.68	0.06	0.77	--
1987	Measurements	18	18	18	18	18	18	18	18	18	18	18	18	--
	Minimum	<0.02	<0.02	<.10	<0.25	<0.11	<1.1	0.13	0.44	0.16	0.34	0.02	0.04	--
	Maximum	<0.04	<0.02	<0.403	<0.817	<0.486	<1.3	0.45	0.9	0.43	0.59	0.08	0.59	--
	Average	<0.02	<0.02	<0.23	<0.56	<0.28	<1.2	0.32	0.64	0.31	0.45	0.05	0.22	--

[a]Analyte not analyzed.

TABLE 4-38

SUMMARY OF SEDIMENT RADIOLOGICAL RESULTS - CIS
(pCi/g)

Sample ID	Tc-99	U-234	Th-228	U-235	Th-230	U-238
SD-21-017	U	2.3	0.1	0.2	0.4	8.6
SD-21-019	U	1.7	0.3	0.1	0.2	6.3
SD-26-001	U	11.0	0.4	0.9	1.3	46.0
SD-26-005	U	3.6	0.3	0.2	1.9	12.0
SD-26-007	U	3.3	0.1	0.2	0.9	12.0
SD-28-002	8.6	19.0	0.3	2.4	0.9	111.0
SD-28-007	10.0	121.0	1.7	12.0	9.0	728.0
SD-28-008	13.0	133.0	0.2	26.0	0.1	761.0
SD-28-010	17.0	62.0	2.6	14.0	7.6	338.0
SD-28-011	16.0	85.0	0.2	18.0	0.9	446.0
SD-36-001	8.6	89.0	1.0	27.0	4.0	480.0
SD-36-002	7.0	131.0	1.1	29.0	5.1	746.0
SD-36-003	8.3	71.0	0.2	9.4	0.5	369.0
SD-36-004	17.0	126.0	1.3	33.0	6.1	696.0
SD-36-006	9.3	126.0	0.7	33.0	4.4	696.0

U = Undetected

964

4783

TABLE 4-39

SUMMARY OF RADON FLUX MEASUREMENTS

($pCi/m^2/SEC^{-1}$)

Pit Area in m^2	Waste Pit 1 (7430)	Waste Pit 2 (4460)	Waste Pit 3 (22,300)	Waste Pit 4 (7990)
Number of Samples	99	98	199	27[a]
Arithmetic Mean	9.1	6.4	2.6	<0.1
Standard Deviation	13.4	13.4	6.2	<0.1
Standard Error	1.4	1.4	0.6	<0.1
Minimum	0.6	0.2	0.3	<0.1
Maximum	75.2	81.0	48.0	<0.1
99% Confidence Interval of the Mean	5.6 - 12.7	2.9 - 9.9	1.0 - 4.2	<0.1

[a]Includes two duplicate samples.

965

TABLE 4-40

INDIANA CONTROL AREA RADIONUCLIDE CONCENTRATIONS IN GARDEN PRODUCE, AGRICULTURAL CROPS, AND SOIL SAMPLES[a]

		Radionuclide Type and Concentration (pCi/g Dry Weight)					
Sample	Location	Cs-137	Sr-90	U-234	U-235, -236	U-238	Sum of U Activity
Soil (field)	I1	0.3	<0.5[b]	1.1	<0.6	1.0	2.1
Alfalfa	I1	<0.5	0.5	2.4	0.6	1.1	4.1
Field Corn	I1	0.3	<0.5	1.1	<0.6	1.0	2.1
Soil (garden)	I1	0.3	<0.5	1.4	<0.6	1.2	2.6
Okra	I1	<0.4	<0.5	<0.6	<0.6	<0.6	--[c]
Tomato	I1	<0.2	<0.5	2.5	<0.6	0.8	3.3
Green pepper	I1	<0.3	<0.5	<0.6	<0.6	<0.6	--
Potato (flesh)	I1	<0.2	<0.5	<0.6	<0.6	<0.6	--
Potato (peel)	I1	<0.2	<0.5	<0.6	<0.6	<0.6	--
Soil	I2	0.2	<0.5	2.4	<0.6	3.2	5.6
Tomato	I2	<0.2	<0.5	0.8	<0.6	<0.6	0.8
Tomato	I2	<0.4	<0.5	<0.6	<0.6	<0.6	--
Green pepper	I2	<0.3	<0.5	<0.6	<0.6	<0.6	--
Potato (flesh)	I2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Potato (peel)	I2	<0.3	<0.5	2.7	<1.4	<1.4	2.7
Soil	I3	0.3	1.2	1.0	<0.6	1.3	2.3
Soybean	I3	<0.2	<0.5	<0.6	<0.6	<0.6	--
Soybean	I3	<0.2	<0.5	<0.6	<0.6	<0.6	--
Soybean (husk)	I3	<0.2	0.6	0.7	<0.6	<0.6	0.7
Field corn	I3	<0.2	<0.5	<0.6	<0.6	<0.6	--

[a]Source: ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final".
[b]< = Less than stated detection limit.
[c]-- = No uranium isotopes detected.

4783

TABLE 4-41

RADIONUCLIDE CONCENTRATIONS IN GARDEN PRODUCE FROM ROADSIDE STAND IN THE FEMP VICINITY[a]

		Radionuclide Type and Concentration ([pCi/g] Dry Weight)					
Sample	Site	Cs-137	Sr-90	U-234	U-235, 236	U-238	Sum of U Activity
Sweet corn	Roadside Stand	<0.2[b]	<0.5	<0.6	<0.6	<0.6	--[c]
Sweet corn	Roadside Stand	<0.2	<0.5	<0.6	<0.6	<0.6	--
Tomato	Roadside Stand	<0.5	<0.5	1.9	<0.6	0.7	2.6
Cantaloupe	Roadside Stand	<0.2	<0.5	<0.6	<0.6	<0.6	--

[a]Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]< = Less than stated detection limit.
[c]-- = No uranium isotopes detected.

967

TABLE 4-42

RADIONUCLIDE CONCENTRATIONS IN FEMP VICINITY GARDEN PRODUCE, AGRICULTURAL CROPS, AND SOIL SAMPLES[a]

		Radionuclide Type and Concentration (pCi/g Dry Weight)					
Sample	Site[b]	Cs-137	Sr-90	U-234	U-235, -236	U-238	Sum of U Activity
Soil	G1	0.2	<0.5[c]	1.7	<0.6	1.6	3.3
Green pepper	G1	<0.2	<0.5	<0.6	<0.6	<0.6	--[d]
Okra	G1	<0.3	<0.5	<0.6	<0.6	<0.6	--
Tomato	G1	<0.3	<0.5	<0.6	<0.6	<0.6	--
Cucumber	G1	<1.1	<0.6	3.0	<0.6	1.8	4.8
Squash	G1	<0.3	<0.5	<0.6	<0.6	<0.6	--
Soil	G2	0.3	0.8	1.3	<0.6	1.5	2.8
Cabbage	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Green pepper	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Okra	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Potato (peel)	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Potato (flesh)	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Sweet potato	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Tomato	G2	<0.2	<0.5	<0.6	<0.6	<0.6	--
Soil	G3	0.3	0.7	0.8	<0.6	<0.6	0.8
Tomato	G3	<0.3	<0.5	0.8	<0.6	<0.6	0.8
Okra	G3	<0.5	<0.5	1.4	<0.6	0.8	2.2
Green pepper	G3	<0.2	<0.5	1.0	<0.6	<0.6	1.0
Soil	G4	0.2	<0.5	2.5	<0.6	2.1	4.6
Alfalfa	G4	<0.4	<0.5	1.2	<0.6	<0.6	1.2
Soil (garden)	G5	<0.2	<0.5	1.3	<0.6	1.3	2.6
Soil (field)	G5	<0.2	2.7	1.3	<0.6	1.7	3.0
Tomato	G5	<0.3	<0.5	<0.6	<0.6	<0.6	--
Field corn	G5	<0.2	<0.5	<0.6	<0.6	<0.6	--
Field corn	G5	<0.2	<0.5	<0.6	<0.6	<0.6	--
Soil (soybean field)	G6	<0.2	<0.5	3.1	<0.6	2.8	5.9
Soybeans	G6	<0.2	<0.5	<0.6	<0.6	<0.6	--

963

TABLE 4-42
(Continued)

Sample	Site[b]	Radionuclide Type and Concentration (pCi/g Dry Weight)					
		Cs-137	Sr-90	U-234	U-235, -236	U-238	Sum of U Activity
Soil (pumpkin field)	G6	0.3	1.3	3.7	<0.6	2.9	6.6
Pumpkin	G6	<0.3	<0.5	1.5	<0.6	<0.6	1.5
Pumpkin	G6	<0.4	<0.5	0.9	<0.6	0.8	1.7

[a]Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-42.
[c]< = Lessd than stated detection limit.
[d]-- = No uranium isotopes detected.

TABLE 4-43

TOTAL URANIUM CONCENTRATION RATIOS IN GARDEN PRODUCE AND AGRICULTURAL CROPS FOR SELECTED SITES IN THE FEMP VICINITY[a]

Sample	Site[b]	Concentration Ratio[c]
Control Sites		
Field alfalfa	I1	1.95
Field corn	I1	1.00
Garden okra	I1	--[d]
Garden tomato	I1	1.27
Garden green pepper	I1	--
Garden potato (flesh)	I1	--
Garden potato (peel)	I1	--
Garden tomato	I2	0.14
Garden tomato	I2	--
Garden green pepper	I2	--
Garden potato (flesh)	I2	--
Garden potato (peel)	I2	0.48
Soybean	I3	--
Soybean	I3	--
Soybean (husk)	I3	0.30
Field corn	I3	--
FEMP Vicinity Sites		
Green pepper	G1	--
Okra	G1	--
Tomato	G1	--
Cucumber	G1	1.46
Squash	G1	--
Cabbage	G2	--
Green pepper	G2	--
Okra	G2	--
Potato peel	G2	--
Potato flesh	G2	--
Sweet potato	G2	--
Tomato	G2	--
Tomato	G3	1.00
Okra	G3	2.75
Green pepper	G3	1.25
Alfalfa	G4	0.26
Tomato	G5	--

TABLE 4-43
(Continued)

Sample	Site[b]	Concentration Ratio[c]
Field corn	G5	--
Field corn	G5	--
Soybeans	G6	--
Pumpkin	G6	0.23
Pumpkin	G6	0.26

[a]Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-42.
[c]Concentration ratios are calculated as CR = (radionuclide activity per weight of plant)/(radionuclide activity per weight of soil).
[d]-- = Radionuclide concentration below detectable limits; therefore, concentration ratio not calculated.

TABLE 4-44

RADIONUCLIDE CONCENTRATIONS IN WETLAND PLANTS AND SOIL NEAR OPERABLE UNIT 1 ON THE FEMP[a]

		Radionuclide Type and Concentrations (pCi/g Dry Weight)							
Sample	Site[b]	Cs-137	Sr-90	Tc-99	U-234	U-235,U-236	U-238	Total Isotopic Uranium[c]	Concentration Ratio[d]
Algae[e]	PR-1	<0.2[f]	0.9	<0.9	<0.6	<0.6	<0.6	g	g
Algae[e]	PR-2A	<0.2	<0.5	<0.9	<0.6	<0.6	<0.6	g	g
Soil	9A	<0.2	<0.6	h	3.9	<0.6	12.4	16.3	i
Cattail leaf	9A	<0.3	<0.5	h	<0.6	<0.6	<0.6	g	g
Cattail leaf	9A	<0.2	<0.5	h	0.7	<0.6	0.7	1.4	0.09
Cattail root	9A	<0.3	<0.5	h	2.6	<0.6	3.8	6.4	0.39
Grass blade	9A	<0.3	<0.6	h	<0.6	<0.6	<0.6	g	g
Grass root	9A	<0.2	<0.5	h	7.7	1.3	22.3	31.3	1.92
Grass blades[e]	9A	<0.2	<0.5	1.9	<0.6	<0.6	<0.6	g	g
Grass roots[e]	9A	<0.2	<0.5	<0.9	0.9	<0.6	4.2	5.1	0.31
Cattail leaf	9B	<0.2	<0.5	h	1.4	<0.6	1.9	3.3	0.20
Cattail root	9B	<0.2	<0.5	h	<0.6	<0.6	<0.6	g	g

[a]Source - ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-41.
[c]Total uranium in milligrams per kilogram (ppm).
[d]Concentration ration is determined for total isotopic uranium and is calculated, where possible, as CR= (radionuclide activity per weight of plant)/(radionuclide activity per weight of soil).
[e]1988 sample.
[f]< - Less than stated detection limit.
[g]No uranium isotopes detected.
[h]Technetium-99 analyzed for 1988 samples only.
[i]Not applicable.

972

TABLE 4-45

CONCENTRATIONS OF RADIOLOGICAL CONSTITUENTS
IN SOIL AND TERRESTRIAL VEGETATION NEAR OPERABLE UNIT 1[a]

		Concentrations (pCi/g)				
Analyte	Site[b]	Soil	Grass Blades	Grass Roots	Forb Leaves	Forb Roots
U-234	9	2.9	<0.6[c]	3.9	--[d]	--
	9	2.6	--	--	--	--
	11	1.7	--	--	<0.6	0.6
U-235	9	<0.6	<0.6	<0.6	--	--
U-236	9	<0.6	--	--	--	--
	11	<0.6	--	--	<0.6	<0.6
U-238	9	5.2	<0.6	4.8	--	--
	9	4.2	--	--	--	--
	11	2.6	--	--	<0.6	2.1
U-total[e]	9	8.1	<0.6	8.7	--	--
	9	6.8	--	--	--	--
	11	4.3	--	--	<0.6	2.7
Cs-137	9	<0.2	<0.3	<0.2	--	--
	9	<0.2	--	--	--	--
	11	<0.2	--	--	<0.2	<0.2
Sr-90	9	0.6	<1.5	<0.5	--	--
	9	0.5	--	--	--	--
	11	<0.5	--	--	<0.5	<0.5

[a] Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b] See Figure 4-41.
[c] < = Isotopes were below presented detection limit.
[d] -- = No samples at this site.
[e] Total uranium in milligrams per kilogram (ppm).

TABLE 4-46

CHEMICAL CONCENTRATIONS IN VEGETATION AND WILDLIFE COLLECTED FROM THE FEMP[a]

Sample Type	Site[b]	Anthracene	Butylbenzyl-phthalate	Chrysene	Fluoranthene	Phenanthrene	Pyrene	2-Nitrophenol	4-Nitrophenol
Organics[c]									
Grass blades	9A	10000 U[d]	2000 J[e]	10000 U	10000 U	10000 U	10000 U	10000 U	50000 U
Grass roots	9A	10000 U	1000 J	10000 U	10000 U	10000 U	10000 U	10000 U	50000 U
Minnows	PR-1	20000 U	20000 U	20000 U	20000 U	20000 U	20000 U	20000 U	20000 U
Deer (Kidney)	--	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Deer (Liver)	--	10000 U	10000 U	10000 U	10000 U	10000 U	10000 U	10000 U	10000 U

		PCB						Pesticide	
Sample Type	Site	Aroclor-1260	Aroclor-1254	Aroclor-1221	Aroclor-1016	Aroclor-1232	Aroclor-1242	Chlordane	4,4-DDT
Pesticides and PCBs[c]									
Grass blades	9A	800 U	800 U	800 U	800 U	800 U	800 U	800 U	400 U
Grass roots	9A	800 U	800 U	800 U	800 U	800 U	800 U	800 U	400 U
Minnows	PR-1	800 U	800 U	800 U	800 U	800 U	800 U	800 U	400 U
Deer (Kidney)	--	800 U	800 U	800 U	800 U	800 U	800 U	800 U	400 U
Deer (Liver)	--	800 U	800 U	800 U	800 U	800 U	800 U	800 U	400 U

Sample Type	Site	Aluminum	Arsenic	Barium	Cadmium	Fluoride	Lead	Mercury	Silver	Sulfate	Vanadium	Zinc
Inorganics[c]												
Grass blades	9A	25	13	3.2	0.5 U	210	3 U	0.5	0.5 U	320	1 U	4.4
Grass roots	9A	2160	3 U	17.5	0.5 U	50 U	3 U	2.1	0.5 U	830	3	8.0
Minnows	PR-1	28	6	1.0	4.2	1400	3 U	0.3	0.5 U	830	1 U	33.2
Deer (Kidney)	--	4 U	17	0.2 U	0.5 U	160	3 U	0.1 U	0.5 U	60	1 U	32.3
Deer (Liver)	--	8	20	0.2 U	0.5 U	2400	3 U	0.1 U	0.5 U	140	1 U	51.8

[a]Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-41.
[c]All concentrations in milligrams per kilogram (ppm).
[d]U - Indicates compound was not detected.
[e]J - Indicates estimated level.

TABLE 4-47

RADIONUCLIDE CONCENTRATIONS IN MAMMAL TISSUE SAMPLED NEAR OPERABLE UNIT 1 FROM THE FEMP[a]

			Radionuclide Type and Concentrations (pCi/g Dry Weight)						
Sample	Type	Site[b]	Cs-137	Sr-90	Tc-99	U-234	U-235, U-236	U-238	Total Isotopic Uranium[c]
Opossum	Muscle[d]	Paddys Run Railroad Bridge	<0.3	<0.5	<1.0	<0.6	<0.6	<0.6	e
Small mammal[f] (Composite)	Carcasses	Pit 5	<0.2	<0.1	g	<0.6	<0.6	<0.6	e
Small mammal[f] (Composite)	Organs	Pit 5	<1.1	<2.5	g	8.3	1.1	8.6	18.0
Deer[d]	Kidney		<0.2	<0.5	<0.9	<0.6	0.6	<0.6	0.6
Deer[d]	Liver		<0.2	<0.5	<0.9	<0.6	<0.6	<0.6	e

[a]Source - ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-41.
[c]Total uranium in milligrams per kilogram (ppm).
[d]1988 sample.
[e]< - Less than stated detection limit.
[f]Composite small samples of deer mouse and short-tailed shrew.
[g]Technetium-99 analyzed for 1988 samples only.

4783

TABLE 4-48

RADIONUCLIDE CONCENTRATIONS IN FISH FROM PADDYS RUN AND POND[a]

Sample	Site[b]	Radionuclide Type and Concentrations ([pCi/g] Dry Weight)						Total Isotopic Uranium[c]
		Cs-137	Sr-90	Tc-99	U-234	U-235, U-236	U-238	
Minnow[d]	PR-1	<0.2[e]	<0.5	<1.6	<0.6	<0.6	<0.6	f
Minnow	PR-2	<0.4	<0.5	g	<0.6	<0.6	<0.6	f
White sucker	PR-2	0.20	<0.5	g	--[h]	--[h]	--[h]	f
Creek chub	PR-2	<1.90	<0.7	g	1.0	<0.6	0.7	1.7
Creek chub	PR-3	<0.17	<0.5	g	<0.6	<0.6	<0.6	f
White sucker	PR-3	<0.22	<0.5	g	<0.6	<0.6	<0.6	f
Bluegill	PR-3	<0.19	<0.5	g	<0.6	<0.6	<0.6	f
White sucker	PR-4	<0.41	<0.5	g	0.6	<0.6	<0.6	0.6
Creek chub	PR-4	<0.24	<0.5	g	<0.6	<0.6	<0.6	f
Bluegill	PR-4	<1.23	<3.32	g	2.4	<1.1	1.3	3.7
Bluegill	Pond (9B)	<0.2	<0.5	g	<0.6	<0.6	<0.6	f
White sucker	Pond (9B)	<0.2	<0.5	g	0.7	<0.6	1.0	1.7
Creek chub	Pond (9B)	<0.2	<0.5	g	<0.6	<0.6	<0.6	f

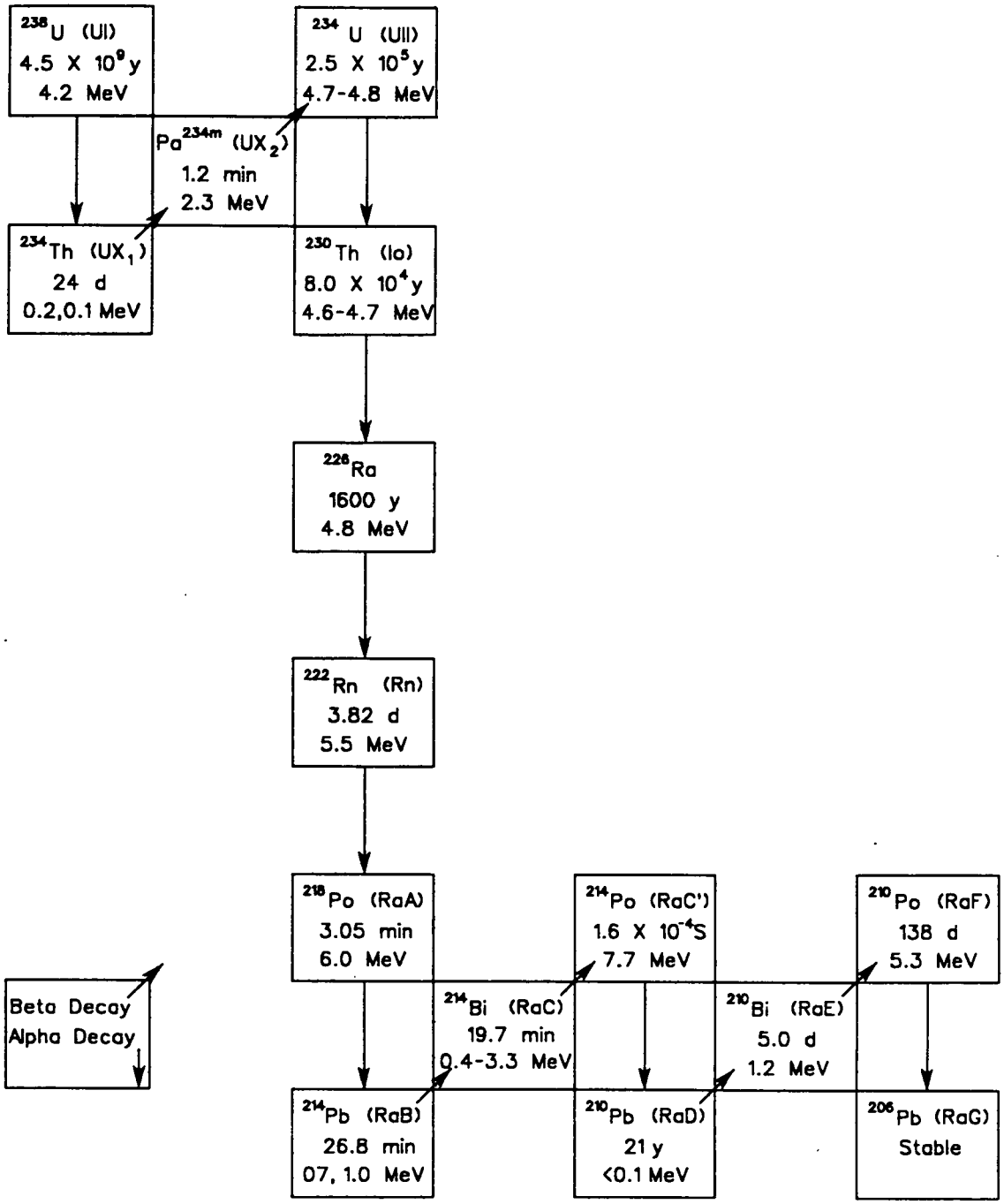
[a]Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-41.
[c]Total uranium in milligrams per kilogram.
[d]1988 composite sample.
[e]< = Less than stated detection limit.
[f]No isotopes of uranium detected.
[g]Technetium-99 analyzed for 1988 samples only.
[h]Lost in analysis.

TABLE 4-49

RADIONUCLIDE CONCENTRATIONS IN BENTHIC MACROINVERTEBRATES FROM PADDYS RUN[a]

		Radionuclide Type and Concentration ([pCi/g] Dry Weight)						
Sample	Site[b]	Cs-137	Sr-90	Tc-99	U-234	U-235, U-236	U-238	Total Isotopic Uranium[c]
Benthos composite	PR-1[d]	<0.2[e]	<0.5	1.6	<0.6	<0.6	<0.6	f
Benthos composite	PR-2	<2.0	<3.7	g	3.6	<1.5	2.8	6.4
Crayfish	PR-2	<1.94	<1.2	g	3.5	<0.9	0.9	4.4
Crayfish	PR-3	<4.00	<2.6	g	3.6	<1.1	1.5	5.1
Crayfish	PR-4	<0.24	<1.8	g	1.5	<0.6	<0.6	1.5

[a]Source ASI/IT 1990, "Biological Sampling Analysis and Resources Report, Final."
[b]See Figure 4-41.
[c]Total uranium in milligrams per kilogram (ppm).
[d]1988 sample.
[e]< = Less than stated detection limit.
[f]No isotopes of uranium detected.
[g]Technetium-99 analyzed for 1988 samples only.



NOTE:

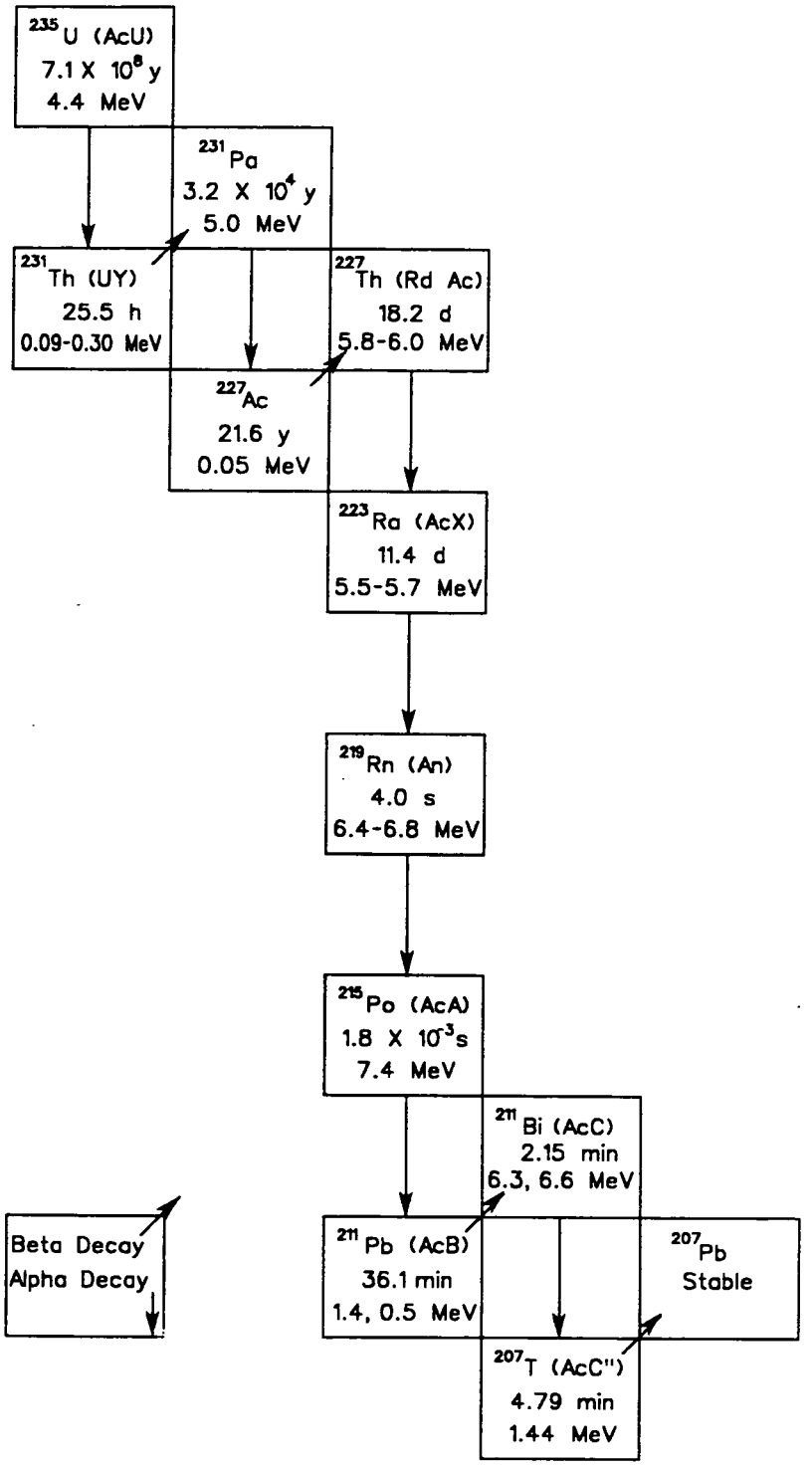
1. SOURCE-N.C.R.P., 1987

LEGEND:

214
Pb (RaB) - MASS SYMBOL
26.8 min - HALF-LIFE
1.0 MeV - DECAY ENERGY

409191-A-369 /OU1 /KNOX /DS
40919369.OU1 06/13/93 GP

FIGURE 4-1. PRINCIPAL DECAY SCHEME OF THE URANIUM SERIES



NOTE:

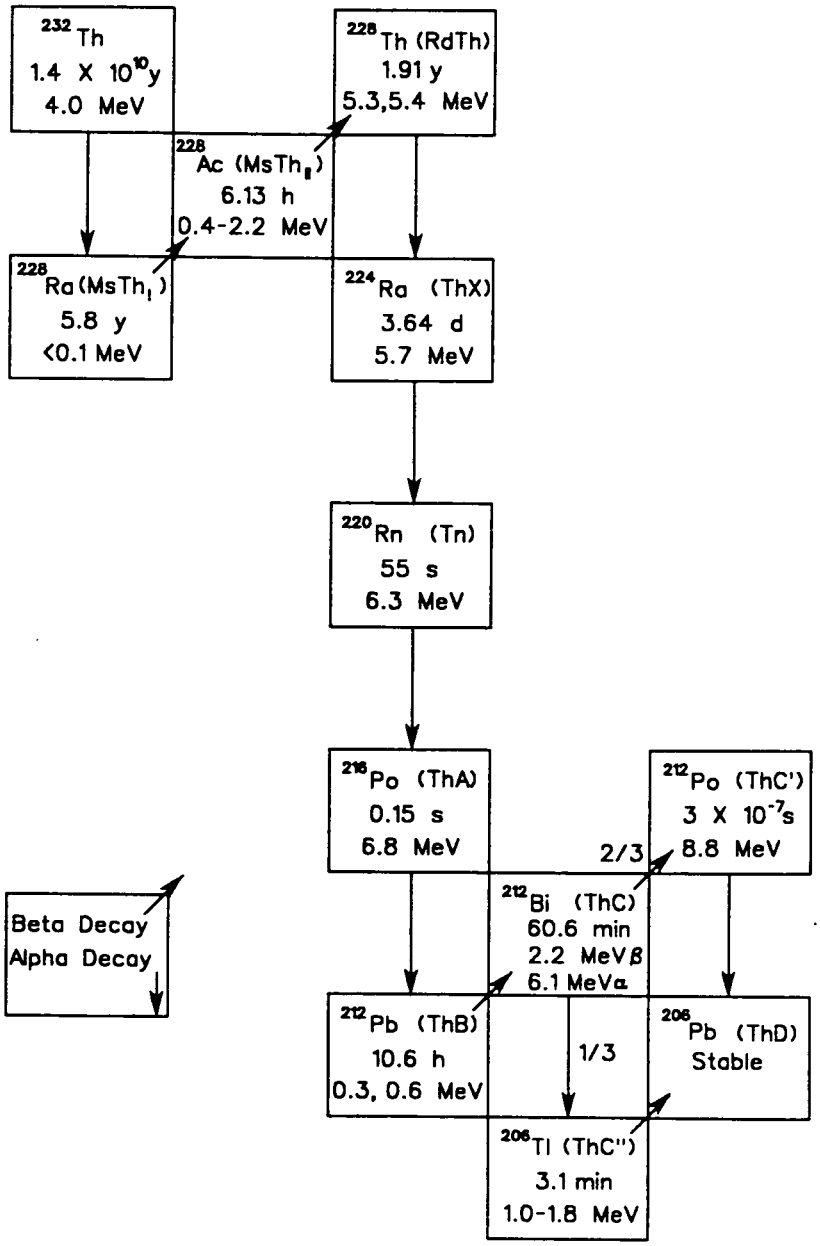
1. SOURCE-N.C.R.P., 1987

LEGEND:

^{211}Pb (AcB) - MASS SYMBOL
36.1 min - HALF-LIFE
1.4 MeV - DECAY ENERGY

400191-A-370 /OU1 /IONOX /DS
40009370.OU1 08/13/93 GP

FIGURE 4-2. PRINCIPAL DECAY SCHEME OF THE ACTINIUM SERIES



NOTE:

1. SOURCE-N.C.R.P., 1987

LEGEND:

212 Pb (ThB) - MASS SYMBOL
10.6 h - HALF-LIFE
0.6 MeV - DECAY ENERGY

930

409191-A-371/OU1/10NOX/DS
409163/71.OU1 09/13/93 GP

FIGURE 4-3. PRINCIPAL DECAY SCHEME OF THE THORIUM SERIES

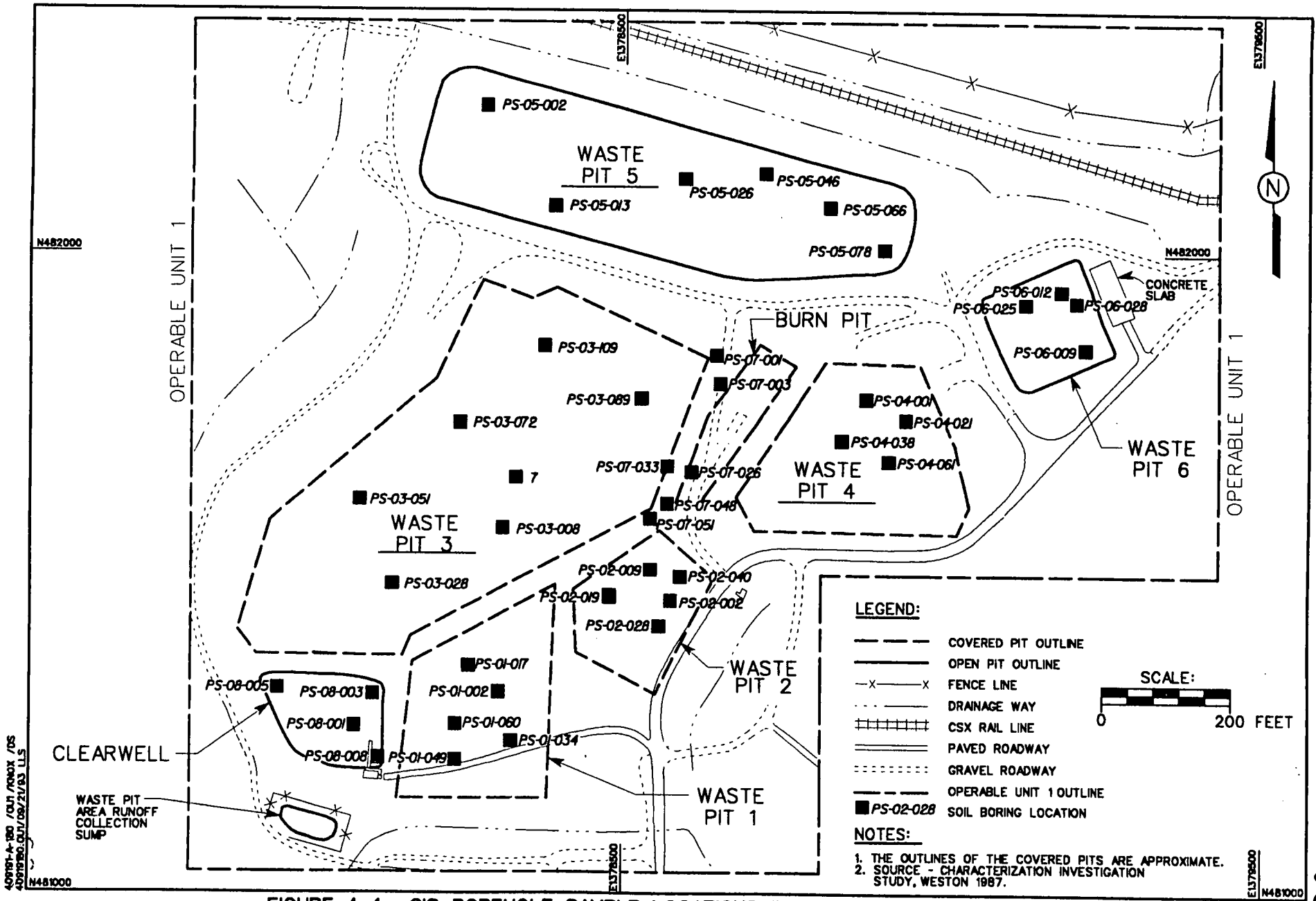


FIGURE 4-4. CIS BOREHOLE SAMPLE LOCATIONS IN THE WASTE STORAGE AREA

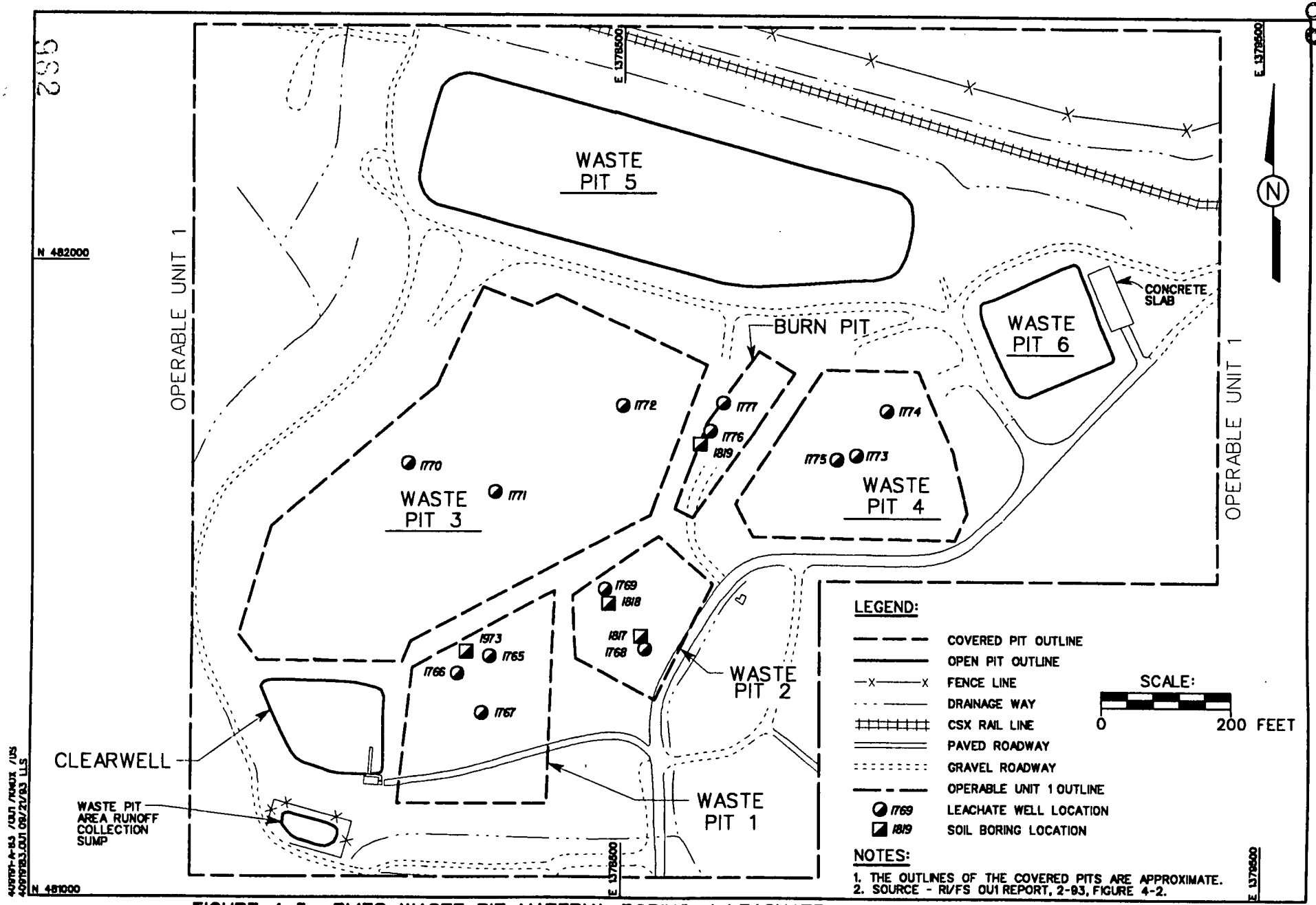


FIGURE 4-5. RI/FS WASTE PIT MATERIAL BORING / LEACHATE MONITORING WELL LOCATIONS

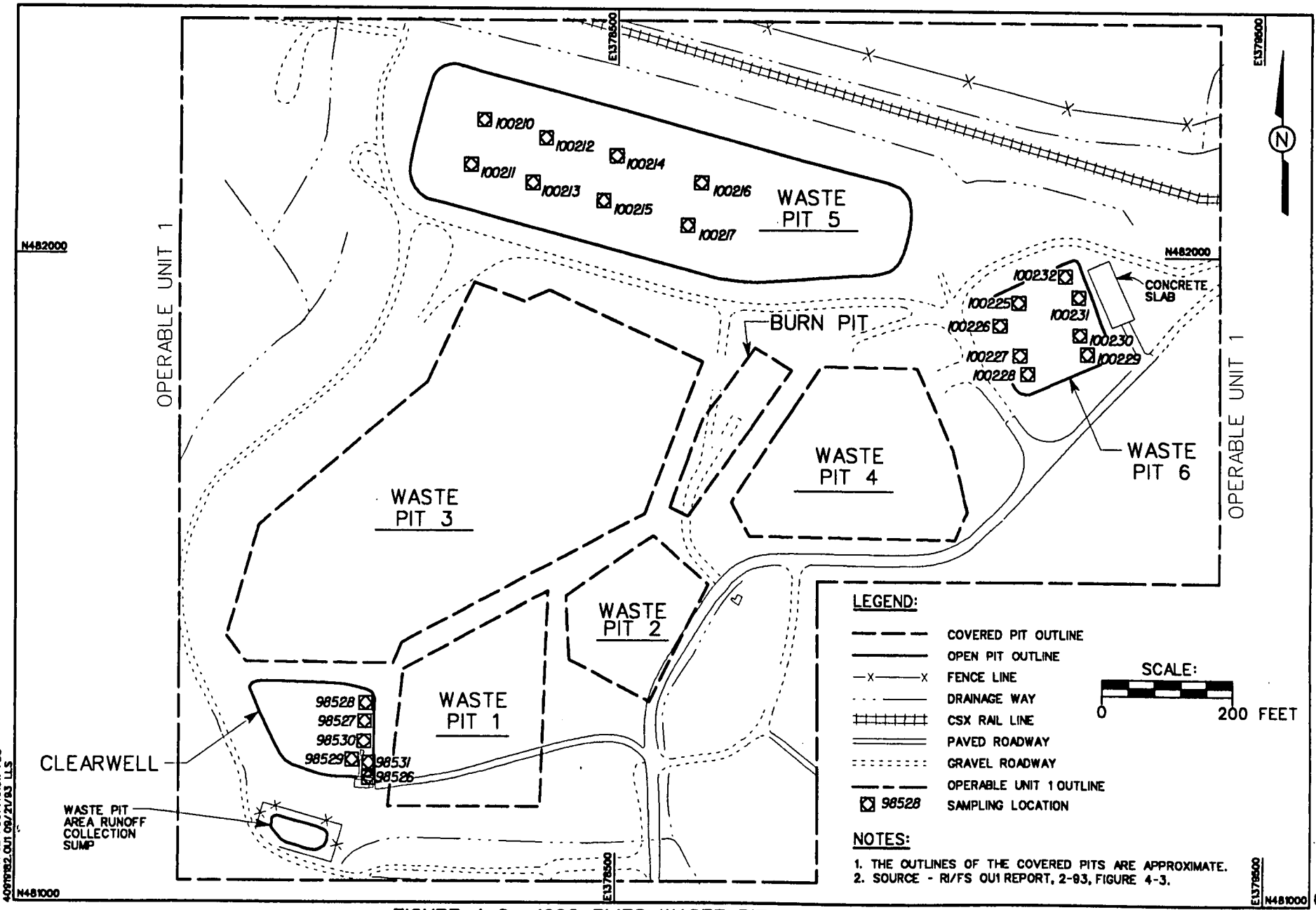


FIGURE 4-6. 1992 RI/FS WASTE PIT SAMPLING LOCATIONS

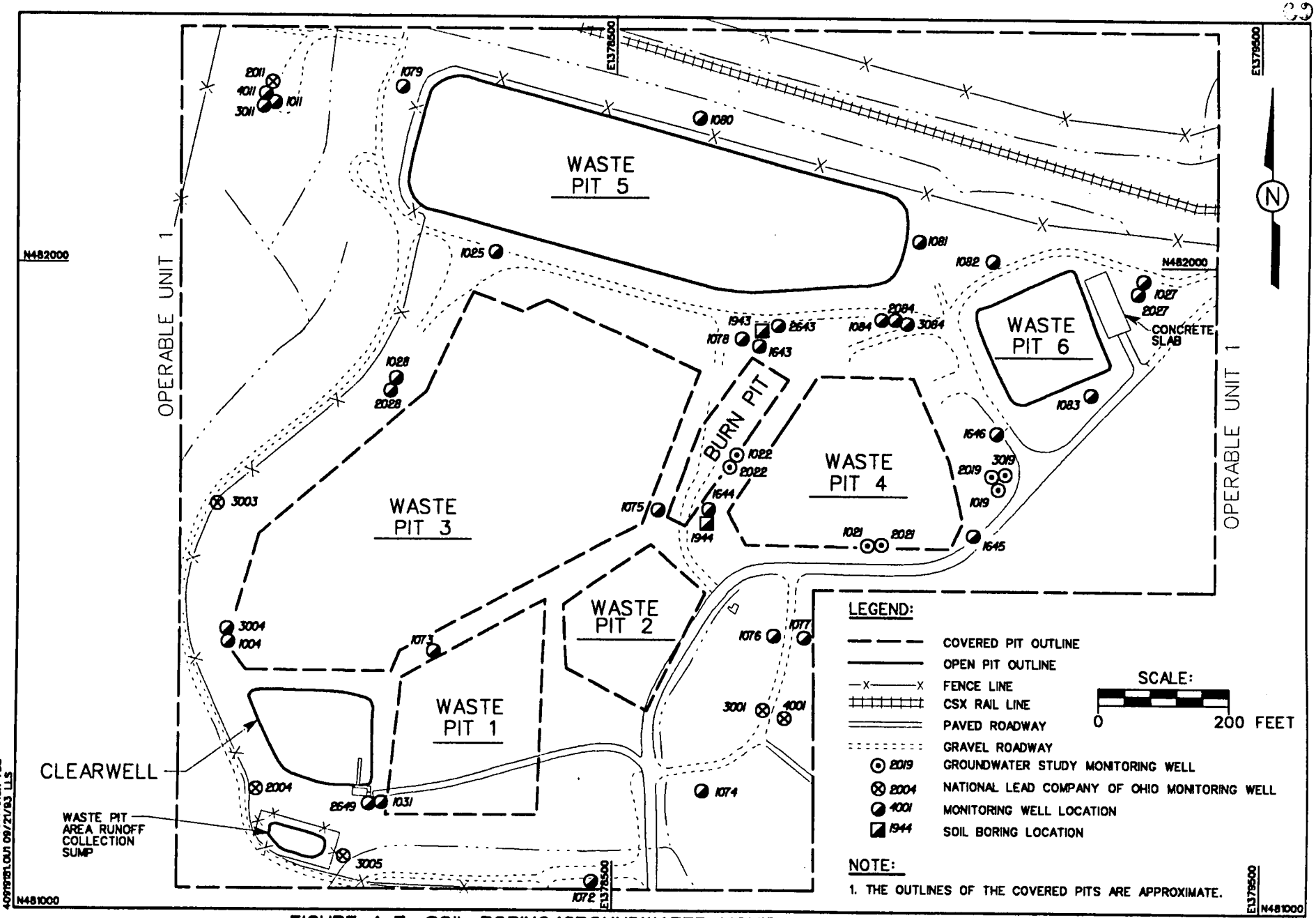


FIGURE 4-7. SOIL BORING/GROUNDWATER MONITORING WELL LOCATIONS

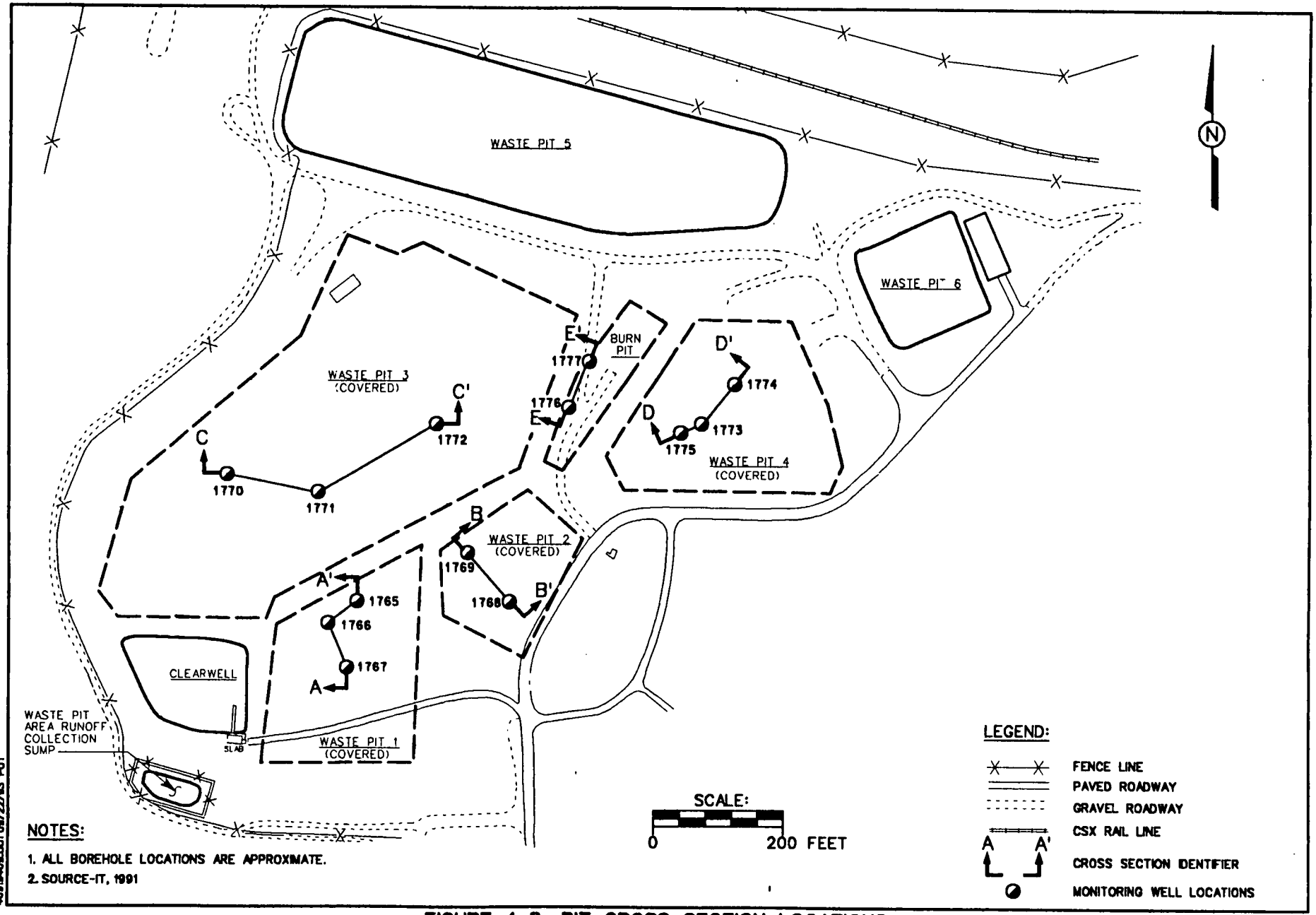
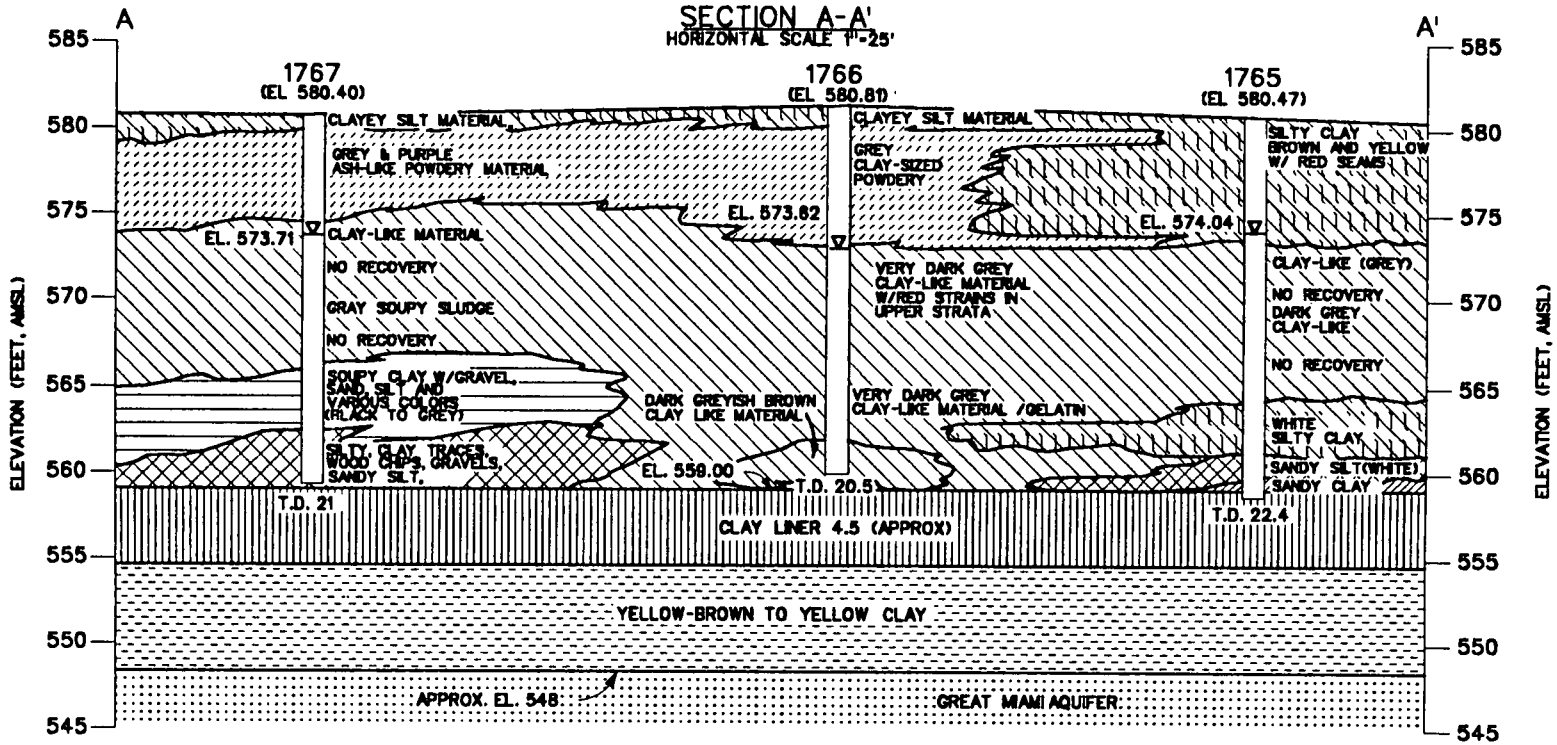


FIGURE 4-8. PIT CROSS SECTION LOCATIONS



WASTE STREAMS	MASS QUANTITY (MT)	VOLUME (M^3)	CHARACTERISTICS
GENERAL SUMP SLUDGE	10,764	7,500	LIME NEUTRALIZED, FILTERED WASTE STREAMS. GRAY TO WHITE LIQUID CONTAINING 2.5-10X SOLIDS (MOSTLY LIME). PASTEY MATERIAL FOLLOWING SOLIDS SEPARATION.
TRAILER CAKE	18,401	13,000	WHITE TO GRAY GRANULAR-LIKE SAND. PARTICLE SIZE: 100X < 0.03 INCH AND 90X <50 MICRONS. SCREENED MAG FLUORIDE BEFORE DEPOSITED INTO PITS.
DEPELTED MAGNESIUM FLOURIDE SLAG	6,783	4,700	WHITE TO BLACK, DEPENDANT UPON THE OXIDATION STATE AND QUANTITY OF URANIUM ASSOCIATED WITH IT. GRANULAR, FROM 0.03 INCH TO 1 INCH IN GRAIN SIZE.
DEPLETED RESIDUES	2,163	1,500	INCLUDED RESIDUES FROM DEPLETED PROCESS WASTES. VARYING COLORS: LIGHT BROWN TO DARK GREY. TEXTURE DEPENDANT UPON DEPLETED WASTE STREAM.

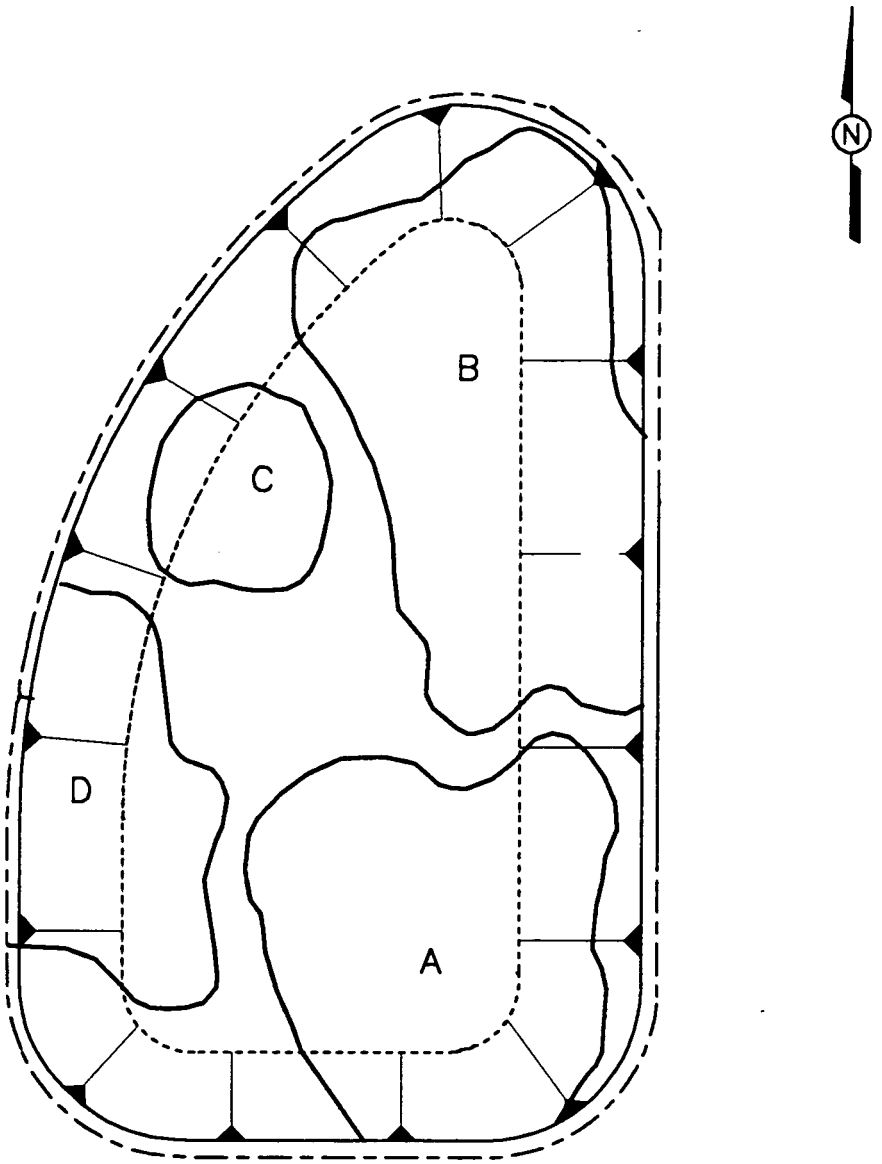
NOTES:

1. PERIOD OF OPERATION 1952-1959.
2. SCATTERED PATTERNS THROUGH BORINGS OF GREY, PURPLE, YELLOW, AND WHITE MATERIAL, MOSTLY CLAY-LIKE WITH SILT AND SAND SEAMS.
3. EM READINGS ACROSS THE SOUTHERN PORTION OF THE PIT INDICATE THE PRESENCE OF HIGHLY CONDUCTIVE MATERIAL, SUCH AS GRAPHITE.
4. PREDOMINANT CONSTITUENTS IN PIT MATERIAL INCLUDE U-238(18,160 PCI/G), U234(8,30 PCI/G), AND TH230(5460 PCI/G). ALL VALUES ARE MAXIMUM.
5. PRINCIPAL ORGANICS ARE AROCLOR 1254(10 PPM) IN PIT MATERIAL AND AROCLOR 1284(10PPM), MAXIMUM VALUES. PCB'S WERE USED AT THE PLANT IN HYDRAULIC FLUIDS USED IN HEAVY EQUIPMENT. RECORDS OF DISPOSAL IN PIT WERE ARE UNAVAILABLE.
6. SEE TABLE 4-1, TABLE 1.1, AND SECTION 1-2.2.1 FOR DETAILED DISCUSSION OF WASTE STREAMS IN PIT 1.

WASTE STREAM VOLUMES AND CALCULATIONS ARE BASED ON MATERIALS CONTROL AND ACCOUNTING (MC&A) PLANT RECORDS, CRU3 WORK PLAN ADDENDUM, AND INTERVIEWS WITH KNOWLEDGEABLE PLANT PERSONNEL.

FIGURE 4-9. CONCEPTUAL CROSS SECTION OF WASTE PIT 1 CONTENTS

4091B1-394/OUT /DNOX: /DS
4091B394 10/01/93/GP



ANOMALY	MAGNETICS	EM31 HORIZONTAL	EM31 VERTICAL	GPR
A	X	X	X	X
B	X	X	X	X
C	X			X
D	X			X

X-DENOTES ANOMALOUS MEASUREMENTS

FIGURE 4-10. GEOPHYSICAL ANOMALY MAP OF WASTE PIT ONE

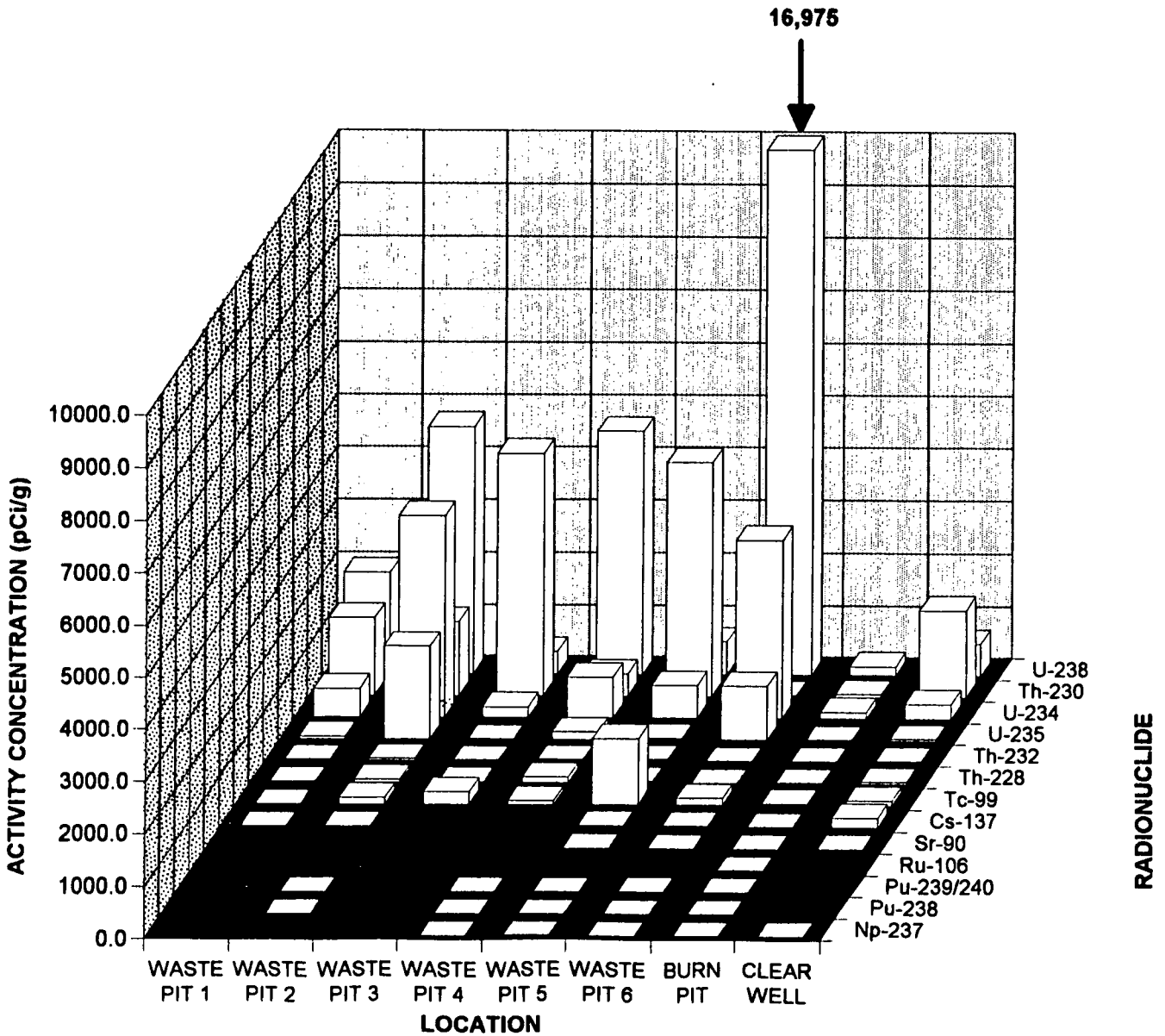


FIGURE 4-11. WASTE PIT MATERIAL - CIS RADIOLOGICAL DATA

4091191-A-369/ OU1/ RNOV/ DS
4091192/60 XLS/ 09-20-43/ GP

4783

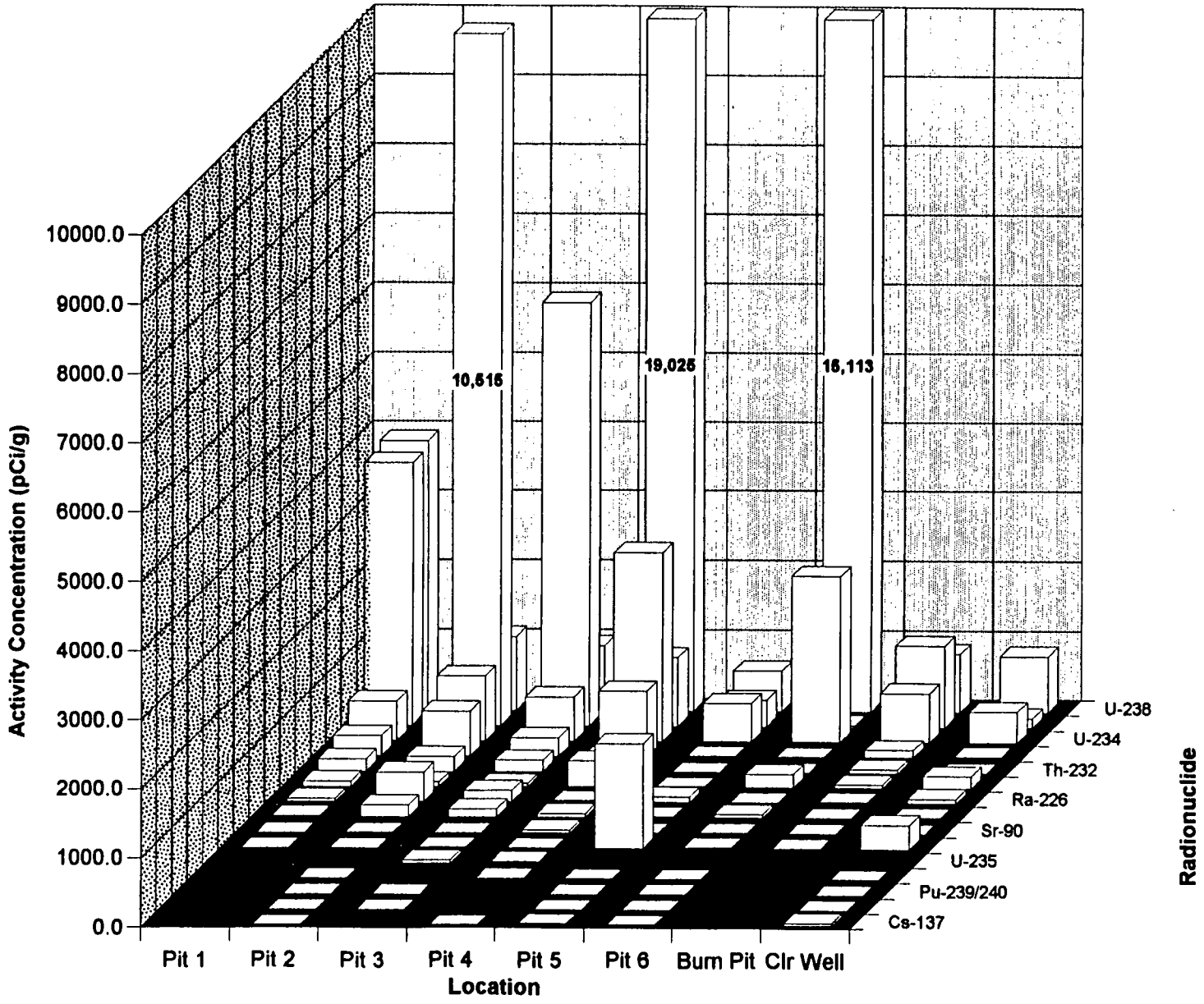


FIGURE 4-12. WASTE PIT MATERIAL - RI/FS RADIOLOGICAL DATA

4283

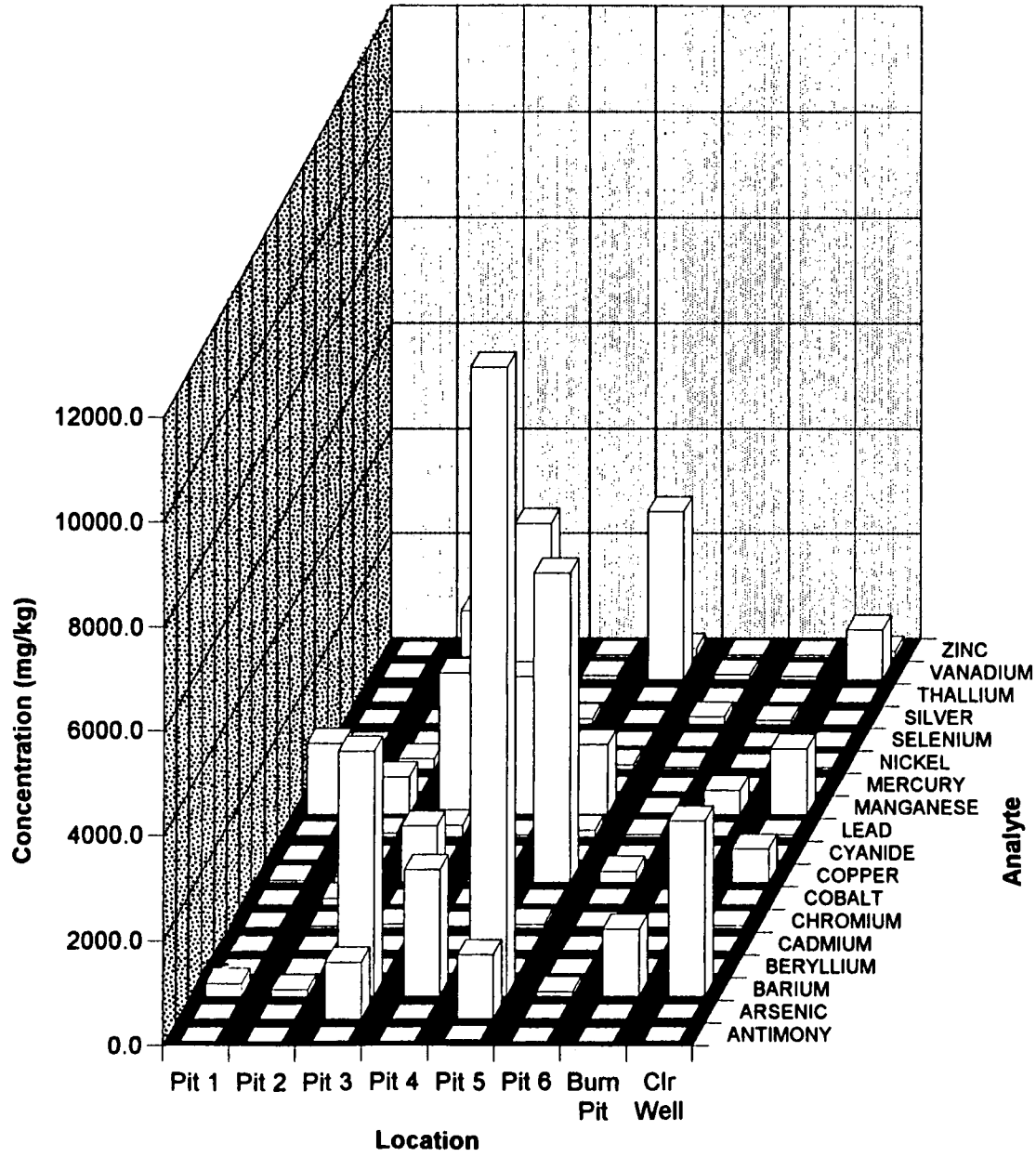


FIGURE 4-13. WASTE PIT MATERIAL - CIS INORGANIC DATA

409191-A-362/ OU1/ KNOX/ DS
40919362.XLS/ 09/26/03/ GP

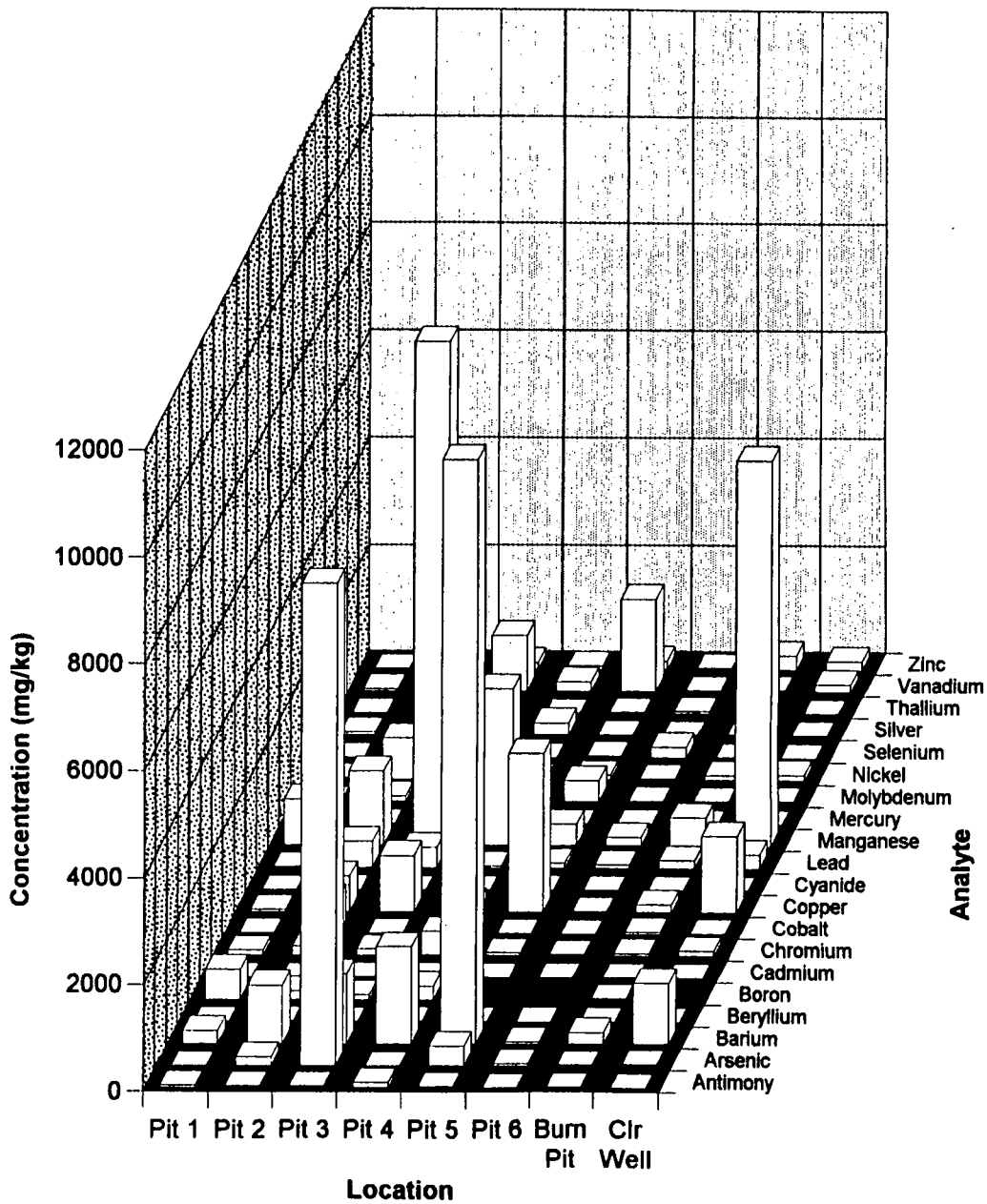
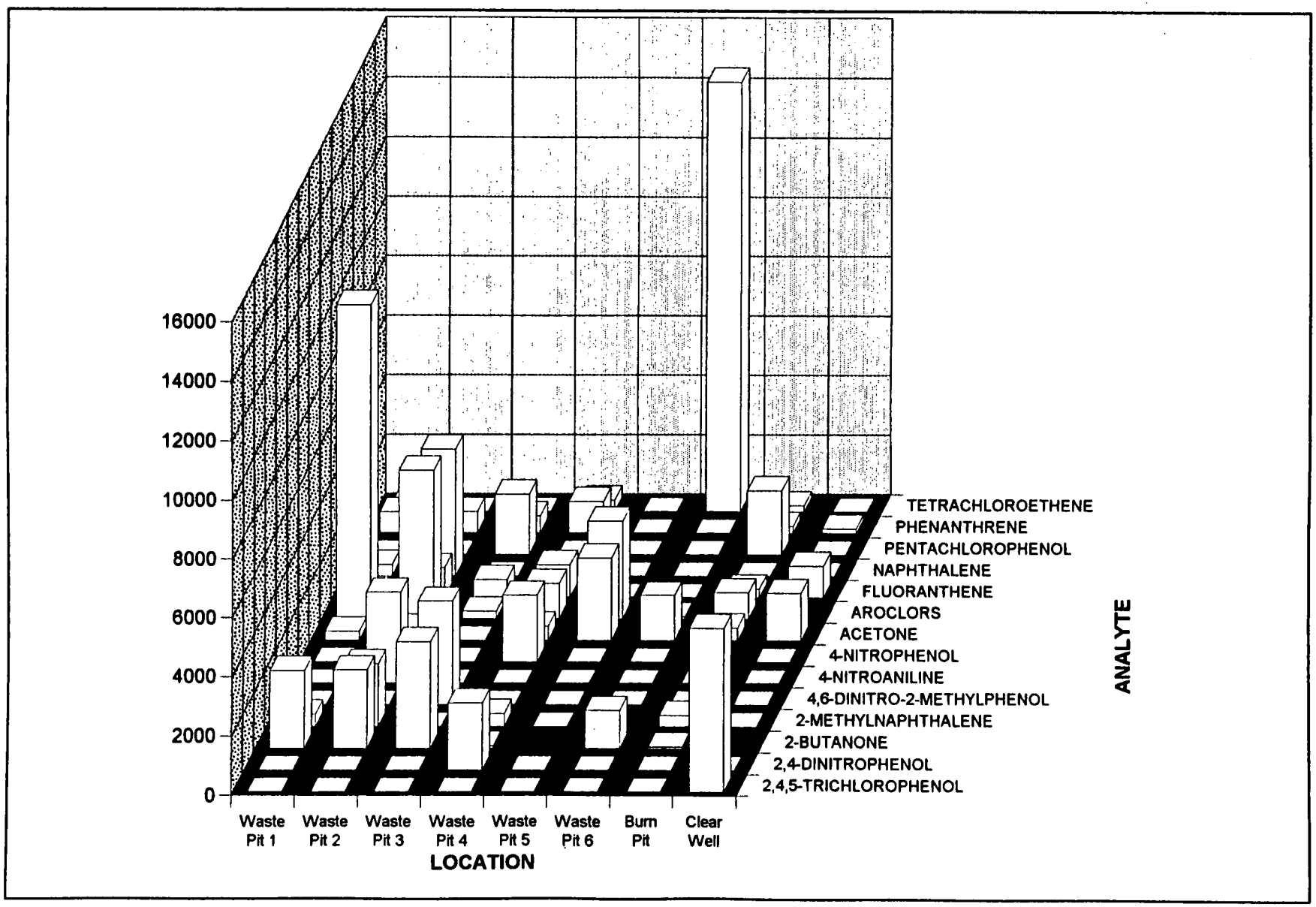


FIGURE 4-14. WASTE PIT MATERIAL - RI/FS INORGANIC DATA

991

4283

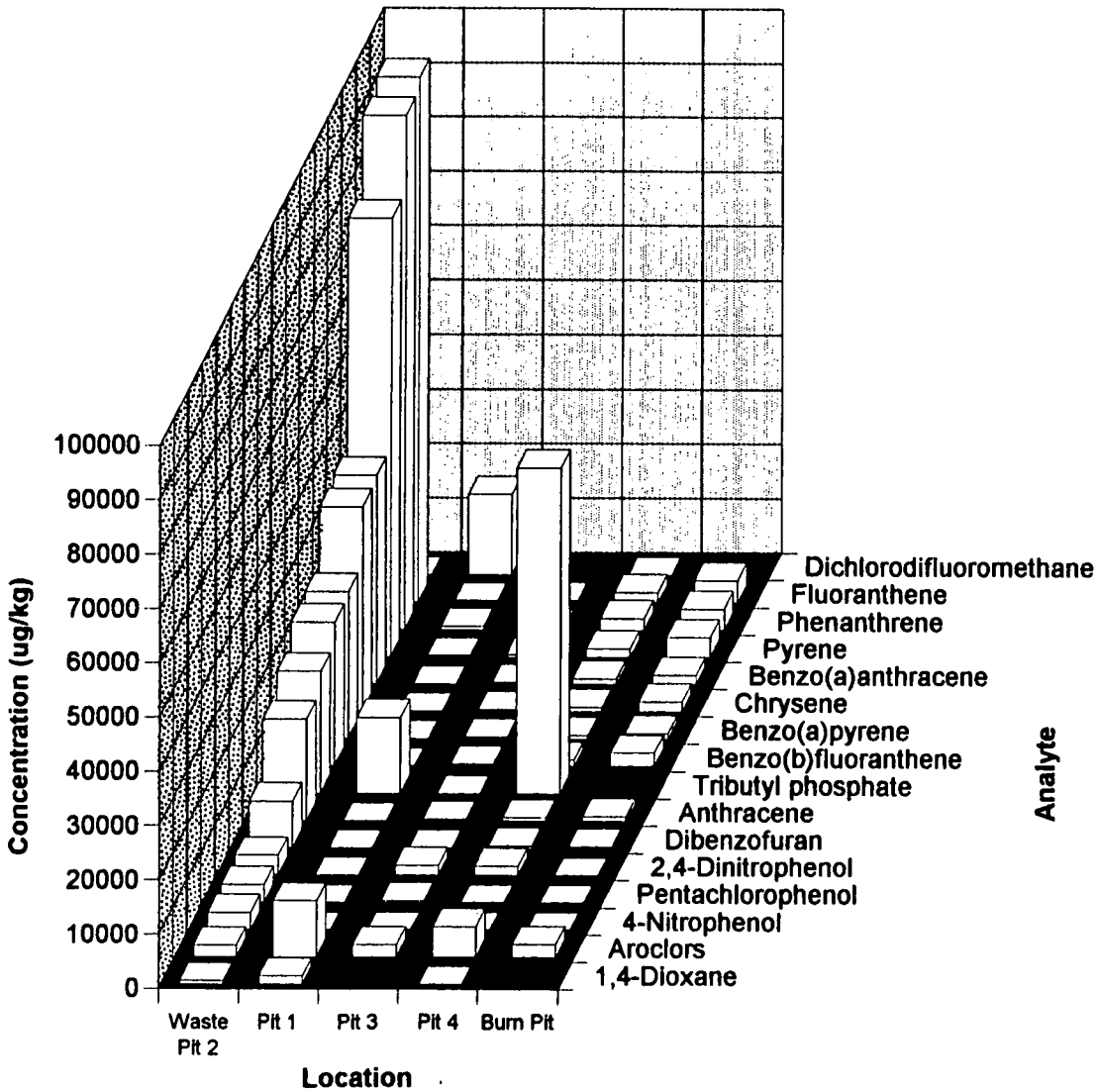
GP 03-26-99 TX/S 03/03 XLS
OU1/ KNOX/ DS
4-641



409191-4-364/ OU11/ KNOX/ DS
40919364.XLS/ 09-29-93/ GP

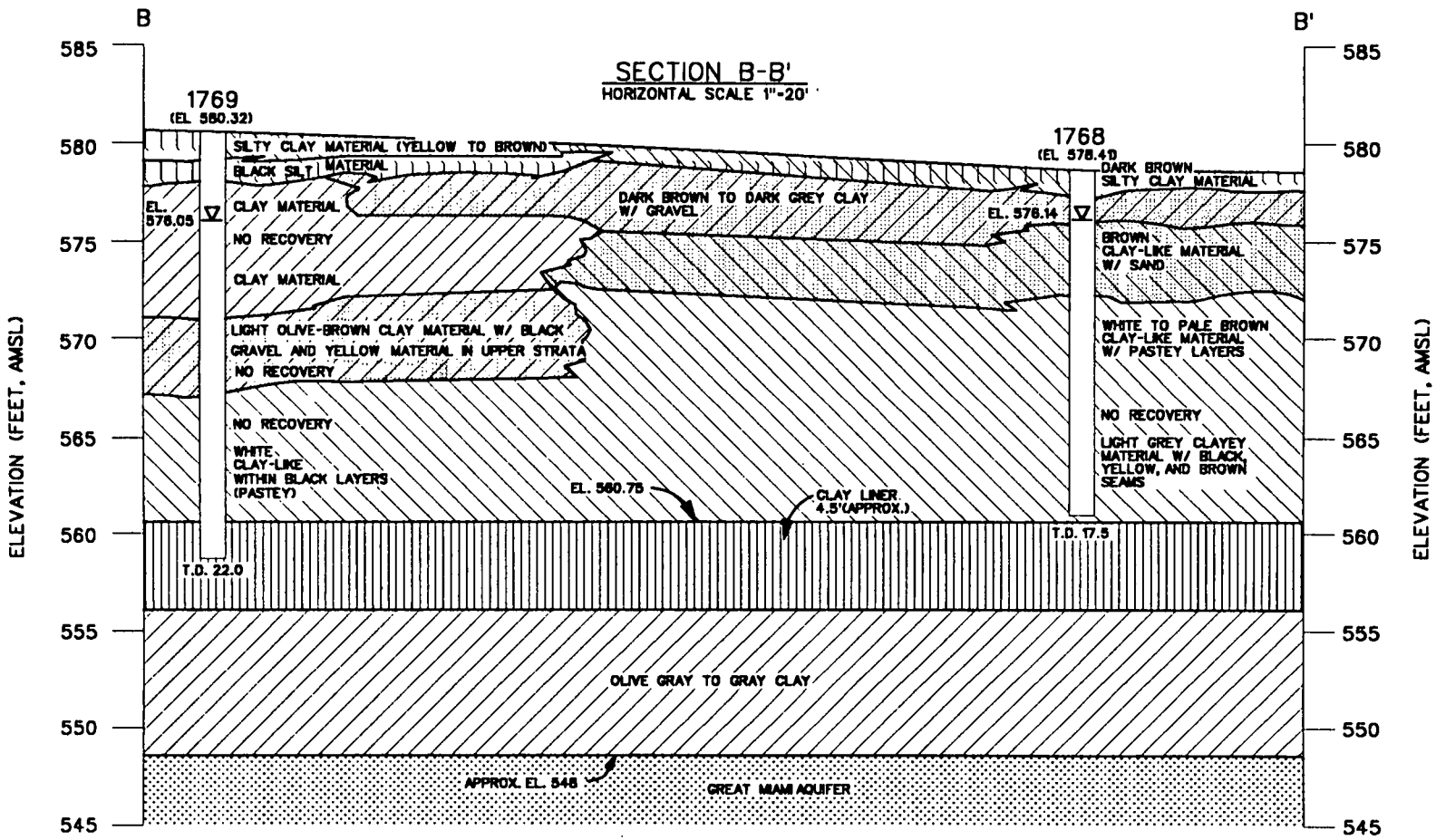
FIGURE 4-15. WASTE PIT MATERIAL - CIS ORGANIC DATA

4783
582



409191-4-365/ OU11/ 10NOV/ DS
40918365.XLS/ 09-29-93/ GP

FIGURE 4-16. WASTE PIT MATERIAL - RI/FS ORGANIC DATA



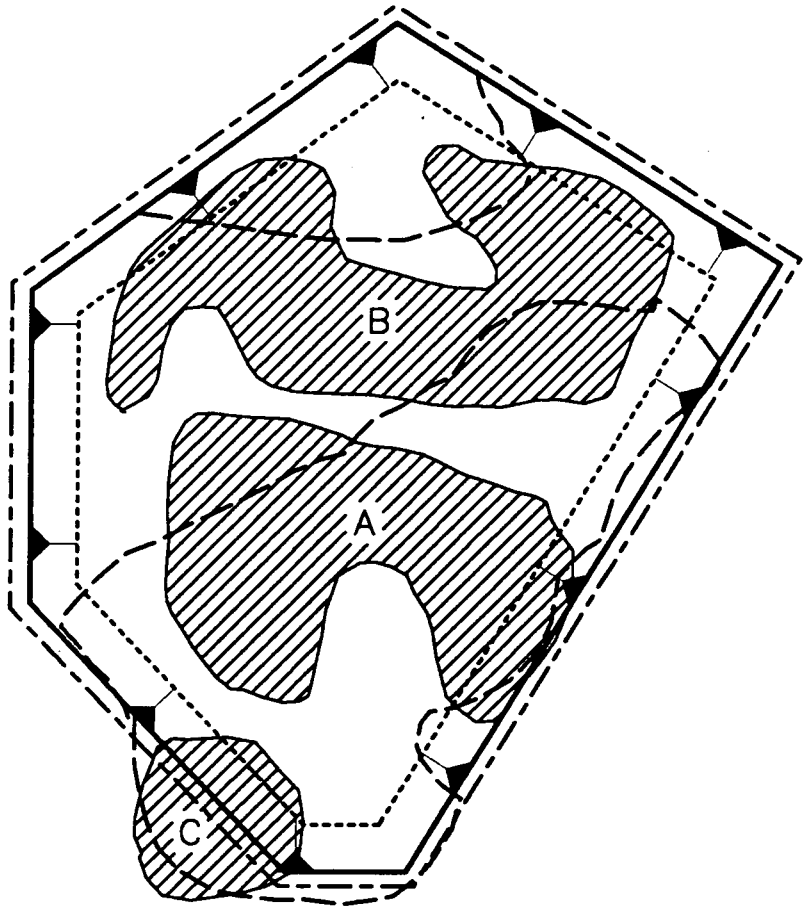
WASTE STREAMS	MASS QUANTITY (MT)	VOLUME (M^3)	CHARACTERISTICS
RAFFINATE	433	500	RED, BROWN, ORANGE, YELLOW, OR BLUE (MOSTLY ANY COLOR DEPENDING ON THE PRIMARY IMPURITIES ASSOCIATED WITH THE ORE CONCENTRATE. PASTY CONSISTENCY WITH HIGH PLASTICITY.
GENERAL SUMP SLUDGE	6,578	4,600	LIME NEUTRALIZED, FILTERED WASTE STREAMS. GRAY TO WHITE LIQUID CONTAINING 2.5-10X SOLIDS (MOSTLY LIME). PASTEY MATERIAL FOLLOWING SOLIDS SEPARATION.
TRAILER CAKE	14,208	9,900	WHITE TO GRAY GRANULAR LIKE SAND. PARTICLE SIZE: 100X < 0.03 INCH AND 90X <50 MICRONS. SCREENED MAG FLUORIDE BE ORE DEPOSITED INTO PITS.

NOTES:

1. PERIOD OF OPERATION 1957-1984.
2. MATERIAL INCLUDES YELLOWISH-BROWN MATERIAL THAT VARIES FROM PALE TO OLIVE-BROWN. WHITE HETEROGENEOUS MIXTURES OF CLAY ARE ALSO PRESENT. PIECES OF CONCRETE WERE ENCOUNTERED IN SOME BORINGS.
3. PREDOMINANT RADIOLOGICAL CONSTITUENTS IN PIT MATERIAL ARE U238(U234, TH230, AND Ra226, ALL PRESENT IN URANIUM DECAY SERIES.
4. BLACK SEAMS ENCOUNTERED MAY BE GRAPHITE. YELLOWISH MIXTURES MAY BE YELLOWCAKE.
5. MAJOR ORGANICS IN PIT MATERIAL INCLUDE DIBENZOFURANS (21 PPM), AND AROCLOR 1254(10PPM), ALL VALUES ARE MAXIMUM.
6. SEE TABLE 4.1, TABLE 1.1, AND SECTION 1.2-2.2 FOR DETAILED DISCUSSION OF WASTE STREAMS IN PIT 2. PAHS ARE ON AVERAGE HIGHER THAN ALL OTHER PITS WITH A MAXIMUM CONCENTRATION OF 280PPM FLOURANTHENE AND PHENANTHRENE. PLANT RECORDS DO NOT INDICATE QUANTITIES OF ORGANICS DISPOSED IN PITS.

WASTE STREAM VOLUMES AND CALCULATIONS ARE BASED ON MATERIALS CONTROL AND ACCOUNTING (MC&A) PLANT RECORDS, CRU3 DRAFT WORK PLAN ADDENDUM (1992), AND INTERVIEWS WITH KNOWLEDGEABLE PLANT PERSONNEL.

FIGURE 4-17. CONCEPTUAL CROSS SECTION OF WASTE PIT 2 CONTENTS



ANOMALY	MAGNETICS	EM31 HORIZONTAL	EM31 VERTICAL	GPR
A	X			X
B	X			
C	X			

LEGEND:

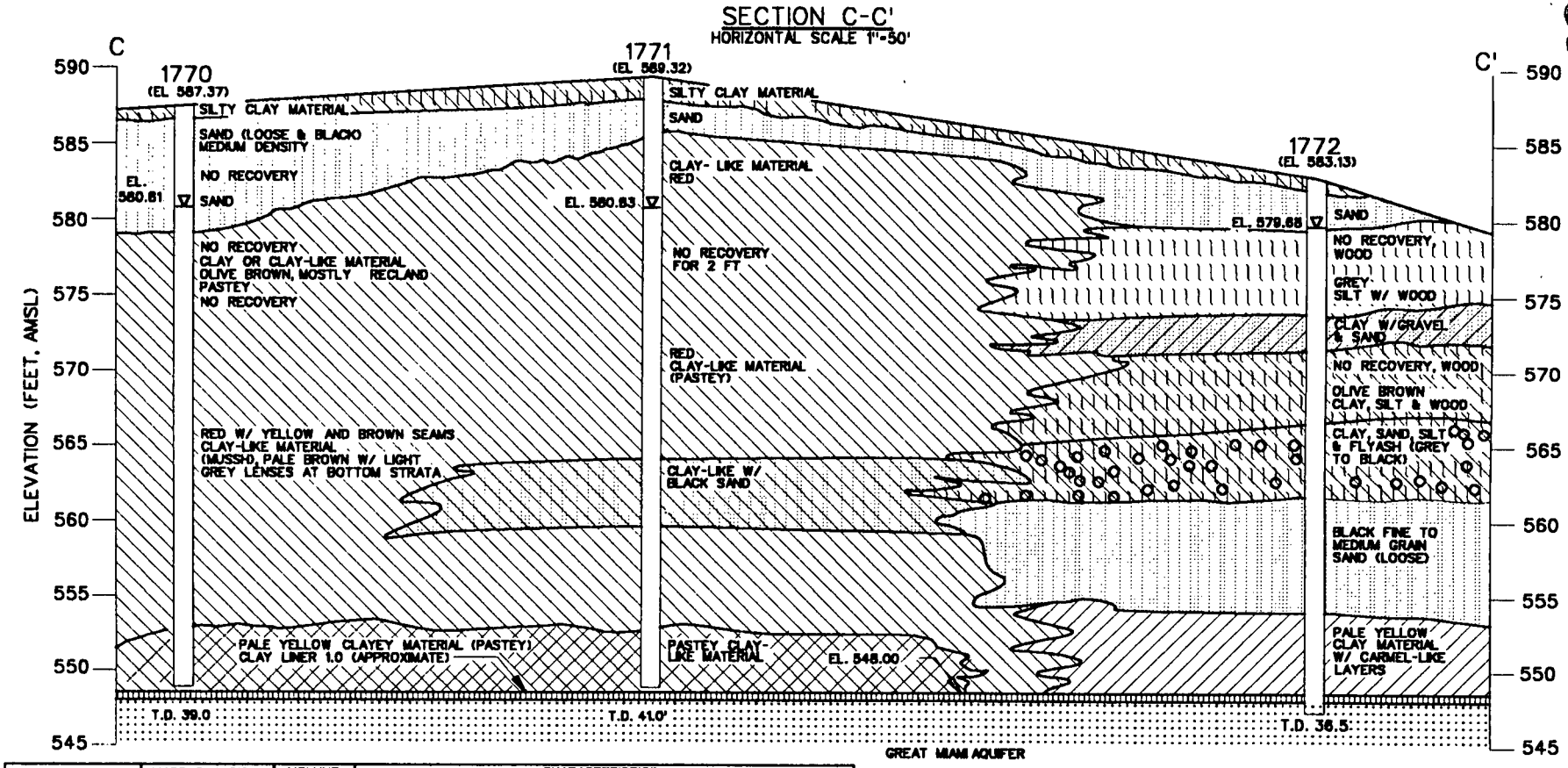
MAGNETIC ANOMALY

ELECTROMAGNETIC ANOMALY

X-DENOTES ANOMALOUS MEASUREMENTS

40919390.0U1 09/22/93/GP
40919-4-3390/ OU7/ 40N07/ DS

FIGURE 4-18. GEOPHYSICAL ANOMALY MAP OF WASTE PIT TWO



WASTE STREAMS	MASS QUANTITY (MT)	VOLUME (M^3)	CHARACTERISTICS
TRAILER CAKE	30,072	20,900	WHITE TO GRAY GRANULAR LIKE SAND. PARTICLE SIZE: 100X < 0.03 INCH AND 90X <50 MICRONS. SCREENED MAG FLUORIDE BEFORE DEPOSITED INTO PITS.
SLAG LEACH FILTER CAKE	12,605	8,700	WHITE TO GRAY PARTICLES SLURRIED TO THE PITS AS A LIQUID. PARTICLE SIZE SIMILAR TO TRAILER CAKE. WAS FILTERED, RESLURRIED AND PUMPED TO THE PIT AS A LIQUID.
NEUTRALIZED RAFFINATE	---	---	RED, BROWN, ORANGE, YELLOW, OR BLUE (MOSTLY ANY COLOR) DEPENDING ON THE PRIMARY IMPURITIES ASSOCIATED WITH THE ORE CONCENTRATE. PASTY CONSISTENCY WITH HIGH PLASTICITY. NEUTRALIZED WITH LIME.
GENERAL SUMP SULDGE	41,720	29,000	LIME NEUTRALIZED, FILTERED WASTE STREAMS. GRAY TO WHITE LIQUID CONTAINING 2.5-10X SOLIDS (MOSTLY LIME). PASTEY MATERIAL FOLLOWING SOLIDS SEPARATION.
WATER TERATMENT SLUDGE	2,669	1,900	WHITE TO GREY. PASTEY.
FLY ASH	---	---	BLACK TO DARK GRAY FINE LIGHT MATERIAL FROM THE BOILER AND ONSITE INCINERATOR. SHOULD CONTAIN HIGH LEVELS OF DIOXIN AND PAH'S.

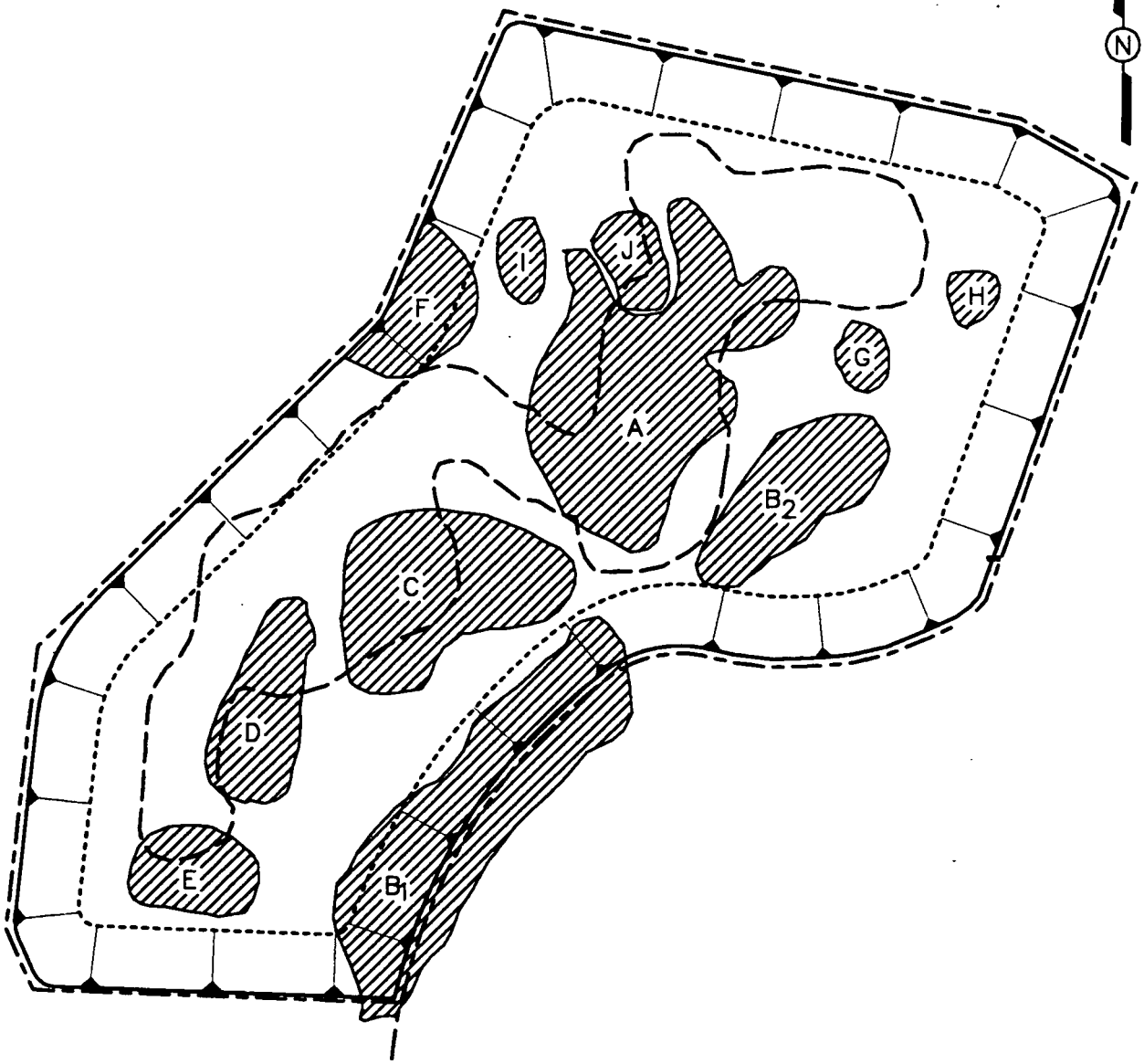
NOTES:

1. PERIOD OF OPERATION 1958-1977
2. EXTREME VARIATION AND SCATTERED PATTERNS OF RED CLAY INTERSPERSED WITH SEAMS OF YELLOW, BROWN, GREY, AND BLACK SEAMS, WITH HIGH (PASTEY, MUSHY)PLASTICITY. WOOD ALSO ENCOUNTERED IN BORING 1772. FLYASH ALSO ENCOUNTERED IN BORINGS 1772.
3. PREDOMINANT RADIOLOGICAL CONSTITUENTS ARE U238 (17,900 PCI/G).
4. AROCLOR 1248/1254 CONCENTRATIONS IN PIT MATERIAL ARE 4.8 AND 3.4PPM, RESPECTIVELY. ALL VALUES ARE MAXIMUM. DIOXINS ARE MAXIMUM IN PIT MATERIAL AT 19.4PPB AND PAH'S, ON AVERAGE ARE MAXIMUM AT 1 PPM.
5. PLANT RECORDS DO NO INDICATE QUANTITIES OF ORGANICS DISPOSED IN WASTE PIT 3.
6. SEE TABLE 4-1, TABLE 1-1 AND SECTION 1.2.2.3 FOR DETAILED DISCUSSION OF WASTESTREAMS IN PIT 3.

WASTE STREAM VOLUMES AND CALCULATIONS ARE BASED ON MATERIALS CONTROL AND ACCOUNTING (MC&A) PLANT RECORDS, CRU3 DRAFT WORK PLAN ADDENDUM (1992), AND INTERVIEWS WITH KNOWLEDGEABLE PLANT PERSONNEL.

FIGURE 4-19. CONCEPTUAL CROSS SECTION OF WASTE PIT 3 CONTENTS

400191-398 /OU1 /OU1X /DS
400193398.OU1 09/30/93/GP



ANOMALY	MAGNETICS	EM31 HORIZONTAL	EM31 VERTICAL	GPR
A	X			X
B_1	X			
B_2	X			
C	X			X
D	X			
E	X			
F	X			
G	X			
H	X			
I	X			
J	X			

X-DENOTES ANOMALOUS MEASUREMENTS

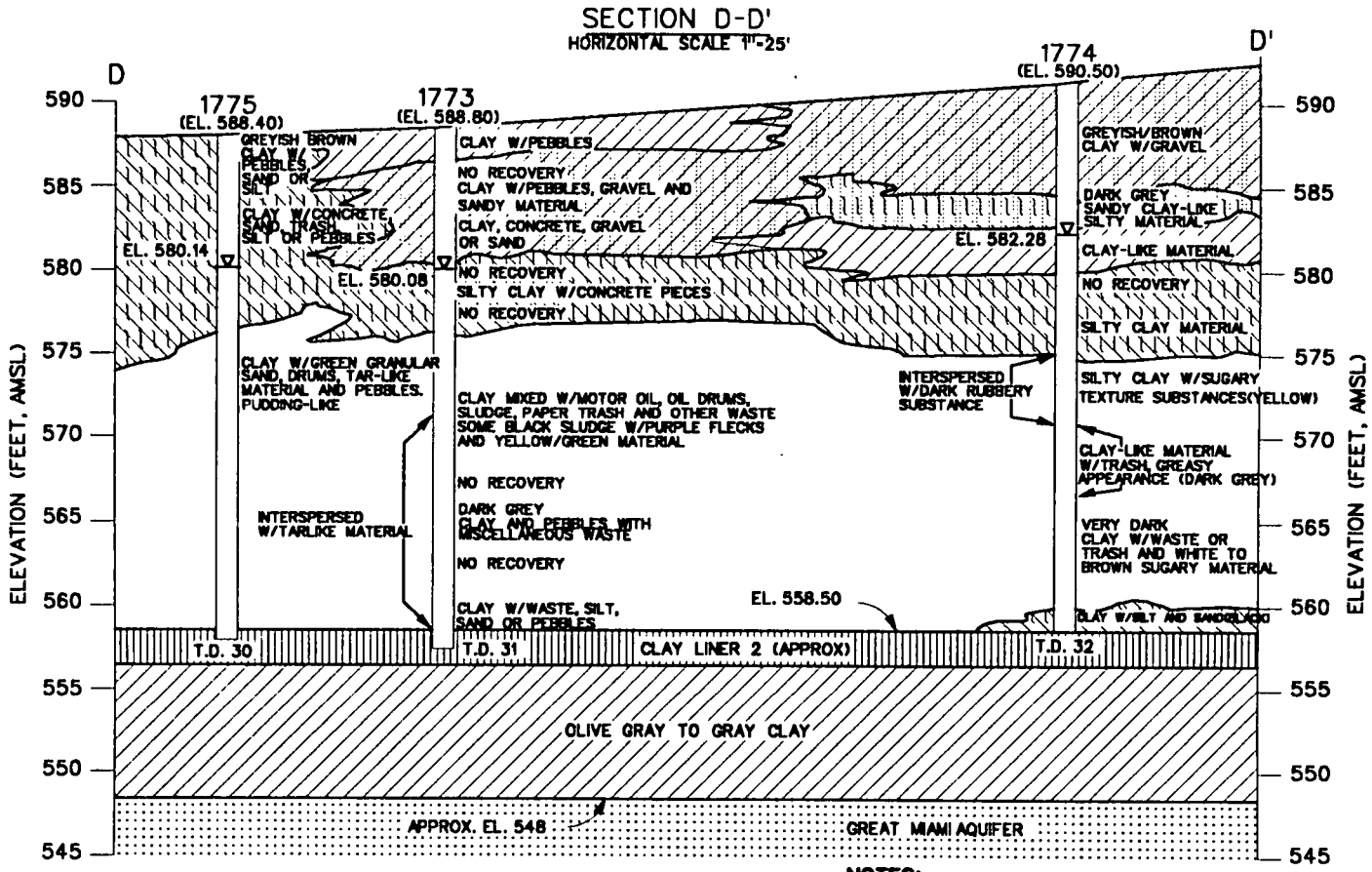
LEGEND:

MAGNETIC ANOMALY

ELECTROMAGNETIC ANOMALY

40918139L.OUT /OUU/KNOX/DS
40901-A-3/01/09/22/93 LLS

FIGURE 4-20. GEOPHYSICAL ANOMALY MAP OF WASTE PIT THREE



NOTES:

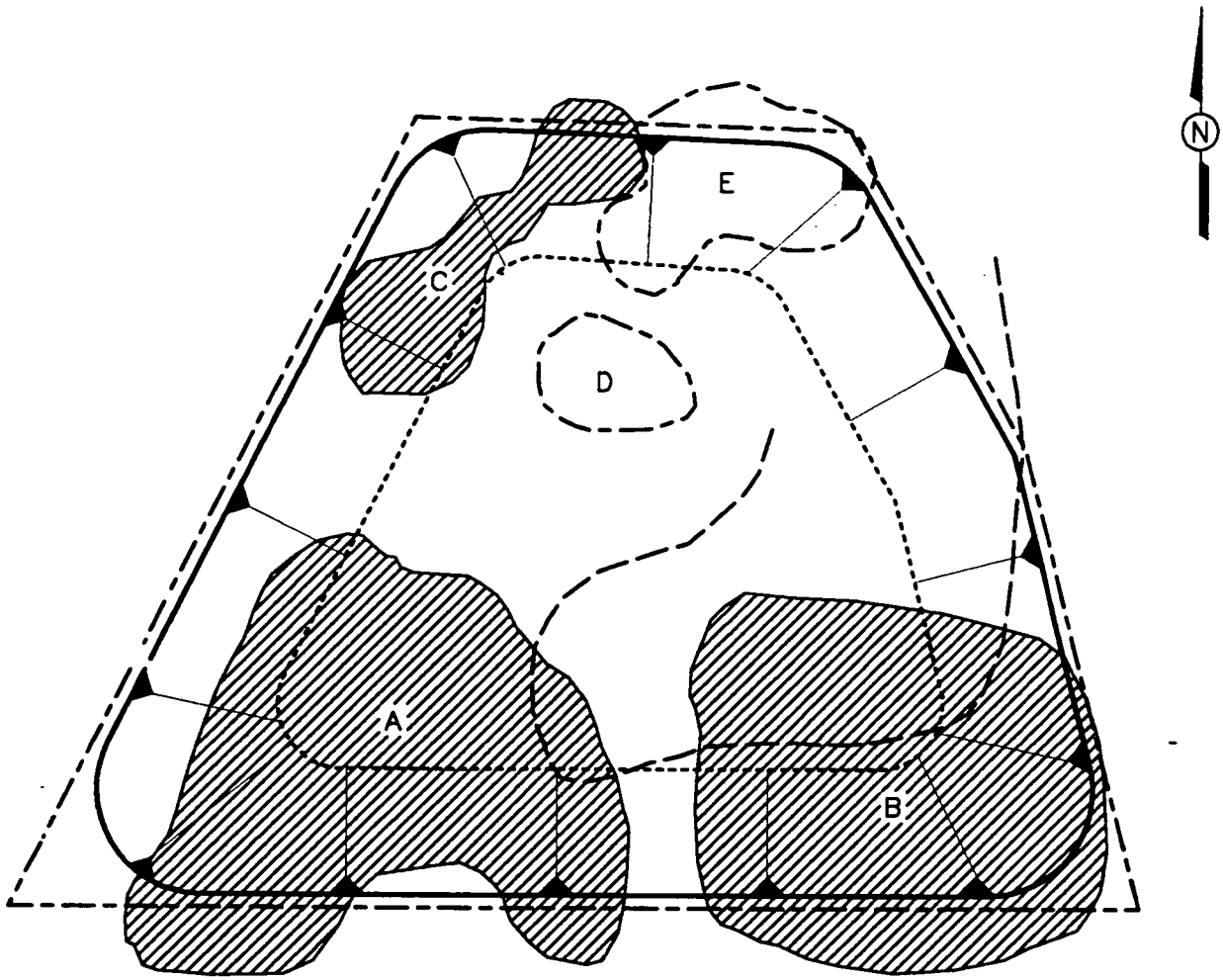
1. PERIOD OF OPERATION 1960-1968
2. SCATTERED PATTERNS OF CLAY AND SILTY MATERIAL WITH POCKETS OF SAND AND GRAVEL. TARRY SUBSTANCE ENCOUNTERED IN BORING 1773 BUT NOT REPEATED IN OTHER BORINGS.
3. PIT APPEARS TO HAVE BEEN A DISPOSAL AREA FOR GENERAL PLANT TRASH IN ADDITION TO MAGNESIUM FLOURIDE. MATERIALS RANGE IN COLOR AND TEXTURE FROM BLACK TAR TO WHITE AND SUGARY WITH YELLOW LENSES INTERSPERSED.
4. PREDOMINANT RADIOLOGICAL CONSTITUENTS ARE U238(41,900 PCI/G) AND TH228(2489 PCI/G), ALL VALUES ARE MAXIMUM.
5. PREDOMINANT ORGANIC CONSTITUENTS ARE AROCLOR 1248 AND 1254 (7500 AND 6900 PPB, RESPECTIVELY), ALL VALUES ARE MAXIMUM.
6. PAH'S ARE SCATTERED, WITH MAXIMUM VALUES AT 12PPM (PHENANTHRENE). TRIBUTYL/PHOSPHATE IS ALSO PRESENT AT 72 PPM, (MAX VALUE) AND PROBABLY PRESENT FROM THE DISPOSAL OF CONTAMINATED OIL STORAGE DRUMS, ALTHOUGH NO RECORDS EXIST TO VERIFY THIS ASSUMPTION.
7. PLANT RECORDS DO NO INDICATE QUANTITIES OF ORGANICS DISPOSED IN WASTE PIT 4.
8. CONSULT TABLE 4.1, TABLE 1-1, AND SECTION 1.2.2.4 FOR A DETAILED DISCUSSION OF WASTESTREAMS IN PIT 4.

WASTE STREAMS	MASS QUANTITY (MT)	VOLUME (M^3)	CHARACTERISTICS
ASBESTOS	---	---	CRYSTALLINE MATERIAL.
DUST COLLECTOR RESIDUES	---	---	FINE, POWDERY GREY TO BLACK MATERIAL.
DEPLETED GRAPHITE MOLDS	---	---	BLACK CHARCOAL-LIKE POWDERY MATERIAL. MOSTLY FOUND IN PIT 4. GRAPHITE MOLDS WERE DEPOSITED INTO PITS IN PIECES OF UP TO 12 INCHES IN DIAMETER.
DEPLETED MAGNESIUM FLOURIDE SLAG	7,845	5,300	WHITE TO BLACK, DEPENDANT UPON THE OXIDATION STATE AND QUANTITY OF URANIUM ASSOCIATED WITH IT. GRANULAR, FROM 0.03 INCH TO 1 INCH IN GRAIN SIZE.

WASTE STREAM VOLUMES AND CALCULATIONS ARE BASED ON MATERIALS CONTROL AND ACCOUNTING (MC&A) PLANT RECORDS, CRU3 DRAFT WORK PLAN ADDENDUM (1992), AND INTERVIEWS WITH KNOWLEDGEABLE PLANT PERSONNEL.

FIGURE 4-21. CONCEPTUAL CROSS SECTION OF WASTE PIT 4 CONTENTS

409191-397 /OU1 /0-0X /DS
409191397.OU1 09/30/93/JV/GP



ANOMALY	MAGNETICS	EM31 HORIZONTAL	EM31 VERTICAL	GPR
A	X	X	X	X
B	X			
B	X			X
C				X
D				X
E				

LEGEND:

MAGNETIC ANOMALY

ELECTROMAGNETIC ANOMALY

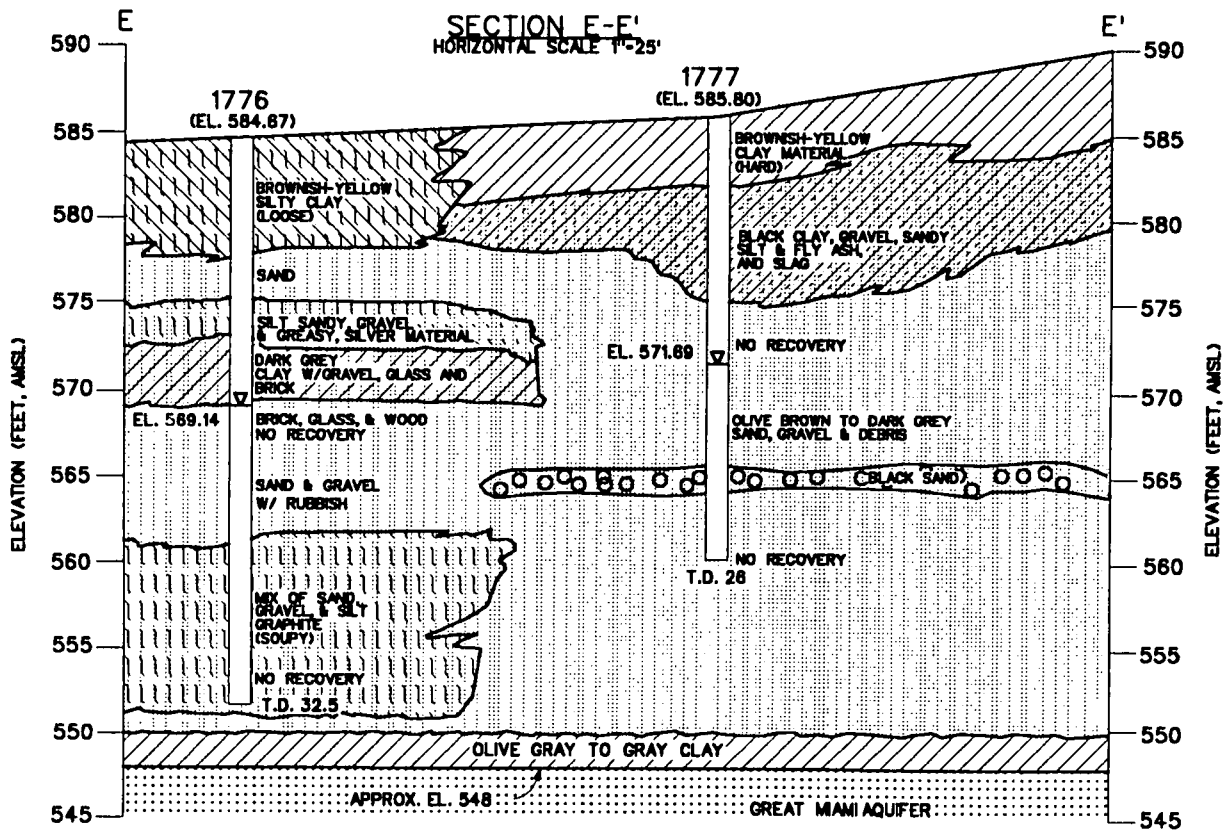
GPR ANOMALY

X-DENOTES ANOMALOUS MEASUREMENTS

4091B1392.DJI 08/22/93/LLS
40-DIR-P-3E3 / QUI / KNO / DS

FIGURE 4-22. GEOPHYSICAL ANOMALY MAP OF WASTE PIT FOUR

999



NOTES:

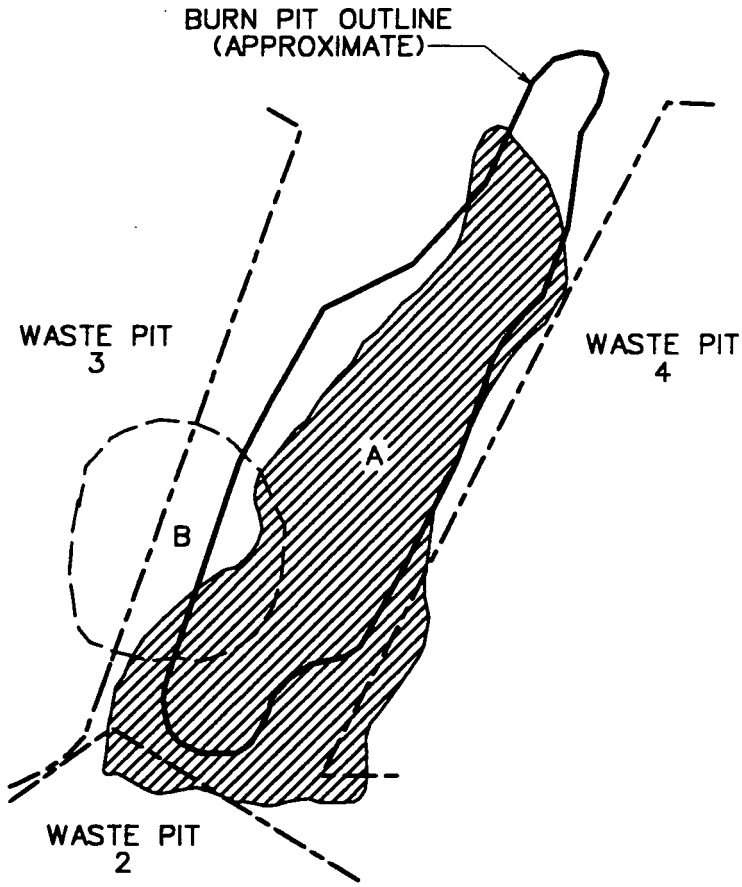
1. PERIOD OF OPERATION 1957-1968.
2. VARIABILITY OF GRAVEL, SAND, BRICK, GLASS, AND FLYASH. COLORS AND TEXTURES RANGE FROM BROWNISH-YELLOW LOOSE MATERIAL (BORING 1776) TO BLACK SAND AND FLYASH LENSES (BORING 1777).
3. AROCLOR 1254 DETECTED AT 7.7 PPM (MAX VALUE), DIOXINS AND FURANS WERE ALSO DETECTED AT 900 PPB (DIBENZO FURAN) AND 0.98 PPB (HEPTACHLORODIBENZO-P-DIOXIN), MOST LIKLEY RELATED TO DEPOSITS OF FLAYASH FROM ONSITE INCINERATION OF PCB'S THOUGH PLANT RECORDS DO NOT VERIFY THIS ASSUMPTION. PAH'S ARE ALSO PRESENT AT 18PPM (FLUORANTHENE) AND 15PPM (PHENANTHRENE). ALL VALUES ARE MAXIMUM.
4. STRATIFIED CONCENTRATIONS OF PENTACHLOROPHENOL (2.6 PPM MAX) AND TETRACHLOROETHENE (260 PPB) WERE ALSO DETECTED, SUGGESTING THAT THE BURN PIT WAS ALSO USED TO DISPOSE OF SPENT SOLVENT FROM PLANT EXTRACTION PROCESSES.
5. PREDOMINANT RADIOLOGICAL CONSTITUENTS IN PIT MATERIAL ARE TH 230(218 PCI/G) AND U234(1711 PCI/GM), MAX VALUES. THE BURN PIT OVERALL HAS THE LOWEST LEVEL OF RADIONUCLIDE CONCENTATIONS OF ALL PITS.
6. PLANT RECORDS DO NOT INDICATE QUANTITIES OF ORGANICS OR INORGANICS DISPOSED IN THE BURN PIT.
7. CONSULT TABLE 4.1, TABLE 1-1, AND SECTION 1.2.2.8 FOR A DETAILED DISCUSSION OF WASTES DISPOSED IN THE BURN PIN.

WASTE STREAMS	MASS QUANTITY (MT)	VOLUME (M^3)	CHARACTERISTICS
OIL	---	---	SPENT OIL FROM IN PLANT PROCESSES AND DUST COLLECTOR RESIDUE. USED PLANT-WIDE FOR DUST CONTROL ON ROADS.
COMBUSTABLE WASTES	---	---	ALL WASTE DEPOSITED AND BURNED IN THE BURN PIT. NO RECORDS TO VERIFY COMPOSITION.
ASH: GRAVEL	---	---	DARK TO LIGHT GRAY MATERIAL WITH UNEVEN VARIATIONS OF GRAVEL. OCCASIONAL BLACK SEAMS.

WASTE STREAM VOLUMES AND CALCULATIONS ARE BASED ON MATERIALS CONTROL AND ACCOUNTING (MC&A) PLANT RECORDS, CRU3 DRAFT WORK PLAN ADDENDUM (1992), AND INTERVIEWS WITH KNOWLEDGEABLE PLANT PERSONNEL.

FIGURE 4-23. CONCEPTUAL CROSS SECTION OF BURN PIT CONTENTS

409191-398 /OUT /KONJX /DS
409193-398.OUT 09/30/93 GP



ANOMALY	MAGNETICS	EM31 HORIZONTAL	EM31 VERTICAL	GPR
A	X			
B		X	X	

LEGEND:

MAGNETIC ANOMALY

ELECTROMAGNETIC ANOMALY

X-DENOTES ANOMALOUS MEASUREMENTS

FIGURE 4-24. GEOPHYSICAL ANOMALY MAP OF BURN PIT

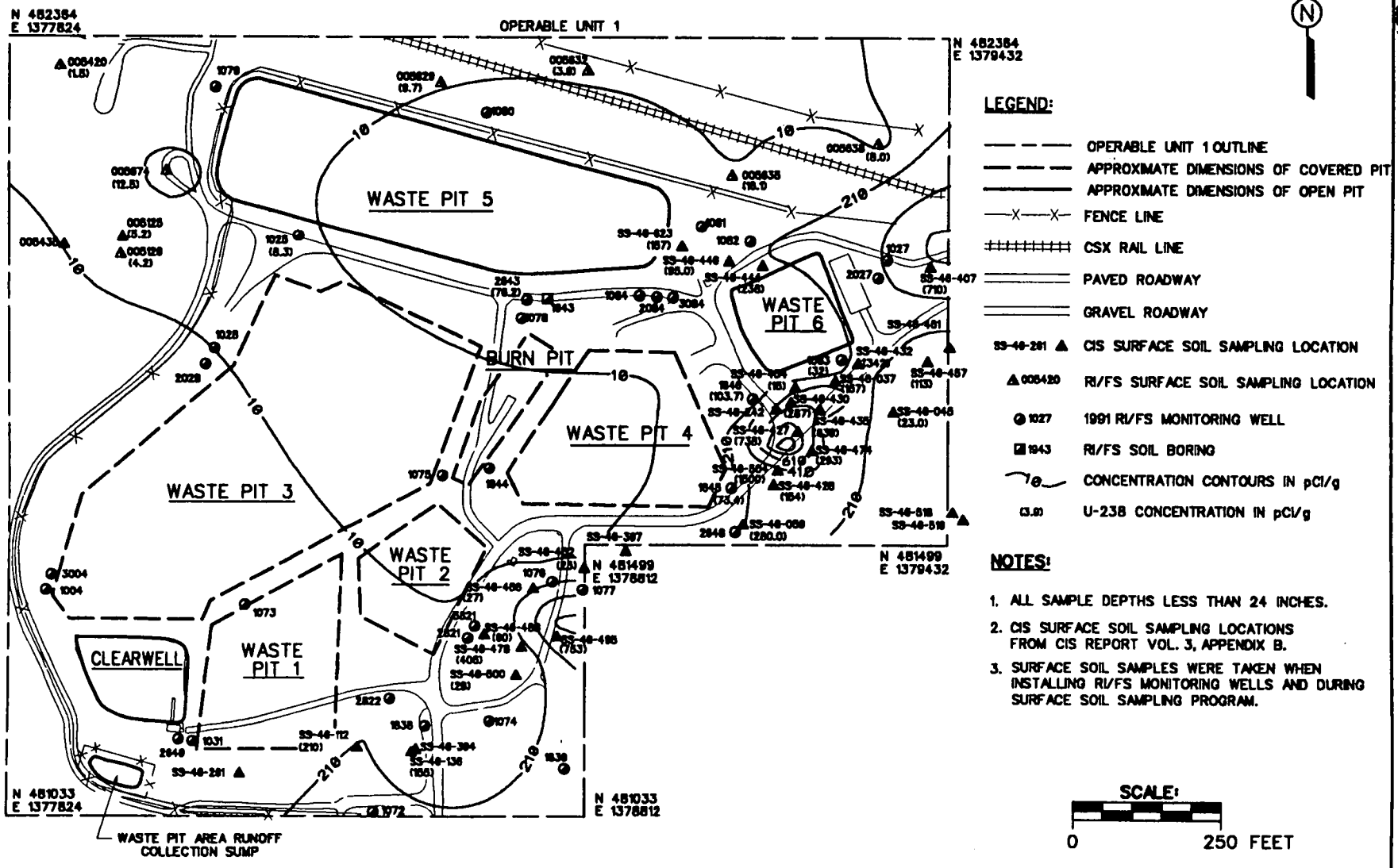
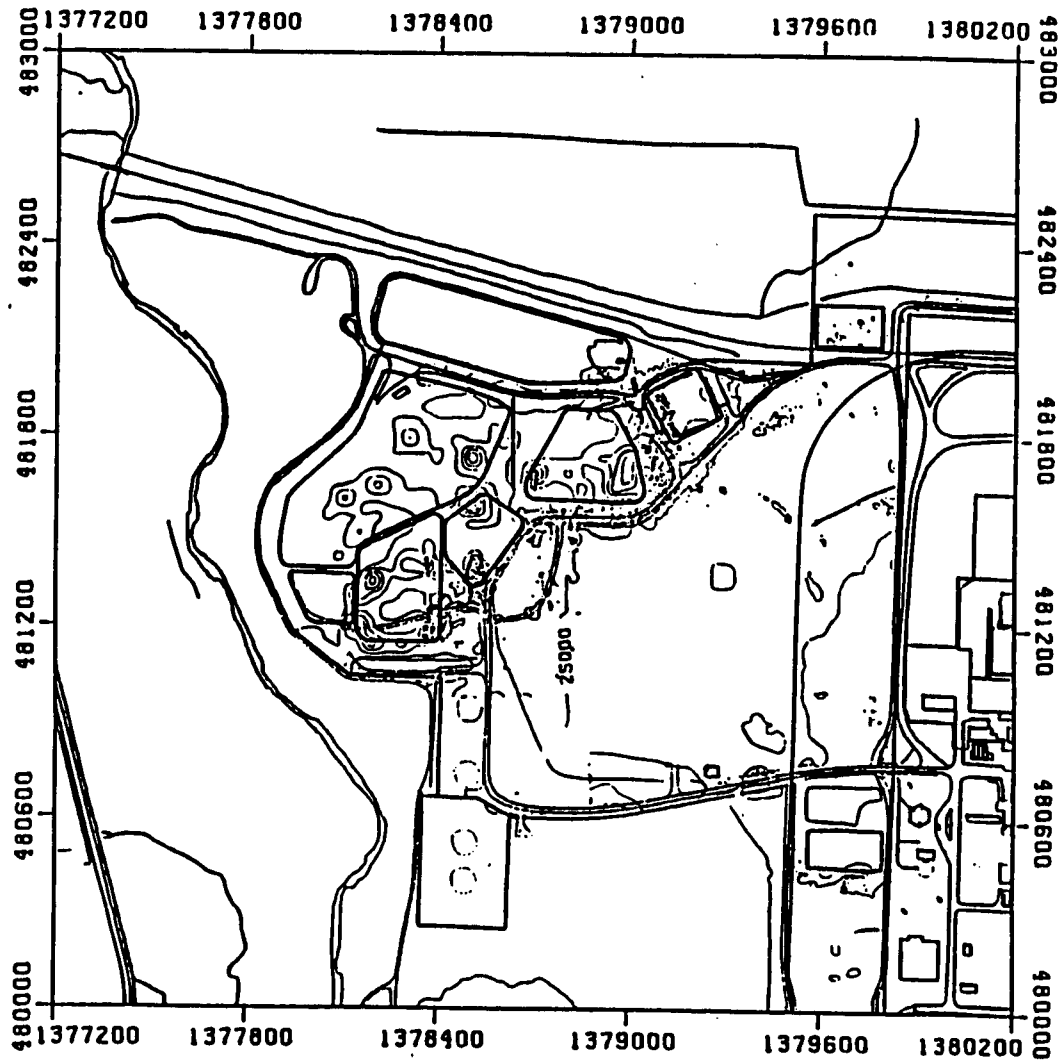


FIGURE 4-25. ISOPLETH OF U-238 ACTIVITY CONCENTRATION IN SURFACE SOILS

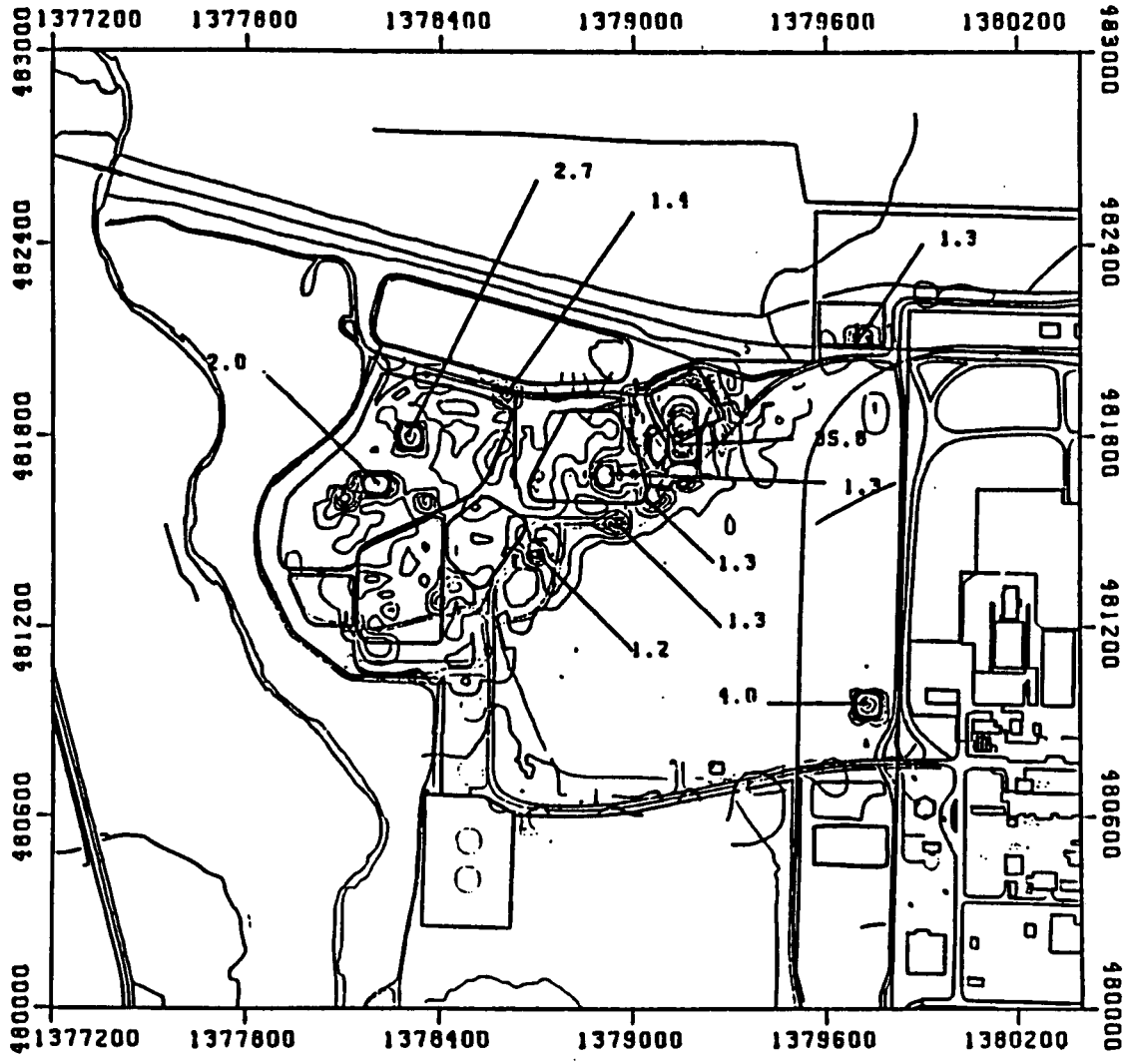


NOTES:

1. COORDINATES ARE STATE PLANAR (OHIO SOUTH ZONE).
2. SOURCE - ROY F. WESTON, INC. 09/01/87.

FIGURE 4-26. FIDLER MEASUREMENT CONTOURS WITHIN OPERABLE UNIT I (COUNTS PER MINUTE)

400101-A-406 /OU1 /00001 /DS
40019403.OU1 09/21/93/POT



NOTES:

1. COORDINATES ARE STATE PLANAR (OHIO SOUTH ZONE).
2. SOURCE - ROY F. WESTON, INC. 09/01/87.

FIGURE 4-27. BETA GAMMA DOSE RATE CONTOURS WITHIN OPERABLE UNIT I (mRAD/HR)

409194.001 08/22/93/TLS
409194-4-4-08 /001 /XNOX /DS

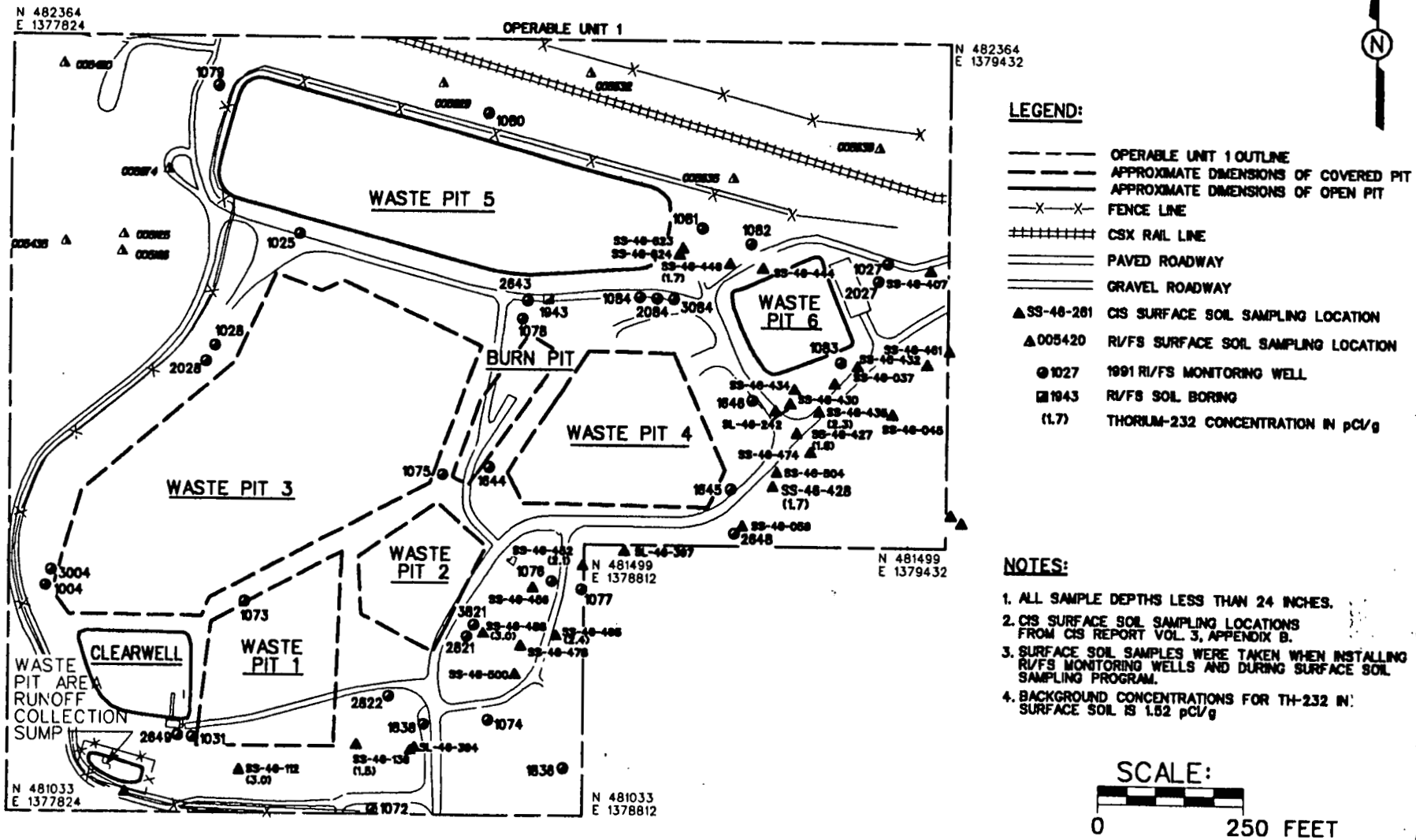


FIGURE 4-28. LOCATION OF SURFACE SOIL CONTAINING ELEVATED THORIUM-232

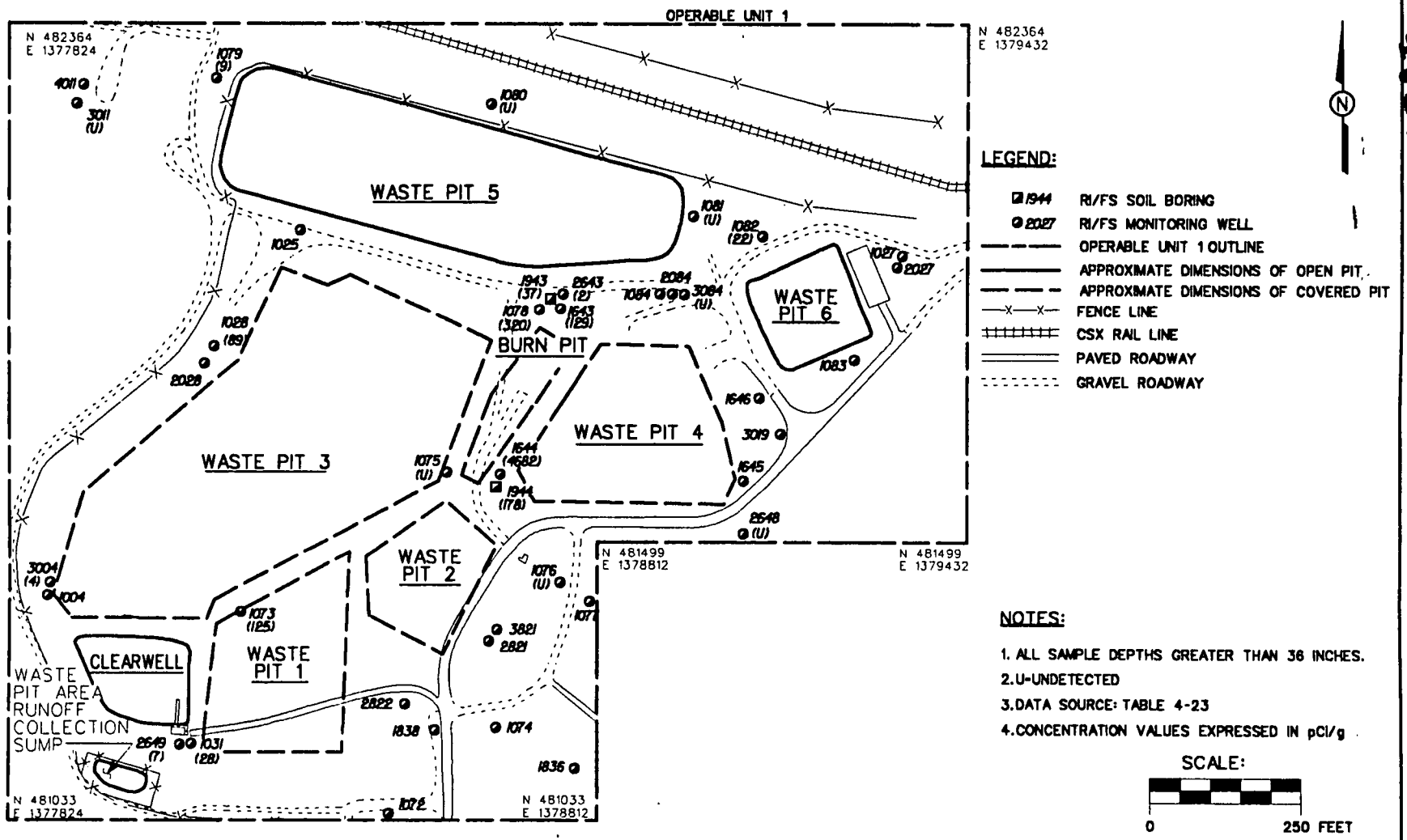
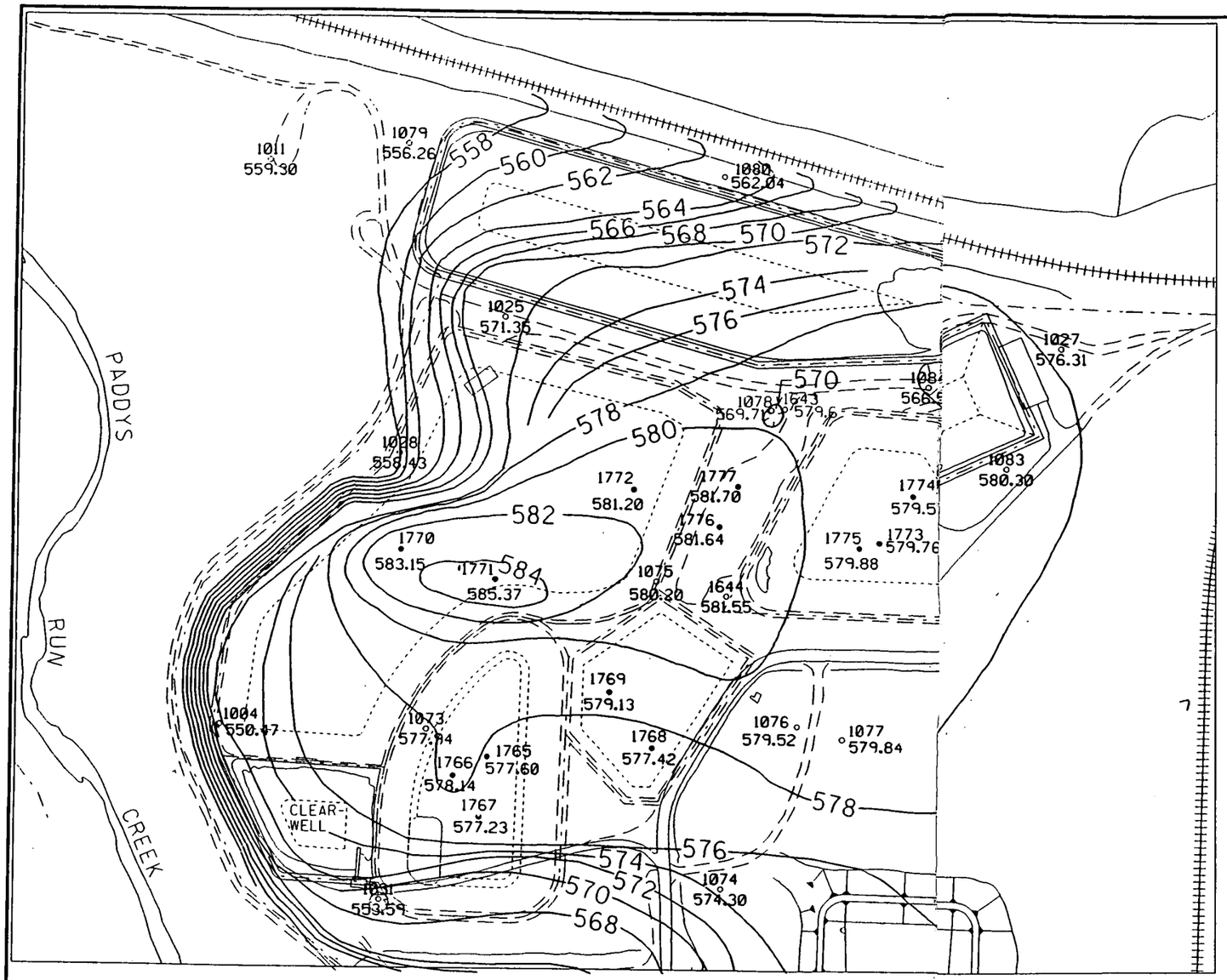


FIGURE 4-29. URANIUM CONCENTRATION IN SUBSURFACE SOIL (ZONE 1:0-38')



NOTE:

1. SOURCE - FERMCO CADD DRAWING NO. MY931DRY.DGN.

SCALE:

100' 0' 100' 200' 30

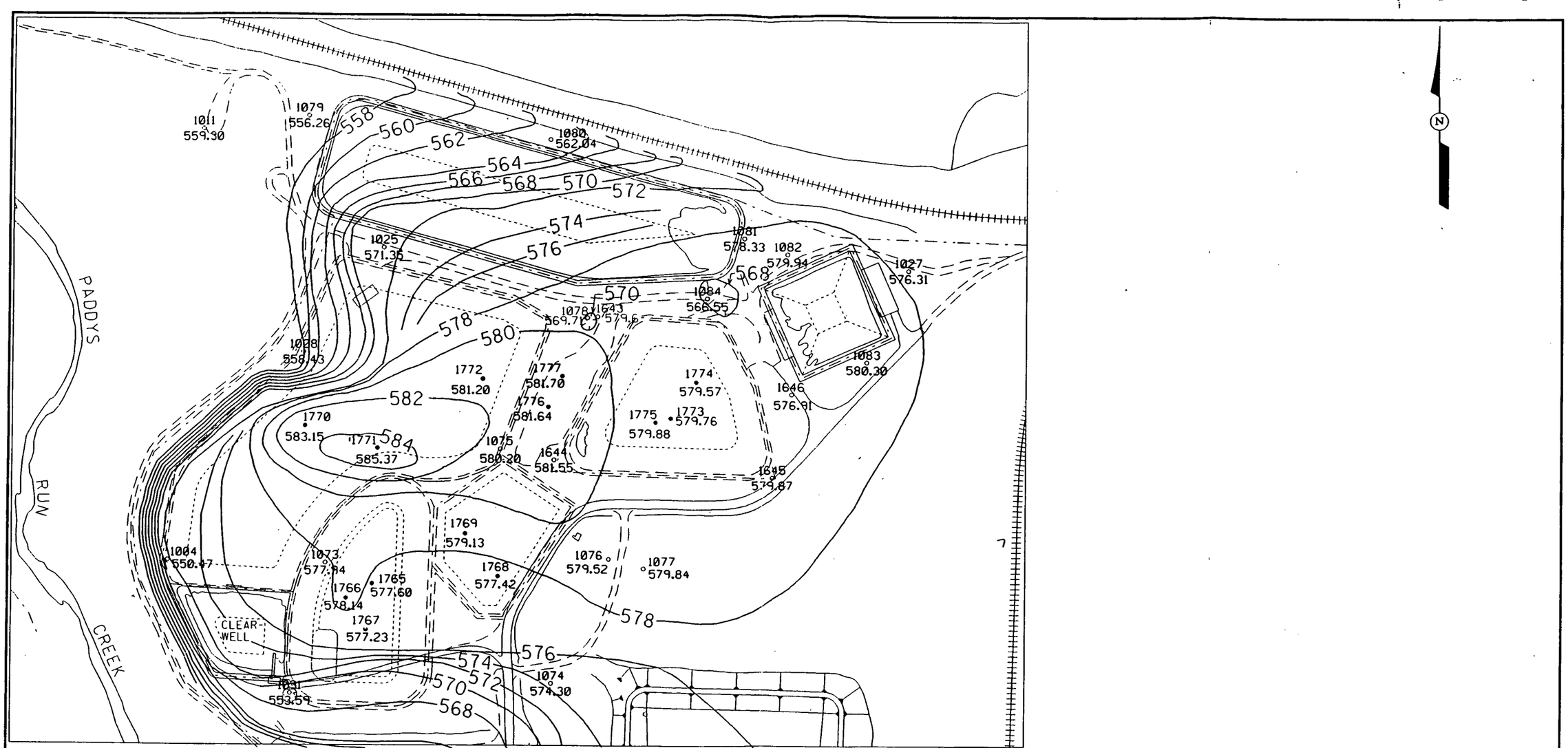
LEGEND:

- OPEN WASTE PIT OUTLINE
- COVERED WASTE PIT OUTLINE
- 1645 579.87 ○ GLACIAL OVERBURDEN WELL W/WATER LEVEL ELEVATION FOR MAY 1993
- 1776 581.64 ● WASTE PIT WELL W/WATER LEVEL ELEVATION FOR MAY 1993
- ROADWAY
- RAIL LINES

serverlt:/res2187/fig4-30.dgn

1007

FIGURE 4-30. WATER LEVEL ELEVATIONS IN WASTE PITS AND GLACIAL OVERBURDEN, MAY 1993



NOTE:

1. SOURCE - FERMCO CADD DRAWING NO. MY93IDRY.DGN.

SCALE:

100' 0' 100' 200' 300'

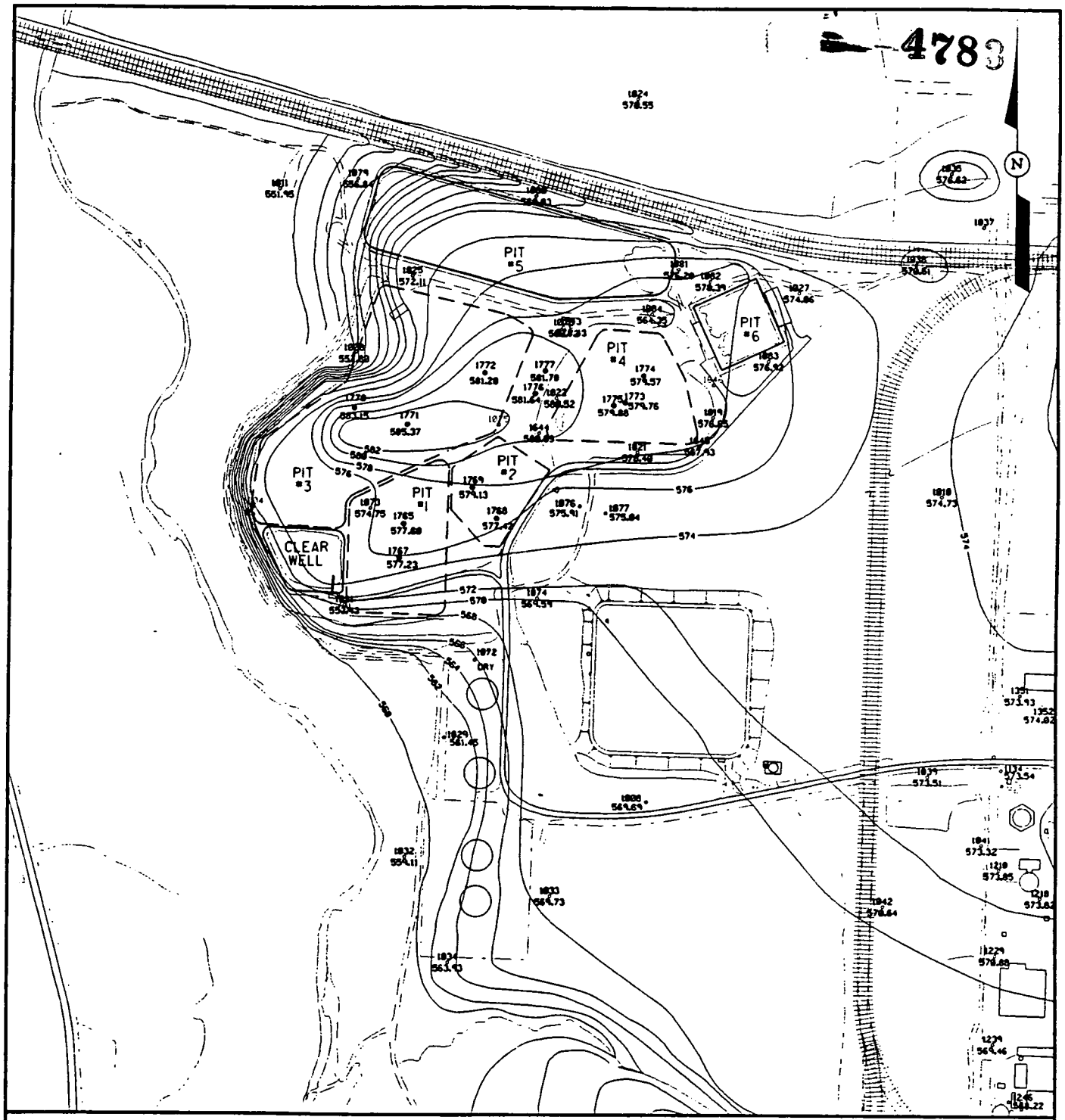
LEGEND:

- OPEN WASTE PIT OUTLINE
- COVERED WASTE PIT OUTLINE
- 1645 579.87 ○ GLACIAL OVERBURDEN WELL W/WATER LEVEL ELEVATION FOR MAY 1993
- 1776 581.64 ● WASTE PIT WELL W/WATER LEVEL ELEVATION FOR MAY 1993
- ROADWAY
- RAIL LINES

1007

serverli:/res2187/fig4-30.dgn

FIGURE 4-30. WATER LEVEL ELEVATIONS IN WASTE PITS AND GLACIAL OVERBURDEN, MAY 1993



NOTE:

1. SOURCE - FERMCO CADD DRAWING NO. 0911DRY.DGN

LEGEND:

- OPEN WASTE PIT OUTLINE
- CLOSED WASTE PIT OUTLINE
- GLACIAL OVERBURDEN WELL W/WATER LEVEL ELEVATION
- WASTE PIT WELL W/WATER LEVEL ELEVATION
- FENCE LINES
- ROADWAY

SCALE: 100' 0' 100' 200' 300'

FIGURE 4-31. WATER LEVEL ELEVATIONS IN WASTE PITS AND GLACIAL OVERBURDEN, AUTUMN 1991

1008

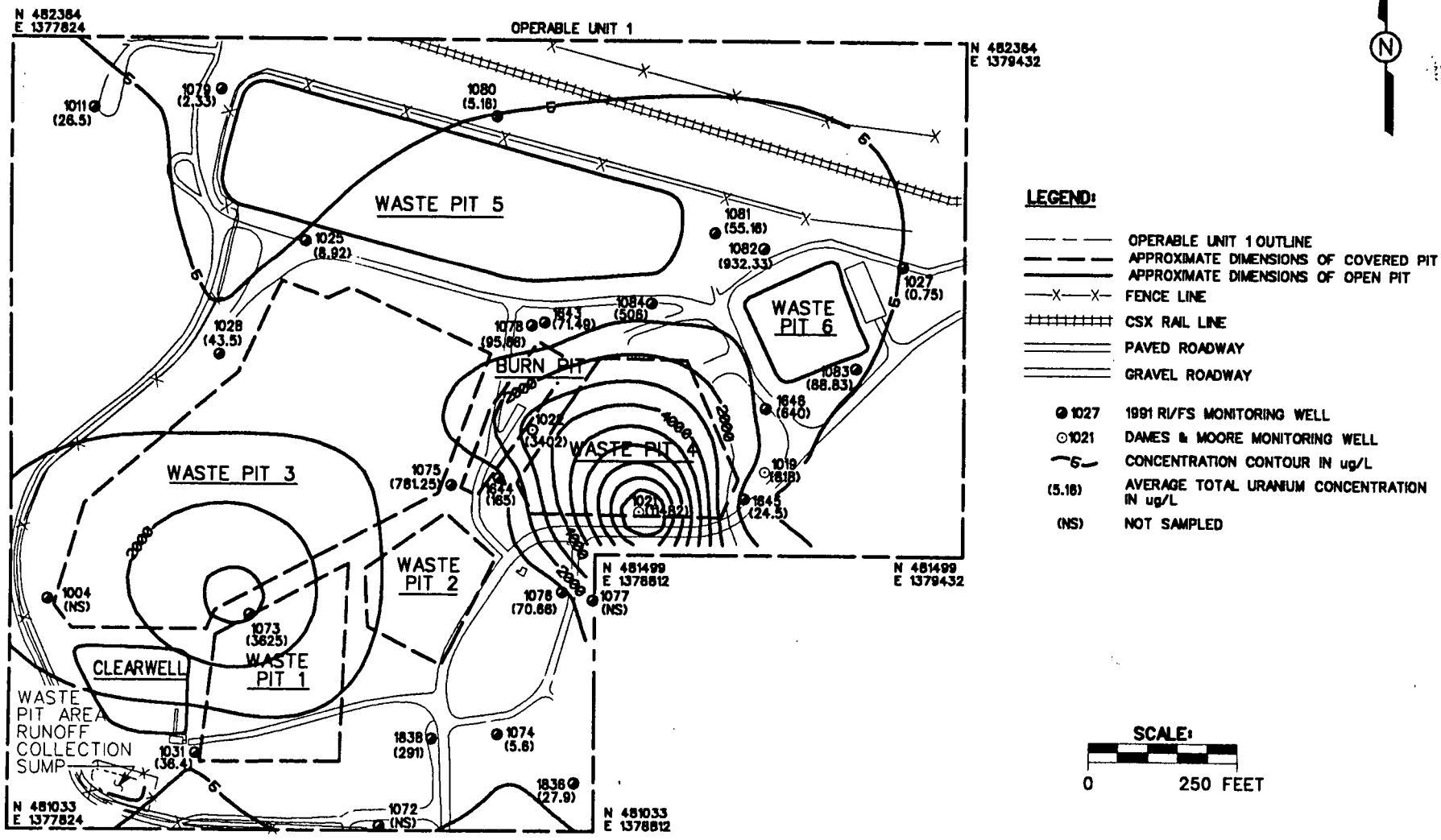
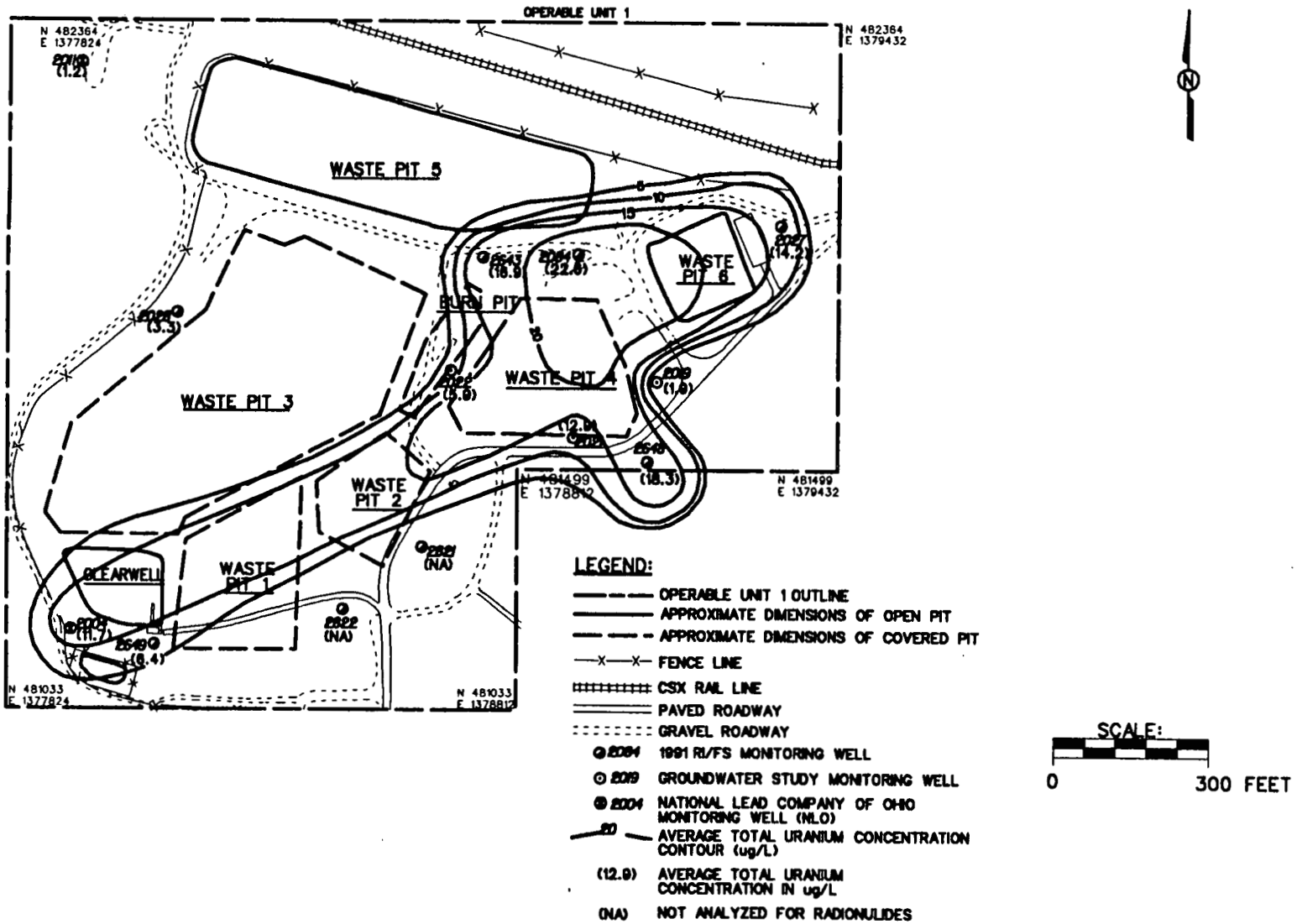


FIGURE 4-32. AVERAGE TOTAL URANIUM CONCENTRATIONS IN PERCHED GROUNDWATER

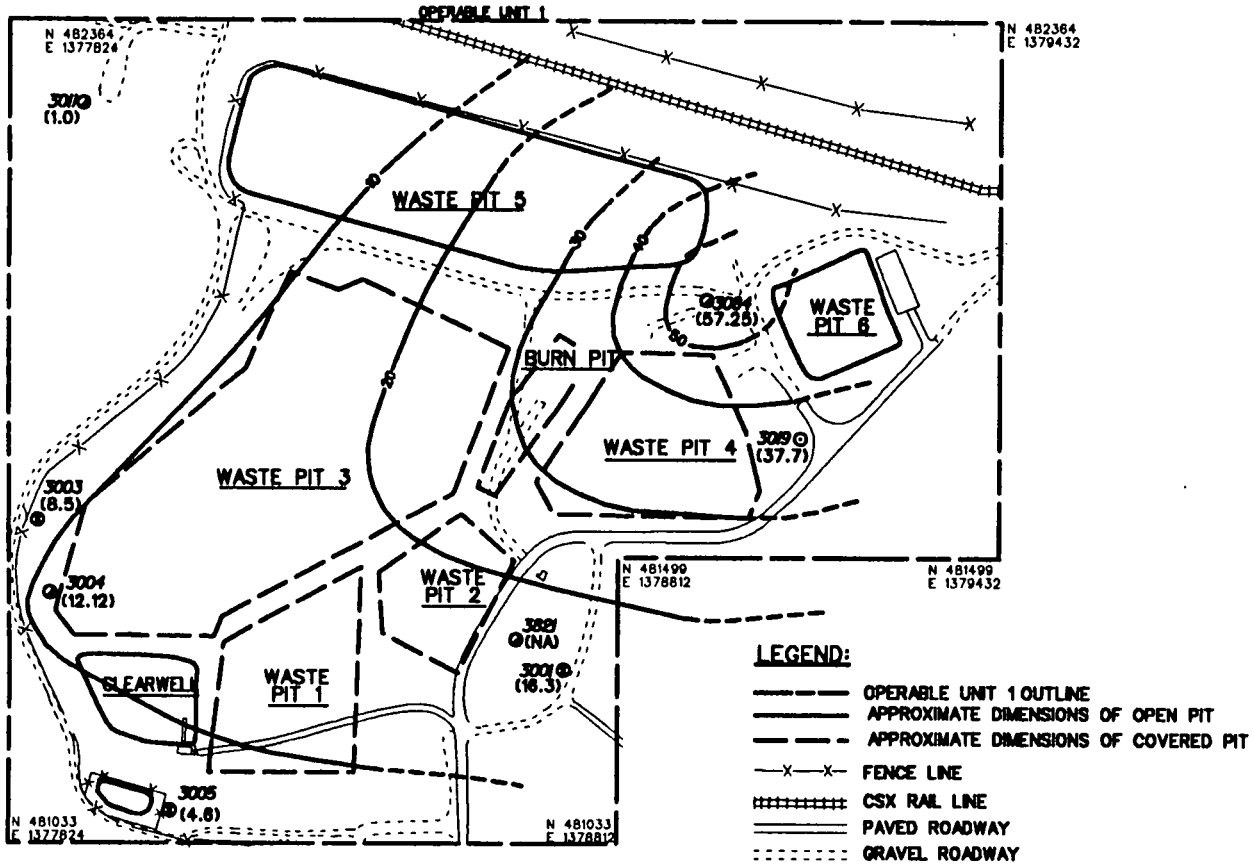


NOTE:

1. GROUNDWATER STUDY AND NLO MONITORING WELL LOCATIONS FROM DAMES AND MOORE GROUNDWATER STUDY TASK C REPORT, JULY 1985.

FIGURE 4-33. AVERAGE TOTAL URANIUM CONCENTRATIONS IN THE UPPER ZONE OF THE GREAT MIAMI AQUIFER

1010
4783



LEGEND:

- OPERABLE UNIT 1 OUTLINE
- APPROXIMATE DIMENSIONS OF OPEN PIT
- APPROXIMATE DIMENSIONS OF COVERED PIT
- FENCE LINE
- CSX RAIL LINE
- PAVED ROADWAY
- GRAVEL ROADWAY
- 3084 — 1991 RI/FS MONITORING WELL
- 3019 — GROUNDWATER STUDY MONITORING WELL
- 3005 — NATIONAL LEAD COMPANY OF OHIO MONITORING WELL (NLO)
- 20 — AVERAGE TOTAL URANIUM CONCENTRATION CONTOUR (ug/L)
- (37.7) — AVERAGE TOTAL URANIUM CONCENTRATION IN ug/l
- (NA) — NOT ANALYZED FOR RADIONUCLIDES

SCALE: 0 — 300 FEET

NOTE:

1. GROUNDWATER STUDY AND NLO MONITORING WELL LOCATIONS FROM DAMES AND MOORE GROUNDWATER STUDY TASK C REPORT, JULY 1985.

FIGURE 4-34. AVERAGE TOTAL URANIUM CONCENTRATIONS IN THE MIDDLE ZONE OF THE GREAT MIAMI AQUIFER

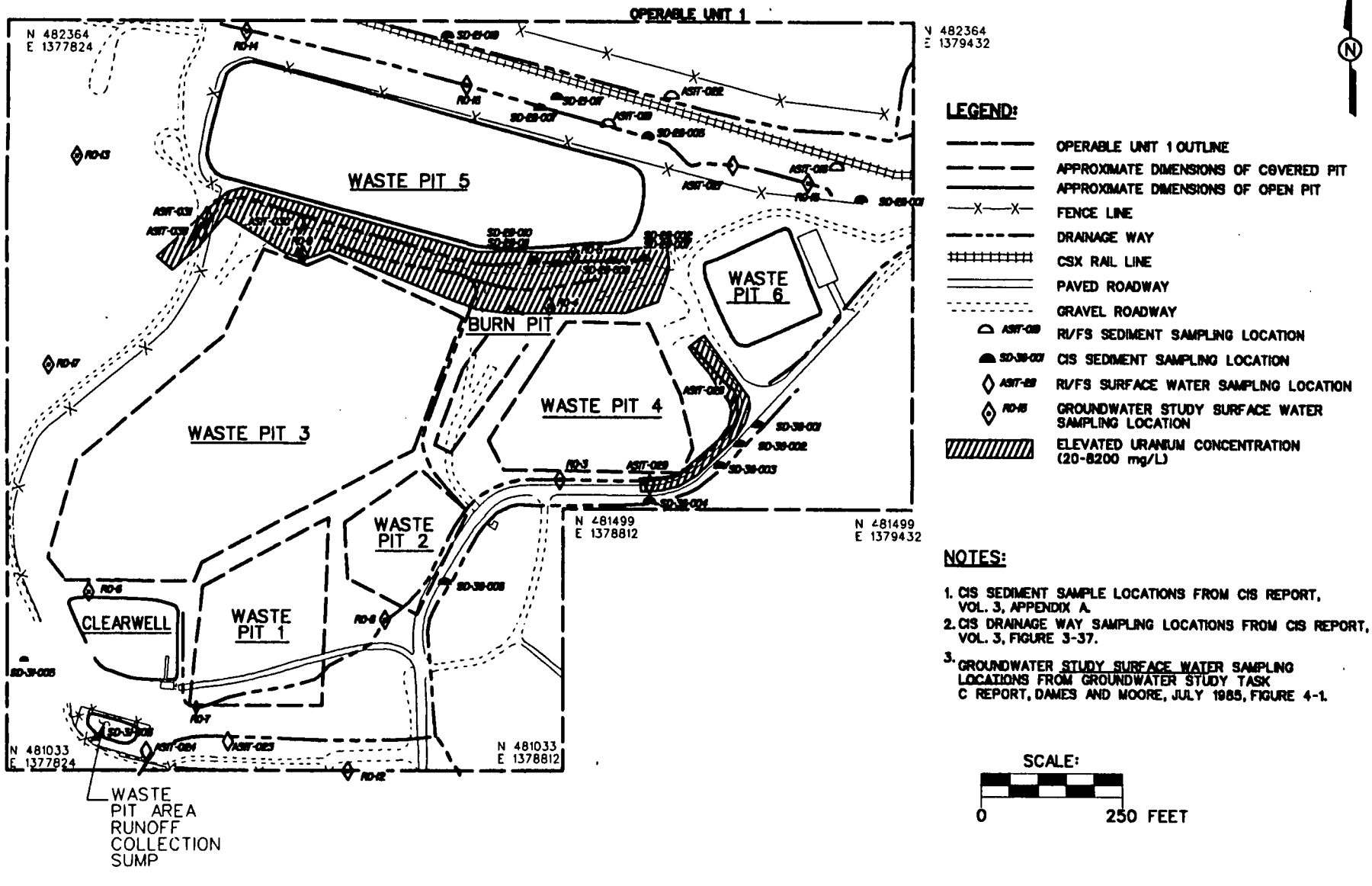


FIGURE 4-35. DISTRIBUTION OF URANIUM IN SURFACE WATER

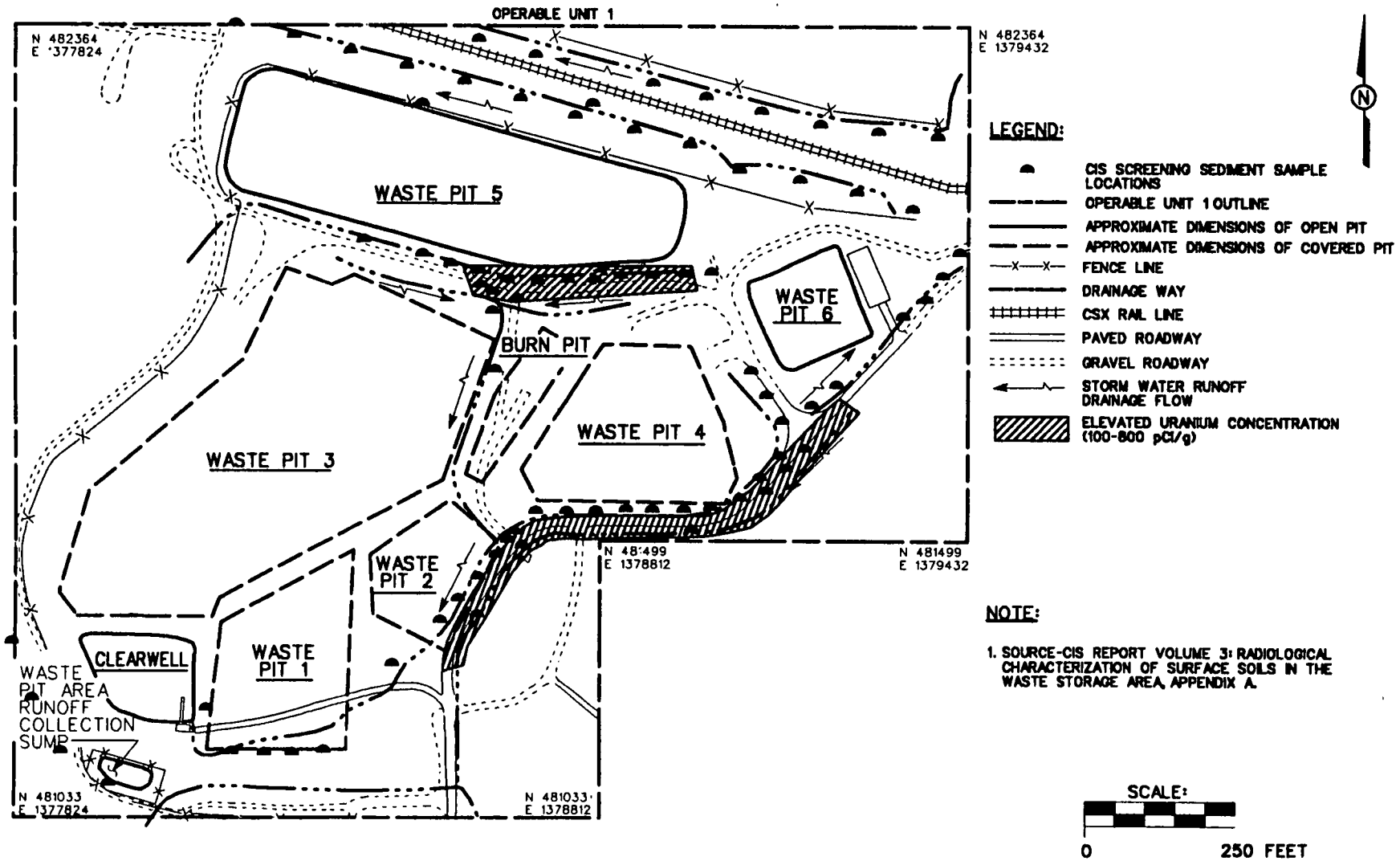


FIGURE 4-36. DISTRIBUTION OF URANIUM IN SEDIMENTS

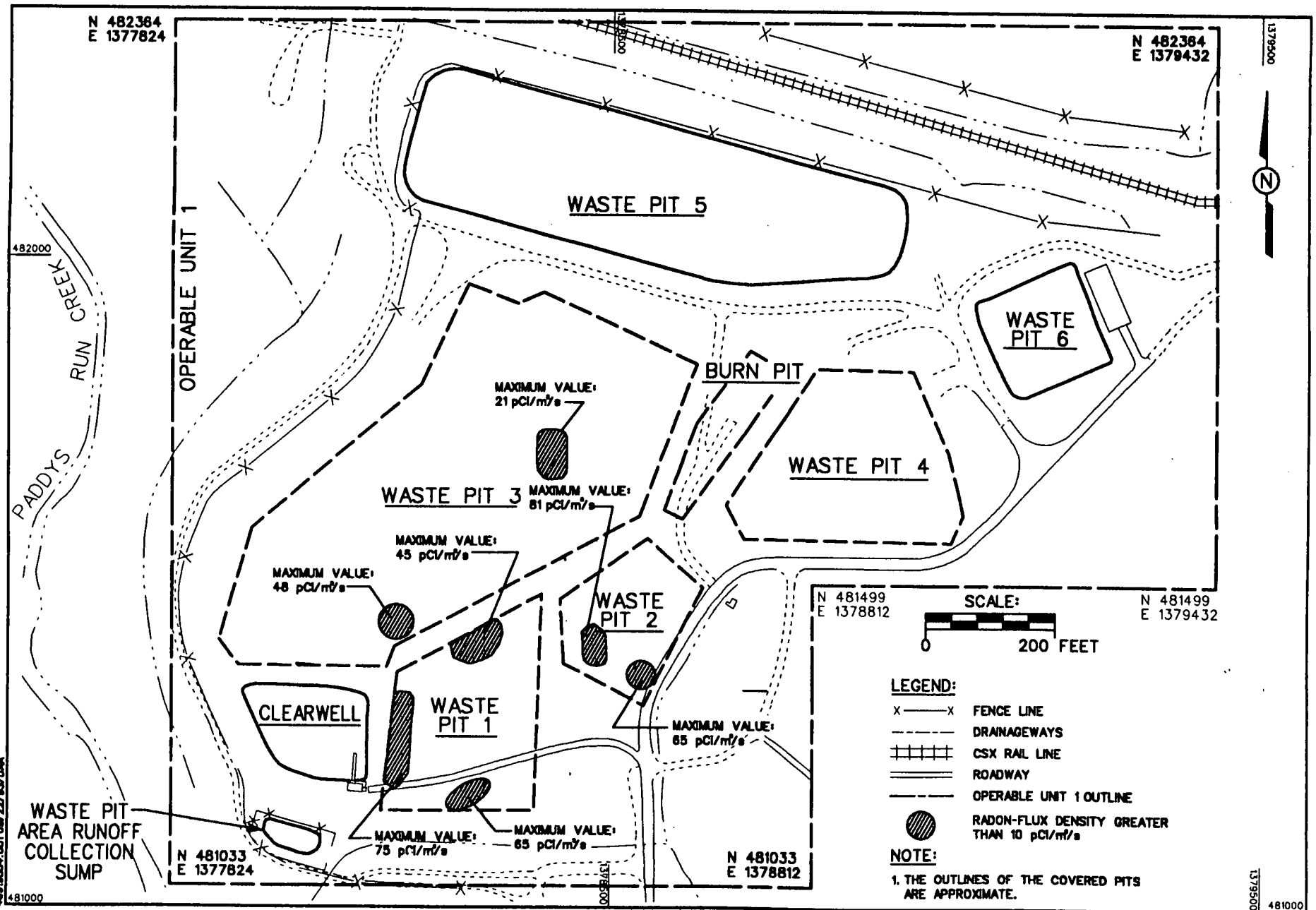


FIGURE 4-37. RADON-FLUX DENSITY FOR WASTE PITS 1, 2, 3 AND 4

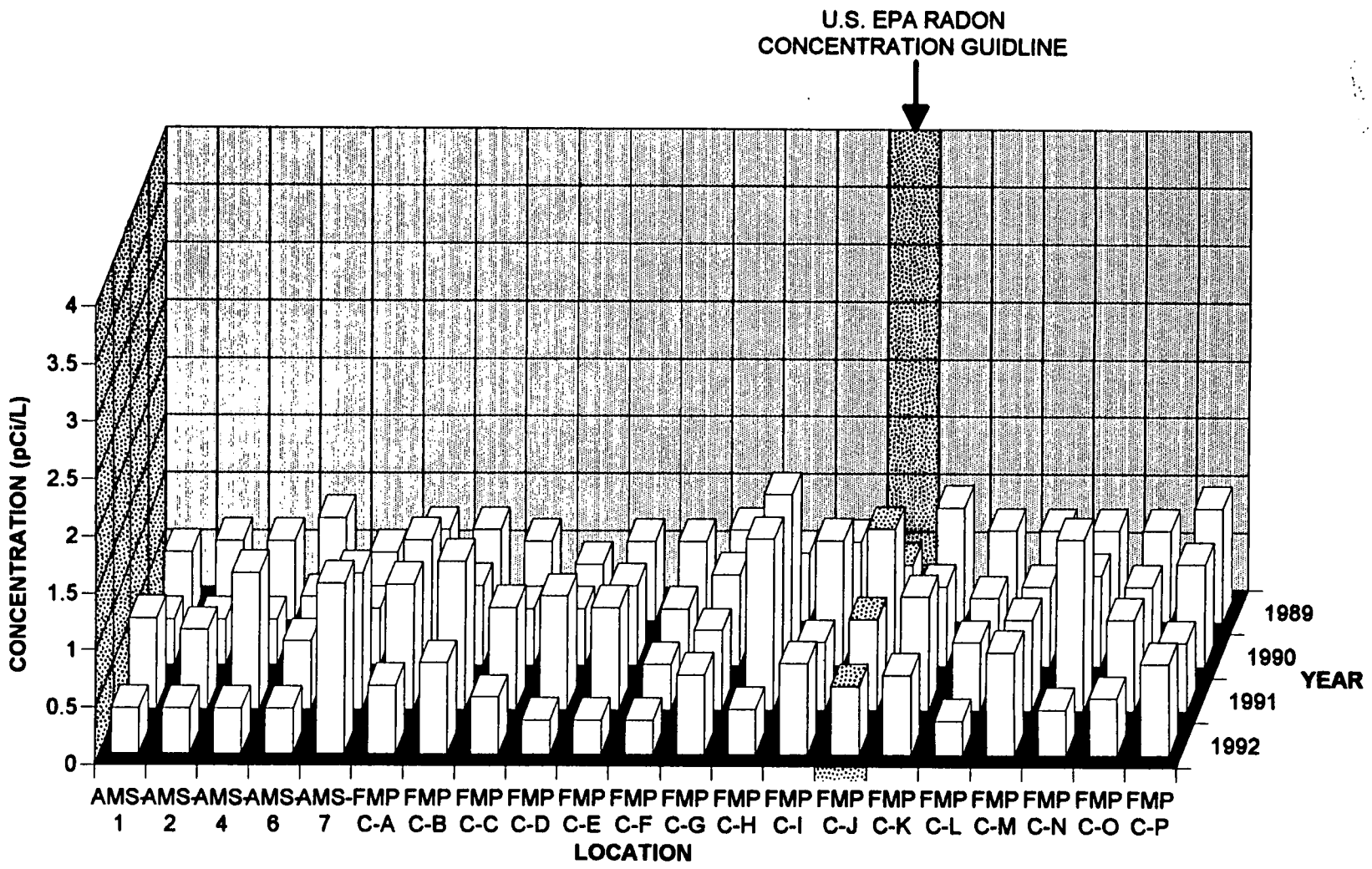


FIGURE 4-38. AIRBORNE RADON CONCENTRATION FEMP ENVIRONMENTAL MONITORING

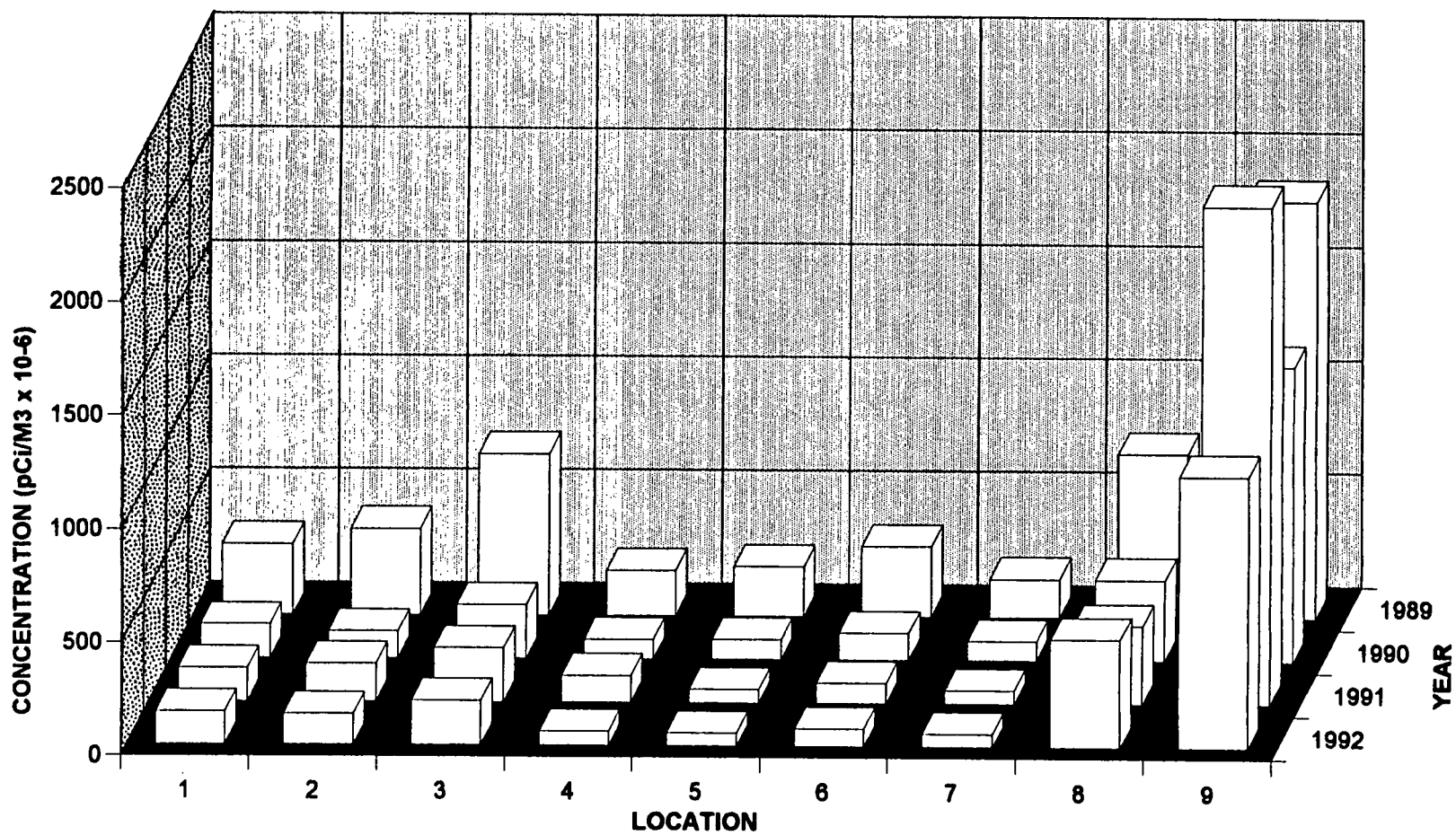


FIGURE 4-39. AIRBORNE URANIUM CONCENTRATION FEMP AIR MONITORING STATIONS

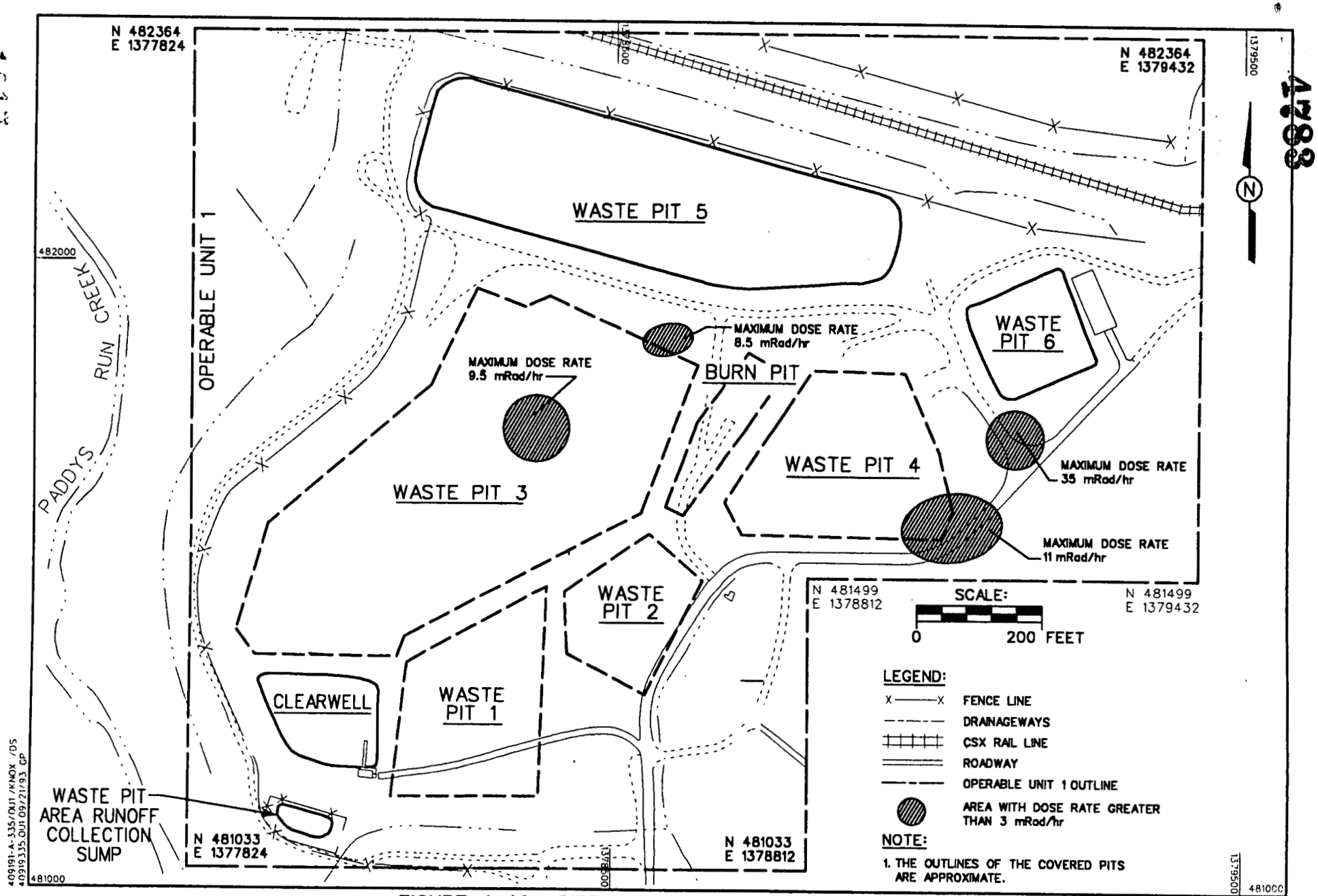


FIGURE 4-40. DIRECT RADIATION DOSE RATE-CIS

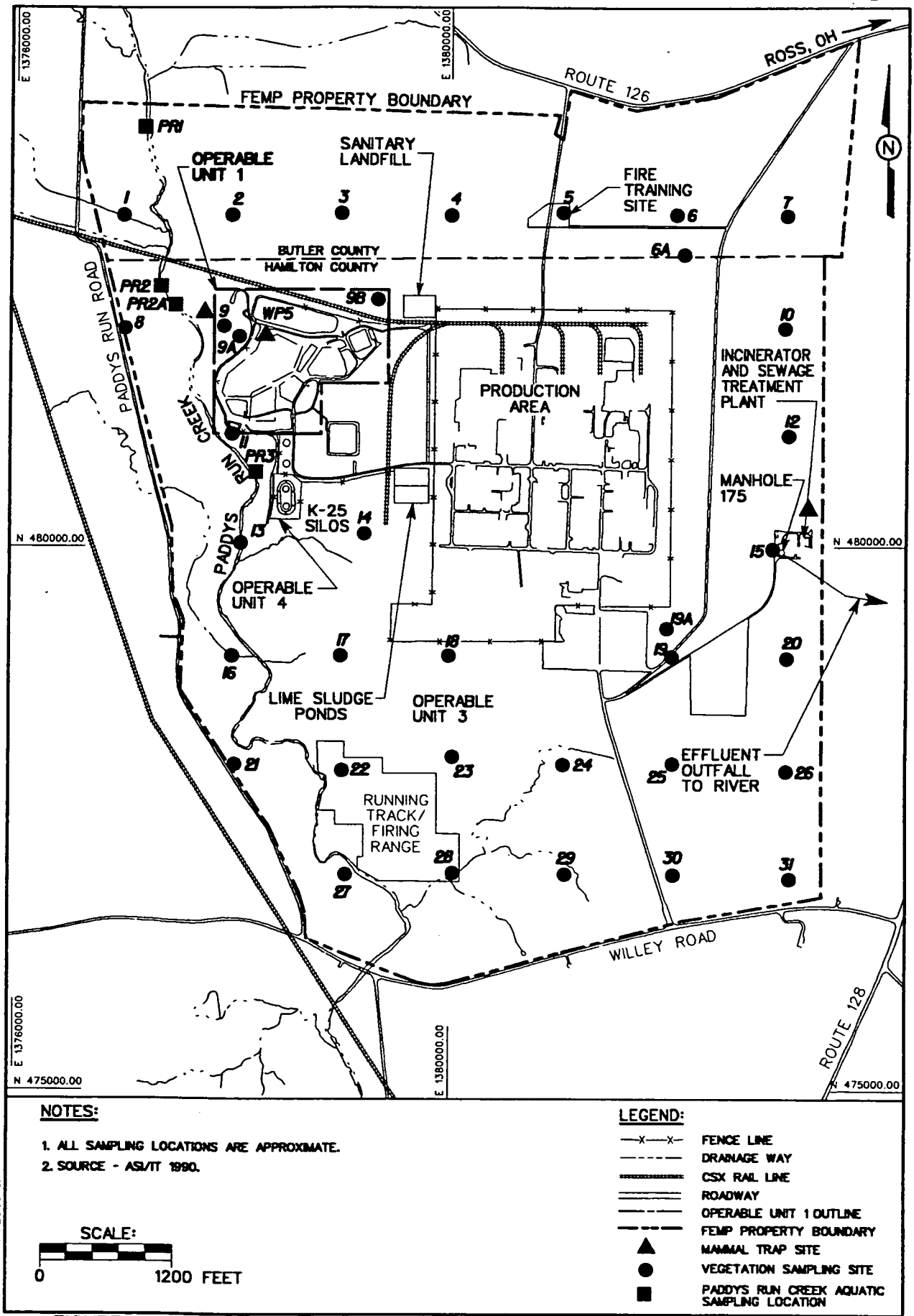
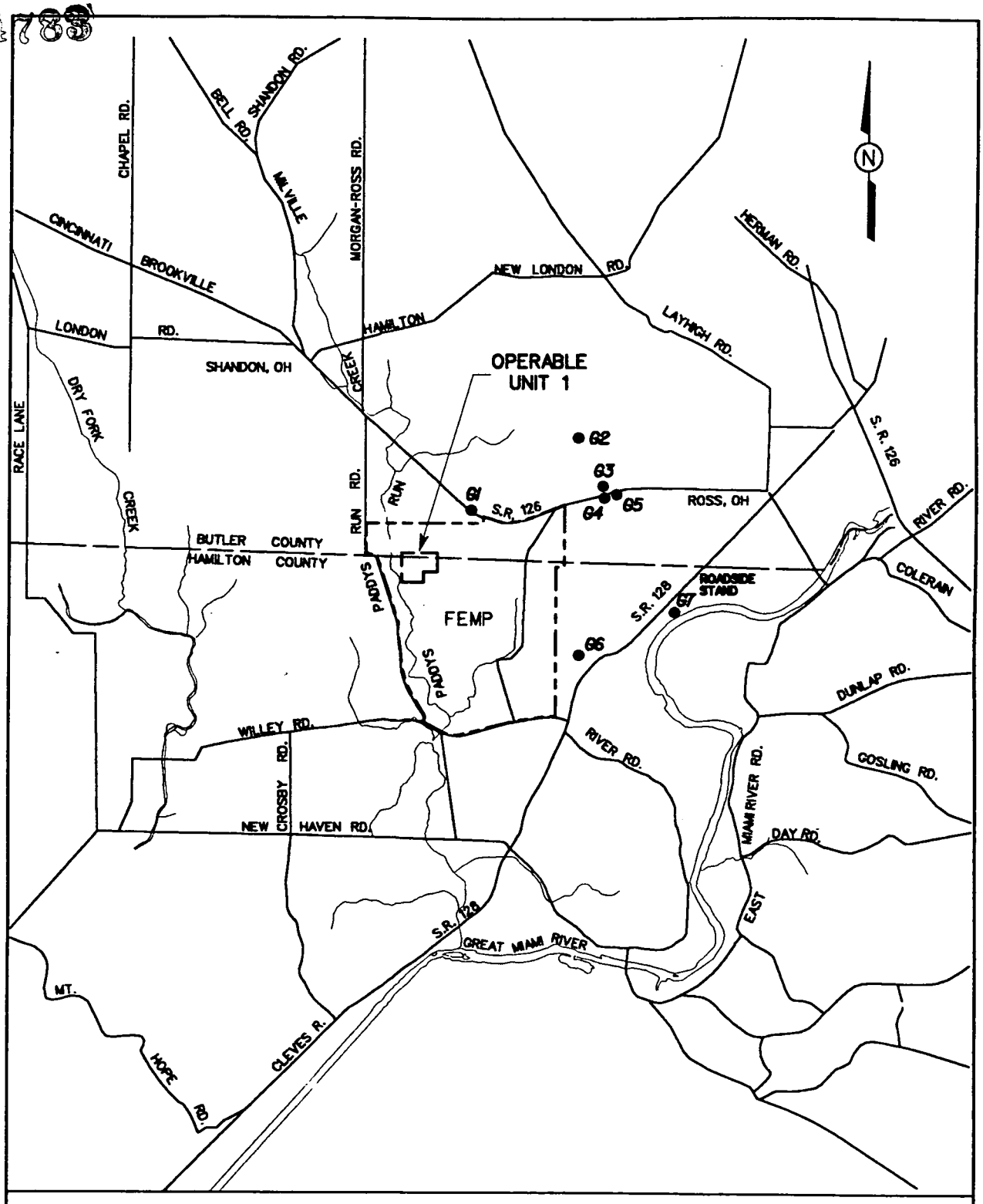


FIGURE 4-41. LOCATION OF RI/FS VEGETATION/SOILS AND MAMMAL SAMPLING SITES NEAR THE WASTE STORAGE AREA AND ON SITE



NOTES:

1. SOURCE: ASI/IT 1990.
2. INDIANA CONTROL SITE (NOT SHOWN ON MAP).
3. ALL LOCATIONS ARE APPROXIMATE.

LEGEND:

- DRAINAGE WAY
- OPERABLE UNIT 1 OUTLINE
- FEMP PROPERTY BOUNDARY
- ●G6 SAMPLE SITES

SCALE: 0 — 1 MILE

409191-A-318/OU1/KNOX/DS
409183B.OU1 08/21/93 GP

FIGURE 4-42. LOCATION OF SAMPLING SITES FOR GARDEN PRODUCE AND AGRICULTURAL CROPS IN THE FEMP VICINITY

5.0 CONTAMINANT FATE AND TRANSPORT

A fate and transport model was used to predict contaminant movement from the waste areas to potential human or ecological receptors via a number of potential migration pathways. Used in conjunction with monitoring data, the model predicted contaminant concentrations at potential exposure locations when measured contaminant concentration data were not available, such as off-site locations and/or a future scenario. The modeling also provided the best data on contaminant migration into off-property locations or for future exposure predictions by extrapolating from known field data. Conservative assumptions were used to provide a "worst case" picture of contaminant movement. The modeled future concentrations were also based on the unremediated baseline case for the Operable Unit 1 waste areas. The results of the fate and transport model were used in the Operable Unit 1 Baseline Risk Assessment (Appendix E) to estimate potential risks to human health.

The technical approach and the methods used to quantitatively predict contaminant concentrations for use in the Operable Unit 1 Baseline Risk Assessment are presented as follows:

- A presentation of background information on the environmental setting
- Definition of the conceptual transport models for surface water, groundwater, and air based on a reasonable and conservative depiction of the environmental setting
- Description of the screening processes used to reduce the number of CPC
- Overview of the modeling process and discussion of modeling results
- Comparison of modeling results with field data

Various radionuclides, metals, and organic chemicals found in Operable Unit 1 during past sampling activities were evaluated in the fate and transport modeling process. Based on those analyses, the most prevalent radionuclides within the Operable Unit 1 study area are the isotopes of uranium, radium, thorium, and their progeny. In addition, various metals and organic chemicals were screened and modeled as part of the process as described in this section.

CPCs are identified for each waste pit in the Operable Unit 1 study area as discussed in the Operable Unit 1 Baseline Risk Assessment (Section 6.0 and Appendix E). Sections 5.1 through 5.3 present information on migration pathways, contaminant persistence, and modeling procedures that pertain to the entire Operable Unit 1 study area. Section 5.3 also presents the results of the fate and transport modeling for each of the individual waste pits. Appendix D presents the fate and transport of contaminants through the surface water, groundwater, and air pathways in detail.

5.1 POTENTIAL MIGRATION PATHWAYS

Contaminant transport from Operable Unit 1 may be via the following pathways:

- Surface water runoff
  - Erosion of contaminated soils into Paddy's Run from the vicinity of the waste pits
- Groundwater transport
  - Leaching of contaminants from the waste pits through the vadose zone to underlying groundwater
  - Infiltration of contaminated surface water from Paddy's Run to the Great Miami Aquifer
- Air emissions
  - Volatilization of organic compounds, wind erosion of contaminated particulate matter and the direct release of radon gas

Each of these potential contaminant transport pathways is discussed below. The reader should refer to Appendix D and the baseline risk assessment (Section 6 and Appendix E) for detailed information about each of these pathways, the associated transport mechanisms, and the impact on environmental media or receptors.

5.1.1 Surface Water Pathway

Surface water runoff is a viable transport pathway for all of the waste pits in Operable Unit 1. During a rainfall event, soil particles are dislodged by the impact of raindrops and the flow of runoff across the soil surface. The amount of soil erosion depends on rainfall intensity, slope length, slope steepness, vegetative cover, and erosion control practices in place. Contaminants adsorbed to the soil particles are also desorbed and transported into the receiving surface water. Each contaminant will be present in the runoff water in two forms:

- Adsorbed to the soil particles
- Dissolved and transported in the water

5.1.2 Groundwater Pathway

Rainfall and surface water runoff can infiltrate through the surface of the waste pits and percolate through the waste and soil overlying the groundwater aquifer. The FEMP is situated above the Great Miami Aquifer, which serves as a principal source of domestic, municipal, and industrial water throughout the region. The Great Miami Aquifer is considered the primary pathway by which contaminants released from Operable Unit 1 could be transported to a human receptor. The four controlling mechanisms for this migration pathway are:

- The leaching of contaminants from the soil matrix into the dissolved phase
- The percolation of the contaminated leachate to the underlying aquifer
- The infiltration of contaminated surface water from Paddy's Run to the Great Miami Aquifer
- The movement of water in the Great Miami Aquifer

The contaminant concentrations in leachate reaching groundwater depend on the precipitation infiltration rate, the initial concentrations, contaminant mass, and solubility of the contaminants, degradation rates, soil textures, soil hydraulic conductivities, depth to the groundwater, and a number of other chemical- and soil-specific factors. Predicted contaminant concentrations in the Great Miami Aquifer were used as the basis for the assessment of human exposure by water intake and exposure pathways as discussed in Section 6.0 and Appendix E (Baseline Risk Assessment).

5.1.3 Air Pathway

Air emissions associated with Operable Unit 1 may involve different types of release mechanisms. If organic compounds are present within the surface soil or exposed pit materials, then volatilization of these compounds may occur. The Operable Unit 1 area may also involve the direct release of radon gas which is generated as a result of radioactive decay of Ra-222 and U-238. Finally, during periods of turbulent wind conditions, particles of contaminated surface soil can become suspended in the air and may potentially be subject to inhalation by on or off-site human receptors. In the event that the wastes within the waste pits become uncovered, the transport of this material via wind erosion may also become a concern. The amount of material that may be suspended depends on wind speed and other site conditions such as soil moisture, particle size, and vegetative cover. Concentrations of these airborne contaminants at on-site and off-site receptor locations form the basis for the assessment of human exposure by the air pathways, as discussed in Section 6.0.

5.2 PERSISTENCE OF CONTAMINANTS

The migration of contaminants from Operable Unit 1 and their persistence in the environment are a function of both site characteristics and of the physical/chemical properties of the contaminants. Such properties include water solubility, tendency to transform or degrade (the compound's half life), and chemical affinity for solids or organic matter (partition coefficient). These properties and how they affect contaminant behavior are described below for radionuclides, inorganics, and organics.

5.2.1 Radionuclides

Radionuclides undergo spontaneous transformations that involve the emission of particles and radiant energy. The resulting isotope may also be radioactive and undergo spontaneous decay or a stable element may result which no longer has carcinogenic risk. The decay process can occur by various spontaneous mechanisms. Two of the more important decay modes are alpha decay and beta decay. The emissions produced by these decay modes consist of three different types particles or photons (rays): alpha, beta, and gamma.

Alpha decay consists of the emission of an alpha particle from the nucleus of an atom. An alpha particle is composed of two protons and two neutrons, and consequently has a charge of +2. Following radioactive decay by alpha emission, a different element is formed (e.g., Ra-226 becomes Rd-222) because the number of protons in the nucleus has changed. During beta decay a neutron is transformed into a proton and electron. The electron is then expelled from the nucleus as a beta particle. The atomic number of the resulting progeny is thus increased by one, and the number of neutrons is decreased by one (e.g. Sr-90 becomes Yttrium-90). The atom may be left in an excited state; that is, the atom has excess energy that must be released. This energy can be emitted in several ways, including the formation of a gamma photon (ray) with a discrete energy.

Most of the radioactive materials present at the FEMP originated from natural sources such as pitchblende ore or ore concentrates. The radioactive elements present in these materials belong to three decay series (chain): the U-238 (uranium) series, the U-235 (actinium) series, and the Th-232 (thorium) series as shown in Figures 5-1, 5-2, and 5-3. If they are not subject to chemical or physical separation, the members of a series attain a state of radioactive equilibrium where the rate of decay of each nuclide is essentially equal to that of the nuclide that heads the series (the parent), leading to constant ratios of activity concentrations among the respective nuclides (parent and daughters or progeny). At the FEMP, radioactive equilibrium between various portions of these three decay chains does not always exist due to processing of ores too ore concentrates prior to arrival at FEMP or as part of the uranium extraction process at FEMP. In addition to chemical processes, physical processes were used to preferentially extract certain isotopes (same element but with differing numbers of neutrons in the nucleus; such as U-234, U-235, and U-235) from materials prior to their use at FEMP (i.e. uranium that has been isotopically separated as part of fuel manufacturing) during the chemical process conducted at FEMP. The isotopic ratios of these raw materials remained essentially unchanged during the chemical process conducted at FEMP.

As a result of the utilization of different chemical processes in different areas of the FEMP, there is a wide variance in terms of the presence or absence of members of the decay chain, member concentration, and isotopic content of wastes within the boundaries of Operable Unit 1. This explains the variation of U-234/U-238 ratios from location to location across the FEMP. Activity ratios and parent/progeny equilibrium can sometimes be used at the site as an indicator of contaminant source since many waste pits contain materials that are either all of natural origin (U-234/238 ratio of approximately U-234/-238 ratio less than one). The materials in the various waste pits may thus have differing U-234/U-238 ratios.

The half-lives of some of the radionuclides of concern at the FEMP are measured in thousands of years. Exceptions are Sr-90, with a half-life of 29 years, and Cs-137, with a half-life of 30 years.

Many geochemical reactions occur that cause constituent movement to be retarded, which is a reduction in the velocity of the contaminant movement in a medium. In addition, radioelements may undergo changes in their chemical form. Radionuclide retardation in groundwater transport and their decay constants are discussed in detail in Appendix D.

5.2.2 Inorganics

Inorganics do not degrade in the environment, but they may undergo speciation, which is a change in chemical form. They may also react with soils or other solid surfaces by ion exchange, adsorption, precipitation, or complexation (combining of two compounds to form a new compound). These processes are affected by pH, oxidation-reduction conditions, and the type and amount of organic matter, clay, and hydrous oxides present. In turn, these factors are affected by the physical and biological properties of the environmental media.

Chemical speciation has a large impact on the solubility of inorganic materials and therefore their mobility in the environment. Chemical speciation, however, is very complex and difficult to distinguish in routine laboratory analysis. In general, the only distinction made in sampling and analysis for inorganics is between total and filterable inorganics in water. The filterable inorganics represent the dissolved fraction, which is the more mobile and bioavailable fraction. Inorganic contaminant retardation in groundwater transport is further discussed in Appendix D.

5.2.3 Organics

Organic contaminants may be degraded in the environment by various processes, including hydrolysis, oxidation/reduction, photolysis, or biodegradation. Degradation rates in various media can vary from minutes to years depending on the chemical and environmental conditions.

The mobility of an organic compound is affected by its volatility, partitioning between solids and water, water solubility, and concentration. Water solubility and the tendency to adsorb to particles or organic matter can correlate with retardation in groundwater transport. Chemicals with higher water solubilities and lower adsorption coefficients are expected to remain primarily in the dissolved phase and be transported at the same rate with the groundwater flow. Chemicals with lower water solubilities and higher adsorption coefficients are expected to remain primarily adsorbed to the surface of the soils and thus transportation with the groundwater would be very limited and at a much slower rate. Retardation factors in groundwater transport are discussed further in Appendix D. A general overview of the relative water solubility, tendency to adsorb to solids, and contaminant mobility for different categories of organic CPCs at Operable Unit 1 is presented as follows:

- Volatile organic compounds
  - High water solubility
  - High volatility

- Low tendency to adsorb to solids
- Generally transported dissolved in water or in air
- Operable Unit 1 examples include 1,2-DCE, 1,1,1-TCA, TCE, VC, and toluene

• Semivolatile organic compounds

- Medium to low water solubility
- Medium volatility
- Medium to high tendency to adsorb to solids
- Transport may occur dissolved in water, in air, or adsorbed to soil particles
- Operable Unit 1 examples include anthracene, chlorobenzene, and di-n-butylphthalate

• Pesticides, PCB's, and dioxins

- Low water solubility
- Low volatility
- High tendency to adsorb to solids
- Generally transported while adsorbed to soil particles
- Operable Unit 1 examples include chlordane, Aroclor-1248, and octachlorodibenzo-p-dioxin

5.3 MODELING OF POTENTIAL CONTAMINANT MIGRATION

Modeling was performed to predict the transport of contaminants within various media, and to estimate the concentrations of contaminants that potential receptors may be exposed to in the future. As part of the initial modeling process, screening of CPCs was performed to narrow down the list of compounds to be carried through the later, detailed modeling process. The screening included comparisons of observed concentrations against various criteria including background concentrations, risk levels, travel time constraints, etc., which is described in detail in Section E.2.3 of Appendix E. The following sections summarize the modeling of contaminant transport through groundwater, surface water, and air. Details regarding modeling activities for the contaminant fate and transport analysis are provided in Appendix D.

5.3.1 Surface Water Modeling

The modeling approach used to estimate contaminant concentrations in surface water and sediment resulting from transport by surface water runoff from Operable Unit 1 is described in this section. Modeling the transport of soil by runoff requires characterization of the contaminants in the initial soil or waste source term. Based on the runoff scenarios selected, runoff and partitioning models were used to quantify the migration of contaminants to stream sediment and surface water from erosion by runoff effluent.

Contaminants in surface soil can be released from source areas and transported to surface water via precipitation runoff. During a rainfall event, some amount of the rainwater infiltrates the soil surface and some runs off the surface as shown in Figure 5-4. The amount of runoff depends on soil type,

vegetative cover, the amount of moisture already present in the soil, and the intensity and duration of rainfall, slope length, and slope steepness.

Contaminants in the surface soil can be transported via runoff either in the dissolved phase or adsorbed to soil particles. The less soluble a contaminant is in water, the more likely it will be adsorbed to soil particles. Because the water solubility of contaminants in Operable Unit 1 can vary widely, transport is modeled for both dissolved-phase and adsorbed-phase contaminants.

Because Paddy's Run is in direct contact with the Great Miami Aquifer over a portion of its course, this section also describes the use of the surface water modeling results to define source terms for the aquifer modeling performed in Section D.3.

5.3.1.1 Conceptual Model

Surface runoff from Operable Unit 1 that reaches Paddy's Run in response to a rainfall event, was considered a significant potential pathway for contaminant migration to surface water. Paddy's Run, in turn, discharges to the Great Miami River. Sources that are potentially vulnerable to erosion by surface water flowing across Operable Unit 1 are the contaminated surface soils within Operable Unit 1. These soils can contribute to off-property contamination of surface water and sediment. Because Paddy's Run would receive any runoff from these soils and the area of Operable Unit 1 is relatively small, these soils are treated as one large source when assessing the impact of Operable Unit 1 on water quality in Paddy's Run and the Great Miami River. Surface soil contaminant concentrations used in the surface water assessment are the upper 95 percent confidence interval on the means of the surface soil concentrations reported in each individual sample for the CIS or RI/FS surface soil data bases for Operable Unit 1 (Table 5-1). For modeling purposes, compounds which were not detected (ND designations for 4 constituents in Table 5-1) in any available sample were assigned a value of zero in establishing the source concentrations.

Paddy's Run is an intermittent stream that begins north of the site and flows southward along the western edge of the FEMP. Prior to the completion of Removal Action No. 2, natural drainage from Operable Unit 1 flowed to Paddy's Run (Figure 5-5). Paddy's Run flows into the Great Miami River 1.5 miles south of the FEMP. Removal Action No. 2 was undertaken to minimize future runoff from reaching Paddy's Run. Field work was completed for the implementation of this removal action in July 1992, however, for the purpose of modeling runoff, the benefits of Removal Action No. 2 were ignored based on the 1000 year period of the modeling.

The direction of surface water flow is determined by examining the topographic map of the Operable Unit 1 study area presented in Figure 5-5. Figure 5-5 also provides information on the slope of the ground surface in the Operable Unit 1 study area, and the distance to the nearest receiving stream (Paddy's Run).

5.3.1.2 Technical Approach

The modeling approach used to estimate contaminant concentrations in surface water and sediment resulting from transport by surface water runoff is described here. Modeling the transport of soil by runoff requires characterization of the contaminants in the initial soil or waste source term.

A soil loss model obtained from the EPA "Superfund Exposure Assessment Manual," (EPA 1988b), the Modified Universal Soil Loss Equation (MUSLE), was used to quantify soil migration. The MUSLE model employs event-specific runoff volume and flow rate variables to calculate the soil loss for a single rainfall event. The MUSLE model was chosen to facilitate evaluation of an event-specific worst-case conservative scenario. The MUSLE model calculates the total mass of soil transported by surface water in a single rainfall event using event-specific runoff volume, storm duration, and flow rate variables.

The MUSLE model is used to model the amount of contaminated soil migrating to Paddy's Run from erosion by precipitation runoff. The MUSLE model is based on the following equation.

$$Y(s)_E = (CF)[(V_r)(q_p)]^{0.56})(K)(LS)(C)(P)$$

The MUSLE employs event-specific runoff volume and flow rate variables:

$Y(s)_E$	=	Soil loss in runoff (metric tons per event)
CF	=	Conversion factor (11.8 for metric units)
V_r	=	Volume of runoff (m^3)
q_p	=	Peak runoff flow rate (m^3/s)
K	=	Soil erodibility factor (metric tons/ha/unit erosion potential)
LS	=	Product of slope length factor and slope steepness factor (0.25, unitless)
C	=	Cover factor (unitless)
P	=	Erosion control practice factor (unitless)

Additional equations were used to describe contaminant partitioning between soil and water in the runoff flow. These partitioning equations provide an estimate of the contaminant concentration dissolved in water runoff and adsorbed to the soil that is carried with the runoff and deposited in the sediment of receiving surface water bodies (Haith 1980; Mills et al. 1982; Mockus 1972). The volume of runoff is also estimated to determine both the amount that stream flow may be increased by a runoff event, and to estimate dissolved contaminant loading.

Local meteorological data were used to obtain estimates of the amount and duration of rainfall at the site. The volume of surface water runoff flowing to Paddy's Run was estimated in the surface water runoff modeling using the SCS curve method. The surface runoff modeling was based on a single storm event (6.35 cm in 24 hours; Hershfield 1961). For modeling purposes, the flow rate in Paddy's Run of 410 m^3/hr generated by the storm was used.

Information on the soil types present was obtained from soil borings in Operable Unit 1 using the U.S. Soil Conservation Service designation, which is presented in detail in Section 3.0 of this RI report. The types and areal density of vegetation in Operable Unit 1 were provided by aerial photos, site reconnaissance and interviews with personnel familiar with the Operable Unit 1 study area.

Contaminant concentrations in Paddy's Run were calculated as simple dilutions of dissolved concentrations in surface water runoff. Contaminant concentrations in the Great Miami River are calculated as simple dilutions of dissolved concentrations in Paddy's Run. The results from Paddy's Run are compared to observed conditions as discussed in Subsection 5.3.1.3.

An average flow rate of 340,000 m^3/hr was used for the Great Miami River based on previous studies (DOE 1993a). For modeling purposes, it was assumed that all flow and contaminant mass in Paddy's Run empties into the Great Miami River and 30 percent infiltrates to the Great Miami Aquifer. Details regarding the surface water modeling process, as well as modeling uncertainties, are presented in Appendix D.

Source Determination

Sources that are potentially vulnerable to erosion by surface water flowing across Operable Unit 1 are the surficial materials in the Burn Pit and Waste Pits 1 through 4. In addition, surrounding contaminated surface soils can contribute to off-property contamination of surface water and sediment. Because Paddy's Run could receive runoff from these sources, all of these sources are treated as one large source when assessing the impact of Operable Unit 1 on water quality in Paddy's Run and the Great Miami River. Surface soil contaminant concentrations used in the surface water assessment are the upper 95 percent confidence interval on the means of the surface soil concentrations reported in each sample for the CIS or RI/FS surface soil data base in Operable Unit 1 (Table 5-1). Compounds which were not detected in any available sample were assigned a value of zero in establishing source concentrations.

5.3.1.3 Results of Surface Water Modeling

Results of the surface water modeling are presented in Table 5-2. These results show Paddy's Run loading, Paddy's Run sediment concentration, Paddy's Run concentration, and Great Miami River concentrations. The results show ranges in Paddy's Run concentrations from a minimum for Cesium-137 of 2.68 x 10^{-14} mg/L to a maximum for U-238 of 2.55 x 10^{-1} mg/L. Since a constant dilution factor converts Paddy's Run concentration to Great Miami River concentration (see discussion above), the constituents maintain the same relative concentrations in the Great Miami River although they are approximately 3 orders of magnitude lower. Paddy's Run sediment is predicted to have 7.24 x 10^2 mg/kg concentration of U-238 (the maximum constituent) and proportionally less of the remaining constituents (see Table 5-2). Organics and inorganics are modeled to be present at levels below 1 µg/L in surface water and in the 1 mg/kg range for sediments.

Comparison of Modeled Results to Measured Concentrations

Modeled concentrations in Paddy's Run surface water are compared to measured concentrations for several constituents in Table 5-3. Actual surface water concentrations are expected to vary over time, depending on the current rainfall pattern. Also, a direct comparison is limited by the scope of the surface water runoff model; only surface soil within the Operable Unit 1 study area are accounted for, while actual concentrations in Paddy's Run result from runoff from the entire stream drainage area including upstream contributions. In most of these cases, both modeled and measured concentrations in surface water samples are less than the reported detection limits for surface water samples. Modeled concentrations for lead are approximately 2 orders of magnitude less than measured concentrations which could be due to sources other than Operable Unit 1. Modeled activities for U-234 and U-238 are approximately 1 order of magnitude higher than measured activities.

The fact that modeled results for uranium are higher than the measured data suggests that the surface water runoff model is producing conservative estimates of surface water runoff from Operable Unit 1.

5.3.1.4 Uncertainties in the Model

The surface water model (like any other model) is a mathematical tool which simplifies the actual situation. Uncertainties in the output from the model are introduced from three primary sources:

- Input Variable Uncertainty: The accuracy of the model prediction is highly dependent on the accuracy of the input variables. Input variables such as the SCS runoff curve number, rainfall and runoff factor, soil erodibility factor, slope length and steepness factor, cover factor, etc. are approximate numbers representing the physical characteristics of a given site. The chemical-specific Kd values, used to calculate the fraction of contaminants sorbed to soil particles, are another source of uncertainty.

- Modeling Uncertainty: Any mathematical model representing a physical process tends to be simplified by making approximations and assumptions. The uncertainties in model predictions will increase with increased simplification of the model. Several portions of the surface water model equations consist of empirical equations, which are approximations of actual physical processes.

- Scenario Uncertainty: The assumption that the whole area of Operable Unit 1 acts as a point source of contamination, and the use of area-weighted average concentrations for the site will introduce some uncertainty in the model predictions. The biggest source of uncertainty and conservation is the assumption of failure of the caps on the waste pits and consequent exposure of the waste pit contents to surface water runoff.

5.3.1.5 Paddy's Run Loading to the Great Miami Aquifer

Because Paddy's Run lies directly in contact with the Great Miami Aquifer over a portion of its course, a contaminant migration pathway exists into the aquifer through the stream bed. Migration of contaminants in surface runoff to Paddy's Run from the surface soil in the Operable Unit 1 waste areas and from Paddy's Run to the Great Miami Aquifer has been designated an additional migration

pathway to groundwater. As discussed below, a screening procedure and method of deriving the contaminant loading to the Great Miami Aquifer from Paddy's Run based on the results of the surface water modeling was developed to account for this pathway in the groundwater fate and transport modeling.

Paddy's Run Screening

Figure 5-6 presents the surface water to groundwater pathway transport modeling diagram which shows the different steps that are involved in determining the CPC and the modeling process. Potential CPCs are first screened to remove constituents that pose insignificant risk. This screening is performed by taking the contaminated concentration in the runoff effluent (C_e) from MUSLE, and applying a Great Miami Aquifer dilution factor to this concentration to determine a theoretical Great Miami Aquifer concentration. This theoretical Great Miami Aquifer concentration was then compared to 10^{-7} risk based concentrations for carcinogens or 0.1 Hazard Quotient concentrations for non-carcinogens. These screening concentrations are derived by dividing the 10^{-6} risk based concentrations or Hazard Quotient of 1 concentrations for tap water (US EPA 1993) by 10. If theoretical Great Miami Aquifer concentrations are below the screening concentrations then the constituent is screened out and is not modeled in the aquifer (Table 5-4).

The Paddy's Run to Great Miami Aquifer dilution factor is determined by a mixing equation as described in detail in Section D.2.6. Table 5-4 shows the results of the Paddy's Run dilution screening of CPCs. Constituents requiring modeling with the Sandia Waste Isolation Flow and Transport (SWIFT) model are arsenic, Tc-99, U-234, and U-238. These contaminants are used as source terms for the Great Miami Aquifer groundwater modeling (SWIFT modeling). The groundwater model used in support of the risk analysis is a finite-difference computer model of groundwater flow and solute transport. The computer program used is SWIFT/386 Version 2.51.

Groundwater Loading from Paddy's Run

Based on the known areas of infiltration from Paddy's Run to the Great Miami Aquifer, a conceptual model was developed for the surface water pathway for the Operable Unit 1 waste areas. Surface water in Paddy's Run can infiltrate into the Great Miami Aquifer in locations where the stream bed lies in direct contact with the aquifer. Based on previous Paddy's Run infiltration studies (DOE 1993), 30 percent of the runoff effluent volume is assumed to infiltrate to the Great Miami Aquifer through Paddy's Run during storm events.

Table 5-4 shows the loading of contaminants to the Great Miami Aquifer from Paddy's Run. Uranium is the dominant constituent that reaches the aquifer, at a post-aquifer dilution concentration of 1.45 x 10^{-2} mg/L.

Using the results of the surface water modeling and constituent screening process, the loading rates of each compound were used to calculate the expected maximum concentration loading over time which would occur in the Great Miami Aquifer. The calibrated groundwater flow model for the FEMP was then used to simulate the solute transport of the compounds in the Great Miami Aquifer.

5.3.2 Groundwater Modeling and Transport Analysis

A summary of the fate and transport modeling for the groundwater pathway is presented in the following sections. Fate and transport modeling for groundwater consisted of two primary components: geochemical modeling of the waste units and their contaminants and transport modeling of contaminants as they migrate through the vadose zone and underlying Great Miami Aquifer.

The migration of water and dissolved contaminants from the waste source to the receptor involves flow through both unsaturated (vadose zone) and saturated zones (regional aquifer and perched zones). Flow and contaminant transport in these zones is affected by the permeability of the media, the driving gradient, and the saturation conditions. Another factor considered in fate and transport modeling is dispersion (mixing) in groundwater. Attenuation and retardation are also considered as factors and both factors may affect the transport of the solute through the system. The geochemical modeling and transport modeling are discussed in detail in Appendix D and are summarized in the following sections.

5.3.2.1 Conceptual Model

Based on characteristics of the material underlying the Operable Unit 1 waste areas, a conceptual model was developed for the pathway between the waste areas and receptor locations. The model was developed to account for the variable stratigraphies of the soils that are found within the waste areas of Operable Unit 1. Fluids and/or leachate entering from the waste areas migrates first through the unsaturated glacial overburden, then the unsaturated outwash deposits, and finally into the Great Miami Aquifer. The migration pathway for contaminated perched groundwater is consistent with the above conceptual model, with the exception that the glacial overburden thickness is halved to account for the position of the perched groundwater zones within the overburden.

The waste areas contained in Operable Unit 1 were assumed to remain in their existing locations and in their current conditions for the purposes of the fate and transport modeling. Waste Pits 1, 2, 3, and 4 remained in their covered states and Waste Pits 5 and 6, the Burn Pit, and the Clearwell were assumed to remain in their present states and to be exposed to the elements. Waste Pits 1 through 4 were assumed to remain essentially unchanged for the duration of the simulations, with a vegetative cover established on the surface. Runoff and evapotranspiration were assumed to occur following precipitation events. Waste Pits 5 and 6, the Burn Pit, and the Clearwell were all assumed to remain uncovered and open to incoming precipitation. In addition, precipitation was assumed to pond on the

surface of these units and either infiltrate or evaporate. No surface runoff or transpiration was allowed to occur at these waste pits.

The assumptions regarding waste pit conditions were made to provide a conservative estimate of contaminant transport.

The migration of contaminants from the source to the groundwater begins with the infiltration of rainwater (Figure 5-7). For inorganics and radionuclides, as the water percolates through the waste, contaminants in the waste are dissolved into the water to form a leachate. At the base of the waste, this leachate is referred to as Leachate A (shown in Figure 5-7). In addition to its contaminant concentrations, Leachate A is characterized by a number of chemical properties, which affect the fate and transport of contaminants (including Ph, redox potential, mineral solubility, and reaction equilibrium). Leachate A then migrates and reacts with the underlying glacial overburden to form a modified leachate, referred to as Leachate B. These interactions determine what chemical species are present in the percolating leachate, and how fast they will move in the unsaturated zone. In this analysis the composition of the leachate and the speed at which individual constituents migrate are be treated individually for each waste pit. For organic constituents, a leachate concentration is derived from the reaction of rainwater with waste solids. This leachate concentration is assumed to be unchanged by reaction with the glacial overburden material. Leachate B or Organic Leachate concentrations are used as initial inputs into the vadose zone modeling portion of the groundwater model. Leachate B concentrations were derived through geochemical modeling of Leachate A interactions with surrounding soils and groundwater, as described in Appendix D.1.

Perched groundwater in the glacial overburden contains abundant bicarbonate ion, and it is expected that pore water will have a chemical composition similar to the perched groundwater. As Leachate A migrates into the glacial overburden it will mix with pore water, resulting in a pH decrease and possible mineral precipitation (e.g., $Ca^{+2} + OH^- + HCO_3^- <-> CaCO_3 + H_2O$). In this reaction, calcium and hydroxide ions provided by Leachate A are free to react with bicarbonate ion in the pore water to form calcite and water. Such a reaction is likely because the perched groundwater, and by inference the pore water, is calculated to be saturated with respect to calcite. This type of reaction, and many others, will modify Leachate A as it migrates into the glacial overburden, and this modified leachate is referred to as Leachate B. Therefore, the conceptual model is set up to account for the distinct chemical reactions that occur in the different environments.

The flow and contaminant transport process in the vadose zone is based on the hydrogeology of the site. As discussed previously, the geology of the FEMP site is dominated by glacial sediments. A sequence of weathered and unweathered fine-grained till deposits interbedded with sand and gravel glaciofluvial stringers forms the uppermost geologic unit at the site. The layer of weathered brown silty till overlies the unweathered till, which consists primarily of gray silt and clay. This weathered

till layer is not included in the vadose zone modeling because the waste pits generally extend vertically through the weathered till. The uppermost layer in the vadose zone model (Layer 1) is the unweathered till. The thickness of this unit (referred as glacial overburden) ranges between 0 and 5 m (0 and 16 ft) for waste areas, as indicated in Table 5-5.

A thick sequence of saturated, well sorted sand and gravel outwash underlies the unsaturated outwash deposits, and forms the uppermost aquifer at the site (Great Miami Aquifer). The uppermost 6 to 8 m (20 to 25 ft) of the outwash deposits is unsaturated and forms model Layer 2 of the vadose zone conceptual flow model. This aquifer is divided by a clay interbed of variable thickness at an approximate depth of 37 m (120 ft). The receptor pathway considered for this analysis is the upper part of the Great Miami Aquifer above the clay interbed. The groundwater flow model simulates groundwater and contaminant migration through this portion of the Great Miami Aquifer.

All layer thicknesses were estimated using geologic cross sections based on boring logs generated during subsurface investigations conducted across the site.

Using the results of the vadose zone modeling, the loading rates of each compound were used to calculate the expected maximum concentration which would occur in the Great Miami Aquifer. These expected maximum concentrations were then compared to risk-based screening concentrations to determine if a significant amount of risk existed for each compound.

The calibrated groundwater flow model (SWIFT numerical code) for the FEMP was used to simulate the solute transport of the compounds in the Great Miami Aquifer. Based on the contaminant masses and the aquifer loading rates determined from the vadose zone modeling, loading periods were defined for each compound to reduce the amount of data entry required. In general, loading periods ranged from 10 to 200 years in length. Compounds with steady loading rates had long loading periods, while compounds with variable loading rates used short loading periods. This allowed the simulation of short loading "spikes" while at the same time minimizing data input and run times. Compounds of concern, as identified through the initial screening process, were loaded for a total of 1000 years in the Great Miami Aquifer or until their concentrations reduced below 1 billionth of the original loaded concentration.

5.3.2.2 Source Term Development for Vadose Zone and Groundwater Models

Analytical data for the waste areas were compiled and screened to identify those constituents that are of concern based on the requirements of the Operable Unit 1 Baseline Risk Assessment (Section 6.0 and Appendix E). A variety of radionuclides, inorganics, and organic compounds are included in the CPC. Waste area constituents and their corresponding contaminant inventory (as calculated in Appendix E) are presented in Appendix D.

1033

Methods of Estimating Leachate Concentrations

Geochemical data collected for the Operable Unit 1 study area were assessed in conjunction with mineral solubility calculations to estimate contaminant concentrations in leachate at the base of each Operable Unit 1 waste unit (Leachate A in Figure 5-7) and in modified leachate within the glacial overburden (Leachate B in Figure 5-7). Leachate concentrations are derived only for potential CPCs which are defined based on analysis of pit materials (Appendix D.1.0). All contaminant concentrations used as input data in the fate and transport model are constrained by (in order of preference): in situ leachate analyses (Appendix C, Sections C6 and C7), CIS surface water analyses (Appendix C, Sections C9 and C10), TCLP data (Appendix A, Sections A2 and A3), mineral solubility calculations using the EQ3/6 geochemical model, or the EPA 70-year rule (EPA 1988a).

The preferred data for estimating contaminant concentrations in Leachate A was analyses of in situ leachate. When these data were unavailable, an approach of using the best available data, the surface water or TCLP data, was followed. If in situ leachate or surface water analyses indicated that the compound was not detected, then the concentration of a particular potential CPC was conservatively estimated as the maximum detection limit value. TCLP data were screened to determine if the use of a contaminant concentration determined by the TCLP test would result in depletion of the contaminant inventory in less than 70-years. If the use of the TCLP concentration does not deplete the contaminant inventory in less than 70 years it is used to estimate Leachate A, but if its use depletes the inventory in less than 70 years it is discarded and the contaminant concentration moves to the next level of the hierarchy, mineral solubility calculations. Mineral solubility calculations are carried out for contaminants that lack in situ and TCLP data, or for contaminants which fail the TCLP screening. Inorganic and radionuclide contaminants that lack in situ and TCLP data and cannot be constrained by mineral solubility calculations are passed along to the 70-year rule calculation to estimate their Leachate A calculation. After all contaminant concentrations in Leachate A are constrained, a computer simulation reacts Leachate A with the glacial overburden minerals to produce Leachate B.

The logic behind using this decision hierarchy is to apply the best available site-specific data to the estimation of leachate compositions. Each successively lower step on this hierarchy represents a more conservative method for estimating contaminant concentrations in leachate. For example, using TCLP when in situ or surface water data are unavailable results in estimating a leachate composition derived by leaching with acid rather than rain water. The acetic acid leaching results in greater concentrations for many metals in leachate because acetic acid is a more aggressive leaching agent than rain water.

Results derived from the geochemical assessment and modeling (Appendix D.1) are used as initial contaminant concentrations in the vadose zone fate and transport model to predict contaminant concentrations at the top of the Great Miami Aquifer.

Uncertainties in Estimating Leachate Concentrations

Uncertainty is introduced into the estimation of leachate compositions whenever in situ leachate analyses are lacking. Surface water analyses used to estimate leachate composition probably reflect diluted in situ leachate residing within the void space of the waste. Given that dilution will also occur when leachate migrates into the underlying glacial overburden, the use of actual surface water analyses probably introduces less uncertainty than other types of data or methods used to calculate the leachate composition. The use of TCLP data to estimate leachate composition will probably result in contaminant concentrations that are greater than values expected for in situ leachate. As mentioned previously, this occurs due to the enhanced leaching by acetic acid versus rainwater. Using the EQ3/6 geochemical code to perform mineral solubility calculations requires that several assumptions be made about the mineralogy of the waste, the kinetics of the reactions, and the lack of treatment of organic constituents. These assumptions introduce uncertainties into the process of estimating leachate concentrations. Calculations carried out to estimate contaminant concentrations using the 70-year rule will introduce a large conservative uncertainty for all but the most soluble contaminants (e.g., bromide and cesium). The possibility exists to underestimate the contaminant concentration when the 70-year rule is applied to very soluble constituents.

Uncertainties in estimating leachate concentrations are discussed in more detail in Appendix D.1. The geochemical/leachate modeling results are summarized below.

Results of Geochemical Assessment/Leachate Estimation

Results of the geochemical assessment for the Operable Unit 1 waste pits are given in Tables 5-6 through 5-21. Leachates A and B contaminant concentrations were developed using the approach outlined in Figures 5-8 and 5-9.

Leachate A and B for Inorganics and Radionuclides

While the entire list of potential inorganic and radionuclide CPCs are shown on Tables 5-6 through 5-13, leachate concentrations are provided only for those constituents detected in the pit materials for the subject waste area.

For Waste Pit 1 (Table 5-6), in situ leachate analyses are available for ammonia, antimony, arsenic, barium, beryllium, boron, cadmium, cesium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, molybdenum, nickel, radium, silver, strontium, thorium, uranium, and vanadium. Only the technetium concentration is constrained by TCLP data. After reacting Leachate A with glacial overburden minerals using EQ3/6, results for Leachate B indicate that beryllium, chromium, manganese, mercury, strontium, thorium, and zinc concentrations have been lowered by mineral solubility. The remaining contaminant concentrations in Leachate B are identical to Leachate A.

Leachate A results for Waste Pit 2 (Table 5-7) show ammonia, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, molybdenum, nickel, nitrate, plutonium, radium, ruthenium, selenium, silver, strontium, thallium, uranium, vanadium, and zinc concentrations are constrained by in situ leachate analyses. Technetium and thorium are constrained by TCLP data. After reacting Leachate A with glacial overburden minerals using EQ3/6, results for Leachate B (Table 5-7) indicate that barium, beryllium, chromium, manganese, mercury, plutonium, strontium, thorium, and zinc concentrations have been lowered by mineral solubility. The remaining contaminant concentrations in Leachate B are identical to Leachate A.

Results for Waste Pit 3 are given in Table 5-8. Leachate A concentrations for ammonia, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, molybdenum, nickel, nitrate, plutonium, selenium, silver, strontium, technetium, thallium, tin, uranium, vanadium, and zinc are constrained by in situ leachate analyses. Radium and thorium are constrained by TCLP data. After reacting Leachate A with glacial overburden minerals using EQ3/6, results for Leachate B (Table 5-8) indicate that barium, beryllium, manganese, mercury, plutonium, silver, strontium, and zinc concentrations have been lowered by mineral solubility. The remaining contaminant concentrations in Leachate B are identical to Leachate A.

In Waste Pit 4 (Table 5-9), Leachate A concentrations for ammonia, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, molybdenum, nickel, plutonium, radium, selenium, silver, strontium, technetium, thorium, tin, uranium, vanadium, and zinc are constrained by in situ leachate analyses. Neptunium is constrained by TCLP data. After reacting Leachate A with pore water (perched groundwater) using EQ3/6, results for Leachate B (Table 5-9) indicate that barium, chromium, manganese, mercury, neptunium, plutonium, silver, strontium, thorium, and vanadium concentrations have been lowered by mineral solubility. The remaining contaminant concentrations in Leachate B are identical to Leachate A.

Leachate A results for Waste Pit 5 (Table 5-10) show antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, vanadium, and zinc concentrations are constrained by TCLP data. Cesium, neptunium, plutonium, ruthenium, selenium, silver, strontium, technetium, thallium, thorium, and uranium are constrained by in situ or surface water analyses and cyanide, molybdenum, radium, and tin by the 70-year rule. All contaminant concentrations in Leachate B are identical to Leachate A.

For Waste Pit 6 (Table 5-11), analyses are available for arsenic, barium, beryllium, lead, manganese, nickel, silver, thallium, and zinc and these concentrations are constrained by TCLP; and cadmium, chromium, cobalt, copper, cesium, neptunium, plutonium, technetium, thorium, radium, strontium, vanadium, and uranium by surface water or in situ data. Only tin is constrained with the 70-year rule. All contaminant concentrations in Leachate B are identical to Leachate A.

Results for the Burn Pit (Table 5-12) show antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, molybdenum, neptunium, nickel, plutonium, radium, selenium, silver, uranium, vanadium, and zinc concentrations are constrained by in situ leachate analyses. Technetium and thorium concentrations are set using TCLP data. After reacting Leachate A with pore water (perched groundwater) using EQ3/6, results for Leachate B (Table 5-12) indicate that barium, beryllium, lead, manganese, mercury, neptunium, plutonium, silver, strontium, thorium, and zinc concentrations have been lowered by mineral solubility. The remaining contaminant concentrations in Leachate B are identical to Leachate A.

In the Clearwell most Leachate A concentrations are constrained by surface water data (Table 5-13), TCLP data are unavailable and molybdenum, neptunium, and tin concentrations are fixed using the 70-year rule. All contaminant concentrations in Leachate B are identical to Leachate A.

Several observations on the data presented in Tables 5-6 through 5-13 warrant further discussion to clarify differences in reported concentrations for a given element. For any given contaminant concentration constrained by the 70-year rule, its concentration in Leachate A or B is proportional to its inventory abundance in the waste unit. Therefore, a waste unit with a higher contaminant inventory will yield a higher contaminant concentration when the 70-year rule is applied. In general, the same argument can be applied to contaminant concentrations constrained by TCLP data. That is, a waste unit with a higher contaminant inventory will generally yield a higher TCLP concentration for that element.

Organic Leachate

Results for organic leachate concentrations for Waste Pits 1 through 6, the Burn Pit, and Clearwell are presented in Tables 5-14 through 5-21, respectively. While the entire list of potential organic CPC for Operable Unit 1 as defined in Appendix D.1 are shown on each of these tables, leachate concentrations are provided only for organic constituents detected in the waste pit materials for the subject waste area.

In situ leachate analyses were available for organic CPC for Waste Pits 1, 2, 3, 4, and the Burn Pit (Tables 5-14, 5-15, 5-16, 5-17, and 5-20). When the in situ leachate analyses indicated that the constituent was not detected, the organic leachate concentration was conservatively estimated as the maximum detection limit value.

CIS surface water analyses were available for Waste Pits 5 and 6 and the Clearwell (Tables 5-18, 5-19, and 5-21). For all constituents except Aroclor-1254 and tetrachloroethane in Waste Pit 6, CPCs were not detected and the organic leachate concentration was conservatively estimated as the maximum detection limit value.

TCLP data were not used to constrain any organic leachate concentrations.

The EPA 70-year rule was used to calculate organic leachate concentrations for benzo(ghi)fluoranthene in Waste Pit 2 (Table 5-15), acenaphthylene and pentachlorophenol in Waste Pit 3 (Table 5-16), and the majority of the CPC in the Clearwell (Table 5-17).

Constituent Screening

The list of potential CPC is screened in several ways to eliminate constituents that pose insignificant risk from further analysis. These screening steps are performed because vadose zone and aquifer modeling require long computational times and to allow the analysis to focus on only those constituents that may potentially create significant risks. Figure 5-10 shows the different screening steps. These steps include pre-screening and background screening (performed and presented in other sections of the RI) and initial concentration, travel time, and vadose zone output concentration screening (presented in Appendix D). Tables 5-22 and 5-23 shows the list of potential CPCs and the results of different screening steps, showing the chemicals that remained after the various screening processes to make the final CPC list for groundwater modeling.

5.3.2.3 Vadose Zone Modeling

Vadose zone modeling was performed by using the results of the geochemical modeling (leachate concentrations) and initial screening as inputs into one-dimensional unsaturated flow models to simulate transport through the vadose zone to the Great Miami Aquifer. The one-dimensional unsaturated flow model used was ODAST, which simulates dispersion, retardation, and decay through unsaturated materials. The Hydrologic Evaluation of Landfill Performance (HELP) model was also used to estimate infiltration rates through the waste pits. Each waste unit was modeled separately with individual stratigraphy, contaminant type and concentration, and infiltration rate parameters, and each contaminant was simulated using retardation and decay factors taken from literature studies. The conceptual models for the waste pits consider the following:

- The contents of each waste pit
- The presence or absence of standing water in the waste pits
- The presence or absence of discrete caps
- The presence/absence of perched water in the waste pits areas
- The average concentration of contaminants in perched groundwater
- The identifiable geologic strata beneath the waste pits
- The presence/absence of sand lenses beneath the waste pits
- The thickness of each layer in the vadose zone
- The vertical permeability of the layers
- The interstitial fluid velocity through each layer based on saturation
- The dispersion coefficients of each layer
- The partition coefficients for each contaminant in each layer

The vadose zone was modeled as two layers, the glacial overburden underlying the waste pits (Layer 1) and the unsaturated portion of the underlying Great Miami Aquifer (Layer 2). Layer 1 soils consist of unweathered tills, present beneath six of the eight waste units in Operable Unit 1. Two of the

waste units, Waste Pit 3 and the Clearwell, are assumed to rest directly on the Great Miami Aquifer and thus have no Layer 1 unit. Beneath the unweathered till is the unsaturated sand and gravel outwash layer (Layer 2) present beneath all the waste units. The conceptual model and media parameters for the Operable Unit 1 waste pits are presented in Tables 5-5 and 5-24, respectively.

The vertical hydraulic conductivity values for Layer 1 are obtained by dividing the average horizontal hydraulic conductivities of 1000-series wells in the vicinity of Operable Unit 1 by 10. The vertical hydraulic conductivity for Layer 2 is obtained by dividing the horizontal hydraulic conductivity of the Great Miami Aquifer by 10. The factor of 10 represents a typical horizontal to vertical hydraulic conductivity ratio. The vertical hydraulic conductivity is estimated from 0.0114 to 0.0186 feet per day for Layer 1. The vertical hydraulic conductivity of Layer 2 is 45 feet per day for all of the Operable Unit 1 waste areas.

Flow and solute transport through porous media are not only determined by the parameters considered in the conceptual model described above, they are also affected by retardation factors (R_f) and decay rates. These parameters are both chemical- and media-specific. The retardation factors used for all the CPC for the vadose zone Layers 1 and 2, the radioactive decay constants for radionuclides, and the biodegradation coefficients for the organic constituents are discussed in detail in Appendix D.3. These retardation factors and decay rates are used in the screening process, analytical modeling of the vadose zone, and numeric modeling of the aquifer.

The retardation factor is used to account for those reversible reactions that slow the arrival of a contaminant front, but do not act as a sink. The R_f can be expressed as the ratio between the rate of groundwater movement and the rate of contaminant movement. The R_fs used have been revised from the Risk Assessment Work Plan Addendum (DOE 1992) based on more conservative assumptions (for transport) of organic content and moisture content (see Table 5-24). The radioactive decay constants and biodegradation coefficients were estimated based on the degradation rates (Howard et al. 1991) using the formulation presented in the Risk Assessment Work Plan Addendum (DOE 1992).

If constituents are detected in the Great Miami Aquifer sooner than their theoretical arrival time (as determined by the conceptual model parameters and chemical specific factors), then a direct leak loading term to the aquifer is created to represent the present concentration in the aquifer. In theory this term may represent leakage under conditions different than the present waste area configuration or leakage through previously leaky well casings.

A detailed description of the vadose zone modeling is presented in Appendix D.3.

Vadose Zone Modeling Results

Loading rates to the Great Miami Aquifer from each waste pit were estimated using ODAST. Table 5-25 provides a summary of the loading times and rates for the CPCs, which will reach the Great Miami Aquifer within 1000 years. The loading rates were used as input data for the SWIFT aquifer model to simulate the groundwater movement and solute transport in the Great Miami Aquifer. This table also presents the approximate number of years required for the CPCs from Operable Unit 1 to reach the Great Miami Aquifer and the maximum concentrations of compounds in the leachate that would be expected before being diluted in the aquifer. In addition, this table presents the maximum loading concentration and the corresponding time.

Table 5-25 shows that U-238 has the highest loading rate and loading concentrations at between 620 and 630 years for the waste area source. Uranium-234 and U-235 also contribute significant loading and concentrations at these times. Boron and vinyl chloride have the highest loading and concentration of the inorganic and organic constituents, respectively. For the perched groundwater source, U-238 again has the highest loading rate and loading concentrations at between 530 and 540 years.

Loading rates of a constituent from ODAST to the aquifer from a given source vary over time. Typically, loading rates experience a mild increase representing the dispersion front followed by a sharp increase representing the principle breakthrough of the constituent. They can then stabilize or decrease depending upon the depletion time of the source. Depletion times and rates vary with each constituent and waste pit as a function of contaminant type, concentration, and mass; waste pit configuration and associated soil characteristics; and infiltration rate.

5.3.2.4 Aquifer Modeling

The SWIFT III groundwater flow and contaminant transport model was used to assess contaminant transport through the Great Miami Aquifer. This calibrated groundwater flow model for FEMP was developed separate from the Operable Unit 1 RI/FS, and was used by Operable Unit 1 for the RI fate and transport modeling. A detailed description of the development, calibration, verification of the site-wide model is available in the Groundwater Modeling Report - Summary of Model Development (DOE 1993). The modeling approach taken for Operable Unit 1 is described in detail in Appendix D.3.0. The Operable Unit 1 fate and transport modeling involved incorporating the vadose zone modeling results to determine loading rates (both concentration and volume) to the Great Miami Aquifer from the waste pits. In addition, surface water infiltration from Paddy's Run to the great Miami Aquifer was used as another source term to the model. The model then simulated the transport of contaminants away from these source areas. Figure 5-11 presents a conceptual model of contaminant transport through groundwater. Dispersion, retardation, and decay were factored into the contaminant transport process. Compounds were simulated for a total of 1000 years or until their concentrations decreased below 1 billionth of the original concentration.

1783

The selected constituents to be modeled using SWIFT III were based on both the risk associated with human health from the ingestion of water from the Great Miami Aquifer and the time required for the constituent to migrate through the vadose zone to the Great Miami Aquifer. The modeling of contaminant migration through the vadose zone to the Great Miami Aquifer revealed that the peak concentrations of some constituents can be expected to be quite low at the point of reaching the aquifer. These concentrations would be further diluted in the aquifer. Consequently, the modeling of these contaminants in the aquifer was not considered necessary for the human health risk assessment. The risk decision to model a constituent in the aquifer was based on whether the concentration in the leachate at the point of entering the aquifer exceeded a predetermined screening level. The concentration in the leachate (before dilution in the aquifer) capable of producing a 10^{-7} lifetime risk of cancer or the concentration of the 0.1 Hazard Quotient for noncarcinogens was selected to be an appropriate and conservative screening level. If the predicted concentration of a given constituent (as it enters the aquifer) equals or exceeds the respective screening level concentration, the constituent was included in the aquifer modeling.

The second criteria applied to selection of the constituents to be modeled was an evaluation of travel time to the Great Miami Aquifer. Some of the compounds present in the wastes have high attenuation capacities and do not reach the Great Miami Aquifer within 1000 years, based on ODAST modeling results. These compounds were excluded from the SWIFT modeling, if they were also not present in groundwater monitoring data. If the constituents have been found in groundwater but were not projected to have reached the aquifer at the currently measured concentration, a direct leak term was added to the model to simulate the direct leakage of these constituents into the Great Miami Aquifer through leaky monitoring well casings that existed at Operable Unit 1 in the past but have since been sealed.

One modeling run was performed for each constituent that remained after the screening processes. The loading from each waste pit was entered into the SWIFT model as a discrete source, thus there were multiple sources for each constituent. The modeling runs produced simulations of the aggregate effects of loading from all of the waste pits, for the selected constituents. Table 5-25 lists the constituents that survived the various screening processes and were simulated using the SWIFT model. Loading concentrations and rates for each constituent are also included in the table.

In the case of U-234, U-235, and U-238, all three uranium isotopes were modeled as one radioelement to simplify the modeling and to allow the use of the previously calibrated total-uranium solute transport model. Because the uranium at the FEMP is mostly U-238 (approximately 99 percent by mass), this approach was considered appropriate.

1741

Aquifer Modeling Results

Table 5-26 shows the maximum concentrations of the various contaminants modeled in the aquifer and at the boundary of the site. Contour plots were made for selected constituents at different simulation times for CPCs from both the vadose zone and surface water pathways. These constituents include total uranium, cyanide, and tetrachloroethane. Contour plots are presented at 100 years, at the time of maximum concentration, and at 1000 years (see Appendix D.3). Figures 5-12 through 5-14 illustrate the uranium concentrations in the groundwater at the three selected time intervals due to loading from the Operable Unit 1 source areas. Uranium is shown because it is responsible for the bulk of the cumulative groundwater ingestion risk posed by constituents migrating from Operable Unit 1. For the waste area source, maximum uranium concentration in the aquifer of 12.5 mg/L occurred at 630 years, at a location adjacent to Waste Pit 4. For the perched groundwater source, the maximum concentration in the aquifer of 1.5×10^{-2} mg/L occurred at 540 years. Low levels of several other radiological constituents, organics, and inorganics were also modeled to be present. A maximum uranium concentration of 0.26 µg/L from the surface water pathway occurred at 10 years at coordinates N 481,311, E 1,377,790 (Table 5-27). No significant levels of any other CPCs were modeled to be present in the aquifer from the surface water pathway. From Figures 5-12 through 5-14, it can be observed that the contaminant plumes are moving to the east and southeast. This flow direction corresponds to the model flow field and is influenced by the high capacity SOWC water supply wells located east of the facility.

In general, contaminants with low retardation factors reach the Great Miami Aquifer earlier than the contaminants with high retardation factors. The contaminants that reach the aquifer are diluted and move laterally downgradient. Some contaminants reach the aquifer earlier due to direct leaking than if natural migration through the vadose zone layers was the only migration pathway.

In general, projected future increases of uranium concentrations within the aquifer are the most significant result of the modeling.

5.3.2.5 Uncertainty in Modeling Results

The groundwater fate and transport modeling performed for Operable Unit 1 is subject to uncertainty and variability due to factors such as the limited compound-specific characterization data, the inability of the models to simulate natural systems with 100 percent accuracy, and the assumptions for future site conditions for the waste units. Of these factors, the assumptions made for the future conditions of the waste units have the most impact on the modeling results. The waste units are all assumed to release contaminants to the environment without future maintenance. This is a worst case scenario and thus yields higher contamination levels than would be considered if a vegetative cover or cap was constructed. However, this type of assumption is the primary premise in performing a baseline assessment and the most conservative for the purpose of evaluating the risk from the groundwater pathway.

The inherent assumptions built into the models and the assumptions made to develop input parameters for the models also have an impact on the final results. The major uncertainty in the analysis is the estimation of parameters related to the attenuation and retardation of constituents. A conservative approach was used which may overestimate the concentrations of the leachate. The assumptions of total contact between the waste and the leaching fluid and no containment of the leachate will produce higher concentrations than would be anticipated under actual conditions.

The following sections discuss uncertainty associated with the different models used in the fate and transport modeling.

HELP Model

The HELP model is mainly sensitive to the parameters used to define evapotranspiration and runoff. The majority of water exiting the system is lost through these two mechanisms and thus the remaining water becomes the seepage passing through the waste unit. Evapotranspiration is controlled by the plant cover type used, which was assumed to be bare ground for the Operable Unit 1 simulations. A decrease in contaminant seepage and loadings would occur if vegetative cover were established, as the amount of water available for seepage would decrease.

Runoff in the HELP model is controlled by the Soil Conservation Study (SCS) runoff curve number used, which in turn is derived from the ground type, vegetation type, and land use. If any of these factors are incorrect, available water for seepage could change and thus loading to the aquifer would change.

A detailed description of the HELP model's sensitivity to various factors is included in Appendix.D.3.

ODAST Model

Sensitivity analyses were conducted on the vadose zone model ODAST by varying the Darcy velocity, the longitudinal dispersivity, and the layer thickness within the model to determine their impacts on the loading curves generated by the models. Data from a waste unit was used as a baseline for comparison and an unretarded, nondecaying contaminant was used. Longitudinal dispersivity, Darcy velocity, and layer thickness were all varied by a factor of two by both doubling and halving each of the parameters while all other inputs were held constant. The results of these analyses are discussed in detail in Appendix D.3.

The simulations show that for a given source loading rate, the peak concentration reached for a non-decaying solute is the same regardless of the values used for the tested parameters. This is shown by the peak loadings reached by the contaminant, which is 100 ppb for all cases studied. The main influence noted in all three cases has to do with the time required for maximum loading to occur at the base of the vadose zone. Longitudinal dispersion has a negligible impact on the time for loading to

reach the aquifer and the vadose models are not sensitive to its value. The models are sensitive to both Darcy velocity and layer thickness as these both directly control the transport time required to pass through the vadose zone. Doubled layer thicknesses or halved Darcy velocities cause a significant increase in the time required for contaminant to reach the aquifer and for maximum loading to occur. Likewise, halving the layer thicknesses and doubling the Darcy velocity causes a decrease in the times.

From sensitivity analysis, it was seen that the variation of different parameters affects the arrival time of the contaminant, however, there is no significant change in the peak concentration. It was observed that the peak concentration for uranium was always within 1 order of magnitude when steady state or peak concentration was reached.

When decay is combined with low seepage velocities and/or retardation due to adsorption, the contaminant concentration at the Great Miami Aquifer is significantly reduced.

The movement of organic constituents to the Great Miami Aquifer is greatly impeded by high biodegradation rates. For low seepage velocities and dispersion coefficients, the transport process is delayed and more time is available for degradation of the organic chemicals. Thus for organic chemicals, the peak concentrations were several orders of magnitude lower (or zero) with low-end as compared to high-end seepage velocities and dispersion coefficients.

SWIFT Model

Like the vadose zone models, SWIFT is mostly influenced by the solute transport parameters used to simulate contaminant movement through the aquifer. Of these, retardation is the least well defined and has the most impact on the fate of contaminants in the groundwater. Calibration of the SWIFT model for uranium was performed as part of the RI/FS process. The SWIFT flow model was calibrated by comparing hydraulic heads calculated by the model against heads measured in numerous monitoring wells throughout the FEMP and surrounding areas. The SWIFT solute transport model was calibrated by simulation of uranium transport in the Great Miami Aquifer (IT 1990a) over the period of operation at the FEMP. A portion of this calibration involved testing uranium retardation values to determine which value fit historical loading data and present day groundwater concentration data most accurately. Uranium retardation factors below 4 were found to transport uranium too quickly through the system and thus did not match historical data. Retardation factors above 15 were found to not match present day uranium distributions without large aquifer dispersion values, which were felt to be unrealistic. Consequently, a retardation factor of 12 was found to give the best match for uranium during the modeling process, which also fell within the range of the geochemical studies performed for uranium at the FEMP (IT 1989). This same value was used in uranium fate and transport modeling.

As described in Appendix D.3, "direct leak" terms had to be incorporated into the calibration process so that a better match between groundwater monitoring data and early concentrations of uranium and other constituents. The major parameter affecting solute transport is retardation. Higher retardation factors delay the appearance of a concentration peak at a receptor almost proportionately. Experimental determination of retardation factors for CPCs that have relatively large source terms and are relatively toxic is an important factor in reducing uncertainty in solute transport.

5.3.3 Air Transport Modeling

5.3.3.1 Introduction

An air transport analysis was conducted for Operable Unit 1 to support the determination of the fate and transport of contaminants in the baseline risk assessment. The objective of the air transport analysis is to estimate the maximum downwind ambient air concentrations for the current and future emission scenarios. The section provides an overview of the methodology, input data and results of the analysis. The reader is referred to Appendix D.4.0 for details regarding the technical approach, calculation procedures, and model output associated with the air transport analysis.

The analysis was conducted in accordance with EPA guidelines for air quality dispersion modeling and utilized on-site data whenever possible. Whenever on-site information was not available, conservative assumptions were made so as not to underestimate the impact from the Operable Unit 1 area in either emission scenario.

The methodology used to determine the maximum on-site and off-site concentrations included 3 principal tasks. The first task was to determine the emission rate for each contaminant associated with each Operable Unit 1 waste pit. Second, calculate downwind contaminant concentrations using representative emissions, meteorological and receptor data and an EPA-approved air dispersion model. The air dispersion model used in this analysis was the Industrial Source Complex Long Term 2 (ISCLT2) model. Third, model calculations of concentrations were postprocessed into tabular and graphical summaries for the purpose of identifying total contaminant impacts to the environment, for use in the baseline risk assessment.

5.3.3.2 Emission Scenarios

Operable Unit 1 consists of the following areas: Waste Pits 1 through 6, the Burn Pit, and the Clearwell. A map showing the location of the Operable Unit 1 source emission areas being addressed in this air transport analysis are shown in Figure 5-15. The reader is referred to Section 1.0 regarding process knowledge for a description of suspected wastes stored in these areas and Section E.3 of Appendix E regarding the conditions of each waste pit.

The conceptual emission scenarios for the Operable Unit 1 air transport analysis represented two physical configurations of the Operable Unit 1 site. The two emission scenarios examined current conditions of the Operable Unit 1 site and a future case study which assumed that the Operable Unit 1 site is part of a family farm.

In the current scenario, the Operable Unit 1 waste pits remain in their present state. Waste Pits 1, 2, 3, 4, and the Burn Pit are assumed to be a flat surface areas covered with contaminated surface soils. The conceptual model for the current scenario conservatively assumes that Waste Pit 4 is covered by contaminated surface soil, when in reality, Waste Pit 4 presently has a temporary RCRA cover. Waste Pits 5, 6 and the Clearwell are filled with water and are assumed to have no emissions. A recent site tour of Operable Unit 1 Waste Pits 1, 2, 3, and the Burn Pit indicates that these waste pits are almost completely covered by vegetation. In the current scenario, no vegetative cover was assumed for these waste pit areas in order to take a conservative approach regarding the wind erosion of contaminated surface soil materials. The current scenario also included Waste Pits 1, 2, and 3 as having emissions of radon gas.

In the future scenario, Waste Pits 1, 2, 4, and the Burn Pit remain covered with contaminated surface soil. Waste Pits 5 and 6 are assumed to be half-filled with water and the other halves of the pit materials are exposed to the air. The Clearwell remains completely covered with water. The cover of Waste Pit 3 is assumed to have failed, leaving the surface area of the pit material exposed to the air. Waste Pits 1 and 2 are irrigated and used to grow crops for human and animal consumption. For this condition, Waste Pits 1 and 2 are assumed to be covered by crop vegetation during a 6 month growing season. For the remaining 6 months of the year, Waste Pits 1 and 2 are assumed to have no vegetative cover. As a result, a 0.50 vegetative cover factor was applied to particulate emissions for Waste Pits 1 and 2 in the future scenario. This vegetative cover assumption is consistent with local agriculture practices. Waste Pits 1, 2, 3, 5, and 6 are assumed to have emissions of radon gas in the future scenario.

Because the Clearwell remains covered with in both the current and future scenarios, it was assumed to not have air emissions and is not given further consideration in the air transport analysis. Further discussion of the contaminant emission rates for each emission scenario is contained within Section 5.3.3.4 below.

5.3.3.3 Air Transport Contaminants

The contaminants associated with Operable Unit 1 were identified based on surface soil and waste pit material sampling data summarized within the Site-Wide Characterization Report. This sampling data has been compiled into a CPC database. The maximum upper confidence limit (UCL) surface soil and waste pit material contaminant concentrations in the CPC database were used in conjunction with the

air dispersion modeling results to calculate annual average CPC air concentrations for the current and future emission scenarios.

A review of the CPC database indicates that the Operable Unit 1 waste pit materials include organics, inorganics, and radionuclides. Radon gas is assumed to be a radioactive decay product of Ra-226 and U-238. Many of these contaminants are adsorbed onto soils or are particulates, while radon is released as a gaseous emission.

The volatilization of organics from the surface soils and the waste pit materials were evaluated as a possible source in both emission scenarios. All of the organic compounds found in the CPC database for the waste pit materials are considered to have relatively low vapor pressures and do not currently represent a significant source term on an annual basis. Also, over time the volatilization rate for the organics should gradually decrease and not be a significant source for the future scenario, when the waste pit cover is minimized. As a result, volatilization was not considered as a release mechanism for organics, however particulate transport of organics was modeled.

The emission sources and contaminants evaluated in the air transport analysis were developed from a review of the CPC database described above and the conceptual model developed for the current and future emission scenarios and are identified below:

- The release of radon gas from the surface soil of Waste Pits 1, 2, and 3 in the current scenario
- The release of radon gas from the surface soil of Waste Pits 1, 2, 3, and the exposed materials of Waste Pits 5 and 6 in the future scenario.
- The wind erosion of contaminated particulate matter from the surface soil of Waste Pits 1, 2, 3, 4, and the Burn Pit in the current scenario.
- The wind erosion of contaminated particulate matter from the surface soils of Waste Pits 1, 2, 4, and the Burn Pit and from the exposed waste pit materials in Waste Pits 3, 5, and 6 in the future scenario.

5.3.3.4 Contaminant Emission Rate Estimates

Contaminant emissions from the Operable Unit 1 waste pits were assumed to occur as a result of two principal release mechanisms for both emission scenarios: (1) wind erosion of contaminated particulate matter and (2) the direct release of radon gas.

The methodology used to calculate contaminant emission rates is discussed below. The reader is also referred to Appendix D.4.0 for additional details and examples of radon and particulate matter emission rate calculations.

Radon

Radon is a gaseous radioactive decay product of Ra-226. In this analysis, radon gas emissions were assumed to come from Waste Pits 1, 2, 3, 5, and 6.

In the current emissions scenario, Waste Pits 1, 2, and 3 are covered with surface soil and are the only sources of radon gas. Emission flux rates for these waste pits were obtained from sampling data gathered during a previous investigation conducted by Geotech in 1992 for the covered waste pit areas.

In the future emissions scenario, Waste Pits 1 and 2 remain covered with surface soil, while the entire surface of Waste Pit 3 is assumed to fail, resulting in the exposure of the waste pit contents to air. Also, Waste Pits 5 and 6 are half-filled with water, which results in exposing the other half of the waste pit's material to the air. Because cover materials such as soil and water inhibit the release of radon, the source term for radon at Waste Pits 3, 5 and 6 becomes higher in the absence of cover material.

The radon emission flux for Waste Pits 3, 5, and 6 in the future scenario was calculated using the RAECOM model assuming no cover material. Further information regarding the calculation of radon flux rates for Waste Pits 3, 5, and 6 in the future scenarios are given in Appendix D.4.1.

A listing of the radon emission flux rates used in the current and future scenario modeling for Waste Pit areas 1, 2, 3, 5, and 6 are shown in Table 5-28.

Contaminated Particulate Matter

In calculating the wind erosion emission rate for each CPC in this analysis, it was assumed that the contaminants were a constituent of the particulate.

The concentration or activity level of each contaminant was obtained from the CPC database. Soil sample data from the covers of Waste Pits 1, 2, 3, 4, and the Burn Pit were not available. However, sampling data for surface soils located immediately between the Operable Unit 1 waste pits, within the Operable Unit 1 source area, were used to represent the contamination of the soil covering the waste pits. These samples were assembled into a composite surface soil sample to estimate the contamination levels of the surface soils. Samples of individual waste pit materials were available from soil borings and used when calculating the impact from exposed waste pit material surfaces in the future emission scenario. Because the samples contained within the CPC database for each waste pit were summarized into a composite summary, the air transport analysis assumed that the contaminant concentration or activity level were uniformly distributed throughout each individual waste pit area. The contaminant concentrations or radionuclide activity levels used for each waste pit area, in each emission scenario, are shown in Tables 5-29 through 5-32.

4783

The methodology used for estimating particulate emissions due to wind erosion was based on the concept of "threshold friction velocity" (AU). The specific methodology, recommended by the EPA for estimating wind erosion rates from flat soil surfaces at hazardous waste sites, is described in various EPA documents (1985). The approach assumes that a minimum wind speed is required for the resuspension of particulate matter from the soil and that the emission rate is a function of two factors, specifically a) the TFV, and b) the erosion potential of the soils. The lower the TFV is, the higher the potential for erosion of the soil by the wind.

Various steps are required in the wind erosion emission rate calculation process using the TFV concept. These steps are described in further detail within Appendix D.4.2, along with the calculation used to calculate the wind erosion emission rate for Operable Unit 1 waste pit sources. The Operable Unit 1 waste pit areas are covered by spotty vegetation, however no vegetative cover was assumed for the surface soil in order to not underestimate the wind erosion source term.

5.3.3.5 Air Dispersion Modeling

The air transport modeling was conducted using a specific modeling protocol. The objective of the protocol was to use the most representative source area emissions data, on-site meteorological data in an air quality dispersion model to calculate annual average concentrations for all contaminants in the current and future emission scenarios. A general overview of the modeling protocol is discussed below. The reader is referred to Appendix D.4.3 for more specific details of model input data and model assumptions.

On-Site Meteorological Data

Meteorological and climatological data are required as input for the ISCLT2 dispersion model. This data includes wind speed, wind direction, atmospheric stability, ambient air temperature, and mixing height. The principal source of meteorological data was the on-site FEMP meteorological monitoring system which was installed in 1986. Other supplementary meteorological and climatological data, not available from the on-site system, was obtained from the National Weather Service (NWS) Office at the Cincinnati-Northern Kentucky International Airport and from the James A. Cox International Airport at Dayton, Ohio.

Climatological data regarding the annual average temperature and precipitation was obtained from both the FEMP on-site station and the NWS office at the Cincinnati-Northern Kentucky International Airport. Upper air data, in support of determining mixing heights was obtained from the James A. Cox International Airport at Dayton, Ohio.

A review of meteorological data measured and recorded at the FEMP monitoring station during the 1987-1992 period, indicates that the prevailing wind direction blows from the southwest. The on-site meteorological data was processed into a frequency distribution format known as the STability ARray

(STAR) format for input into the ISCLT2 model. STAR summaries for each annual period are given in Attachment D.I of Appendix D.4. Graphical illustrations of the wind roses for each of the 6 annual periods are given in Attachment D.II of Appendix D.4.0.

Modeling Approach

The ISCLT2 model was used to calculate annual average concentrations using a number of model options that allow the user to specify the atmospheric conditions of pollutant dispersion, the type of emission source and source emission parameters.

The selection of rural or urban dispersion coefficients for use in the ISCLT2 model was based on a land-use analysis conducted previously for the FEMP. The land use types within a 3-km radius of Operable Unit 1 were estimated from a review of USGS maps and a site survey of the area. Based on the review, no more than 10 percent of the area within a 3-km radius of Operable Unit 1 can be classified as industrial, commercial or compact residential. Therefore, the area was classified as rural for the purpose of dispersion modeling and rural dispersion coefficients were selected for use in the modeling.

All source emissions were assumed to result from either the resuspension of contaminated particulate matter due to wind erosion or the release of radon gas from contaminated waste pit areas. All Operable Unit 1 source areas were defined as area sources in the model and emission rates were in the units of grams or picoCuries per second per square meter $pCi/s/m^2$.

Because of the large number of contaminants that had to be addressed in this analysis, each waste pit source was modeled using a unit emission rate. Individual source concentration data for surface soils and waste pit materials was then used in conjunction with unit emission rate dispersion coefficients to calculate specific contaminant concentrations at all receptor locations.

Further detailed information regarding the modeling process can be found in Appendix D.4.3.

Receptor Network

The maximum annual contaminant concentrations resulting from both emission scenarios were determined by having the ISCLT2 model calculate concentrations at a number of receptor locations in various directions and distances from the Operable Unit 1 waste pit areas. Receptor points included locations within and outside the FEMP boundary.

Results of the ISCLT2 coarse grid modeling were reviewed to locate the areas of maximum on-site and off-site concentrations for each of the 6 years of meteorological data. A fine grid receptor network was then centered over each coarse grid maximum concentration location and remodeled with

ISCLT2. The fine receptor grid enabled the modeling analysis to improve the accuracy of the maximum concentration calculation for each emission scenario.

A discrete receptor network was also used to calculate annual average concentrations at sensitive locations. The discrete receptor network included four elementary schools, 1 middle/high school and 1 day nursery identified below:

(1) Crosby Elementary School
(2) Morgan Elementary School
(3) Elda Elementary School
(4) St. John Elementary School
(5) Ross Middle/High School
(6) Ross County Day Nursery

Additional information regarding the air transport receptor network, including illustrations of the coarse and fine receptor grids can be found in Appendix D.4.3.

5.3.3.6 Air Dispersion Modeling Results

This section presents the results of the air transport modeling. The modeling results for all potential contaminants in the current and future emission scenarios are presented separately. Maximum annual average concentrations associated with each emission scenario are provided for on-site and off-site receptor locations. In general, predicted on-site contaminant concentrations were higher than off-site contaminant concentrations, and the future scenario concentrations, both on site and off site, were higher than those predicted for their corresponding current scenario concentrations. An example copy of the ISCLT2 modeling output for one of the emission scenarios is given in Attachment D.II of Appendix D.4.0.

Current Scenario Results

Calculated maximum annual average on-site concentrations for all potential contaminants in the current emissions scenario are summarized in Tables 5-33 through 5-35. These maximum concentrations occurred in the modeling run using meteorological data from the 1989 annual period. The results are summarized by contaminant group respectively as radiological, inorganic and other contaminants. Concentrations are given as pCi/m^3 for radiological contaminants (except total uranium) and as μg/m^3 for inorganic and other contaminants. Also given for each contaminant is the location of the maximum annual average concentration in cartesian coordinates (x,y) in meters from the origin. The center of the Burn Pit was selected as the origin for this modeling analysis. The maximum predicted on-site concentration for all contaminants in the current scenario occurred immediately south of the receptor grid origin at x,y coordinate (0 meters,-50 meters). Radon, uranium, technetium, and thorium

were the radiological constituents predicted at the highest activity levels. The highest calculated inorganic concentration for inorganics was 0.16 $\mu g/m^3$ for manganese.

Tables 5-36 through 5-38 summarize the maximum annual average predicted off-site contaminant concentrations. These maximum concentrations occurred in the model run using meteorological data from the 1987 annual period. Contaminant concentration units are identical to those discussed above for the current on-site results. The maximum off-site annual predicted average concentrations for the current scenario occurred at receptor x,y coordinate (-450 meters, -150 meters) or west-southwest from the receptor origin at the western FEMP boundary. The radiological constituents radon, uranium, and thorium were modeled to be present at the highest activity levels.

Figures 5-16 to 5-21 show a graphical distribution of predicted ground level concentrations for three typical contaminants associated with the Operable Unit 1 current emissions scenario. These three contaminants are identified as arsenic, radon and U-238. The concentration distribution for each contaminant are presented in a series of two figures. The first figure for each contaminant gives an area wide perspective of the concentration distribution, while the second figure provides an inset view of the concentration distribution in the immediate vicinity of the Operable Unit 1, where the spatial change of contaminant concentrations is greatest.

Future Scenario Results

The maximum annual average future scenario on-site concentrations for radionuclides, inorganic and other contaminants are summarized in Tables 5-39 through 5-41. On a comparative basis, the future scenario concentrations were generally one order of magnitude higher than those calculated in the current scenario. Because the future scenario included no containment cover on all of Waste Pit 3, and one-half of Waste Pits 5, and 6, the point of maximum predicted concentration varied for many contaminants, however they were generally clustered at or just east and north of the receptor origin. Also, with the exposure of waste pit materials in the future scenario, several additional contaminants were introduced into the analysis. Radon, uranium, technetium, and thorium were the radiological constituents modeled to have the highest activity concentrations. Trace levels of both inorganics and organics were modeled to be transported to these locations.

Tables 5-42 through 5-44 summarize the maximum annual off-site concentrations for the future scenarios. With the exception of cesium 137 (Cs-137) and neptunium (Np-237), the maximum annual average concentration was calculated to be at receptor point (-450 meters, -150 meters). The maximum impact for Cs-137 and Np-237 was predicted at the off-site receptor point (-500 meters, -100 meters). Both of these maximum receptors are along the western FEMP boundary. The radiological constituents radon, uranium, technetium, and thorium were modeled to have the highest activity levels. The highest calculated off-site concentrations of inorganics and organics were 0.34 $\mu g/m^3$ of arsenic and 2.6×10^{-4} $\mu g/m^3$ of pentachlorophenol in airborne particulates. Figures 5-22 to

5-27 show the distribution of predicted ground-level concentrations for the constituents arsenic, radon, and U-238, respectively, in the future scenario.

Discrete Receptors

Maximum annual contaminant concentrations predicted for the current and future scenarios were also calculated for the six discrete potential receptors identified in Section 5.3.3.5. Contaminant concentrations calculated for the current scenario are given in Tables 5-45 through 5-47, whereas predicted concentrations for the future scenario are shown in Tables 5-48 through 5-50.

5.3.3.7 Uncertainties in the Air Transport Analysis

Virtually all aspects of the air transport analysis have some degree of uncertainty due to the approximations or assumptions primarily made for emission scenarios, and model input parameters. In an effort to try an account for some of these uncertainties, conservative assumptions were made so as to not underestimate risks.

In the Operable Unit 1 air transport analysis, most of the uncertainties can be related to the limitations of the air dispersion models, representativeness of the meteorological data, assumptions made in the conceptual model and the mathematical models used to predict the emission rate of contaminated particulate matter and radon gas.

Uncertainties are inherent in the mathematical algorithms used to simulate the transport and dispersion of air contaminants for all models. Dispersion models attempt to estimate the downwind concentration for specific receptor locations and averaging periods. These models attempt to account for different types of atmospheric conditions and other conditions influencing air dispersion. Despite these technical features, the models can still have difficulty calculating contaminant concentrations due to unknown conditions affecting source release and dispersion. Validation studies of model accuracy have shown that models are generally more reliable for long term averaging periods than for short term averaging periods and that models are reasonably accurate in estimating the magnitude of highest concentrations within an particular area. However, models can have difficulty predicting observed concentrations for a particular location and time period due to the affects of local topography, spatial and temporal variations in meteorology between the source and receptor or temporal fluctuations in source emissions. Topography is not expected to be an influencing factor in this analysis because the area modeled is essentially flat. Therefore, a thorough understanding of modeling assumptions and limitations should be known before interpreting model results.

The conceptual model used in the air transport analysis assumed that many of the waste pit areas will have particulate emissions as a result of wind erosion. The wind erosion of particulates is basically a function of vegetative cover, wind speed, particle size and soil moisture content. For the current emission scenario, the soil covered waste pits were assumed to have no vegetative cover, when in

reality these pits are almost completely covered by vegetation. The EPA recommended predictive model for calculating wind erosion emission rates assumed a conservatively low modal diameter for the surface soil and pit material particulate matter. The lower the modal diameter used in the calculation procedure, the higher the calculated wind erosion emission rate. In addition, the maximum UCL concentration value was used for the contaminants. All of these assumptions can lead to conservatively high estimates of the Operable Unit 1 impact from contaminated particulate matter in both the current and future emission scenarios.

The radon flux emission rate calculated for the exposed waste pit materials in the future scenario were calculated using the RAECOM model recommended by the EPA. Assumptions were made for certain input parameters to the model, such as radon emanation coefficient, radon diffusion coefficient and radon distribution coefficient. Conservative values were used for these parameters. Therefore, an uncertainty exists for the estimation of the radon emission rates for these waste pit areas.

Despite the lack of certain site specific input data at various points in the air transport analysis, the conservative approach of estimating input parameters serves to maintain the representativeness of the air transport analysis in support the baseline risk assessment.

5.3.3.8 Comparison of Model Predictions to Ambient Air Monitoring Data

In an effort to assess the relative impact of Operable Unit 1 for the current conditions, the air transport modeling results were compared to ambient monitoring data collected off site and along the Fernald site boundary. By comparing modeling results to annual average monitoring results, a perspective of the contribution from Operable Unit 1 to ambient air quality can be evaluated. The comparison made in this section has been limited to the contaminant radon for reasons discussed below. In view of the uncertainties inherent in the air transport modeling and the ambient monitoring data, the results of this comparison should be viewed qualitatively.

The FEMP conducts ambient monitoring for the contaminants radon, total suspended particulate (TSP) and gross beta. The contaminant radon was chosen for the comparison study because of the following reasons:

a) Direct measurements of radon flux were made for waste pit areas 1, 2, and 3. Source specific emissions measurement data are always preferred over theoretical estimations for the air transport modeling.

b) There are more ambient monitors measuring radon at various distances from Operable Unit 1 than for either TSP or for gross beta.

c) Due to the presence of agricultural farming land around the Fernald site, there could be many other sources of TSP other than the Operable Unit 1, particularly so because most of

Operable Unit 1 is currently vegetated and assumptions in the conceptual model conservatively evaluate nonvegetated surface areas.

d) Background data for radon was available from off-site monitors.

The Operable Unit 1 air transport analysis addressed 5 years of on-site meteorological data for the annual periods 1987 through 1992. The comparison of air transport modeling and ambient air quality was considered most relevant for the current emissions scenario and the most recently available radon monitoring data period which was 1992.

The sources of radon from Operable Unit 1 in the current emissions scenario were Waste Pits 1, 2, and 3. Emission flux rates for these waste pits were obtained from data gathered during a previous investigation conducted by Geotech in 1992 for the covered waste pit areas.

The results of this comparison study, for the current scenario, suggests that the maximum contribution from radon sources, will occur at the monitoring stations located closest to Operable Unit 1. However, the net contribution calculated by the ISCLT2 model from Operable Unit 1 appears to be relatively small and that other more significant sources of radon exist within the FEMP boundary.

The relative impact of Operable Unit 1 to overall ambient air quality can be evaluated by comparing air dispersion modeling results to FEMP ambient monitoring data. Currently, the ambient monitoring program at Fernald is limited to the radon, gross beta and total suspended particulate (TSP) at both on-site and off-site locations. A comparison of model concentration estimates to measured air quality data was reported in the air transport analysis conducted for the Operable Unit 4 Baseline Risk Assessment (August 12, 1993).

The comparison for Operable Unit 4 involved using radon as the fingerprint contaminant because of advantages relative to site-specific emissions data calculations and the large number of radon monitors currently operating on-site and off-site of the FEMP. Two modeling scenarios were considered in this comparison study involving pre-bentonite and post-bentonite cover installation at the K-65 silo area.

The ISCLT2 model predictions for the pre-bentonite period were reported to be comparable for the 1991 radon ambient monitoring data. At the stations where the sources within Operable Unit 4 had the dominant effect, the model predicted the annual average concentrations well within a factor of two. The average pre-bentonite ratio of the model to monitoring values was 1.39. For the post-bentonite period analysis, the model predictions fared better than for the pre-bentonite model predictions having an average ratio of 0.99. The results of the comparison study strongly suggest the representativeness of the ISCLT2 model to predict the contribution from FEMP sources of radon and potentially for other contaminants.

Operable Unit 1 ISCLT2 model predictions of radon for 1992 were compared to the 1992 Operable Unit 4 predictions at FEMP ambient monitoring stations. Results of the comparison indicated that predictions for Operable Unit 1, in the current scenario, were generally 3 to 8 times lower than impacts calculated for Operable Unit 4 in the post-bentonite scenario. The notable difference in this comparison is the fact that the radon source strength for Operating Unit 1 is lower because Operable Unit 4 is considered a dominant source of radon emissions at the FEMP. Overall, the predicted modeling results in both analyses are relatively close in predicted value.

Considering the agreement in model predictions for the Operable Unit 1 and Operable Unit 4 analyses and the potential uncertainties discussed above in Section 5.3.3, the ISCLT2 model predicted ambient concentrations of radon rather well and indicates that the model is capable of producing representative results for fate and transport applications in the Operable Unit 1 Baseline Risk Assessment.

5.4 SUMMARY OF CONTAMINANT FATE AND TRANSPORT

The fate and transport of the constituents contained in the Operable Unit 1 waste pits were evaluated to provide a basis for estimating current and future risks posed by Operable Unit 1. Contaminant concentrations were estimated for both on-site and off-site areas to provide a range of potential exposure scenarios. The fate and transport evaluation included modeling of surface water, groundwater, and air releases. Figure 5-28 shows the overall fate and transport modeling framework used to support the Operable Unit 1 baseline risk assessment. Conservative assumptions were built into the modeling process in order to provide a reasonable worst-case scenario regarding the migration of constituents from the waste pits and to account for uncertainties associated with the database and models. Screening of CPC was performed at various stages during the fate and transport assessment process, in order to effectively focus the evaluation on those compounds that could potentially pose some measure of risk through the various media.

The fate and transport analysis assumed that the waste pits would remain essentially in their current conditions, without any remedial actions taken. Since the leading alternatives for remediation of the waste pits include active remediation options such as excavation and disposal or capping, the approach taken regarding the waste pit configuration is likely to result in a gross overestimation of future contaminant migration from Operable Unit 1. The following discussions summarize the results of the evaluation of constituent migration from Operable Unit 1 through surface water, groundwater, and air.

5.4.1 Surface Water

The fate and transport evaluation for surface water assessed the potential impacts on Paddy's Run from contaminants transported to the stream via surface water runoff from the Operable Unit 1 area. Concentrations of various constituents were estimated in Paddy's Run for both surface water and sediments. In addition, the impacts of discharges of water from Paddy's Run to both the Great Miami River and Great Miami Aquifer were evaluated.

Based on the modeling results, uranium is the primary CPC migrating to Paddy's Run from the Operable Unit 1 area. Uranium concentrations are at least 3 orders of magnitude higher than any other constituent, and no other constituent is modeled to reach Paddy's Run at a concentration of 1 µg/L or higher. Paddy's Run surface water concentrations ranged from a minimum of 2.68 x 10^{-11} µg/L for Cs-137 to a maximum of 255 µg/L for U-238. Paddy's Run sediment is predicted to have a concentration of 7.24 mg/kg for U-238 (the maximum constituent) and proportionally less of the remaining constituents.

In general, the modeling results compare favorably with actual surface water sampling data for Paddy's Run.

Great Miami River concentrations for the various constituents are approximately 3 orders of magnitude lower than the Paddy's Run concentrations, due to dilution effects. As a result, no constituent from Operable Unit 1 is projected to increase the respective river concentrations by as much as 1 µg/L.

Because of the infiltration that occurs from Paddy's Run to the Great Miami Aquifer, dissolved contaminants in Paddy's Run can infiltrate into the Great Miami Aquifer in locations where the stream bed lies in direct contact with the aquifer. Modeling of Paddy's Run infiltration to the Great Miami Aquifer indicates that Uranium is the dominant constituent that reaches the aquifer, at a projected maximum concentration of 1.45 x 10^{-2} mg/L. This value is in general agreement with groundwater sampling data.

The results of the simulations of Paddy's Run infiltration to the Great Miami Aquifer were used as inputs to the groundwater fate and transport modeling.

5.4.2 Groundwater

Groundwater transport of contaminants from Operable Unit 1 is considered to be the most significant pathway for the migration of the wastes from Operable Unit 1, due to the physical setting of the waste pits. The Great Miami Aquifer, which is designated as a sole source aquifer and is extensively used for water supply in the region, underlies the waste pits with little or no glacial till separating the waste pits from the aquifer. The fate and transport evaluation for groundwater consisted of geochemical modeling to estimate leachate concentrations migrating from the waste pit, modeling of vadose zone transport vertically downward to the Great Miami Aquifer, and modeling of the transport of contaminants through groundwater. In addition, the infiltration of contaminated surface water from Paddy's Run to the aquifer was included as another source of contamination to groundwater.

Each constituent that was included in the groundwater transport portion of the modeling was modeled for a period of 1000 years or until the concentration in the aquifer decreased below 1 billionth of the

initial concentration. Two receptor points were evaluated with respect to the modeling, one on-site in the waste pit area and one at the downgradient property boundary.

As was the case with the surface water modeling, uranium was modeled to be present in the aquifer at the greatest concentrations, at a maximum on-site concentration of 12.5 mg/L after 630 years. Almost all of the modeled impacts were due to releases from the waste pits as opposed to the surface waste pathway. The maximum concentrations of other radiological constituents, organics, and inorganics were generally in the low µg/L range or lower.

5.4.3 Air

Current Scenario Results

Based on the calculated on-site concentrations for all potential contaminants in the current emissions scenario, radon was predicted at the highest activity concentration (28 pCi/m^3). Uranium, technetium, and thorium were the radiological constituents with the next highest activity concentrations at the location of maximum predicted concentrations, with activities in the 10^{-2} to 10^{-3} pCi/m^3 range.

In addition to the radiological constituents, trace levels of a variety of inorganics were modeled to be transported to this location. No predicted inorganic concentration exceeded a level of 10^{-1} µg/m^3, with manganese being the constituent with the highest concentration at 0.16 µg/m^3. Aroclor-1254 was modeled to have a maximum predicted concentration of 4×10^{-4} µg/m^3.

The maximum predicted on-site concentration for all contaminants in the current scenario occurred at a grid location 50 meters south of the center of the Burn Pit. The maximum predicted concentrations occurred for the model run using the 1989 meteorological data.

The maximum predicted off-site annual average concentrations for the current scenario occurred approximately 475 meters west-southwest from the center of the Burn Pit, at the FEMP boundary. Radon, uranium, and thorium were the radiological constituents projected at the highest levels, ranging from 1.0 (radon, 2.3 pCi/m^3) to 10^{-3} pCi/m^3.

In addition to the radiological constituents, trace levels of a variety of inorganics were modeled to be transported to this location. No predicted inorganic concentration exceeded a level of 10^{-2} µg/m^3, with manganese the compound with the highest predicted concentration at 1.5×10^{-2} µg/m^3. The maximum predicted off-site concentration of Aroclor-1254 was 3.5×10^{-5} µg/m^3.

The maximum predicted off-site contaminant concentrations occurred for the model run using the 1987 meteorological data.

4783

Future Scenario Results

Based on the calculated on-site concentrations for all potential contaminants in the future emissions scenario, radon was predicted at the highest activity concentration (480 pCi/m^3). Uranium, technetium, and thorium were the radiological constituents with the next highest predicted concentrations in the 10^{-1} pCi/m^3 range. On a comparative basis, the future scenario predicted concentrations were generally about one order of magnitude higher than those calculated in the current scenario. Trace levels of a variety of inorganics were also modeled to be transported to this location. No predicted inorganic concentration exceeded a level of 10^{-1} µg/m^3, with copper and lead having the predicted concentrations of 9.9 x 10^{-1} µg/m^3 and 1.4 x 10^{-1} µg/m^3, respectively. A variety of organics were also modeled to be transported at trace levels, with tetrachloroethane at the maximum concentration of 1.1 x 10^{-3} 4 µg/m^3.

The point of maximum predicted concentration varied for many contaminants, however they were generally clustered at or just east and north of the receptor origin within the Operable Unit 1 waste pit area. Also, with the exposure of waste pit materials in the future scenario, several additional contaminants, most notably dioxins and furans, were modelled for air transport. The maximum predicted concentrations occurred for the future scenario occurred with the 1989 meteorological database.

With the exception of Cs-137 and Np-237, the maximum off-site annual average concentrations for the future scenario occurred approximately 475 meters west-southwest from the center of the Burn Pit, at the FEMP boundary. The maximum impact for Cs-137 and Np-237 was predicted to occur along the western FEMP boundary approximately 500 feet south-southwest of the Burn Pit. As with the other simulations, radon, uranium, thorium, and technetium were the radiological constituents with the highest concentrations ranging from 10^{+1} (radon, 40 pCi/m^3) to 10^{-2} pCi/m^3.

Low levels of a variety of inorganics were also modeled to be transported. No predicted inorganic concentration exceeded a level of 10^{-1} µg/m^3, with arsenic, manganese, and barium the compounds with the highest concentrations at 3.4 x 10^{-1} µg/m^3, 2.8 x 10^{-1} µg/m^3, and 2 x 10^{-1} µg/m^3, respectively. A variety of organics were also modeled to be transported at trace levels, with no concentration exceeding 10^{-5} µg/m^3.

As was the case for the on-site scenario, predicted radiological concentrations for the future off-site scenario were approximately one order of magnitude lower than for the future on-site scenario. The exposure of waste pit materials in the future scenario resulted in several additional contaminants, most notably dioxins and furans being evaluated for transport. The maximum predicted off-site contaminant concentrations for the future scenario occurred with the 1987 meteorological data.

1053

TABLE 5-1

AVAILABLE POTENTIAL CONSTITUENT OF CONCERN CONCENTRATIONS IN SURFACE SOILS AT OPERABLE UNIT 1[a]

Constituent	Upper 95% CI Concentration
Inorganics[b]	
Antimony	27.2
Arsenic	4.9
Barium	56.9
Berylium	0.8
Cadmium	5.8
Chromium	14.3
Cobalt	10.4
Copper	17.0
Cyanide	0.3
Lead	15.9
Manganese	574.1
Mercury	0.1
Molybdenum	4.3
Nickel	29.4
Selenium	0.6
Silver	8.9
Thallium	0.7
Vanadium	19.6
Zinc	46.7
Organics[c]	
4,4'-DDT	ND[d]
Aroclor-1221	ND
Aroclor-1248	ND
Aroclor-1254	1400.0
Aroclor-1260	200.0
Radionuclides[e]	
Cesium-137	1.0

TABLE 5-1
(Continued)

Constituent	Upper 95% CI Concentration
Neptunium-237	0.5
Plutonium-238	0.4
Plutonium-239-240	0.1
Ruthenium-106	ND
Strontium-90	1.7
Technitium-99	8.7
Thorium-230	74.9
Thorium-232	4.3
Uranium-234	60.1
Uranium-235	6.8
Uranium-238	244.7
Uranium-Total	731.23[f] (mg/kg)

[a] Surface soil concentrations from the CIS surface soil data set.
[b] All concentrations in milligrams per kilogram (ppm).
[c] All concentrations in micrograms per kilogram (ppb).
[d] ND indicates constituent was not detected in any samples in the CIS surface soil data set.
[e] All concentrations in picocuries per gram (pCi/g) except Uranium-total which is in micrograms per gram (ppm).
[f] Uranium-Total concentration derived from Uranium-238 concentration from CIS surface soil data (244.7 pCi/g 0.337 [a conversion factor to micrograms per gram] 0.997 [ratio of U-238 to U-234 + U-235 + U-238]). All other radionuclide concentrations are in pCi/g.

1161

TABLE 5-2

MODELED CONCENTRATIONS IN PADDYS RUN AND THE GREAT MIAMI RIVER

MUSLE Constituents	Paddys Run Sediment Concentration (mg/kg)	Paddys Run Loading (lb/day)	Paddys Run Concentration Cw (mg/ℓ)	Great Miami River Concentration Cgmr (mg/ℓ)
Inorganics				
Antimony	2.720×10^{1}	4.000×10^{-7}	4.600×10^{-4}	5.540×10^{-7}
Arsenic	4.900×10^{0}	9.010×10^{-8}	1.040×10^{-4}	1.250×10^{-7}
Barium	5.69×10^{0}	1.840×10^{-7}	2.110×10^{-4}	2.541×10^{-7}
Beryllium	8.000×10^{-1}	2.260×10^{-9}	2.600×10^{-6}	3.133×10^{-9}
Cadmium	5.800×10^{0}	4.270×10^{-8}	4.900×10^{-5}	5.905×10^{-8}
Chromium	1.430×10^{1}	3.510×10^{-8}	4.030×10^{-5}	4.854×10^{-8}
Cobalt	1.040×10^{1}	6.950×10^{-8}	8.000×10^{-5}	9.626×10^{-8}
Copper	1.700×10^{1}	5.000×10^{-7}	5.750×10^{-4}	6.919×10^{-7}
Cyanide	8.92×10^{-2}	7.65×10^{-6}	8.80×10^{-3}	1.059×10^{-5}
Lead	1.590×10^{1}	1.950×10^{-8}	2.240×10^{-5}	2.699×10^{-8}
Manganese	5.74×10	1.17×10^{-5}	1.350×10^{-2}	1.623×10^{-5}
Mercury	9.90×10^{-2}	3.64×10^{-8}	4.19×10^{-5}	5.041×10^{-8}
Molybdenum	4.300×10^{0}	1.760×10^{-7}	2.020×10^{-4}	2.430×10^{-7}
Nickel	2.940×10^{1}	1.660×10^{-7}	1.910×10^{-4}	2.303×10^{-7}
Selenium	6.00×10^{-1}	2.98×10^{-9}	3.43×10^{-6}	4.128×10^{-9}
Silver	8.890×10^{0}	1.820×10^{-7}	2.090×10^{-4}	2.516×10^{-7}
Thallium	7.000×10^{-1}	1.72×10^{-9}	1.97×10^{-6}	2.376×10^{-9}
Vanadium	1.960×10^{1}	7.210×10^{-8}	8.290×10^{-5}	9.979×10^{-8}
Zinc	4.670×10^{1}	7.160×10^{-8}	8.230×10^{-5}	9.907×10^{-8}
Organics				
Aroclor-1254	1.400×10^{0}	7.690×10^{-11}	8.840×10^{-8}	1.064×10^{-10}
Aroclor-1260	2.000×10^{-1}	1.19×10^{-10}	1.37×10^{-7}	1.648×10^{-10}
Radionuclides				
Cesium-137	1.150×10^{-8}	2.330×10^{-17}	2.680×10^{-14}	3.232×10^{-17}
Neptunium-237	7.070×10^{-4}	4.730×10^{-11}	5.440×10^{-8}	6.544×10^{-11}

TABLE 5-2
(Continued)

MUSLE Constituents	Paddys Run Sediment Concentration (mg/kg)	Paddys Run Loading (lb/day)	Paddys Run Concentration Cw (mg/ℓ)	Great Miami River Concentration Cgmr (mg/ℓ)
Plutonium-238	2.333×10^{-8}	5.050×10^{-17}	5.810×10^{-14}	6.990×10^{-17}
Plutonium-239 and 240	1.610×10^{-6}	3.480×10^{-15}	4.000×10^{-12}	4.819×10^{-15}
Strontium-90	1.230×10^{-8}	4.530×10^{-15}	5.210×10^{-12}	6.276×10^{-15}
Technetium-99	2.760×10^{-4}	8.590×10^{-9}	9.880×10^{-6}	1.190×10^{-8}
Thorium-230	3.710×10^{-3}	2.350×10^{-12}	2.700×10^{-9}	3.256×10^{-12}
Thorium-232	3.930×10^{1}	2.490×10^{-8}	2.860×10^{-5}	3.448×10^{-8}
Uranium-234	9.540×10^{-3}	2.930×10^{-9}	3.360×10^{-6}	4.050×10^{-9}
Uranium-235	3.120×10^{0}	9.560×10^{-7}	1.100×10^{-3}	1.323×10^{-6}
Uranium-238	7.240×10^{2}	2.220×10^{-4}	2.550×10^{-1}	3.072×10^{-4}

1163

TABLE 5-3

COMPARISON OF MODELED RESULTS TO MEASURED SURFACE WATER CONCENTRATIONS IN PADDYS RUN

Constituent of Potential Concern[a]	Modeled Concentration in Paddy's Run[b]	Range of Measured Concentrations in Paddy's Run
Radionuclides (pCi/l)		
Thorium-230	5.45×10^{-2}	<1.0-2.3[c]
Thorium-232	3.13×10^{-3}	<1.0[c]
Uranium-234	2.10×10^{1}	1.2-3.6[c]
Uranium-238	8.55×10^{1}	2.0-6.8[c]
Inorganics (g/l)		
Cadmium	0.049	<2[d]
Chromium	0.0403	<10[d]
Copper	0.575	<10[d]
Lead	0.0224	7.4-9.3[d]
Nickel	0.191	<20[d]
Silver	0.0209	<10[d]

[a]COC listed only if measured data were available for comparison.
[b]Modeled from surface soil source term.
[c]From Operable Unit 4 Remedial Investigation, U.S. Department of Energy, 1993, Table 4-SW, surface water sample locations W-10 and W-11.
[d]ASI/IT, Geochemical Program Issues 3 and 5.

TABLE 5-4

PADDYS RUN LOADING - SCREENING FOR SWIFT

MUSLE Constituents	Runoff Effluent Concentration C_e (mg/ℓ)	Predicted Diluted Aquifer Concentration C_{GMA} (mg/ℓ)	10^{-7} Risk-Based or 0.1 Hazard Quotient Screening Level (mg/ℓ)	SWIFT Modeling Status
Inorganics				
Antimony	2.570×10^{-3}	2.603×10^{-5}	1.500×10^{-3}	No
Arsenic	5.780×10^{-4}	5.855×10^{-6}	4.60×10^{-6}	Yes
Barium	1.180×10^{-3}	1.195×10^{-5}	2.600×10^{-1}	No
Beryllium	1.450×10^{-5}	1.419×10^{-7}	1.900×10^{-6}	No
Cadmium	2.740×10^{-4}	2.775×10^{-6}	1.800×10^{-3}	No
Chromium	2.250×10^{-4}	2.279×10^{-6}	1.800×10^{-2}	No
Cobalt	4.470×10^{-4}	4.528×10^{-6}	2.0×10^{-1}	No
Copper	3.210×10^{-3}	3.251×10^{-5}	1.400×10^{-1}	No
Cyanide	4.910×10^{-2}	4.973×10^{-4}	1.800×10^{-2}	No
Lead	1.250×10^{-4}	1.266×10^{-6}	1.500×10^{-3}	No
Manganese	7.530×10^{-2}	7.627×10^{-4}	1.800×10^{-2}	No
Mercury	2.340×10^{-4}	2.370×10^{-6}	1.100×10^{-3}	No
Molybdenum	1.130×10^{-3}	1.145×10^{-5}	1.800×10^{-2}	No
Nickel	1.070×10^{-3}	1.084×10^{-5}	7.300×10^{-2}	No
Selenium	1.920×10^{-5}	1.945×10^{-7}	1.800×10^{-2}	No
Silver	1.170×10^{-3}	1.185×10^{-5}	1.800×10^{-2}	No
Thallium	1.100×10^{-5}	1.114×10^{-7}	2.900×10^{-4}	No
Vanadium	4.630×10^{-4}	4.690×10^{-6}	2.600×10^{-2}	No
Zinc	4.600×10^{-4}	4.659×10^{-6}	1.100×10^{-10}	No
Organics				
Aroclor-1254	6.460×10^{-6}	6.543×10^{-8}	1.00×10^{-5}	No
Aroclor-1260	7.640×10^{-7}	7.739×10^{-9}	1.00×10^{-5}	No
Radionuclides				
Cesium-137	1.500×10^{-13}	1.519×10^{-15}	2.200×10^{-12}	No
Neptunium-237	3.040×10^{-11}	3.079×10^{-9}	3.400×10^{-8}	No
Plutonium-238	3.240×10^{-11}	3.282×10^{-15}	1.400×10^{-12}	No

TABLE 5-4
(Continued)

MUSLE Constituents	Runoff Effluent Concentration C_e (mg/ℓ)	Predicted Diluted Aquifer Concentration C_{GMA} (mg/ℓ)	10^{-7} Risk-Based or 0.1 Hazard Quotient Screening Level (mg/ℓ)	SWIFT Modeling Status
Plutonium-239/240	2.240×10^{-11}	2.269×10^{-13}	3.700×10^{-10}	No
Strontium-90	2.910×10^{-11}	2.948×10^{-13}	1.100×10^{-12}	No
Technetium-99	5.520×10^{-5}	5.591×10^{-7}	2.400×10^{-7}	Yes
Thorium-230	1.510×10^{-8}	1.529×10^{-10}	2.000×10^{-8}	No
Thorium-232	1.600×10^{-4}	1.621×10^{-6}	2.900×10^{-4}	No
Uranium-234	1.880×10^{-5}	1.904×10^{-7}	5.300×10^{-8}	Yes
Uranium-235	6.140×10^{-3}	6.219×10^{-5}	1.500×10^{-4}	No
Uranium-238	1.430×10^{-0}	1.448×10^{-2}	5.600×10^{-4}	Yes

TABLE 5-5

VADOSE ZONE MODEL INPUT PARAMETERS
OPERABLE UNIT 1

Waste Unit	Layer	Thickness (ft)	K_v (ft/day)	q (ft/day)	V_x (ft/day)	D_x (ft^2/day)
Waste Pit 1	1	2.0	1.140×10^{-2}	7.500×10^{-4}	2.453×10^{-3}	8.231×10^{-4}
	2	24.3	4.500×10^{1}	7.500×10^{-4}	5.176×10^{-3}	1.052×10^{-3}
Waste Pit 2	1	13.0	1.140×10^{-2}	1.380×10^{-3}	4.407×10^{-3}	9.855×10^{-4}
	2	20.0	4.500×10^{1}	1.380×10^{-3}	9.016×10^{-3}	1.398×10^{-3}
Waste Pit 3	1	0.0				
	2	23.7	4.500×10^{1}	2.240×10^{-3}	1.401×10^{-2}	1.872×10^{-3}
Waste Pit 4	1	13.0	1.860×10^{-2}	2.440×10^{-3}	7.768×10^{-3}	1.283×10^{-3}
	2	21.7	4.500×10^{1}	2.440×10^{-3}	1.514×10^{-2}	1.983×10^{-3}
Waste Pit 5	1	13.3	1.830×10^{-3}	3.670×10^{-3}	1.149×10^{-2}	1.630×10^{-3}
	2	23.0	4.500×10^{1}	3.670×10^{-3}	2.196×10^{-2}	2.665×10^{-3}
Waste Pit 6	1	15.9	1.670×10^{-2}	5.360×10^{-3}	1.648×10^{-2}	2.114×10^{-3}
	2	24.3	4.500×10^{1}	5.360×10^{-3}	3.099×10^{-2}	3.607×10^{-3}
Burn Pit	1	12.9	1.410×10^{-2}	6.430×10^{-4}	2.133×10^{-3}	7.976×10^{-4}
	2	21.7	4.500×10^{1}	6.430×10^{-4}	4.500×10^{-3}	9.935×10^{-10}
Clearwell	1	0.0				
	2	23.7	4.500×10^{1}	2.290×10^{-3}	1.429×10^{-2}	1.900×10^{-3}

K_v - vertical hydraulic conductivity
q - vertical flow rate
V_x - vertical seepage velocity
D_x - longitudinal dispersion coefficient

1167

TABLE 5-6

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - PIT 1

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
pH	11.8 SU	NA[c]	6.75 SU	EQ3/6
Eh	-0.190 V	NA	+0.400 V	EQ3/6
Antimony	0.3225	ISL	0.3225	ISL
Arsenic	0.0028	ISL	0.0028	ISL
Barium	1.9236	ISL	1.9236	ISL
Beryllium	0.0774	ISL	1.83×10^{-3}	BeO
Boron	1.2279	ISL	1.2279	ISL
Cadmium	0.0414	ISL	0.0414	ISL
Cesium-137[d]	1.2×10^{-10}	mdl-ISL	1.2×10^{-10}	mdl-ISL
Chromium	0.1929	ISL	3.42×10^{-4}	CrO_2
Cobalt	1.3215	ISL	1.3215	ISL
Copper	0.0832	ISL	0.0832	ISL
Cyanide	0.5437	ISL	0.5437	ISL
Lead	0.0048	ISL	0.0048	ISL
Manganese	208.3633	ISL	0.0771	carb.SS[e]
Mercury	0.0002	ISL	1.8×10^{-10}	calomel
Molybdenum	0.3605	ISL	0.3605	ISL
Neptunium-237				
Nickel	8.2943	ISL	8.2943	ISL
Nitrate	194.7	ISL	194.7	ISL
Plutonium-238				
Plutonium-239 and 240				
Radium-226[d]	1.213×10^{-7}	ISL	1.213×10^{-7}	ISL
Ruthenium-106				
Selenium				
Silver	0.1181	ISL	0.1181	ISL

TABLE 5-6
(Continued)

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Strontium-90[d]	9.12×10^{-11}	ISL	2.84×10^{-14}	carb.SS
Technetium-99[d]	2.18×10^{-6}	TCLP	2.18×10^{-6}	TCLP
Thorium-230	2.57×10^{-8}	mdl-ISL	2.08×10^{-9}	ThO_2
Thorium-232	0.0046	mdl-ISL	2.08×10^{-9}	ThO_2
Thorium-Total[d]	0.0015	mdl-ISL	2.08×10^{-9}	ThO_2
Uranium-234[d]	5.75×10^{-4}	ISL	5.75×10^{-4}	ISL
Uranium-235[d]	1.24×10^{-1}	ISL	1.24×10^{-1}	ISL
Uranium-238[d]	11.93	ISL	11.93	ISL
Uranium-Total[d]	10.8615	ISL	10.86	ISL
Vanadium	0.1103	ISL	0.1103	ISL
Zinc	0.2115	ISL	3.54×10^{-4}	carb.SS

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by EQ3/6 Geochemical Code (EQ3/6) Toxicity Characteristic Leaching Procedure (TCLP), in situ leachate (ISL), maximum detection limit (mdl), US EPA 70-year rule (70-year), or by solubility with respect to the indicated mineral phase.

[c] NA = Not applicable.

[d] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot (\text{gram formula wt}) \cdot (\text{Activity in pCi}/\ell) \cdot (\text{half-life in years})$

[e] carb.SS is carbonate solid solution which includes calcite, magnesite, rhodochrosite, siderite, strontianite, and smithsonite components.

TABLE 5-7

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - PIT 2

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
pH	10.3 SU	NA[c]	6.52 SU	EQ3/6
Eh	-0.108 V	NA	+0.415 V	EQ3/6
Ammonia	275.	ISL	275.	ISL
Antimony	0.571	ISL	0.571	ISL
Arsenic	0.0677	ISL	0.0677	ISL
Barium	0.449	ISL	0.1564	barite
Beryllium	0.0057	ISL	0.004	BeO
Boron	2.82	ISL	2.82	ISL
Cadmium	0.279	ISL	0.279	ISL
Cesium-137	1.2×10^{-10}	mdl-ISL	1.2×10^{-10}	mdl-ISL
Chromium	0.0889	ISL	4.59×10^{-4}	CrO_2
Cobalt	0.595	ISL	0.595	ISL
Copper	0.145	ISL	0.145	ISL
Cyanide	0.0316	ISL	0.0316	ISL
Lead	0.0183	ISL	0.0183	ISL
Manganese	4.52	ISL	3.93×10^{-3}	carb.SS[d]
Mercury	0.0046	ISL	9.8×10^{-11}	calomel
Molybdenum	1.57	ISL	1.57	ISL
Neptunium-237[e]				
Nickel	0.189	ISL	0.189	ISL
Nitrate	4,650.	ISL	4,650.	ISL
Plutonium-238	2.9×10^{-11}	mdl-ISL	6.59×10^{-11}	PuO_2
Plutonium-239 and 240	8.03×10^{-9}	mdl-ISL	6.59×10^{-11}	PuO_2
Radium-226[e]	2.82×10^{-7}	ISL	2.82×10^{-7}	ISL
Ruthenium-106	2.24×10^{-11}	mdl-ISL	2.24×10^{-11}	mdl-ISL
Selenium	0.0583	ISL	0.0583	ISL

1070

TABLE 5-7
(Continued)

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Silver	0.115	ISL	0.115	ISL
Strontium-90[e]	4.7×10^{-11}	ISL	3.14×10^{-14}	carb.ss
Technetium-99[e]	5.33×10^{-6}	TCLP	5.33×10^{-6}	TCLP
Thallium	0.0055	ISL	0.0055	ISL
Thorium-230	9.3×10^{-8}	TCLP	2.05×10^{-9}	ThO_2
Thorium-232	0.0046	mdl-TCLP	2.05×10^{-9}	ThO_2
Thorium-Total[e]	0.0084	TCLP	2.05×10^{-9}	thorianite
Tin				
Uranium-234[e]	1.74×10^{-4}	ISL	1.74×10^{-4}	ISL
Uranium-235[e]	3.68×10^{-2}	ISL	3.68×10^{-2}	ISL
Uranium-238[e]	3.73	ISL	3.73	ISL
Uranium-Total[e]	3.65	ISL	3.65	ISL
Vanadium	0.334	ISL	0.334	ISL
Zinc	0.063	ISL	2.44×10^{-4}	carb.SS

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by EQ3/6 Geochemical Code (EQ3/6) Toxicity Characteristic Leaching Procedure (TCLP), in situ leachate (ISL), maximum detection limit (mdl), US EPA 70-year rule, or by solubility with respect to the indicated mineral phase.

[c] NA = Not applicable.

[d] carb.SS is carbonate solid solution which includes calcite, magnesite, rhodochrosite, siderite, strontianite, and smithsonite components.

[e] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot (\text{gram formula wt}) \cdot (\text{Activity in pCi}/\ell) \cdot (\text{half-life in years})$

[f] No concentration units have been specified for F and NO_3 in the data sets but these are assumed in ppm of mg/ℓ.

1071

TABLE 5-8

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - PIT 3

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
pH	7.7 SU	NA[c]	6.54 SU	EQ3/6
Eh	+0.115 V	NA	+0.118 V	EQ3/6
Ammonia	2,625.	ISL	2,625.	ISL
Antimony	0.656	ISL	0.656	ISL
Arsenic	1.49	ISL	1.49	ISL
Barium	0.526	ISL	0.061	barite
Beryllium	0.0081	ISL	0.0041	BeO
Boron	5.48	ISL	5.48	ISL
Cadmium	0.311	ISL	0.311	ISL
Cesium-137[d]				
Chromium	0.182	ISL	0.182	ISL
Cobalt	0.137	ISL	0.137	ISL
Copper	0.782	ISL	0.782	ISL
Cyanide	1.27	ISL	1.27	ISL
Lead	1.61	ISL	1.61	ISL
Manganese	132.	ISL	0.197	carb.SS[e]
Mercury	0.0988	ISL	2.16×10^{-11}	calomel
Molybdenum	2.8	ISL	2.8	ISL
Nickel	0.0473	ISL	0.0473	ISL
Nitrate	6,574.	ISL	6,574.	ISL
Plutonium-238[d]	2.9×10^{-11}	mdl-ISL	2.9×10^{-11}	mdl-ISL
Plutonium-239 and 240	8.03×10^{-9}	mdl-ISL	6.9×10^{-11}	PuO_2
Radium-226[d]	1.95×10^{-8}	TCLP	1.95×10^{-8}	TCLP
Ruthenium-106[d]				
Selenium	0.14	ISL	0.14	ISL

TABLE 5-8
(Continued)

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Silver	0.165	ISL	0.0285	Ag
Strontium-90[d]	7.5×10^{-10}	ISL	8.3×10^{-13}	carb.SS
Technetium-99[d]	2.06×19^{-5}	ISL	2.06×10^{-5}	ISL
Thallium	0.107	ISL	0.107	ISL
Thorium-230[d]	5.5×10^{-8}	TCLP	1.95×10^{-9}	ThO_2
Thorium-232[d]	0.0046	mdl-TCLP	1.95×10^{-9}	ThO_2
Thorium-Total[d]	0.0029	mdl-TCLP	1.95×10^{-9}	ThO_2
Tin	0.2	ISL	0.2	ISL
Uranium-234[d]	2.57×10^{-4}	ISL	2.57×10^{-4}	ISL
Uranium-235[d]	0.0367	ISL	0.0367	ISL
Uranium-238[d]	7.42	ISL	7.42	ISL
Uranium-Total[d]	4.96	ISL	4.96	ISL
Vanadium	1.24	ISL	1.24	ISL
Zinc	0.158	ISL	1.16×10^{-3}	carb.SS

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by EQ3/6 Geochemical Code (EQ3/6) Toxicity Characteristic Leaching Procedure (TCLP), in situ leachate (ISL), maximum detection limit (mdl), US EPA 70-year rule, or by solubility with respect to the indicated mineral phase.

[c] NA = Not applicable.

[d] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot (\text{gram formula wt}) \cdot (\text{Activity in pCi}/\ell) \cdot (\text{half-life in years})$

[e] carb.SS is carbonate solid solution which includes calcite, magnesite, rhodochrosite, siderite, strontianite, and smithsonite components.

TABLE 5-9

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - PIT 4

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
pH	7.1 SU	NA[c]	6.88 SU	EQ3/6
Eh	0.2221 V	NA	+0.257 V	EQ3/6
Ammonia	81.2	ISL	81.2	ISL
Antimony	0.956	ISL	0.956	ISL
Arsenic	0.0025	ISL	0.0025	ISL
Barium	2.79	ISL	0.0441	barite
Beryllium	0.0809	ISL	7.12×10^{-4}	ISL
Boron	2.93	ISL	2.93	ISL
Cadmium	0.118	ISL	0.118	ISL
Cesium-137[d]				
Chromium	2.22	ISL	0.0406	CrO_2
Cobalt	0.338	ISL	0.338	ISL
Copper	0.643	ISL	0.643	ISL
Cyanide	0.0265	ISL	0.0265	ISL
Lead	0.002	ISL	0.002	ISL
Manganese	588.	ISL	5.98×10^{-3}	carb.SS[e]
Mercury	0.0002	ISL	8.8×10^{-9}	calomel
Molybdenum	0.629	ISL	0.629	ISL
Neptunium-237[d]	5.11×10^{-7}	TCLP	1.45×10^{-9}	NpO_2
Nickel	2.13	ISL	2.13	ISL
Nitrate	7.3	ISL	7.3	ISL
Plutonium-238[d]	2.86×10^{-11}	mdl-ISL	2.86×10^{-11}	mdl-ISL
Plutonium-239 and 240	8.03×10^{-9}	mdl-ISL	1.01×10^{-10}	PuO_2
Radium-226[d]	9.4×10^{-9}	ISL	9.4×10^{-9}	ISL
Ruthenium-106[d]				
Selenium	0.0025	ISL	0.0025	ISL

783

TABLE 5-9
(Continued)

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Silver	1.16	ISL	0.056	Ag
Strontium-90[d]	1.22×10^{-10}	ISL	7.31×10^{-13}	carb.SS
Technetium-99[d]	2.07×10^{-5}	ISL	2.07×10^{-5}	ISL
Thallium				
Thorium-230[d]	2.7×10^{-7}	ISL	2.1×10^{-9}	ThO_2
Thorium-232[d]	0.0087	mdl-ISL	2.1×10^{-9}	ThO_2
Thorium-Total[d]	0.017	ISL	2.1×10^{-9}	thorianite
Tin	0.2	mdl-ISL	0.2	mdl-ISL
Uranium-234[d]	0.0238	ISL	0.0238	ISL
Uranium-235[d]	12.7	ISL	12.7	ISL
Uranium-238[d]	1,280	ISL	1,280	ISL
Uranium-Total[d]	500	ISL	500	ISL
Vanadium	0.929	ISL	0.0145	carb.SS
Zinc	0.412	ISL	0.412	ISL

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by EQ3/6 Geochemical Code (EQ3/6) Toxicity Characteristic Leaching Procedure (TCLP), in situ leachate (ISL), maximum detection limit (mdl), US EPA 70-year rule, or by solubility with respect to the indicated mineral phase.

[c] NA = Not applicable.

[d] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot (\text{gram formula wt}) \cdot (\text{Activity in pCi}/\ell) \cdot (\text{half-life in years})$

[e] carb.SS is carbonate solid solution which includes calcite, magnesite, rhodochrosite, siderite, strontianite, and smithsonite components.

1075

TABLE 5-10

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - PIT 5

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Antimony	0.1577	TCLP	0.1577	TCLP
Arsenic	0.00928	TCLP	0.00928	TCLP
Barium	0.628	TCLP	0.628	TCLP
Beryllium	0.0198	TCLP	0.0198	TCLP
Boron				
Cadmium	0.0094	TCLP	0.0094	TCLP
Cesium-137[c]	1.04×10^{-9}	SW	1.04×10^{-9}	SW
Chromium	0.0243	TCLP	0.0243	TCLP
Cobalt	0.0748	TCLP	0.0748	TCLP
Copper	0.9478	TCLP	0.9478	TCLP
Cyanide	8.64×10^{-2}	70-year	8.64×10^{-2}	70-year
Lead	0.0177	TCLP	0.0177	TCLP
Manganese	2.4135	TCLP	2.4135	TCLP
Mercury	0.0218	TCLP	0.0218	TCLP
Molybdenum	1.15×10^{-2}	70-year	1.15×10^{-2}	70-year
Neptunium-237[c]	5.0×10^{-7}	mdl-SW	5.0×10^{-7}	mdl-SW
Nickel	0.3025	TCLP	0.3025	TCLP
Plutonium-238[c]	2.8×10^{-12}	mdl-SW	2.8×10^{-12}	mdl-SW
Plutonium-239 and 240[c]	8×10^{-10}	mdl-SW	8×10^{-10}	mdl-SW
Radium-226[c]	1.95×10^{-5}	70-year	1.95×10^{-5}	70-year
Ruthenium-106[c]	1.27×10^{-11}	mdl-SW	1.27×10^{-11}	mdl-SW
Selenium	0.0021	SW	0.0021	SW
Silver	3.35×10^{-3}	mdl-SW	3.35×10^{-3}	mdl-SW
Strontium-90[c]	2.9×10^{-10}	SW	2.9×10^{-10}	SW
Technetium-99[c]	1.88×10^{-5}	SW	1.88×10^{-5}	SW
Thallium	5.5×10^{-4}	mdl-SW	5.5×10^{-4}	mdl-SW

TABLE 5-10
(Continued)

Element	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Thorium-230[c]	5.14×10^{-9}	SW	5.14×10^{-9}	SW
Thorium-232[c]	4.6×10^{-4}	mdl-SW	4.6×10^{-4}	mdl-SW
Tin	8.29	70-year	8.29	70-year
Uranium-234[c]	6.79×10^{-5}	SW	6.79×10^{-5}	SW
Uranium-235[c]	0.0089	SW	0.0089	SW
Uranium-238[c]	1.2	SW	1.2	SW
Vanadium	1.4388	TCLP	1.4388	TCLP
Zinc	0.3338	TCLP	0.3338	TCLP

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by Toxicity Characteristic Leaching Procedure (TCLP), surface water (SW), the maximum detection limit (mdl), US EPA 70-year rule (70-year), or by solubility with respect to the indicated mineral phase.

[c] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot (\text{gram formula wt}) \cdot (\text{Activity in pCi}/\ell) \cdot (\text{half-life in years})$

1077

TABLE 5-11

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - PIT 6

Constituent	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Antimony				
Arsenic	0.6316	TCLP	0.6316	TCLP
Barium	1.9559	TCLP	1.9559	TCLP
Beryllium	0.0204	TCLP	0.0204	TCLP
Boron				
Cadmium	9.5×10^{-4}	mdl-SW	9.5×10^{-4}	mdl-SW
Cesium-137[c]	8.6×10^{-11}	mdl-SW	8.6×10^{-11}	mdl-SW
Chromium	2.2×10^{-3}	mdl-SW	2.2×10^{-3}	mdl-SW
Cobalt	4.75×10^{-3}	mdl-SW	4.75×10^{-3}	mdl-SW
Copper	0.006	mdl-SW	0.006	mdl-SW
Cyanide				
Lead	0.6914	TCLP	0.6914	TCLP
Manganese	2.008	TCLP	2.008	TCLP
Mercury				
Molybdenum				
Neptunium-237[c]	1.06×10^{-5}	mdl-SW	1.06×10^{-5}	mdl-SW
Nickel	0.165	TCLP	0.165	TCLP
Plutonium-238[c]	1.1×10^{-11}	mdl-SW	1.1×10^{-11}	mdl-SW
Plutonium-239 and 240[c]	8×10^{-10}	mdl-SW	8×10^{-10}	mdl-SW
Radium-226[c]	5.0×10^{-11}	mdl-SW	5.0×10^{-11}	mdl-SW
Ruthenium-106[c]				
Selenium				
Silver	0.0667	TCLP	0.0667	TCLP
Strontium-90[c]	7.0×10^{-12}	mdl-SW	7.0×10^{-12}	mdl-SW
Technetium-99[c]	1.612×10^{-4}	SW	1.612×10^{-4}	SW
Thallium	0.7535	TCLP	0.7535	TCLP

TABLE 5-11
(Continued)

Constituent	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Thorium-230[c]	1.5×10^{-8}	SW	1.5×10^{-8}	SW
Thorium-232[c]	4.6×10^{-4}	mdl-SW	4.6×10^{-4}	mdl-SW
Tin	1.30	70-year	1.30	70-year
Uranium-234[c]	1.377E-05	SW	1.377×10^{-5}	SW
Uranium-235[c]	4.62×10^{-3}	SW	4.62×10^{-3}	SW
Uranium-238[c]	1.496	SW	1.496	SW
Vanadium	7.0×10^{-3}	mdl-SW	7.0×10^{-3}	mdl-SW
Zinc	1.7918	TCLP	1.7918	TCLP

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is Toxicity Characteristic Leaching Procedure (TCLP), surface water (SW), maximum detection limit (mdl), or by the US EPA 70-year rule (70-year).

[c] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot$(gram formula wt)$\cdot$(Activity in pCi/ℓ)$\cdot$(half-life in years)

1079

TABLE 5-12

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - BURN PIT

Constituent	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
pH	12.16 SU	NA[c]	6.84SU	EQ3/6
Eh	+0.1377 V	NA	+0.259 V	EQ3/6
Antimony	0.103	ISL	0.103	ISL
Arsenic	0.0494	ISL	0.0494	ISL
Barium	8.3836	ISL	0.035	barite
Beryllium	0.0082	ISL	8.22×10^{-4}	BeO
Boron	2.12	ISL	2.12	ISL
Cadmium	0.0197	ISL	0.0197	ISL
Cesium-137[d]				
Chromium	0.129	ISL	0.129	ISL
Cobalt	0.0377	ISL	0.0377	ISL
Copper	0.118	ISL	0.118	ISL
Cyanide	3.6	ISL	3.6	ISL
Lead	0.0981	ISL	0.0113	$PbCO_3$
Manganese	2.96	ISL	0.0298	carb.SS[e]
Mercury	3.0×10^{-4}	ISL	2.4×10^{-8}	calomel
Molybdenum	1.05	ISL	1.05	ISL
Neptunium-237[d]	3.9×10^{-7}	mdl-ISL	1.5×10^{-9}	NpO_2
Nickel	0.299	ISL	0.299	ISL
Nitrate	5.7	ISL	5.7	ISL
Plutonium-238[d]	2.86×10^{-11}	mdl-ISL	2.86×10^{-11}	mdl-ISL
Plutonium-239 and 240[d]	8.03×10^{-9}	mdl-ISL	9.1×10^{-11}	PuO_2
Radium-226[d]	7.34×10^{-8}	ISL	7.34×10^{-8}	ISL
Ruthenium-106[d]				
Selenium	0.0038	ISL	0.0038	ISL
Silver	0.107	ISL	2.06×10^{-3}	Ag

TABLE 5-12
(Continued)

Constituent	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Strontium-90[d]	1.8×10^{-11}	mdl-ISL	1.67×10^{-13}	carb.SS
Technetium-99[d]	1.47×10^{-6}	TCLP	1.47×10^{-6}	TCLP
Thorium-230[d]	1.13×10^{-7}	TCLP	2.12×10^{-9}	ThO_2
Thorium-232S[d]	0.0110	TCLP	2.12×10^{-9}	ThO_2
Thorium-Total[d]	0.0106	TCLP	2.12×10^{-9}	ThO_2
Tin				
Uranium-234[d]	1.46×10^{-4}	ISL	1.46×10^{-4}	ISL
Uranium-235[d]	3.04×10^{-2}	ISL	3.04×10^{-2}	ISL
Uranium-238[d]	2.95	ISL	2.95	ISL
Uranium-Total[d]	2.87	ISL	2.87	ISL
Vanadium	0.0743	ISL	0.0743	ISL
Zinc	0.253	ISL	0.0110	carb.SS

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by EQ3/6 Geochemical Code (EQ3/6) Toxicity Characteristic Leaching Procedure (TCLP), in situ leachate (ISL), maximum detection limit (mdl), US EPA 70-year rule, or by solubility with respect to the indicated mineral phase.

[c] NA = Not applicable.

[d] Radioactive constituent. Formula for conversion of aqueous radioactivity to concentration of radionuclide in solution:
$mg/\ell = 2.798 \times 10^{-15} \cdot (\text{gram formula wt}) \cdot (\text{Activity in pCi}/\ell) \cdot (\text{half-life in years})$

[e] carb.SS is carbonate solid solution which includes calcite, magnesite, rhodochrosite, siderite, strontianite, and smithsonite components.

1081

TABLE 5-13

LEACHATE A AND LEACHATE B COMPOSITIONS FOR INORGANICS AND RADIONUCLIDES IN OPERABLE UNIT 1 - THE CLEARWELL

Constituent	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Antimony	7.0×10^{-4}	mdl-SW	7.0×10^{-4}	mdl-SW
Arsenic	0.0042	SW	0.0042	SW
Barium	1.35×10^{-2}	mdl-SW	1.35×10^{-2}	mdl-SW
Beryllium	5.0×10^{-4}	mdl-SW	5.0×10^{-4}	mdl-SW
Boron				
Cadmium	9.5×10^{-4}	mdl-SW	9.5×10^{-4}	mdl-SW
Cesium-137[c]	7.0×10^{-11}	mdl-SW	7.0×10^{-11}	mdl-SW
Chromium	0.0022	mdl-SW	0.0022	mdl-SW
Cobalt	4.75×10^{-3}	mdl-SW	4.75×10^{-3}	mdl-SW
Copper	0.019	SW	0.019	SW
Cyanide	0.087	SW	0.087	SW
Lead	5.5×10^{-4}	mdl-SW	5.5×10^{-4}	mdl-SW
Manganese	0.02	SW	0.02	SW
Mercury	1.0×10^{-4}	mdl-SW	1.0×10^{-4}	mdl-SW
Molybdenum	5.28	70-year	5.28	70-year
Nickel	9.0×10^{-3}	mdl-SW	9.0×10^{-3}	mdl-SW
Neptunium-237[c]	4.51×10^{-4}	70-year	4.51×10^{-4}	70-year
Plutonium-238[c]	1.1×10^{-11}	mdl-SW	1.1×10^{-11}	mdl-SW
Plutonium-239 and 240[c]	4.8×10^{-9}	mdl-SW	4.8×10^{-9}	mdl-SW
Radium-226[c]	1.1×10^{-9}	SW	1.1×10^{-9}	SW
Ruthenium-106[c]				
Selenium	0.003	SW	0.003	SW
Silver	0.014	SW	0.014	SW
Strontium-90[c]	1.06×10^{-11}	mdl-SW	1.06×10^{-11}	mdl-SW
Technetium-99[c]	2.36×10^{-4}	SW	2.36×10^{-4}	SW
Thallium	5.5E-04	mdl-SW	5.5×10^{-4}	mdl-SW

TABLE 5-13
(Continued)

Constituent	Leachate A Concentration[a]	Constraint[b]	Leachate B Concentration[a]	Constraint[b]
Thorium-230[c]	2.06E-08	SW	2.06×10^{-8}	SW
Thorium-232[c]	4.6E-04	mdl-SW	4.6×10^{-4}	mdl-SW
Tin	2.62	70-year	2.62	70-year
Uranium-234[c]	3.07×10^{-4}	SW	3.07×10^{-4}	SW
Uranium-235[c]	0.056	SW	0.056	SW
Uranium-238[c]	18.6	SW	18.6	SW
Vanadium	0.513	SW	0.513	SW
Zinc	0.047	SW	0.047	SW

[a] Element concentrations in milligrams per liter (ppm), pH in standard units (SU), and Eh in Volts (V). Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.

[b] Constraint on reported concentration is by the maximum detection limit (mdl), surface water (SW), or by US EPA 70-year rule (70-year).

[c] Radioactive constituent. Formula for conversion of aqueous radioactivity to aqueous concentration of radionuclide:
$mg/\ell = 2.798 \times 10^{-15} \cdot$(gram formula wt.)$\cdot$(Activity in pCi/$\ell$)$\cdot$(half-life in years)

1083

TABLE 5-14

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - PIT 1

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran	6×10^{-4}	ISL
2,3,4,7,8-pentachlorodibenzofuran	9×10^{-4}	ISL
2,4,5-trichlorophenol		
4,4'-DDT	0.5	mdl-ISL
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene		
Acenaphthylene		
Anthracene	40	mdl-ISL
Aroclor-1221	2.5	mdl-ISL
Aroclor-1242		
Aroclor-1248	3.1	ISL
Aroclor-1254	5	mdl-ISL
Aroclor-1260	5	mdl-ISL
Benzo(a)anthracene	40	mdl-ISL
Benzo(a)pyrene	40	mdl-ISL
Benzo(b)fluoranthene	40	mdl-ISL
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene		
Benzo(k)fluoranthene	40	mdl-ISL
Chrysene	40	mdl-ISL
Dibenzo(a,h)anthracene		
Dichlorodifluoromethane	200	mdl-ISL
Fluoranthene	40	mdl-ISL
Fluorene		
Heptachlorodibenzofuran	1.7×10^{-3}	mdl-ISL
Heptachlorodibenzo-p-dioxin	3.4×10^{-3}	mdl-ISL
Hexachlorodibenzofuran	1.4×10^{-3}	mdl-ISL

TABLE 5-14
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzo-p-dioxin	2.2×10^{-3}	mdl-ISL
Indeno(1,2,3-cd)pyrene		
Naphthalene	40	mdl-ISL
Octachlorodibenzofuran	6×10^{-4}	ISL
Octachlorodibenzo-p-dioxin	1.6×10^{-3}	ISL
Pentachlorophenol		
Phenanthrene	40	mdl-ISL
Pyrene	40	mdl-ISL
Tetrachlorodibenzofuran	1.24×10^{-2}	ISL
Tetrachloroethene	47	ISL
Vinyl Chloride		

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).1

TABLE 5-15

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - PIT 2

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran	1×10^{-3}	mdl-ISL
2,3,4,7,8-pentachlorodibenzofuran		
2,4,5-trichlorophenol		
4,4'-DDT	1	mdl-ISL
4-Nitroaniline	50	mdl-ISL
4-Nitrophenol	50	mdl-ISL
Acenaphthene	12	ISL
Acenaphthylene	5	ISL
Anthracene	2	ISL
Aroclor-1221		
Aroclor-1242		
Aroclor-1248	0.5	mdl-ISL
Aroclor-1254	1	mdl-ISL
Aroclor-1260		
Benzo(a)anthracene	10	mdl-ISL
Benzo(a)pyrene	10	mdl-ISL
Benzo(b)fluoranthene	10	mdl-ISL
Benzo(ghi)fluoranthene	6.24×10^{-1}	70-year
Benzo(ghi)perylene	10	mdl-ISL
Benzo(k)fluoranthene	10	mdl-ISL
Chrysene	10	mdl-ISL
Dibenzo(a,h)anthracene	10	mdl-ISL
Dichlorodifluoromethane		
Fluoranthene	9	ISL
Fluorene	6	ISL
Heptachlorodibenzofuran	9×10^{-4}	ISL
Heptachlorodibenzo-p-dioxin	3.6×10^{-3}	mdl-ISL

See footnotes at end of table

TABLE 5-15
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzofuran	1.7×10^{-3}	mdl-ISL
Hexachlorodibenzo-p-dioxin	3×10^{-3}	mdl-ISL
Indeno(1,2,3-cd)pyrene	10	mdl-ISL
Naphthalene	10	mdl-ISL
Octachlorodibenzofuran	7E-04	ISL
Octachlorodibenzo-p-dioxin	4.2E-03	ISL
Pentachlorophenol	50	mdl-ISL
Phenanthrene	10	mdl-ISL
Pyrene	7	ISL
Tetrachlorodibenzofuran		
Tetrachloroethene	5	mdl-ISL
Vinyl Chloride	160	ISL

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

1087

TABLE 5-16

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - PIT 3

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran		
2,3,4,7,8-pentachlorodibenzofuran		
2,4,5-trichlorophenol		
4,4'-DDT		
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene		
Acenaphthylene	5.24×10^{-2}	70-year
Anthracene	10	mdl-ISL
Aroclor-1221		
Aroclor-1242		
Aroclor-1248	5	mdl-ISL
Aroclor-1254	10	mdl-ISL
Aroclor-1260		
Benzo(a)anthracene	10	mdl-ISL
Benzo(a)pyrene	10	mdl-ISL
Benzo(b)fluoranthene	10	mdl-ISL
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene	10	mdl-ISL
Benzo(k)fluoranthene		
Chrysene	5	mdl-ISL
Dibenzo(a,h)anthracene		
Dichlorodifluoromethane		
Fluoranthene	10	mdl-ISL
Fluorene		
Heptachlorodibenzofuran	1.5×10^{-3}	ISL
Heptachlorodibenzo-p-dioxin	3.5×10^{-3}	ISL
Hexachlorodibenzofuran	1.7×10^{-3}	mdl-ISL

TABLE 5-16
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzo-p-dioxin	1.2×10^{-3}	mdl-ISL
Indeno(1,2,3-cd)pyrene	10	mdl-ISL
Naphthalene		
Octachlorodibenzofuran		
Octachlorodibenzo-p-dioxin		
Pentachlorophenol	7.09×10^{-1}	70-year
Phenanthrene	10	mdl-ISL
Pyrene	10	mdl-ISL
Tetrachlorodibenzofuran	5.7×10^{-4}	mdl-ISL
Tetrachloroethene	2.0	ISL
Vinyl Chloride		

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

TABLE 5-17

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - PIT 4

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran	1×10^{-3}	mdl-ISL
2,3,4,7,8-pentachlorodibenzofuran	1.1×10^{-3}	mdl-ISL
2,4,5-trichlorophenol		
4,4'-DDT		
4-Nitroaniline		
4-Nitrophenol	10	mdl-ISL
Acenaphthene	12	ISL
Acenaphthylene		
Anthracene	17	ISL
Aroclor-1221		
Aroclor-1242	50	mdl-ISL
Aroclor-1248	50	mdl-ISL
Aroclor-1254	100	mdl-ISL
Aroclor-1260		
Benzo(a)anthracene	10	mdl-ISL
Benzo(a)pyrene	10	mdl-ISL
Benzo(b)fluoranthene	10	mdl-ISL
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene	10	mdl-ISL
Benzo(k)fluoranthene	10	mdl-ISL
Chrysene	10	mdl-ISL
Dibenzo(a,h)anthracene	10	mdl-ISL
Dichlorodifluoromethane		
Fluoranthene	2	ISL
Fluorene	9	ISL
Heptachlorodibenzofuran	2.4×10^{-3}	mdl-ISL
Heptachlorodibenzo-p-dioxin	9.4×10^{-4}	mdl-ISL
Hexachlorodibenzofuran	1.2×10^{-3}	mdl-ISL

TABLE 5-17
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzo-p-dioxin	7.5×10^{-4}	mdl-ISL
Indeno(1,2,3-cd)pyrene	10	mdl-ISL
Naphthalene	16	ISL
Octachlorodibenzofuran	9×10^{-4}	mdl-ISL
Octachlorodibenzo-p-dioxin	1.2×10^{-3}	mdl-ISL
Pentachlorophenol		
Phenanthrene	10	mdl-ISL
Pyrene	10	mdl-ISL
Tetrachlorodibenzofuran	1.7×10^{-3}	mdl-ISL
Tetrachloroethene	140	ISL
Vinyl Chloride	6.0	ISL

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

TABLE 5-18

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - PIT 5

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran		
2,3,4,7,8-pentachlorodibenzofuran		
2,4,5-trichlorophenol		
4,4'-DDT		
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene		
Acenaphthylene		
Anthracene		
Aroclor-1221		
Aroclor-1242		
Aroclor-1248	0.5	mdl-CISsw
Aroclor-1254	1	mdl-CISsw
Aroclor-1260		
Benzo(a)anthracene		
Benzo(a)pyrene		
Benzo(b)fluoranthene		
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene		
Benzo(k)fluoranthene		
Chrysene		
Dibenzo(a,h)anthracene		
Dichlorodifluoromethane		
Fluoranthene		
Fluorene		
Heptachlorodibenzofuran		
Heptachlorodibenzo-p-dioxin		
Hexachlorodibenzofuran		

TABLE 5-18
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzo-p-dioxin		
Indeno(1,2,3-cd)pyrene		
Naphthalene		
Octachlorodibenzofuran		
Octachlorodibenzo-p-dioxin		
Pentachlorophenol		
Phenanthrene		
Pyrene		
Tetrachlorodibenzofuran		
Tetrachloroethene		
Vinyl Chloride		

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

TABLE 5-19

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - PIT 6

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran		
2,3,4,7,8-pentachlorodibenzofuran		
2,4,5-trichlorophenol		
4,4'-DDT		
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene		
Acenaphthylene		
Anthracene		
Aroclor-1221		
Aroclor-1242		
Aroclor-1248		
Aroclor-1254	0.5	mdl-CISsw
Aroclor-1260		
Benzo(a)anthracene		
Benzo(a)pyrene		
Benzo(b)fluoranthene		
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene		
See footnotes at end of table		
Benzo(k)fluoranthene		
Chrysene		
Dibenzo(a,h)anthracene		
Dichlorodifluoromethane		
Fluoranthene		
Fluorene		
Heptachlorodibenzofuran		
Heptachlorodibenzo-p-dioxin		

1094

TABLE 5-19
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzofuran		
Hexachlorodibenzo-p-dioxin		
Indeno(1,2,3-cd)pyrene		
Naphthalene		
Octachlorodibenzofuran		
Octachlorodibenzo-p-dioxin		
Pentachlorophenol		
Phenanthrene		
Pyrene		
Tetrachlorodibenzofuran		
Tetrachloroethene	6	CISsw
Vinyl Chloride		

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

TABLE 5-20

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - BURN PIT

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran		
2,3,4,7,8-pentachlorodibenzofuran		
2,4,5-trichlorophenol		
4,4'-DDT		
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene	40	mdl-ISL
Acenaphthylene		
Anthracene	40	mdl-ISL
Aroclor-1221		
Aroclor-1242		
Aroclor-1248		
Aroclor-1254	20	mdl-ISL
Aroclor-1260		
Benzo(a)anthracene	40	mdl-ISL
Benzo(a)pyrene	40	mdl-ISL
Benzo(b)fluoranthene	40	mdl-ISL
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene	40	mdl-ISL
Benzo(k)fluoranthene	40	mdl-ISL
Chrysene	40	mdl-ISL
Dibenzo(a,h)anthracene		
Dichlorodifluoromethane		
Fluoranthene	40	mdl-ISL
Fluorene	40	mdl-ISL
Heptachlorodibenzofuran		
Heptachlorodibenzo-p-dioxin	7.2×10^{-4}	mdl-ISL
Hexachlorodibenzofuran		

TABLE 5-20
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzo-p-dioxin		
Indeno(1,2,3-cd)pyrene	40	mdl-ISL
Naphthalene	12	ISL
Octachlorodibenzofuran	1.1×10^{-3}	mdl-ISL
Octachlorodibenzo-p-dioxin	1.8×10^{-3}	mdl-ISL
Pentachlorophenol	200	mdl-ISL
Phenanthrene	40	mdl-ISL
Pyrene	40	mdl-ISL
Tetrachlorodibenzofuran		
Tetrachloroethene	2	ISL
Vinyl Chloride	1,000	mdl-ISL

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

TABLE 5-21

ORGANIC LEACHATE CONCENTRATIONS IN OPERABLE UNIT 1 - CLEARWELL

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
1,2,3,7,8-pentachlorodibenzofuran		
2,3,4,7,8-pentachlorodibenzofuran		
2,4,5-trichlorophenol		
4,4'-DDT	8.96×10^{-1}	70-year
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene		
Acenaphthylene		
Anthracene	6.5×10^{-2}	70-year
Aroclor-1221		
Aroclor-1242	1	mdl-CISsw
Aroclor-1248	1	mdl-CISsw
Aroclor-1254	2	mdl-CISsw
Aroclor-1260		
Benzo(a)anthracene	1.29×10^{-1}	70-year
Benzo(a)pyrene	9.68×10^{-2}	70-year
Benzo(b)fluoranthene	1.03×10^{-1}	70-year
Benzo(ghi)fluoranthene		
Benzo(ghi)perylene	3.32×10^{-2}	70-year
Benzo(k)fluoranthene	1.08×10^{-1}	70-year
Chrysene	1.45×10^{-1}	70-year
Dibenzo(a,h)anthracene		
Dichlorodifluoromethane		
Fluoranthene	4.48×10^{-1}	70-year
Fluorene	4.05×10^{-2}	70-year
Heptachlorodibenzofuran		
Heptachlorodibenzo-p-dioxin		
Hexachlorodibenzofuran		

1098

TABLE 5-21
(Continued)

Organic Constituents	Leachate Concentrations[a,b]	Constraint[c]
Hexachlorodibenzo-p-dioxin		
Indeno(1,2,3-cd)pyrene	3.90×10^{-2}	70-year
Naphthalene		
Octachlorodibenzofuran		
Octachlorodibenzo-p-dioxin		
Pentachlorophenol		
Phenanthrene	2.58×10^{-1}	70-year
Pyrene	2.02×10^{-1}	70-year
Tetrachlorodibenzofuran		
Tetrachloroethene		
Vinyl Chloride		

[a] Constituent concentrations in micrograms per liter.
[b] Blank spaces indicate that the constituent was not detected or analyzed in waste pit materials, therefore no leachate concentration was derived and the waste unit was assumed to have 0 source for that constituent.
[c] Constraint on reported concentration is by maximum detection limit (mdl), in situ leachate (ISL), CIS surface water (CISsw), or by the US EPA 70-year rule (70-year).

TABLE 5-22

SCREENING SUMMARY OF POTENTIAL CONSTITUENTS OF CONCERN FOR OPERABLE UNIT 1

Potential Constituent of Concern	Screen Out Advective Travel Time	Screen Out Decay Travel Time	Screen Out Initial Concentration	Screen Out ODAST Output	Found in GW	Constituent of Concern
Inorganics						
Antimony				X	X	X
Arsenic	X				X	X
Barium				X	X	X
Beryllium	X					
Boron						X
Cadmium				X		
Chromium	X					
Cobalt	X					
Copper				X		
Cyanide						X
Lead				X	X	X
Manganese				X	X	X
Mercury				X		
Molybdenum						X
Nickel	X					
Selenium	X					
Silver	X					
Thallium	X					
Tin	X					

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4783

TABLE 5-22
(Continued)

Potential Constituent of Concern	Screen Out Advective Travel Time	Screen Out Decay Travel Time	Screen Out Initial Concentration	Screen Out ODAST Output	Found in GW	Constituent of Concern
Vanadium	X					
Zinc	X					
Organics						
1,2,3,7,8-Pentachlorodibenzofuran	X					
2,3,4,7,8-Pentachlorodibenzofuran	X					
2,4,5-Trichlorophenol		X				
4,4-DDT	X					
4-Nitrophenol		X				
4-Nitroaniline				X		
Acenaphthene		X				
Anthracene		X				
Aroclor-1221						X
Aroclor-1248	X					
Aroclor-1254	X					
Aroclor-1260	X					
Benzo(a)anthracene	X					
Benzo(a)pyrene	X					
Benzo(b)fluoranthene	X					
Benzo(ghi)perylene	X					
Benzo(ghi)fluoranthene	X					

TABLE 5-22
(Continued)

Potential Constituent of Concern	Screen Out Advective Travel Time	Screen Out Decay Travel Time	Screen Out Initial Concentration	Screen Out ODAST Output	Found in GW	Constituent of Concern
Benzo(k)fluoranthene	X					
Chrysene	X					
Dibenzo(a,h)anthracene	X					
Dichlorodifluoromethane						X
Fluoranthene	X					
Fluorene		X				
Heptachlorodibenzofuran	X					
Heptachlorodibenzo-p-dioxin	X					
Hexachlorodibenzofuran	X					
Hexachlorodibenzo-p-dioxin	X					
Indeno(1,2,3-cd)pyrene	X					
Naphthalene		X				
Octachlorodibenzofuran	X					
Octachlorodibenzo-p-dioxin	X					
Pentachlorophenol	X					
Phenanthrene		X				
Pyrene	X					
Tetrachlorodibenzofuran	X					
Tetrachloroethene						X
Vinyl Chloride						X

TABLE 5-22
(Continued)

Potential Constituent of Concern	Screen Out Advective Travel Time	Screen Out Decay Travel Time	Screen Out Initial Concentration	Screen Out ODAST Output	Found in GW	Constituent of Concern
Radionuclides						
Cesium-137	X					
Neptunium-237						X
Plutonium-238	X				X	X
Plutonium-239/240	X					
Radium-226	X				X	X
Ruthenium-106		X				
Strontium-90					X	X
Technetium-99					X	X
Thorium-230	X				X	X
Thorium-232	X					
Uranium-234					X	X
Uranium-235					X	X
Uranium-238					X	X

4788

TABLE 5-23

CONSTITUENTS OF CONCERN SUMMARY LIST

Potential Constituent of Concern	Loading Case[a]	Passed Natural Migration Screening[b]	Found in Groundwater Above Background Concentration[b]	Reaches Fenceline[c]	Reported Maximum Aquifer Concentration[c,d]	Requires SWIFT Modeling	Requires SWIFT Model Calibration
Radionuclides							
Neptunium-237	Case 2	X				X	
Plutonium-238	Case 3		X	No	0.133 pCi/ℓ		
Radium-226	Case 3		X	No	1.78 pCi/ℓ		
Strontium-90	Case 1	X	X	Yes	0.731 pCi/ℓ	X	X
Technetium-99	Case 4	X	X	Yes	6,860 pCi/ℓ	X	X
Thorium-230	Case 3		X	No	1.04 pCi/ℓ		
Uranium-234	Case 1	X	X	Yes	7.99 pCi/ℓ	X	X
Uranium-235	Case 1	X	X	Yes	0.5955 pCi/ℓ	X	X
Uranium-238	Case 1	X	X	Yes	6.34 pCi/ℓ	X	X
Inorganics							
Antimony	Case 2		X	No	0.175mg/ℓ		
Arsenic	Case 3		X	No	0.582mg/ℓ		
Barium	Case 2		X	Yes	0.651mg/ℓ	X	X
Boron	Case 1	X				X	
Cyanide	Case 2	X				X	
Lead	Case 2		X	No	0.058 mg/ℓ		
Manganese	Case 2		X	No	2.072 mg/ℓ		

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TABLE 5-23
(Continued)

Potential Constituent of Concern	Loading Case[a]	Passed Natural Migration Screening[b]	Found in Groundwater Above Background Concentration[b]	Reaches Fenceline[c]	Reported Maximum Aquifer Concentration[c,d]	Requires SWIFT Modeling	Requires SWIFT Model Calibration
Molybdenum	Case 1	X				X	
Organics							
Aroclor-1221	Case 2	X				X	
Dichlorodifluoro-methane	Case 4	X				X	
Tetrachloroethene	Case 4	X				X	
Vinyl Chloride	Case 4	X				X	

[a] See Figure D.3-3 for loading case designation.
[b] See Figure D.3-13 for overall screening approach.
[c] See Figure D.3-2 for screening approach.
[d] If reported maximum aquifer concentration doesn't reach fenceline, then it represents the maximum on-site concentration used in the baseline risk assessment.

TABLE 5-24

MEDIA PARAMETERS FOR VADOSE ZONE MODEL OPERABLE UNIT 1

Parameter	Vadose Zone	
	Layer 1[a]	Layer 2[b]
Porosity (%)	34	39
Specific yield (%)	6	25
Bulk density (g/cc)	1.78	1.60
Field capacity (%)	28	14
Organic content (%)	1	0.5
Fines passing less than 200 mesh (%)	70	16
Moisture content (%)	34[c]	26[d]

[a]Layer 1 consists of a clay-rich till interbedded with glaciofluvial sand and gravel stringers.
[b]Layer 2 consists of well-sorted sand and gravel outwash deposits existing above the Great Miami Aquifer.
[c]Layer 1 is assumed saturated.
[d]Average between porosity and field capacity.

TABLE 5-25

SUMMARY OF LOADING TIMES AND CONCENTRATIONS FOR CONSTITUENTS OF CONCERN

Constituents of Concern	Minimum Time of Arrival to the Aquifer (years)[a]	Time of Maximum Loading Concentration (years)	Maximum Loading Rates to the Aquifer (mg/day)	Maximum Loading Concentration (mg/ℓ)
Vadose Zone Pathway Waste Area Source				
Radionuclides				
Np-237	440	980-1,000	1.135×10^{-2}	1.231×10^{-5}
Sr-90	100	180-200	8.2×10^{-8}	8.971×10^{-11}
Tc-99	5	10-15	3.786×10^{-1}	4.110×10^{-4}
U-234	10	620-630	5.8684×10^{2}	1.381×19^{-2}
U-235	10	620-630	3.88549×10^{2}	9.205×10^{2}
U-238	10	620-630	5.18150×10^{5}	1.228×10^{3}
Inorganics				
Boron	90	350-360	3.1×10^{3}	7.330×10^{0}
Cyanide	5	10-15	7.94×10^{0}	1.870×10^{-2}
Molybdenum	620	980-1,000	3.60×10^{-1}	2.710×10^{-3}
Organics				
Aroclor-1221	680	980-1,000	1.26×10^{0}	9.821×10^{-3}
Dichlorodifluorourethane	15	35-40	2.20×10^{-1}	1.731×10^{-3}
Tetrachloroethene	40	80-85	9.81×10^{-4}	1.051×10^{-6}
Vinyl Chloride	5	20-25	2.442×10^{1}	1.03×10^{-2}
Perched Groundwater Source				
Radionuclides				
Tc-99	10	20-30	24×10^{-4}	5.67×10^{-6}
U-234	400	530-540	1.65×10^{-4}	3.91×10^{-7}
U-235	400	530-540	0.11	2.59×10^{-4}
U-238	400	530-540	14.62	3.45×10^{-2}
Inorganics				
Arsenic	>1,000			

[a]Model simulation time = 0 is 1953 for the waste area source and time = 0 is 1993 for perched groundwater source.

TABLE 5-26

SUMMARY OF CONSTITUENTS OF CONCERN PREDICTED MAXIMUM CONCENTRATIONS IN GROUNDWATER

Constituents of Concern	Time (yrs)[b]	Maximum Concentration in the Aquifer[a]
SWIFT Modeled Constituents		
Waste Area Source		
Radionuclides		
Np-237	1000	1.634×10^{-9}
Sr-90	200	1.368×10^{-12}
Tc-99	20	1.935×10^{-4}
U-234	630	1.414×10^{-4}
U-235	630	9.460×10^{-2}
U-238	630	1.2475×10^{1}
Inorganics		
Barium	1000	8.975×10^{-1}
Boron	360	7.894×10^{-2}
Cyanide	15	3.762×10^{-4}
Molybdenum	1000	4.93×10^{-5}
Organics		
Aroclor-1221	1000	2.690×10^{-5}
Dichlorodifluoromethane	40	5.400×10^{-6}
Tetrachloroethene	80	6.276×10^{-9}
Vinyl Chloride	25	1.459×10^{-3}
Perched Groundwater Source		
Radionuclides		
Tc-99	20	9.35×10^{-8}
U-234	540	1.71×10^{-7}
U-235	540	1.148×10^{-4}
U-238	540	1.514×10^{-2}
Inorganics		
Arsenic	>1,000	

TABLE 5-26
(Continued)

Constituents of Concern	Time (yrs)[b]	Maximum Concentration in the Aquifer[a]
Non-Modeled Constituents		
Waste Area Source		
Radionuclides		
Pu-238	40	0.133 pCi/ℓ
Ra-226	40	1.78 pCi/ℓ
Th-230	40	1.04 pCi/ℓ
Inorganics		
Antimony	40	0.175
Arsenic	40	0.582
Lead	40	0.058
Manganese	40	2.072

[a] All concentrations in milligrams per liter (ppm)
[b] Model simulation time = 0 is 1953 for waste area source and time = 0 is 1993 for perched groundwater source.

TABLE 5-27

SUMMARY OF CONSTITUENTS OF CONCERN
PREDICTED MAXIMUM CONCENTRATIONS IN GROUNDWATER
SURFACE WATER PATHWAY

Constituents of Concern	Time (yrs)[a]	Maximum Concentration in the Aquifer[b]
Radionuclides[c]		
U-234	10	3.0137×10^{-9}
U-238	10	2.660×10^{-4}
Inorganics		
Arsenic	210	7.196×10^{-8}

[a]Model simulation time = 0 is 1993.
[b]All concentrations in milligrams per liter (ppm).
[c]Maximum risk occurs at coordinates N 481,311, E 1,377,790

TABLE 5-28

EMISSION FLUX OF RADON GAS FROM OU-1 WASTE PIT AREAS IN THE CURRENT AND FUTURE EMISSION SCENARIOS

OU1 Waste Pit	Emission Flux (pCi/m^2-sec)	
	Emission Flux Current	Future
1	9.1[a]	9.1[a]
2	6.4[a]	6.4[a]
3	2.6[a]	91.85[b]
5	NA	32.95[b]
6	NA	1.32[b]

[a]Taken from Radon Measurement Program at Waste Pits 1, 2, and 3 (Geotech, Inc., 1992).
[b]Emission flux calculated using the RAECOM model.
NA - Not applicable for this emission scenario.

4733

TABLE 5-29

ACTIVITY LEVELS OF RADIONUCLIDES IN SURFACE SOIL FOR THE CURRENT SCENARIO*

Radionuclides	Activity Level in pCi/g[a]
Cesium 137	1.0
Neptunium 237	0.5
Plutonium 238	0.4
Plutonium 239/240	0.1
Radium 226	1
Radium 228	1.2
Ruthenium 106	0
Strontium 90	1.7
Technetium 99	8.7
Thorium 228	5.5
Thorium 230	74.9
Thorium 232	4.3
Uranium 234	60.1
Uranium 235/236	6.8
Uranium 238	244.7
Total Uranium (mg/kg)	52

* Activity level data obtained from the CPC database list in Table E.3-3.

[a]Activity levels are all in picoCuries/gram, with the exception of Total Uranium, which is in mg/kg.

TABLE 5-30

INORGANIC AND ORGANIC CONCENTRATION DATA
FOR THE CURRENT SCENARIO

Inorganic	Soil Concentration[a] (mg/kg)
Antimony	27.2
Arsenic	4.9
Barium	56.9
Beryllium	0.8
Cadmium	5.8
Chromium	14.3
Cobalt	10.4
Copper	17
Lead	15.9
Manganese	574.1
Molybdenum	4.3
Nickel	29.4
Silver	8.9
Vanadium	19.6
Zinc	46.7
Organics	**(μg/kg)**
Aroclor-1254	1400

[a]Contaminant soil concentrations are taken from the OU1 CPC database for surface soils outside the OU-1 Waste Pit area.

1113

TABLE 5-31

ACTIVITY LEVEL OF RADIONUCLIDES FOR THE FUTURE SCENARIO AT ALL OU-1 WASTE PIT AREAS†

Radionuclide	Activity Level (pCi/g)*						
	Pit 1[a]	Pit 2[a]	Pit 3[b]	Pit 4[a]	Pit 5[b]	Pit 6[b]	BP[a]
Cesium 137	1.0	1.0	0.0	1.0	76.0	31.2	1.0
Neptunium 237	0.5	0.5	2.1	0.5	46.0	3.4	0.5
Plutonium 238	0.4	0.4	1.0	0.4	3.6	1.3	0.4
Plutonium 239/240	0.1	0.1	14.0	0.1	9.7	14.3	0.1
Radium 226	1.0	1.0	310.0	1.0	110.0	4.4	1.0
Ruthenium 106	0.0	0.0	0.0	0.0	1.6	0.0	0.0
Strontium 90	1.7	1.7	5.2	1.7	20.1	5.5	1.7
Technetium 99	8.7	8.7	520.0	8.7	2069.3	166.8	8.7
Thorium 230	74.9	74.9	8600.0	74.9	6813.5	47.6	74.9
Thorium 232	4.3	4.3	400.0	4.3	45.1	1.1	4.3
Uranium 234	60.1	60.1	1112.0	60.1	928.5	5064.3	60.1
Uranium 235/236	6.8	6.8	73.0	6.8	54.0	1800.0	6.8
Uranium 238	244.7	244.7	1300.0	244.7	902.8	20522.8	244.7
Total Uranium (mg/kg)	52.0	52.0	4600.0	52.0	2700.0	19000.0	52.0

*Activity levels are all in picoCuries/gram, with the exception of Total Uranium which is in mg/kg.
[a]Surface soil activity level.
[b]Pit material activity level.
BP = Burn Pit.
†Activity level data obtained from the CPC database list in Table E.3-4.

TABLE 5-32

INORGANIC AND ORGANIC CONCENTRATION DATA FOR THE FUTURE SCENARIO AT ALL OU1 WASTE PIT AREAS

	Concentration (mg/kg)*						
Inorganic	Pit 1[a]	Pit 2[a]	Pit 3[b]	Pit 4[a]	Pit 5[b]	Pit 6[b]	BP[a]
Antimony	27.2	27.2	52.5	27.2	51.7	0.0	27.2
Arsenic	4.9	4.9	21290.0	4.9	2146.8	54.9	4.9
Barium	56.9	56.9	8080.0	56.9	30230.2	95.0	56.9
Beryllium	0.8	0.8	14.4	0.8	14.8	5.7	0.8
Boron	0.0	0.0	155.2	0.0	0.0	0.0	0.0
Cadmium	5.8	5.8	25.9	5.8	11.6	5.7	5.8
Chromium	14.3	14.3	186.1	14.3	115.7	30.0	14.3
Cobalt	10.4	10.4	36.0	10.4	35.5	26.0	10.4
Copper	17.0	17.0	1741.9	17.0	11810.1	222.0	17.0
Cyanide	0.0	0.0	1.6	0.0	0.0	0.0	0.0
Lead	15.9	15.9	670.1	15.9	173.7	79.6	15.9
Manganese	574.1	574.1	16704.9	574.1	3051.5	220.8	574.1
Mercury	0.0	0.0	3.2	0.0	1.6	0.0	0.0
Molybdenum	4.3	4.3	240.9	4.3	666.2	0.0	4.3
Nickel	29.4	29.4	265.8	29.4	150.0	51.0	29.4
Selenium	0.0	0.0	49.5	0.0	13.8	0.0	0.0
Silver	8.9	8.9	37.4	8.9	14.1	158.0	8.9
Thallium	0.0	0.0	12.0	0.0	34.5	71.0	0.0
Tin	0.0	0.0	191.0	0.0	48.0	13.8	0.0
Vanadium	19.6	19.6	5202.7	19.6	4919.8	100.0	19.6
Zinc	46.7	46.7	311.0	46.7	206.0	48.0	46.7
Organic							
Aroclor-1248	0.0	0.0	2725.4	0.0	550.0	0.0	0.0
Aroclor-1254	1400.0	1400.0	2075.5	1400.0	750.0	81.0	1400.0
Benzo(a)anthracene	0.0	0.0	360.0	0.0	0.0	0.0	0.0
Benzo(a)pyrene	0.0	0.0	380.0	0.0	0.0	0.0	0.0

TABLE 5-32
(Continued)

Organic (Continued)	Concentration (mg/kg)*						
	Pit 1[a]	Pit 2[a]	Pit 3[b]	Pit 4[a]	Pit 5[b]	Pit 6[b]	BP[a]
Benzo(b)fluoranthene	0.0	0.0	560.0	0.0	0.0	0.0	0.0
Benzo(ghi)perylene	0.0	0.0	160.0	0.0	0.0	0.0	0.0
Chrysene	0.0	0.0	370.0	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	0.0	0.0	130.0	0.0	0.0	0.0	0.0
Pentachlorophenol	0.0	0.0	1300.0	0.0	0.0	0.0	0.0
Tetrachloroethene	0.0	0.0	0.0	0.0	0.0	31066.4	0.0
Dioxins and Furans							
2,3,7,8-Tetrachlorodibenzofuran	0.0	0.0	200.0	0.0	0.0	0.0	0.0
Heptachlorodibenzo-p-dioxin	0.0	0.0	3,200.0	0.0	0.0	0.0	0.0
Heptachlorodibenzofuran	0.0	0.0	897.0	0.0	0.0	0.0	0.0
Hexachlorodibenzo-p-dioxin	0.0	0.0	308.0	0.0	0.0	0.0	0.0
Hexachlorodibenzofuran	0.0	0.0	267.0	0.0	0.0	0.0	0.0
Octachlorodibenzo-p-dioxin	0.0	0.0	12,700.0	0.0	0.0	0.0	0.0
Octachlorodibenzofuran	0.0	0.0	745.0	0.0	0.0	0.0	0.0

*Contaminant concentrations are taken from the OU1 COC database for surface soils outside the OU1 Waste Pit area and for actual pit materials.
[a]Surface soil concentration.
[b]Pit material concentration.
BP = Burn Pit

TABLE 5-33

CURRENT SCENARIO
MAXIMUM ANNUAL AVERAGE ON-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1989

RADIOLOGICAL CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration (pCi/m^3)[a]
Cesium 137	0.00	-50.00	0.29×10^{-3}
Neptunium 237	0.00	-50.00	0.14×10^{-3}
Plutonium 238	0.00	-50.00	0.11×10^{-3}
Plutonium 239/240	0.00	-50.00	0.29×10^{-4}
Radium 226	0.00	-50.00	0.29×10^{-3}
Radium 228	0.00	-50.00	0.34×10^{-3}
Strontium 90	0.00	-50.00	0.49×10^{-3}
Technetium 99	0.00	-50.00	0.25×10^{-2}
Thorium 228	0.00	-50.00	0.16×10^{-2}
Thorium 230	0.00	-50.00	0.21×10^{-1}
Thorium 232	0.00	-50.00	0.12×10^{-2}
Uranium 234	0.00	-50.00	0.17×10^{-1}
Uranium 235/236	0.00	-50.00	0.19×10^{-2}
Uranium 238	0.00	-50.00	0.07×10^{0}
Total Uranium	0.00	-50.00	0.15×10^{-1}
Radon 222	0.00	-50.00	0.28×10^{2}

[a]Annual air concentrations are in pCi/m^3, with the exception of total uranium, which is in $\mu g/m^3$.
*Receptor origin is located at the center of the Burn Pit.

4783

TABLE 5-34

CURRENT SCENARIO
MAXIMUM ANNUAL AVERAGE ON-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1989

INORGANIC CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Antimony	0.00	-50.00	0.78×10^{-2}
Arsenic	0.00	-50.00	0.14×10^{-2}
Barium	0.00	-50.00	0.16×10^{-1}
Beryllium	0.00	-50.00	0.23×10^{-3}
Cadmium	0.00	-50.00	0.17×10^{-2}
Chromium	0.00	-50.00	0.41×10^{-2}
Cobalt	0.00	-50.00	0.30×10^{-2}
Copper	0.00	-50.00	0.49×10^{-2}
Lead	0.00	-50.00	0.46×10^{-2}
Manganese	0.00	-50.00	0.16×10^{0}
Molybdenum	0.00	-50.00	0.12×10^{-2}
Nickel	0.00	-50.00	0.85×10^{-2}
Silver	0.00	-50.00	0.26×10^{-2}
Vanadium	0.00	-50.00	0.56×10^{-2}
Zinc	0.00	-50.00	0.13×10^{-1}

* Receptor origin is located at the center of the Burn Pit.

TABLE 5-35

MAXIMUM ANNUAL AVERAGE ON-SITE CONTAMINANT CONCENTRATIONS ANNUAL PERIOD: 1989

OTHER CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Aroclor-1254	0.00	-50.00	0.40×10^{-3}

*Receptor origin is located at the center of the Burn Pit.

TABLE 5-36
CURRENT SCENARIO
MAXIMUM ANNUAL AVERAGE OFF-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1987

RADIONUCLIDE CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration (pCi/m^3)[a]
Cesium 137	-450.00	-150.00	0.25×10^{-4}
Neptunium 237	-450.00	-150.00	0.13×10^{-4}
Plutonium 238	-450.00	-150.00	0.10×10^{-4}
Plutonium 239/240	-450.00	-150.00	0.25×10^{-5}
Radium 226	-450.00	-150.00	0.25×10^{-4}
Radium 228	-450.00	-150.00	0.30×10^{-4}
Strontium 90	-450.00	-150.00	0.43×10^{-4}
Technetium 99	-450.00	-150.00	0.22×10^{-3}
Thorium 228	-450.00	-150.00	0.14×10^{-3}
Thorium 230	-450.00	-150.00	0.19×10^{-2}
Thorium 232	-450.00	-150.00	0.11×10^{-3}
Uranium 234	-450.00	-150.00	0.15×10^{-2}
Uranium 235/236	-450.00	-150.00	0.17×10^{-3}
Uranium 238	-450.00	-150.00	0.62×10^{-2}
Total Uranium	-450.00	-150.00	0.13×10^{-2}
Radon 222	-450.00	-150.00	$0.23 \times 10^{+1}$

[a]Annual air concentrations are in pCi/m^3, with the exception of total uranium, which is in $\mu g/m^3$.
*Receptor origin is located at the center of the Burn Pit.

TABLE 5-37

CURRENT SCENARIO
MAXIMUM ANNUAL AVERAGE OFF-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1987

INORGANIC CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Antimony	-450.00	-150.00	0.69×10^{-3}
Arsenic	-450.00	-150.00	0.12×10^{-3}
Barium	-450.00	-150.00	0.14×10^{-2}
Beryllium	-450.00	-150.00	0.20×10^{-4}
Cadmium	-450.00	-150.00	0.15×10^{-3}
Chromium	-450.00	-150.00	0.36×10^{-3}
Cobalt	-450.00	-150.00	0.26×10^{-3}
Copper	-450.00	-150.00	0.43×10^{-3}
Lead	-450.00	-150.00	0.40×10^{-3}
Manganese	-450.00	-150.00	0.15×10^{-1}
Molybdenum	-450.00	-150.00	0.11×10^{-3}
Nickel	-450.00	-150.00	0.75×10^{-3}
Silver	-450.00	-150.00	0.23×10^{-3}
Vanadium	-450.00	-150.00	0.50×10^{-3}
Zinc	-450.00	-150.00	0.12×10^{-2}

*Receptor origin is located at the center of the Burn Pit.

1121

TABLE 5-38

CURRENT SCENARIO
MAXIMUM ANNUAL AVERAGE OFF-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1987

OTHER CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Aroclor-1254	-450.00	-150.00	0.35×10^{-4}

*Receptor origin is located at the center of the Burn Pit.

TABLE 5-39

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE ON-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1989

RADIOLOGICAL CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration (pCi/m^3)[a]
Cesium 137	100.00	100.00	0.61×10^{-2}
Neptunium 237	100.00	100.00	0.36×10^{-2}
Plutonium 238	100.00	100.00	0.37×10^{-3}
Plutonium 239/240	0.00	50.00	0.30×10^{-2}
Radium 226	0.00	50.00	0.63×10^{-1}
Strontium 90	100.00	100.00	0.20×10^{-2}
Technetium 99	100.00	100.00	0.19×10^{0}
Thorium 230	0.00	50.00	0.18×10^{1}
Thorium 232	0.00	0.00	0.80×10^{-1}
Uranium 234	0.00	50.00	0.26×10^{0}
Uranium 235/236	200.00	50.00	0.69×10^{-1}
Uranium 238	200.00	50.00	0.82×10^{0}
Total Uranium	0.00	50.00	0.10×10^{1}
Radon 222	0.00	0.00	0.48×10^{3}

[a]Annual air concentrations are in pCi/m^3, with the exception of total uranium, which is in $\mu g/m^3$.
*Receptor origin is located at the center of the Burn Pit.

4783

TABLE 5-40

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE ON-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1989

INORGANIC CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Antimony	0.00	50.00	0.13×10^{-1}
Arsenic	0.00	0.00	0.42×10^{1}
Barium	100.00	100.00	0.28×10^{1}
Beryllium	0.00	50.00	0.32×10^{-2}
Boron	0.00	0.00	0.31×10^{-1}
Cadmium	0.00	50.00	0.57×10^{-2}
Chromium	0.00	50.00	0.40×10^{-1}
Cobalt	0.00	50.00	0.86×10^{-2}
Copper	100.00	100.00	0.99×10^{0}
Cyanide	0.00	0.00	0.32×10^{-3}
Lead	0.00	0.00	0.14×10^{0}
Manganese	0.00	0.00	0.34×10^{1}
Mercury	0.00	50.00	0.66×10^{-3}
Molybdenum	100.00	100.00	0.65×10^{-1}
Nickel	0.00	50.00	0.57×10^{-1}
Selenium	0.00	0.00	0.10×10^{-1}
Silver	0.00	50.00	0.88×10^{-2}
Thallium	100.00	50.00	0.42×10^{-2}
Tin	0.00	0.00	0.39×10^{-1}
Vanadium	0.00	50.00	0.11×10^{1}
Zinc	0.00	50.00	0.68×10^{-1}

*Receptor origin is located at the center of the Burn Pit.

TABLE 5-41

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE ON-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1989

OTHER CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Aroclor-1248	0.00	0.00	0.55×10^{-3}
Aroclor-1254	0.00	50.00	0.51×10^{-3}
Benzo(a)Anthrace	0.00	0.00	0.71×10^{-4}
Benzo(a)pyrene	0.00	0.00	0.75×10^{-4}
Benzo(b)flouranthene	0.00	0.00	0.11×10^{-3}
Benzo(g,h,i)perylene	0.00	0.00	0.32×10^{-4}
Chrysene	0.00	0.00	0.73×10^{-4}
Indeno(1,2,3-cd)pyrene	0.00	0.00	0.26×10^{-4}
Pentachlorophenol	0.00	0.00	0.26×10^{-3}
Tetrachloroethene	200.00	50.00	0.11×10^{-2}
2,3,7,8 Tetrachlorodibenzofuran	0.00	0.00	0.39×10^{-7}
Heptachlorodibenzo-p-dioxin	0.00	0.00	0.41×10^{-6}
Heptachlorodibenzofuran	0.00	0.00	0.14×10^{-6}
Hexachlorodibenzo-p-dioxin	0.00	0.00	0.51×10^{-7}
Hexachlorodibenzofuran	0.00	0.00	0.53×10^{-7}
Octachlorodibenzo-p-dioxin	0.00	0.00	0.25×10^{-5}
Octachlorodibenzofuran	0.00	0.00	0.15×10^{-6}

*Receptor origin is located at the center of the Burn Pit.

TABLE 5-42

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE OFF-SITE CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1987

RADIOLOGICAL CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration (pCi/m^3)[a]
Cesium	-500.00	-100.00	0.22×10^{-3}
Neptunium	-500.00	-100.00	0.15×10^{-3}
Plutonium 238	-450.00	-150.00	0.27×10^{-4}
Plutonium 239/240	-450.00	-150.00	0.25×10^{-3}
Radium 226	-450.00	-150.00	0.52×10^{-2}
Strontium 90	-450.00	-150.00	0.14×10^{-3}
Technetium 99	-450.00	-150.00	0.13×10^{-1}
Thorium 230	-450.00	-150.00	0.15×10^{0}
Thorium 232	-450.00	-150.00	0.65×10^{-2}
Uranium 234	-450.00	-150.00	0.23×10^{-1}
Uranium 235/236	-450.00	-150.00	0.22×10^{-2}
Uranium 238	-450.00	-150.00	0.34×10^{-1}
Total Uranium	-450.00	-150.00	0.89×10^{-1}
Radon 222	-450.00	-150.00	0.40×10^{2}

[a]Annual air concentrations are in pCi/m^3, with the exception of total uranium, which is in $\mu g/m^3$.
*Receptor origin is located at the origin of the Burn Pit.

TABLE 5-43

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE OFF-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1987

INORGANIC CONTAMINANTS

Analyte	Receptor Coordinate* x (meters)	Receptor Coordinate* y (meters)	Annual Concentration ($\mu g/m^3$)
Antimony	-450.00	-150.00	0.11×10^{-2}
Arsenic	-450.00	-150.00	0.34×10^{0}
Barium	-450.00	-150.00	0.20×10^{0}
Beryllium	-450.00	-150.00	0.27×10^{-3}
Boron	-450.00	-150.00	0.25×10^{-2}
Cadmium	-450.00	-150.00	0.48×10^{-3}
Chromium	-450.00	-150.00	0.33×10^{-2}
Cobalt	-450.00	-150.00	0.73×10^{-3}
Copper	-450.00	-150.00	0.55×10^{-1}
Cyanide	-450.00	-150.00	0.26×10^{-4}
Lead	-450.00	-150.00	0.11×10^{-1}
Manganese	-450.00	-150.00	0.28×10^{0}
Mercury	-450.00	-150.00	0.55×10^{-4}
Molybdenum	-450.00	-150.00	0.54×10^{-2}
Nickel	-450.00	-150.00	0.48×10^{-2}
Selenium	-450.00	-150.00	0.82×10^{-3}
Silver	-450.00	-150.00	0.76×10^{-3}
Thallium	-450.00	-150.00	0.30×10^{-3}
Tin	-450.00	-150.00	0.32×10^{-2}
Vanadium	-450.00	-150.00	0.94×10^{-1}
Zinc	-450.00	-150.00	0.57×10^{-2}

*Receptor origin is located at the center of the Burn Pit.

TABLE 5-44

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE OFF-SITE
CONTAMINANT CONCENTRATIONS
ANNUAL PERIOD: 1987

OTHER CONTAMINANTS

Analyte	Receptor Coordinate*		Annual Concentration ($\mu g/m^3$)
	x (meters)	y (meters)	
Aroclor-1248	-450.00	-150.00	0.44×10^{-4}
Benzo(a)Anthrace	-450.00	-150.00	0.57×10^{-5}
Benzo(a)pyrene	-450.00	-150.00	0.61×10^{-5}
Benzo(b)fluoranthene	-450.00	-150.00	0.89×10^{-5}
Benzo(ghi)perylene	-450.00	-150.00	0.25×10^{-5}
Chrysene	-450.00	-150.00	0.59×10^{-5}
Indeno(1,2,3-cd)pyrene	-450.00	-150.00	0.21×10^{-5}
Pentachlorophenol	-450.00	-150.00	0.21×10^{-4}
Tetrachloroethene	-450.00	-200.00	0.15×10^{-4}
2,3,7,8-Tetrachloro-dibenzofuran	-450.00	-150.00	0.32×10^{-8}
Heptachlorodibenzo-p-dioxin	-450.00	-150.00	0.33×10^{-7}
Heptachlorodibenzofuran	-450.00	-150.00	0.11×10^{-7}
Hexachlorodibenzo-p-dioxin	-450.00	-150.00	0.41×10^{-8}
Hexachlorodibenzofuran	-450.00	-150.00	0.43×10^{-8}
Octachlorodibenzo-p-dioxin	-450.00	-150.00	0.20×10^{-6}
Octachlorodibenzofuran	-450.00	-150.00	0.12×10^{-7}

* Receptor origin is located at the center of the Burn Pit.

TABLE 5-45

CURRENT SCENARIO MAXIMUM ANNUAL AVERAGE CONTAMINANT CONCENTRATIONS FOR DISCRETE RECEPTOR LOCATION

RADIOLOGICAL CONTAMINANTS

Analyte	Discrete Receptor Concentration*					
	Crosby School	Morgan School	Elda School	St. John's School	Ross High School	Ross Day Care
Cesium	3.5×10^{-7}	1.67×10^{-7}	7.56×10^{-7}	2.7×10^{-7}	5.13×10^{-7}	6.55×10^{-7}
Neptunium	1.7×10^{-7}	8.10×10^{-8}	3.78×10^{-7}	1.35×10^{-7}	2.5×10^{-7}	3.28×10^{-7}
Plutonium 238	1.4×10^{-7}	6.44×10^{-8}	3.02×10^{-7}	1.09×10^{-7}	2.00×10^{-7}	2.60×10^{-7}
Plutonium 239/240	3.50×10^{-8}	1.67×10^{-8}	7.56×10^{-8}	2.71×10^{-8}	5.13×10^{-9}	6.55×10^{-8}
Radium 226	3.50×10^{-7}	1.67×10^{-7}	7.56×10^{-7}	2.71×10^{-7}	5.13×10^{-7}	6.55×10^{-7}
Radium 228	4.20×10^{-7}	1.89×10^{-7}	9.07×10^{-7}	3.32×10^{-7}	6.13×10^{-7}	7.94×10^{-7}
Strontium 90	5.90×10^{-7}	2.78×10^{-7}	1.26×10^{-6}	4.67×10^{-7}	8.63×10^{-7}	1.12×10^{-6}
Technetium 99	3.00×10^{-6}	1.44×10^{-6}	6.55×10^{-6}	2.34×10^{-6}	4.38×10^{-6}	5.67×10^{-6}
Thorium 228	1.90×10^{-6}	8.88×10^{-7}	4.16×10^{-6}	1.48×10^{-6}	2.75×10^{-6}	3.65×10^{-6}
Thorium 230	2.60×10^{-5}	1.22×10^{-5}	5.67×10^{-5}	2.14×10^{-5}	3.75×10^{-5}	4.91×10^{-5}
Thorium 232	1.50×10^{-6}	6.99×10^{-7}	3.28×10^{-6}	1.18×10^{-6}	2.13×10^{-6}	2.77×10^{-6}
Uranium 234	2.10×10^{-5}	9.66×10^{-6}	4.54×10^{-5}	1.60×10^{-5}	3.00×10^{-5}	3.91×10^{-5}
Uranium 235/236	2.40×10^{-6}	1.10×10^{-6}	5.17×10^{-6}	1.85×10^{-6}	3.50×10^{-6}	4.41×10^{-6}
Uranium 238	8.50×10^{-4}	4.00×10^{-5}	1.89×10^{-4}	6.64×10^{-5}	1.24×10^{-4}	1.64×10^{-4}
Total Uranium	1.80×10^{-4}	8.44×10^{-6}	3.91×10^{-5}	1.48×10^{-5}	2.63×10^{-5}	3.40×10^{-5}
Radon 222	2.90×10^{-2}	1.0×10^{-2}	6.0×10^{-2}	2.2×10^{-2}	4.1×10^{-2}	5.3×10^{-2}

*Annual air concentrations are in pCi/m^3, with the exception of total uranium, which is in $\mu g/m^3$

TABLE 5-46

CURRENT SCENARIO MAXIMUM ANNUAL AVERAGE CONTAMINANT CONCENTRATIONS FOR DISCRETE RECEPTOR LOCATION

INORGANIC CONTAMINANTS

Analyte	Discrete Receptor Concentration ($\mu g/m^3$)					
	Crosby School	Morgan School	Elda School	St. John's School	Ross High School	Ross Day Care
Antimony	9.40×10^{-6}	4.44×10^{-6}	2.02×10^{-5}	7.50×10^{-6}	1.38×10^{-5}	1.76×10^{-5}
Arsenic	1.70×10^{-6}	7.88×10^{-7}	3.65×10^{-6}	1.35×10^{-6}	2.50×10^{-6}	3.28×10^{-6}
Barium	2.00×10^{-5}	9.21×10^{-6}	4.28×10^{-5}	1.60×10^{-5}	2.88×10^{-5}	3.78×10^{-5}
Beryllium	2.80×10^{-6}	1.33×10^{-7}	6.05×10^{-7}	2.21×10^{-7}	4.13×10^{-7}	5.29×10^{-7}
Cadmium	2.00×10^{-6}	9.32×10^{-7}	4.41×10^{-6}	1.60×10^{-6}	3.00×10^{-6}	3.78×10^{-6}
Chromium	4.90×10^{-6}	2.33×10^{-6}	1.08×10^{-5}	3.94×10^{-6}	7.25×10^{-6}	9.45×10^{-6}
Cobalt	3.60×10^{-6}	1.67×10^{-6}	7.81×10^{-6}	2.83×10^{-6}	5.25×10^{-6}	6.80×10^{-6}
Copper	5.90×10^{-6}	2.78×10^{-6}	1.26×10^{-5}	4.67×10^{-6}	8.63×10^{-6}	1.12×10^{-5}
Lead	5.50×10^{-6}	2.55×10^{-6}	1.20×10^{-5}	4.31×10^{-6}	8.13×10^{-6}	1.05×10^{-5}
Manganese	2.00×10^{-4}	9.32×10^{-5}	4.28×10^{-4}	1.60×10^{-4}	2.88×10^{-4}	3.78×10^{-4}
Molybdenum	1.50×10^{-6}	6.99×10^{-7}	3.28×10^{-6}	1.18×10^{-6}	2.13×10^{-6}	2.77×10^{-6}
Nickel	1.10×10^{-5}	4.77×10^{-6}	2.27×10^{-5}	8.12×10^{-6}	1.50×10^{-5}	1.89×10^{-5}
Silver	3.10×10^{-6}	1.44×10^{-6}	6.68×10^{-6}	2.46×10^{-6}	4.50×10^{-6}	5.80×10^{-6}
Vanadium	6.80×10^{-5}	3.22×10^{-6}	1.51×10^{-5}	5.41×10^{-6}	1.00×10^{-5}	1.26×10^{-5}
Zinc	1.60×10^{-5}	7.55×10^{-6}	3.53×10^{-5}	1.23×10^{-5}	2.38×10^{-5}	3.02×10^{-5}

TABLE 5-47

CURRENT SCENARIO MAXIMUM ANNUAL AVERAGE CONTAMINANT CONCENTRATIONS FOR DISCRETE RECEPTOR LOCATION

OTHER CONTAMINANTS

Analyte	Discrete Receptor Concentration ($\mu g/m^3$)					
	Crosby School	Morgan School	Elda School	St. John's School	Ross High School	Ross Day Care
Arclor-1254	4.80×10^{-7}	2.22×10^{-7}	1.06×10^{-6}	3.81×10^{-7}	7.13×10^{-7}	9.20×10^{-7}

TABLE 5-48

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE
CONTAMINANT CONCENTRATIONS FOR DISCRETE RECEPTOR LOCATIONS

RADIOLOGICAL CONTAMINANTS

	Discrete Receptor Concentrations*					
Analyte	Crosby School	Morgan School	Elda School	St. John's School	Ross High School	Ross Day Care
Cesium	4.80×10^{-6}	2.44×10^{-5}	1.17×10^{-5}	4.06×10^{-6}	8.00×10^{-6}	1.03×10^{-5}
Neptunium	3.10×10^{-6}	1.55×10^{-6}	7.43×10^{-6}	2.58×10^{-6}	5.00×10^{-6}	6.55×10^{-6}
Plutonium-238	4.60×10^{-7}	2.22×10^{-7}	1.05×10^{-6}	3.69×10^{-7}	7.13×10^{-7}	9.20×10^{-7}
Plutonium-239/240	3.40×10^{-6}	1.67×10^{-6}	7.56×10^{-6}	2.71×10^{-6}	5.13×10^{-6}	6.55×10^{-6}
Radium-226	6.50×10^{-5}	3.11×10^{-5}	1.39×10^{-4}	5.17×10^{-5}	9.63×10^{-5}	1.23×10^{-4}
Strontium-90	2.40×10^{-6}	1.22×10^{-6}	5.54×10^{-6}	1.97×10^{-6}	3.75×10^{-6}	4.79×10^{-6}
Technetium-99	2.20×10^{-4}	1.09×10^{-4}	5.04×10^{-4}	1.85×10^{-4}	3.38×10^{-4}	4.41×10^{-4}
Thorium-230	2.00×10^{-3}	9.77×10^{-4}	4.54×10^{-3}	1.60×10^{-3}	3.00×10^{-3}	3.91×10^{-3}
Thorium-232	7.80×10^{-5}	3.77×10^{-5}	1.76×10^{-4}	6.15×10^{-5}	1.15×10^{-4}	1.51×10^{-4}
Uranium-234	3.30×10^{-4}	1.55×10^{-4}	7.56×10^{-4}	2.71×10^{-4}	5.13×10^{-4}	6.55×10^{-4}
Uranium-235/236	4.00×10^{-5}	2.00×10^{-5}	9.45×10^{-5}	3.32×10^{-5}	6.38×10^{-5}	8.19×10^{-5}
Uranium-238	5.80×10^{-4}	2.78×10^{-4}	1.39×10^{-3}	4.80×10^{-4}	9.13×10^{-4}	1.18×10^{-3}
Total Uranium	1.30×10^{-3}	6.11×10^{-4}	2.90×10^{-3}	1.02×10^{-3}	1.88×10^{-3}	2.52×10^{-3}
Radon-222	5.00×10^{-1}	2.30×10^{-1}	1.08×10^{0}	3.9×10^{-1}	7.40×10^{-1}	9.5×10^{-1}

* Annual air concentrations are in pCi/m^3, with the exception of total uranium, which is in $\mu g/m^3$.

TABLE 5-49

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE
CONTAMINANT CONCENTRATIONS FOR DISCRETE RECEPTOR LOCATIONS

INORGANIC CONTAMINANTS

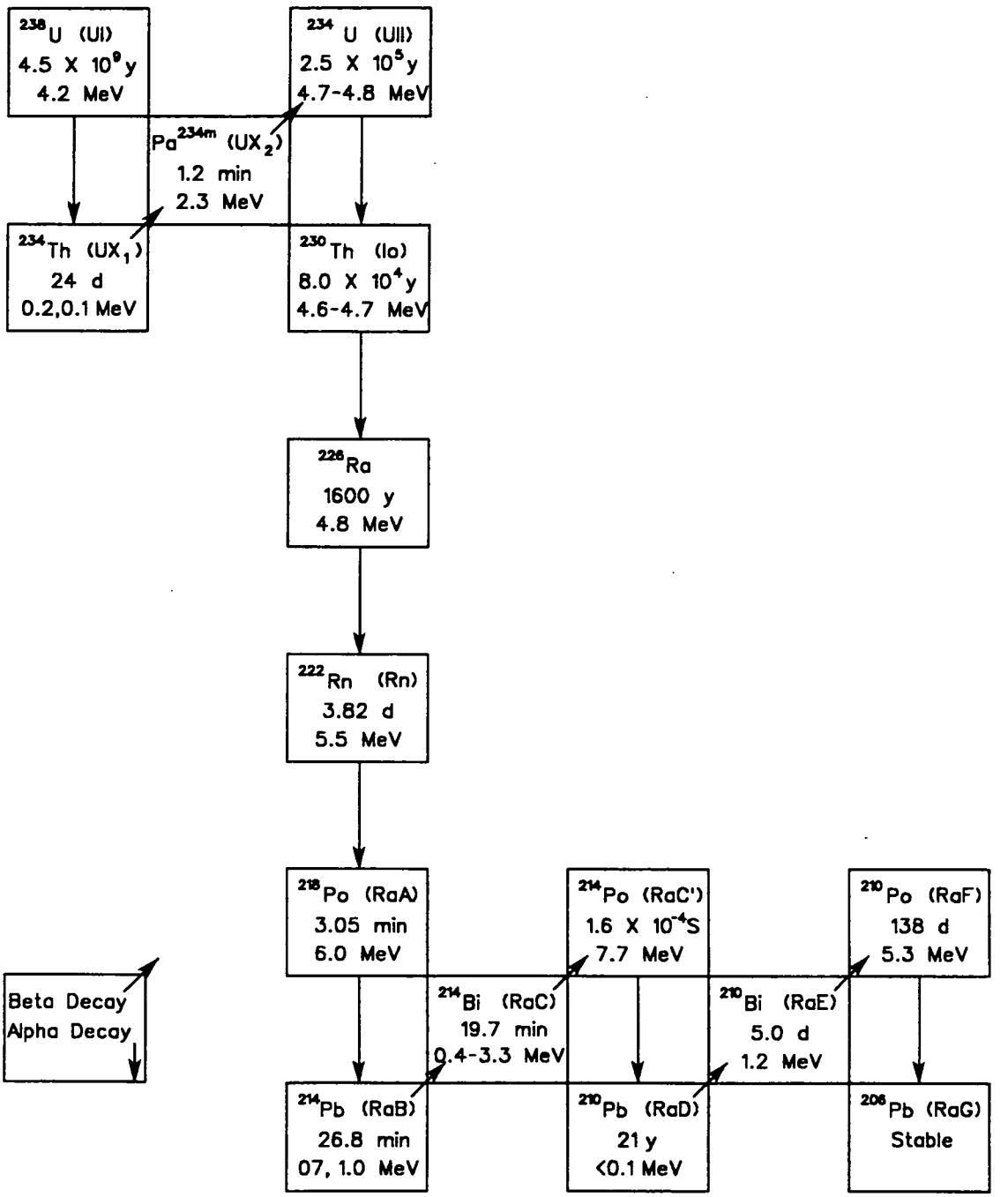
	Discrete Receptor Concentrations* ($\mu g/m^3$)					
Analyte	Crosby School	Morgan School	Elda School	St. John's School	Ross High School	Ross Day Care
Antimony	1.60×10^{-5}	7.66×10^{-6}	3.53×10^{-5}	1.23×10^{-5}	2.38×10^{-5}	3.15×10^{-5}
Arsenic	4.10×10^{-3}	2.00×10^{-3}	1.00×10^{-2}	3.20×10^{-3}	6.13×10^{-3}	7.81×10^{-3}
Barium	3.30×10^{-3}	1.67×10^{-3}	7.43×10^{-3}	2.71×10^{-3}	5.13×10^{-3}	6.55×10^{-3}
Beryllium	3.70×10^{-6}	1.78×10^{-6}	8.32×10^{-6}	2.95×10^{-6}	5.63×10^{-6}	7.31×10^{-6}
Boron	2.90×10^{-5}	1.33×10^{-5}	6.30×10^{-5}	2.34×10^{-5}	4.25×10^{-5}	5.54×10^{-5}
Cadmium	6.30×10^{-6}	3.00×10^{-6}	1.39×10^{-5}	5.04×10^{-6}	9.38×10^{-6}	9.60×10^{-6}
Chromium	4.40×10^{-5}	2.11×10^{-5}	9.70×10^{-5}	3.44×10^{-5}	6.50×10^{-5}	8.44×10^{-5}
Cobalt	1.00×10^{-5}	5.00×10^{-6}	2.27×10^{-5}	8.36×10^{-6}	1.50×10^{-5}	2.02×10^{-5}
Copper	1.00×10^{-3}	5.00×10^{-4}	2.39×10^{-3}	8.36×10^{-6}	1.63×10^{-3}	1.60×10^{-3}
Cyanide	3.00×10^{-7}	1.44×10^{-7}	6.55×10^{-7}	2.34×10^{-7}	4.38×10^{-7}	5.67×10^{-7}
Lead	1.40×10^{-4}	6.66×10^{-5}	3.02×10^{-4}	1.09×10^{-4}	2.00×10^{-4}	2.65×10^{-4}
Manganese	3.40×10^{-3}	1.67×10^{-3}	7.43×10^{-3}	2.71×10^{-3}	5.00×10^{-3}	6.43×10^{-3}
Mercury	6.90×10^{-7}	3.33×10^{-7}	1.51×10^{-6}	5.54×10^{-7}	1.03×10^{-6}	1.39×10^{-6}
Molybdenum	8.40×10^{-5}	4.11×10^{-5}	1.89×10^{-4}	6.77×10^{-5}	1.25×10^{-4}	1.64×10^{-4}
Nickel	6.20×10^{-5}	3.00×10^{-5}	1.39×10^{-4}	5.04×10^{-5}	9.38×10^{-5}	1.21×10^{-4}
Selenium	1.00×10^{-5}	4.77×10^{-6}	2.27×10^{-5}	8.00×10^{-6}	1.50×10^{-5}	1.89×10^{-5}
Silver	1.10×10^{-5}	5.22×10^{-6}	2.39×10^{-5}	8.73×10^{-6}	1.63×10^{-5}	2.14×10^{-5}
Thallium	5.10×10^{-6}	2.55×10^{-6}	1.18×10^{-5}	4.18×10^{-6}	8.00×10^{-6}	1.03×10^{-5}
Tin	3.90×10^{-5}	1.89×10^{-5}	8.57×10^{-5}	3.08×10^{-5}	5.75×10^{-5}	7.43×10^{-5}
Vanadium	1.30×10^{-3}	6.11×10^{-4}	2.77×10^{-3}	1.01×10^{-3}	1.88×10^{-3}	2.39×10^{-3}
Zinc	7.60×10^{-5}	3.66×10^{-5}	1.46×10^{-4}	6.03×10^{-4}	1.14×10^{-4}	1.51×10^{-4}

TABLE 5-50

FUTURE SCENARIO
MAXIMUM ANNUAL AVERAGE
CONTAMINANT CONCENTRATIONS FOR DISCRETE RECEPTOR LOCATIONS

OTHER CONTAMINANTS

	Discrete Receptor Concentrations* ($\mu g/m^3$)					
Analyte	Crosby School	Morgan School	Elda School	St. John's School	Ross High School	Ross Day Care
Aroclor-1248	5.40×10^{-7}	2.55×10^{-7}	1.18×10^{-6}	4.31×10^{-7}	8.00×10^{-7}	1.30×10^{-6}
Aroclor-1254	6.00×10^{-7}	2.89×10^{-7}	1.26×10^{-6}	4.80×10^{-7}	8.88×10^{-7}	1.15×10^{-6}
Benzo(a)anthracene	6.80×10^{-8}	3.28×10^{-8}	1.51×10^{-7}	5.29×10^{-8}	9.88×10^{-8}	1.26×10^{-7}
Benzo(a)pyrene	7.10×10^{-8}	3.44×10^{-8}	1.51×10^{-7}	5.66×10^{-8}	1.05×10^{-7}	1.39×10^{-7}
Benzo(b)fluoranthene	1.10×10^{-7}	6.00×10^{-8}	2.27×10^{-7}	8.24×10^{-8}	1.50×10^{-7}	2.02×10^{-7}
Benzo(g,h,i)perylene	3.00×10^{-7}	1.44×10^{-8}	6.55×10^{-8}	2.34×10^{-8}	4.38×10^{-8}	5.67×10^{-8}
Chrysene	7.00×10^{-8}	3.33×10^{-8}	1.51×10^{-7}	5.54×10^{-8}	1.03×10^{-7}	1.26×10^{-7}
Indeno(1,2,3-cd)pyrene	2.40×10^{-8}	1.11×10^{-8}	5.29×10^{-8}	1.97×10^{-8}	3.63×10^{-8}	4.66×10^{-8}
Pentachlorophenol	2.40×10^{-7}	1.11×10^{-7}	5.29×10^{-7}	1.97×10^{-7}	3.63×10^{-7}	4.66×10^{-7}
Tetrachloroethene	3.90×10^{-7}	1.89×10^{-7}	9.58×10^{-7}	3.32×10^{-7}	6.38×10^{-7}	8.32×10^{-7}
2,3,7,8-Tetrachlorodibenzofuran	3.80×10^{-11}	1.78×10^{-11}	8.19×10^{-11}	2.95×10^{-11}	5.50×10^{-11}	7.06×10^{-11}
Heptachlorodibenzo-p-dioxin	6.10×10^{-10}	2.89×10^{-10}	1.26×10^{-9}	4.80×10^{-10}	8.88×10^{-10}	1.15×10^{-9}
Heptachlorodibenzofuran	1.70×10^{-10}	7.99×10^{-11}	3.65×10^{-10}	1.35×10^{-10}	2.50×10^{-10}	3.15×10^{-10}
Hexachlorodibenzo-p-dioxin	5.80×10^{-11}	2.78×10^{-11}	1.26×10^{-10}	4.55×10^{-11}	8.50×10^{-11}	1.10×10^{-10}
Hexachlorodibenzofuran	5.10×10^{-11}	2.44×10^{-11}	1.11×10^{-10}	3.94×10^{-11}	7.38×10^{-11}	9.58×10^{-11}
Octachlorodibenzo-p-dioxin	2.40×10^{-9}	1.11×10^{-9}	5.17×10^{-9}	1.85×10^{-9}	3.50×10^{-9}	4.54×10^{-9}
Octachlorodibenzofuran	1.40×10^{-10}	6.66×10^{-11}	3.02×10^{-10}	1.11×10^{-10}	2.13×10^{-10}	2.65×10^{-10}



NOTE:

1. SOURCE-N.C.R.P., 1987

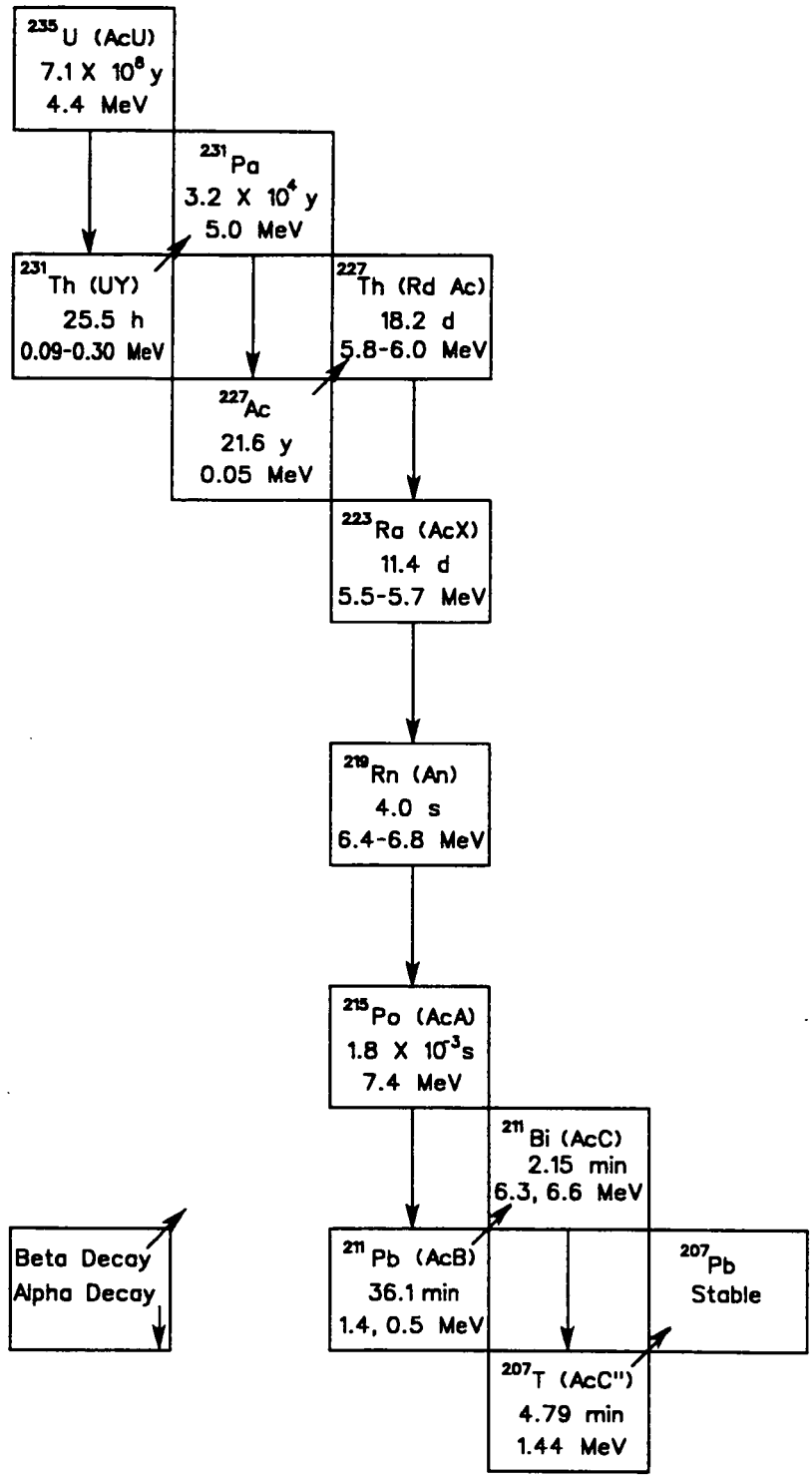
LEGEND:

214
Pb (RaB) - MASS SYMBOL
26.8 min - HALF-LIFE
1.0 MeV - DECAY ENERGY

409191-A-348 /OU1 /0NOX /DS
4091534.OU1 09/23/93 GP

FIGURE 5-1. PRINCIPAL DECAY SCHEME OF THE URANIUM SERIES

4783



NOTE:

1. SOURCE-N.C.R.P., 1987

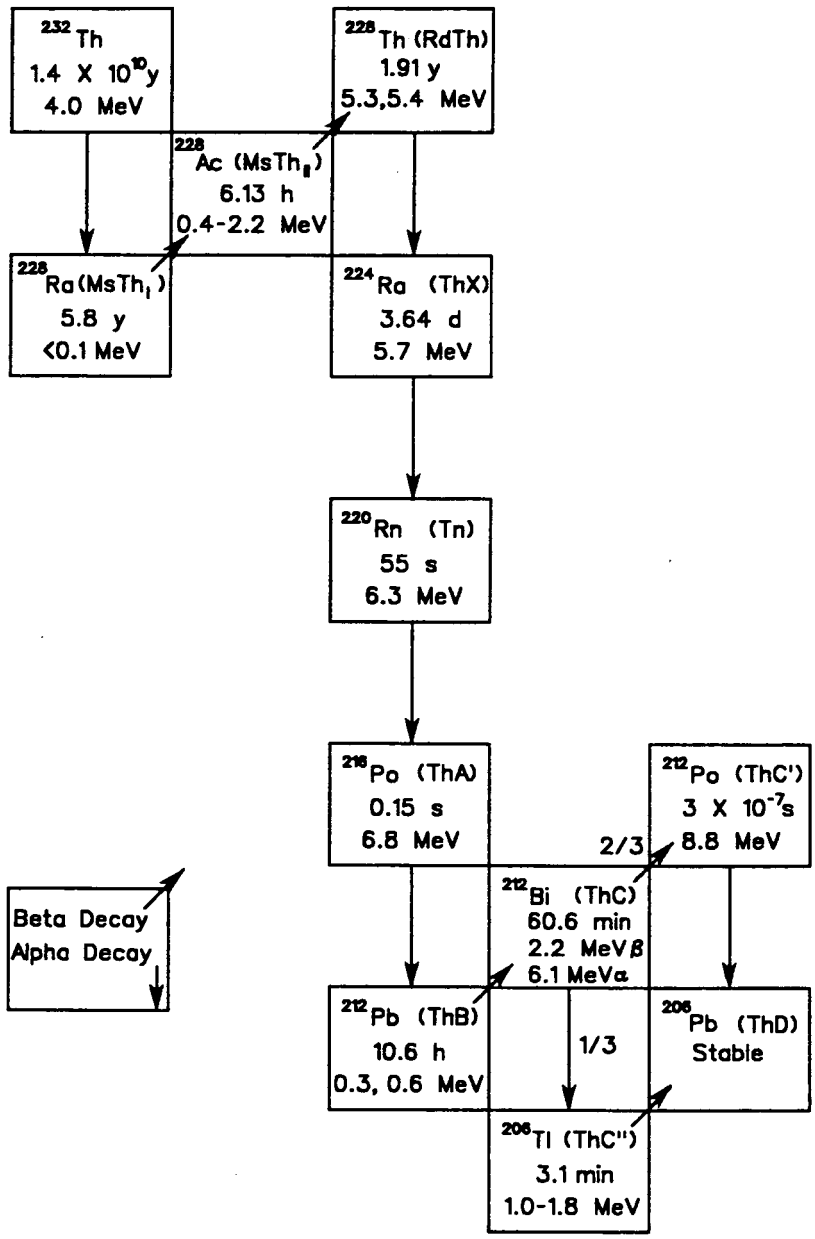
LEGEND:

^{211}Pb (AcB) - MASS SYMBOL
36.1 min - HALF-LIFE
1.4 MeV - DECAY ENERGY

1136

40819-4-348 /OUI /0NOX /DS
40819348.OUI 08/23/83 GP

FIGURE 5-2. PRINCIPAL DECAY SCHEME OF THE ACTINIUM SERIES



NOTE:

1. SOURCE-N.C.R.P., 1987

LEGEND:

212 Pb (ThB) - MASS SYMBOL
10.6 h - HALF-LIFE
0.6 MeV - DECAY ENERGY

409191-A-347 /0U1/0V0X /03
409183-47.0U1 08/23/93 GP

FIGURE 5-3. PRINCIPAL DECAY SCHEME OF THE THORIUM SERIES

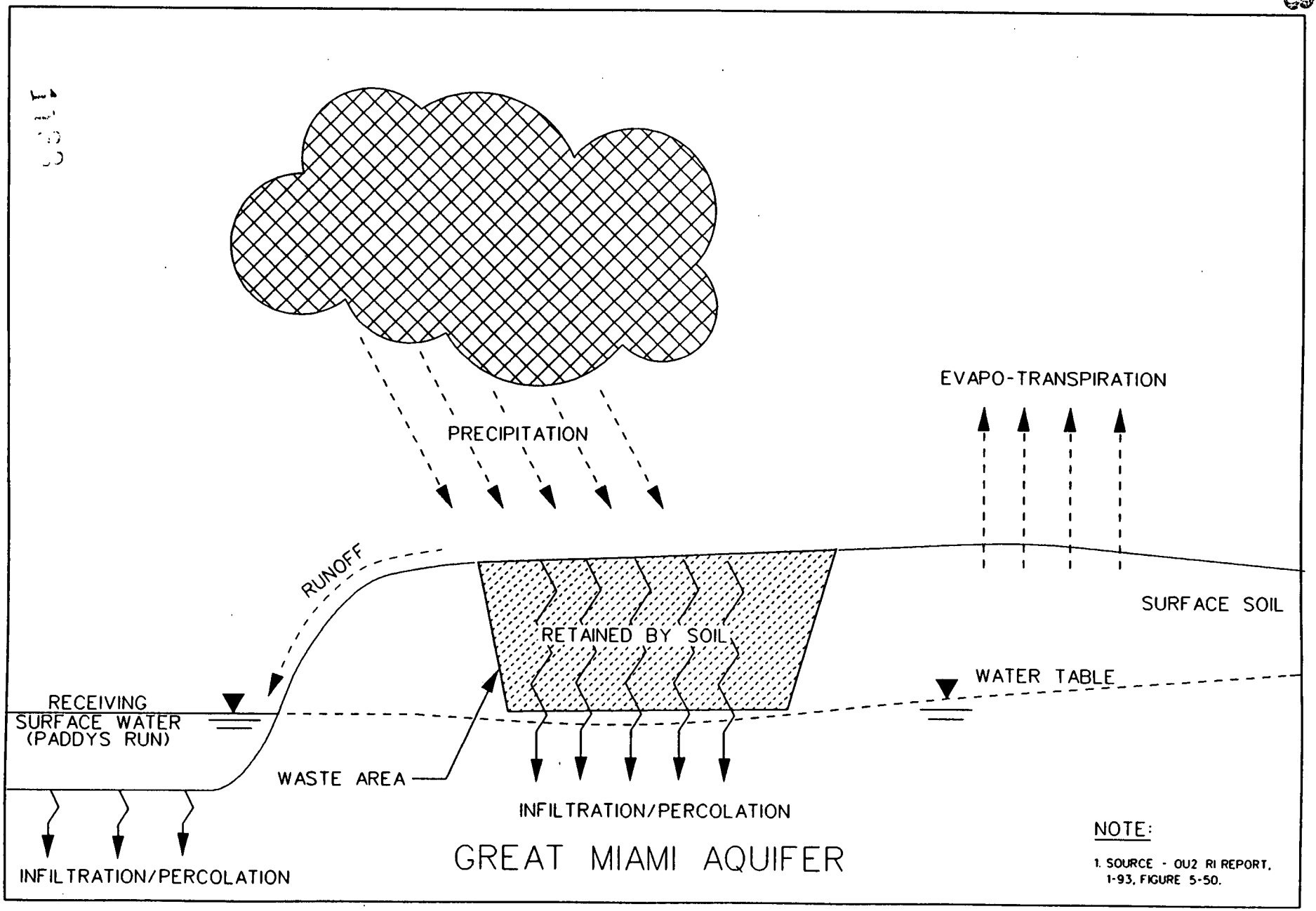
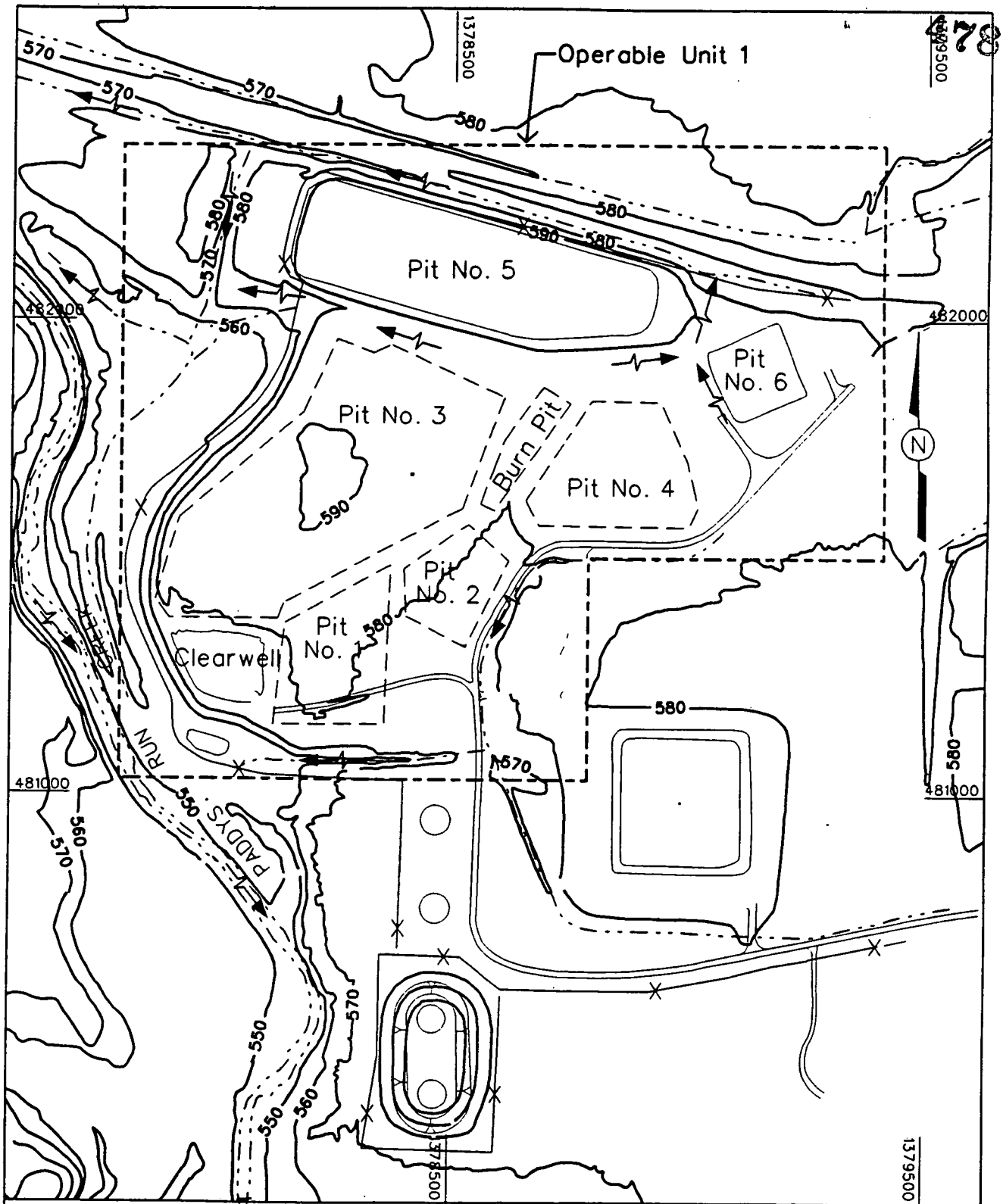


FIGURE 5-4. CONCEPTUAL MODEL OF SURFACE WATER RUNOFF

SKX02067-A OU1 FAIR
SKX02067.DGN 08/10/93 BM



NOTE:

1. CONTOUR INTERVAL - 10 FT.
2. SOURCE - RI OU1 REPORT, 2-93, FIGURE 5-51.
3. DRAINAGE SCENARIO BASED ON DRAINAGE PRIOR TO INSTALLATION OF STORM WATER RUNOFF CONTROL

LEGEND:

- FENCE LINE
- DRAINAGEWAYS
- ROADWAY
- OPERABLE UNIT OUTLINE
- SURFACE WATER DRAINAGE
- 580 TOPOGRAPHIC CONTOUR LINE

SCALE: 0 300 FEET

SKX02068-A OU1 FMR
SKX02068.DGN 08/10/93 BM

FIGURE 5-5. TOPOGRAPHY AND NATURAL DRAINAGE SCENARIO OF OPERABLE UNIT 1

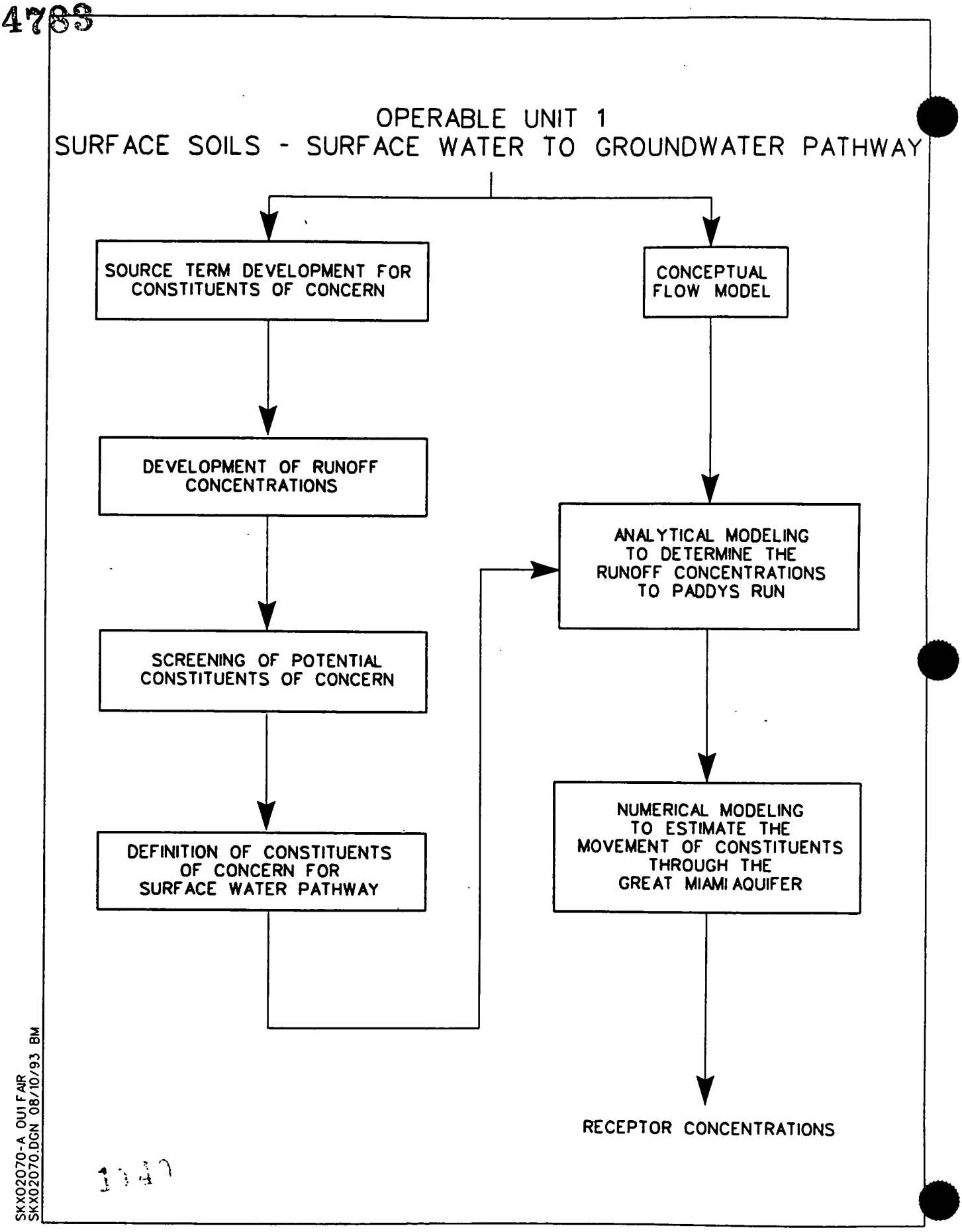


FIGURE 5-6. SURFACE WATER TO GROUNDWATER PATHWAY TRANSPORT MODELING DIAGRAM

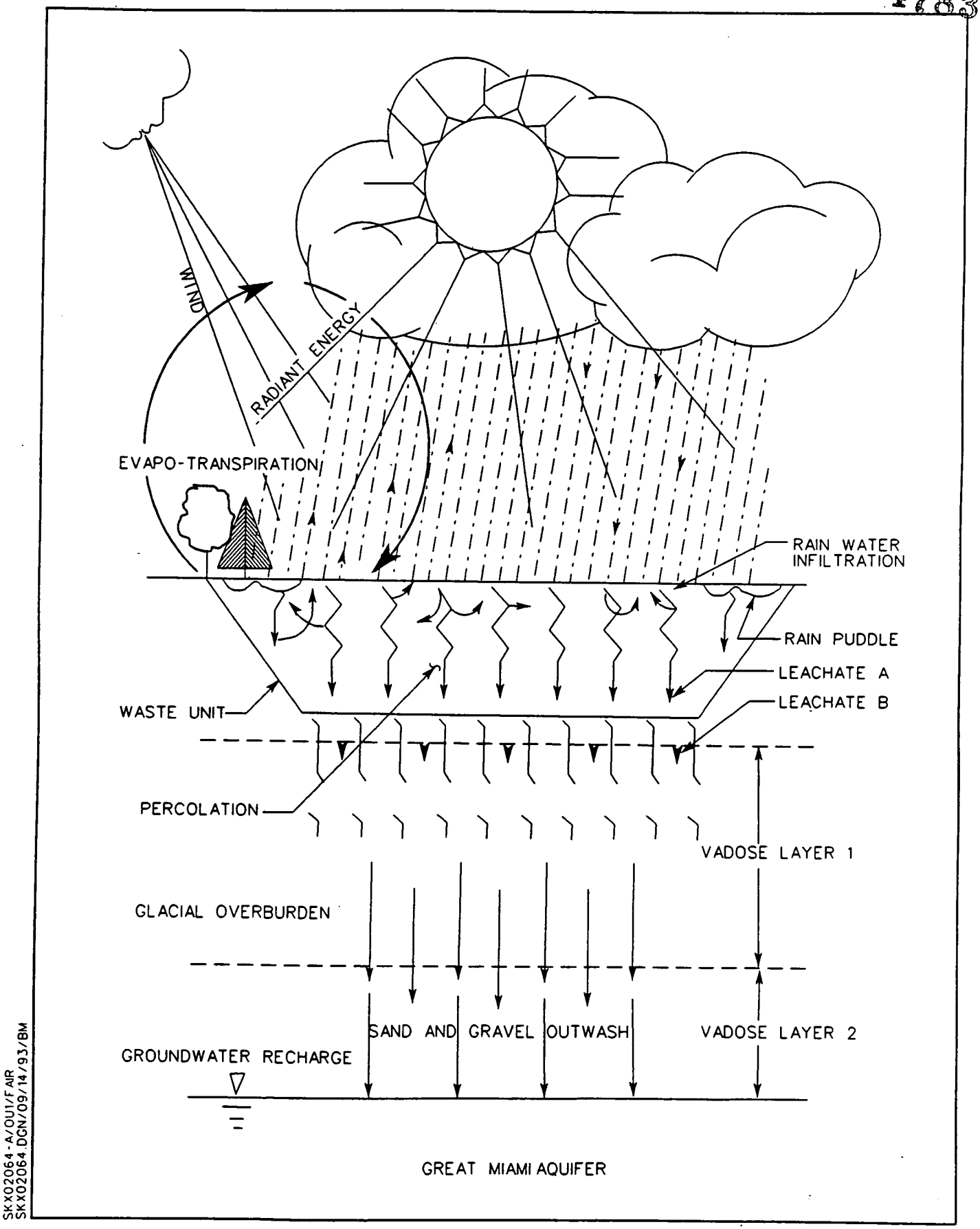


FIGURE 5-7. CONCEPTUAL VADOSE ZONE MODEL

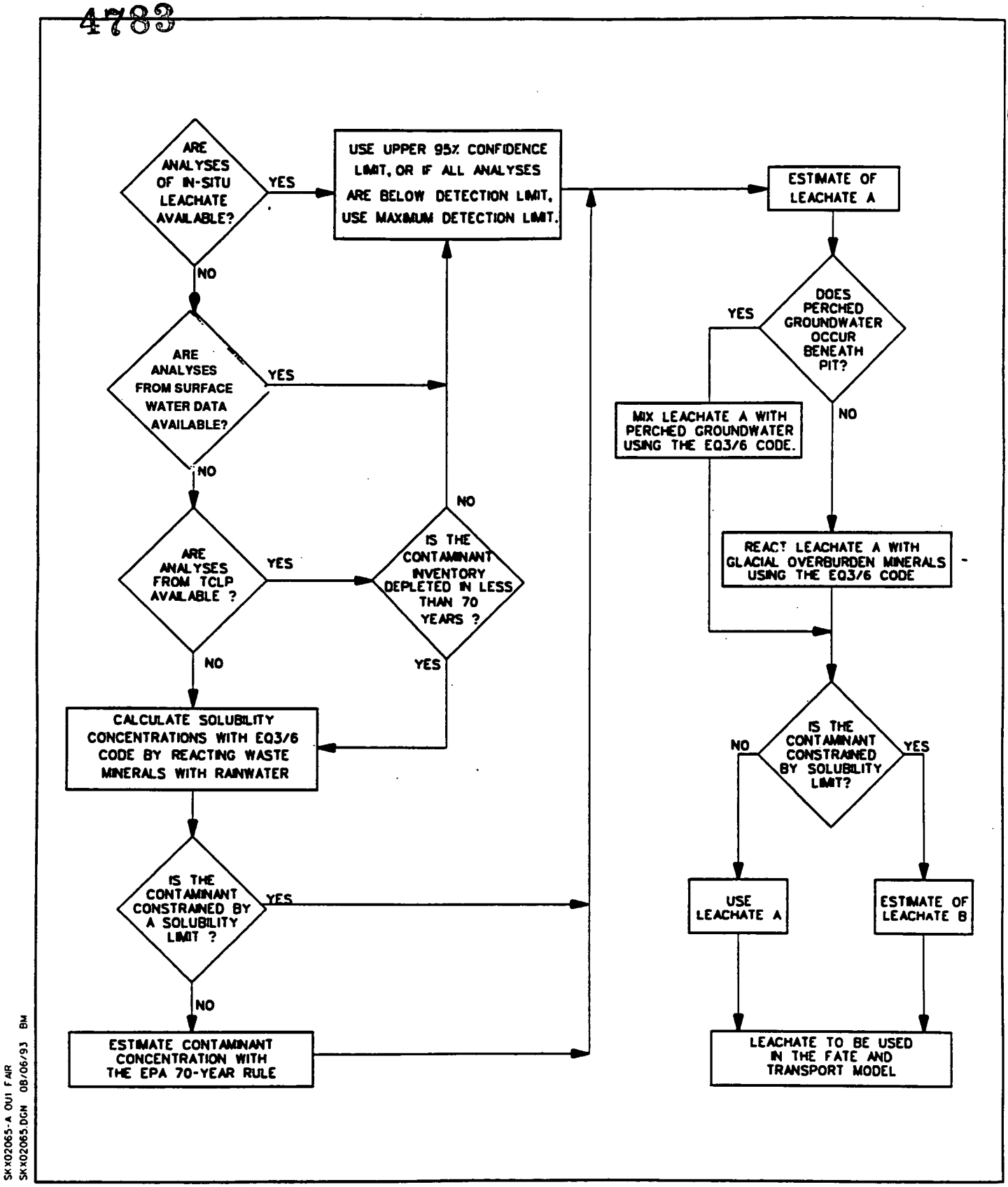


FIGURE 5-8. ESTIMATING LEACHATE FOR RADIONUCLIDES AND INORGANICS

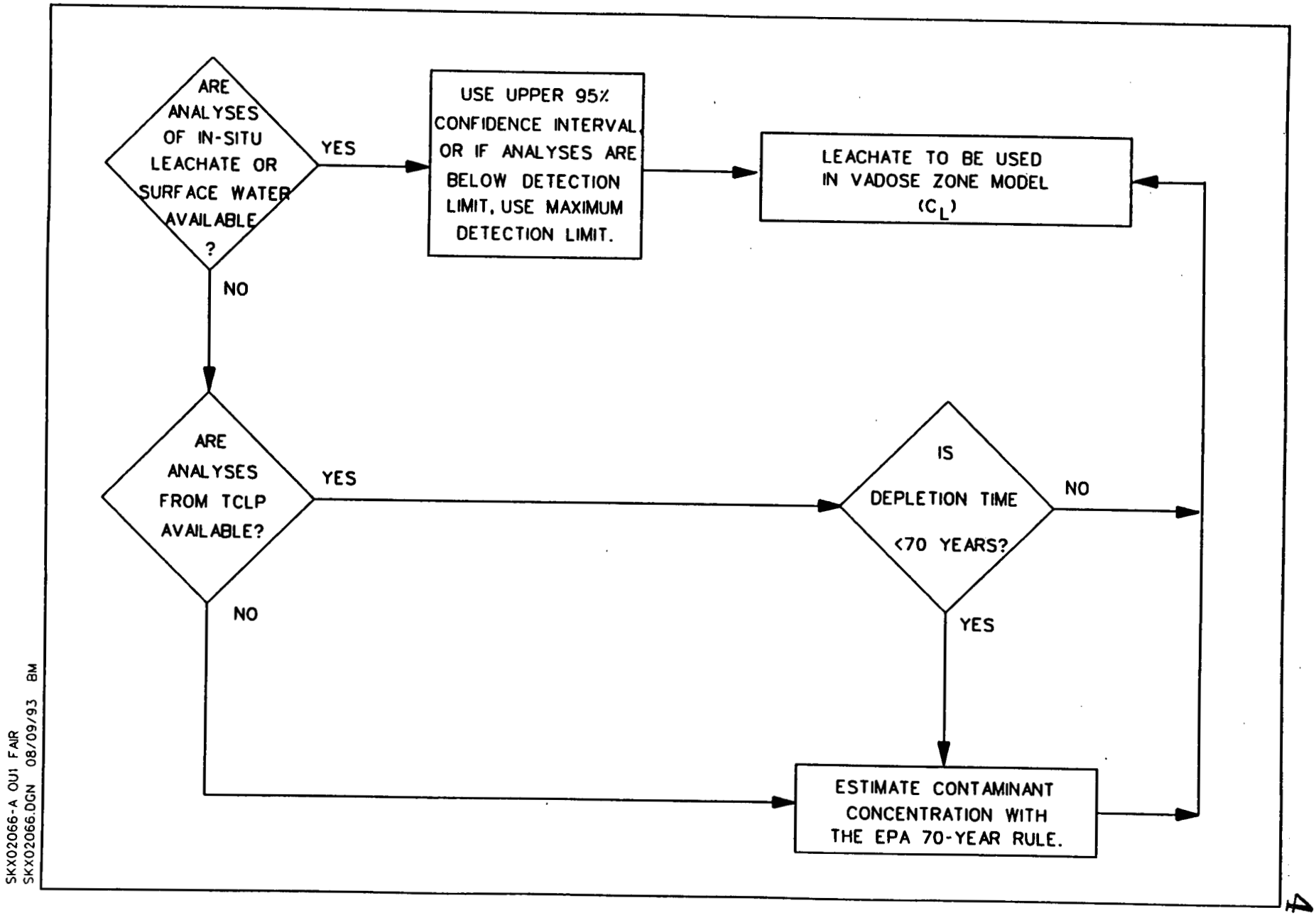


FIGURE 5-9. ESTIMATING LEACHATE FOR ORGANICS

1143

4283

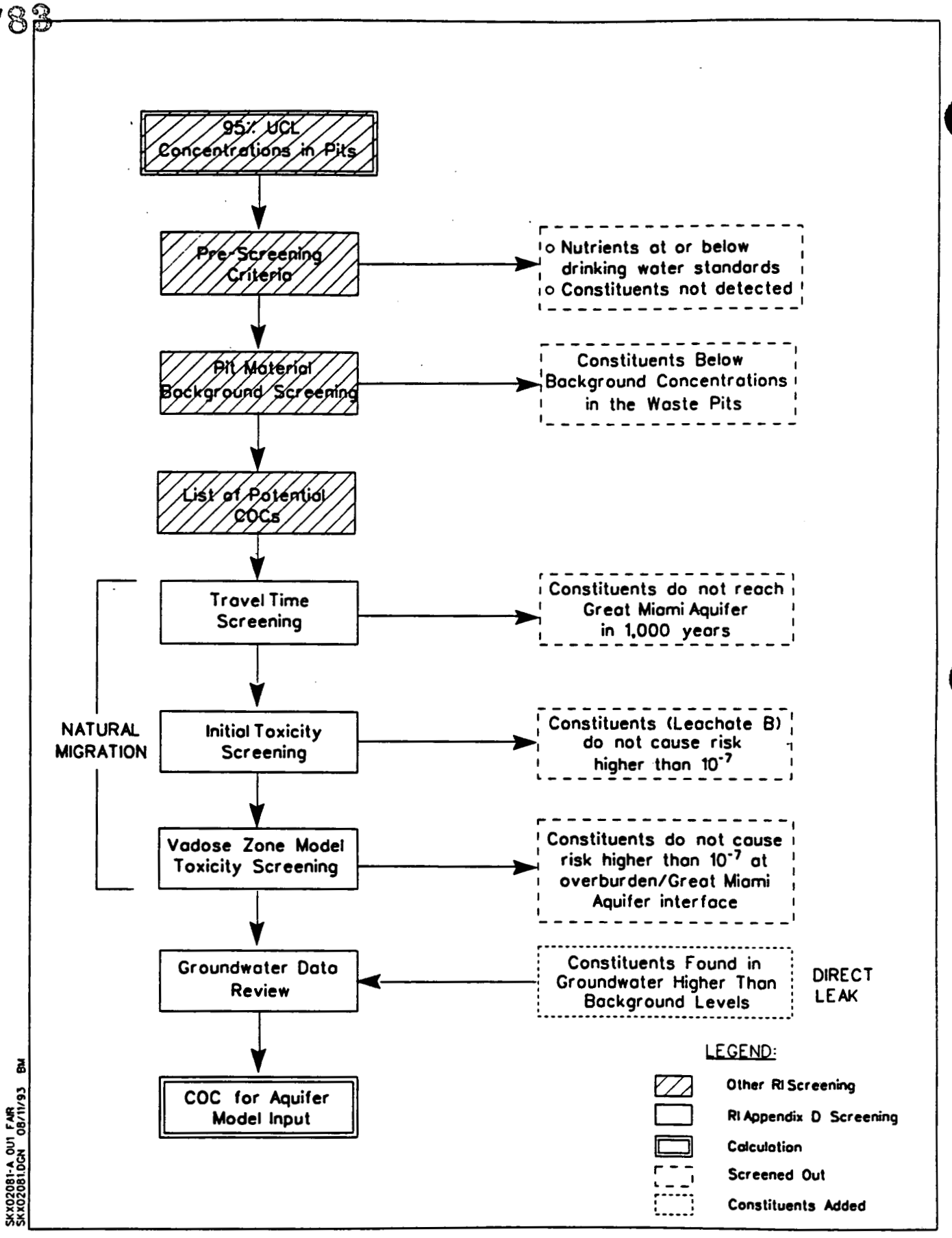


FIGURE 5-10. POTENTIAL CONSTITUENT OF CONCERN SCREENING DIAGRAM

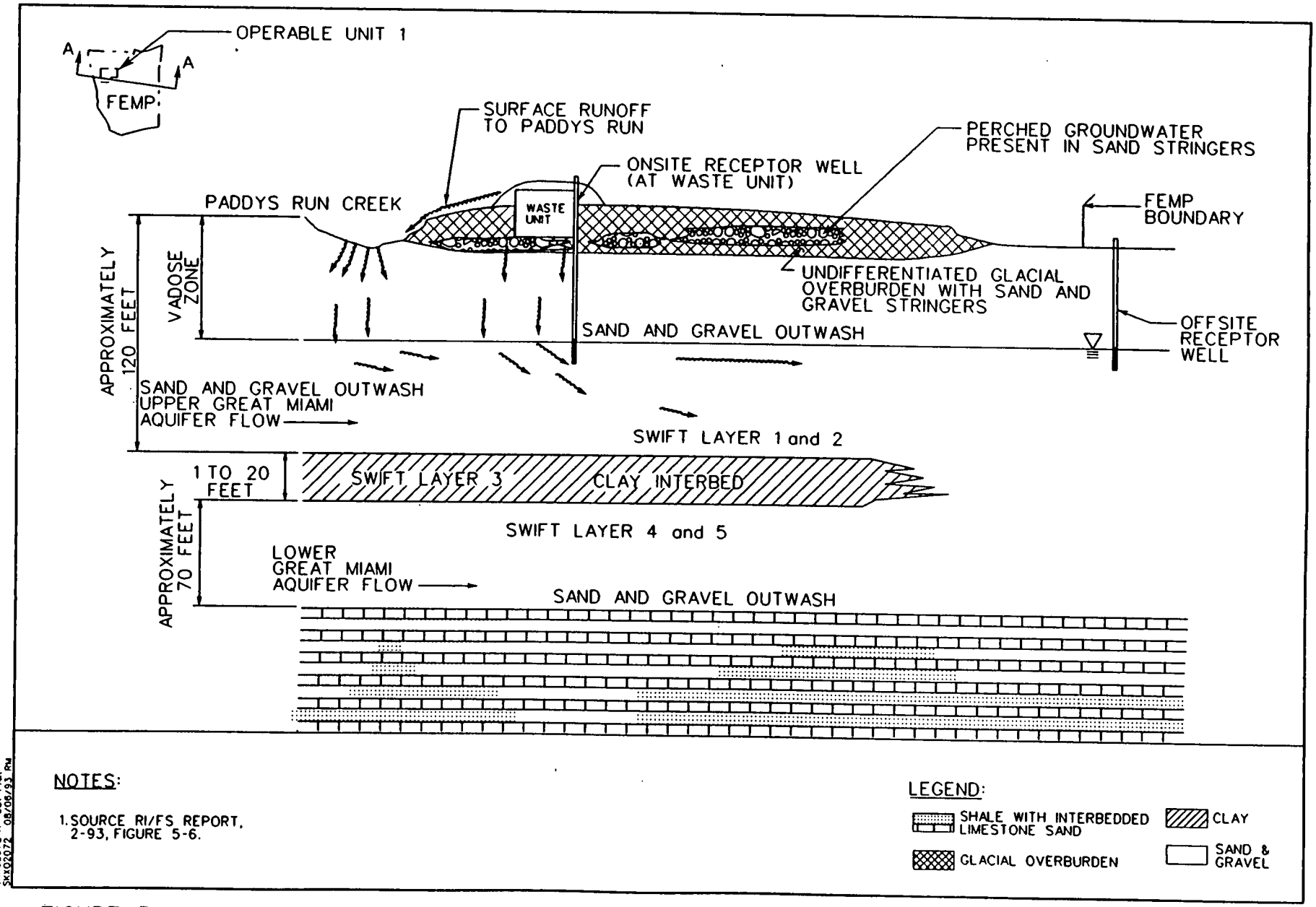


FIGURE 5-11. CONCEPTUAL MODEL OF CONTAMINANT TRANSPORT BY GROUNDWATER AT THE FEMP

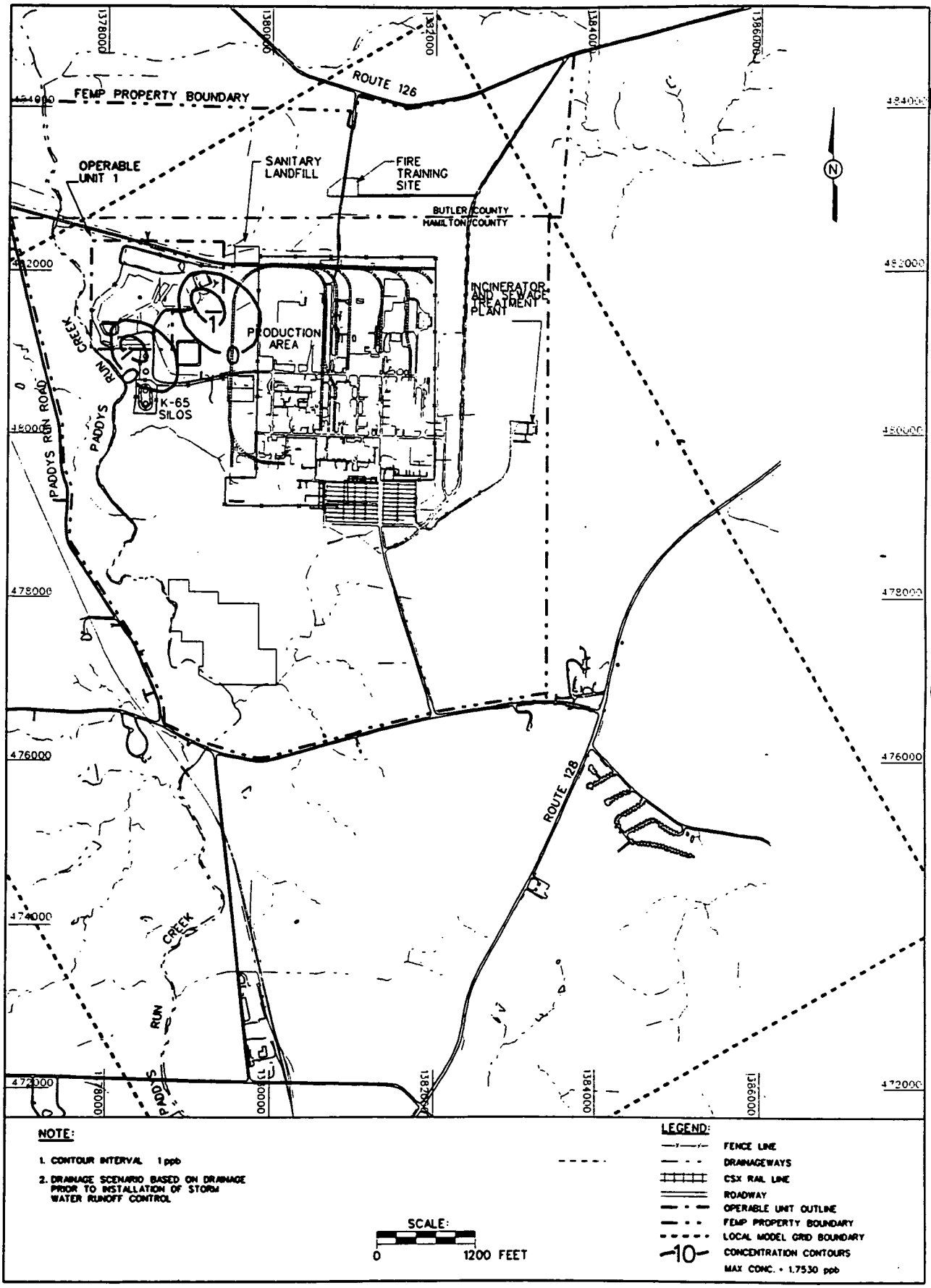


FIGURE 5-12. PROJECTED CONCENTRATION OF TOTAL URANIUM IN GROUNDWATER BENEATH FEMP AFTER 100 YEARS DUE TO LOADING FROM OPERABLE UNIT 1 WASTE AREAS

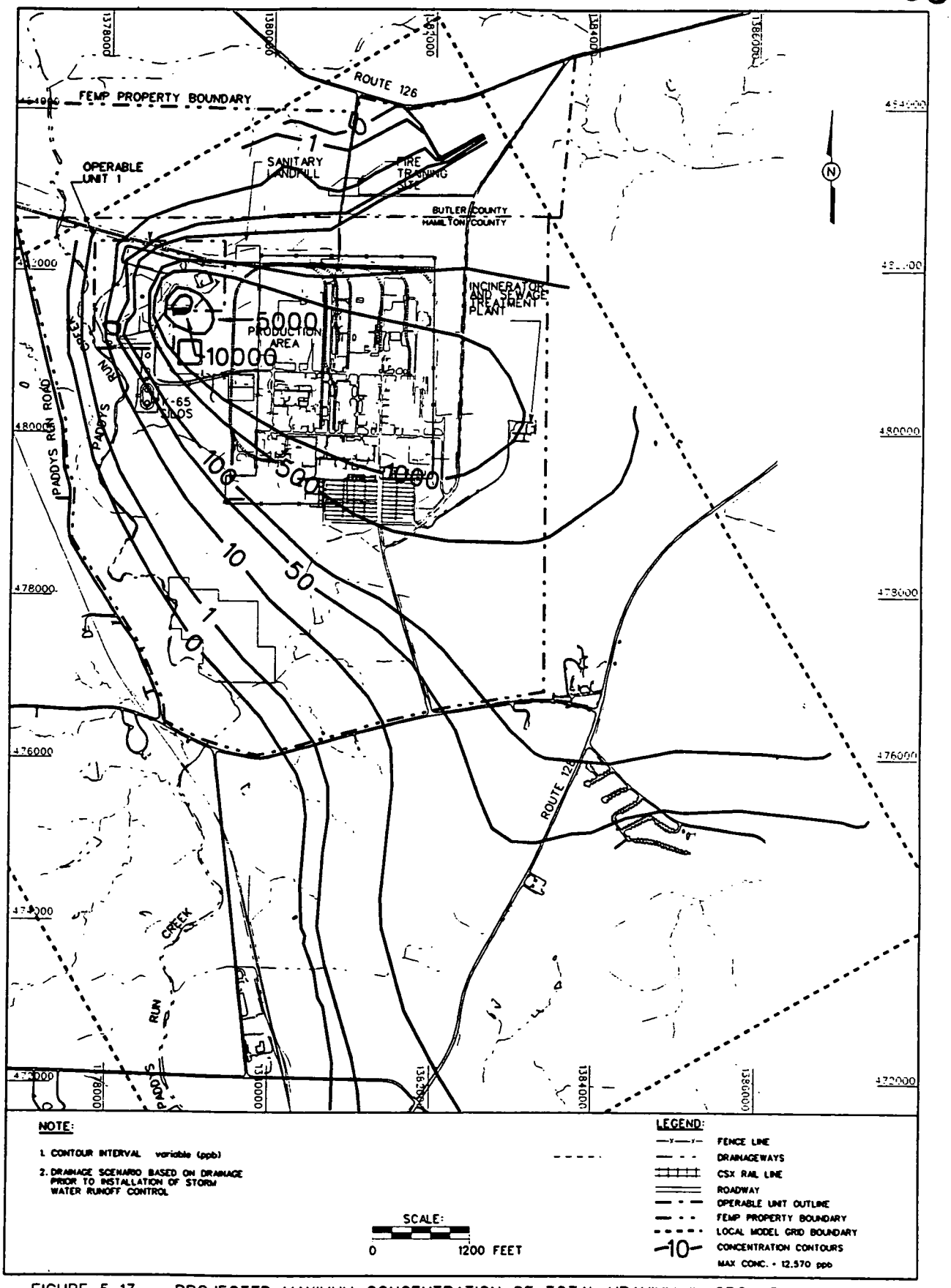
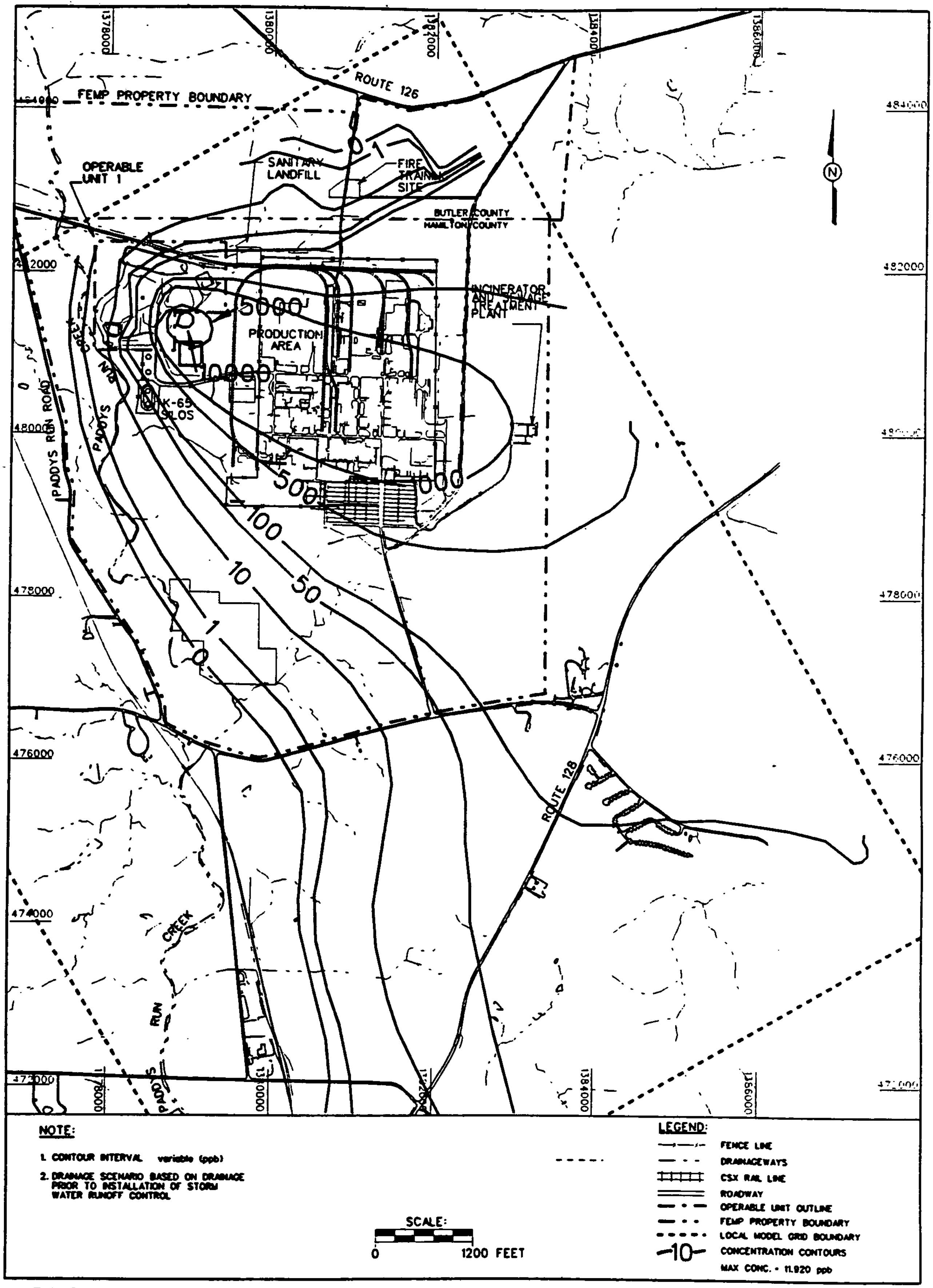


FIGURE 5-13. PROJECTED MAXIMUM CONCENTRATION OF TOTAL URANIUM IN GROUNDWATER BENEATH FEMP DUE TO LOADING FROM OPERABLE UNIT 1 WASTE AREAS AFTER 630 YEARS

4783



SKX02086-A OU1 FAIR
SKX02086.DGN 08/06/93 JE

FIGURE 5-14. PROJECTED CONCENTRATION OF TOTAL URANIUM IN GROUNDWATER BENEATH FEMP AFTER 1000 YEARS DUE TO LOADING FROM OPERABLE UNIT 1 WASTE AREAS

1143

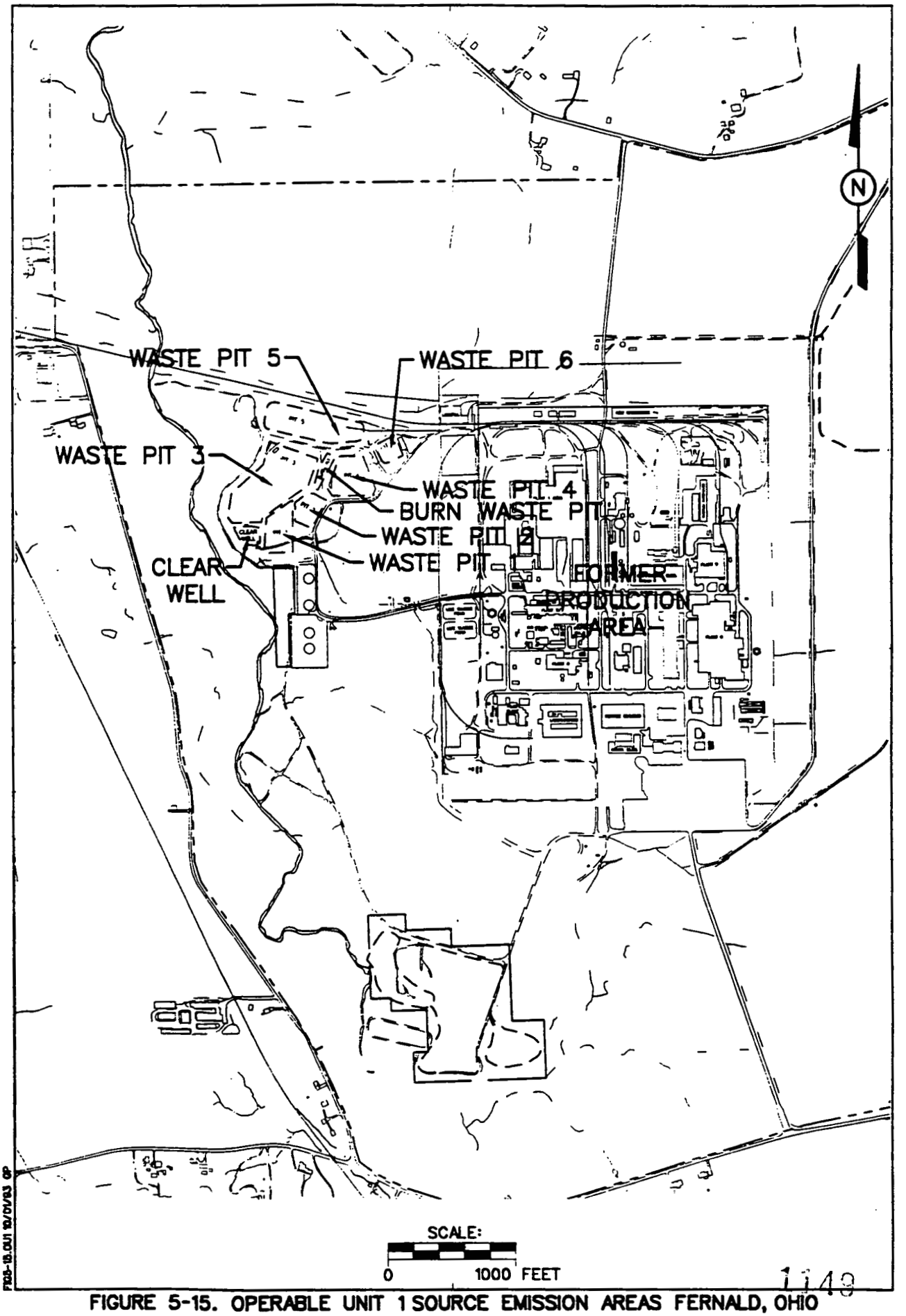
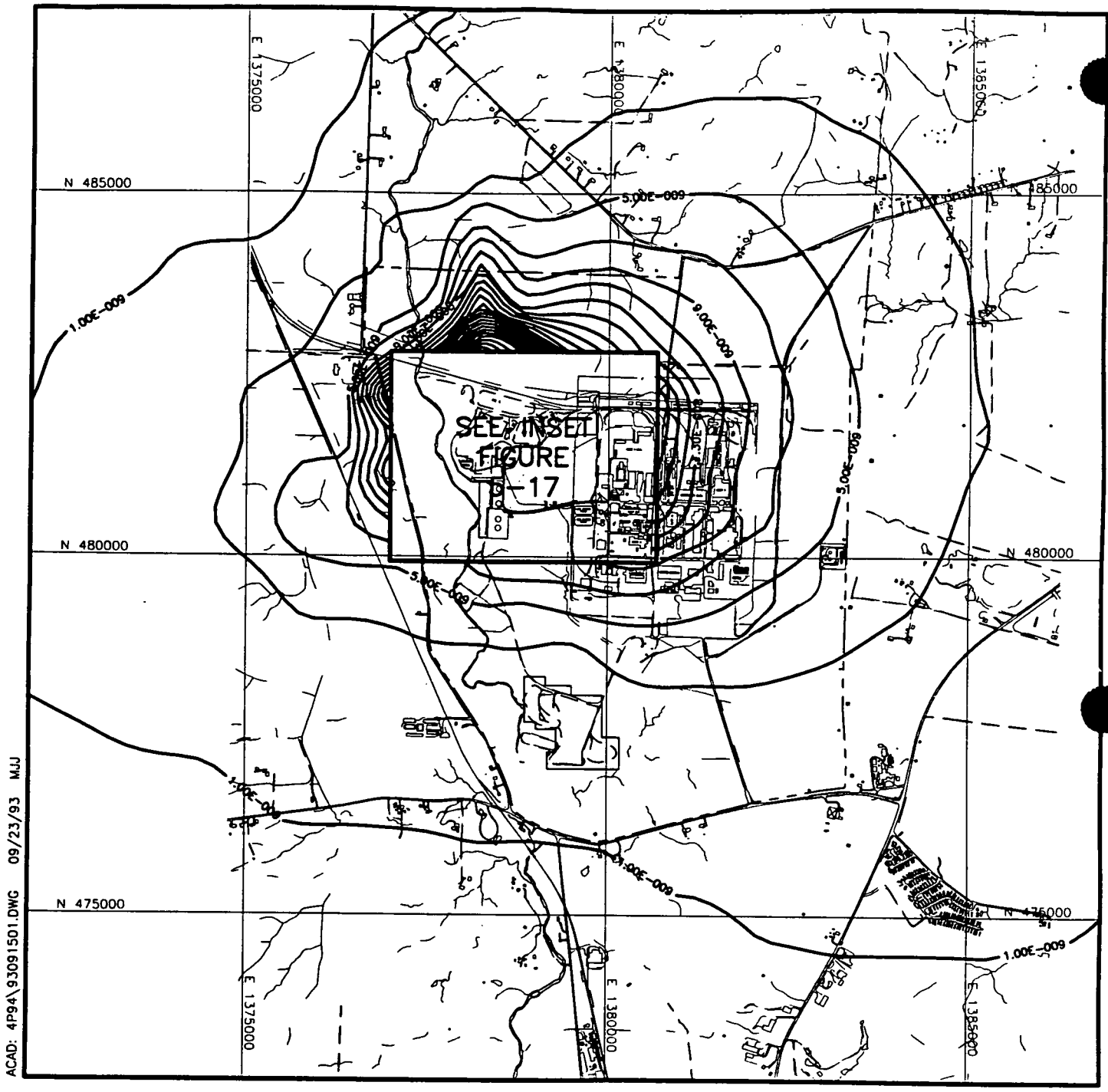


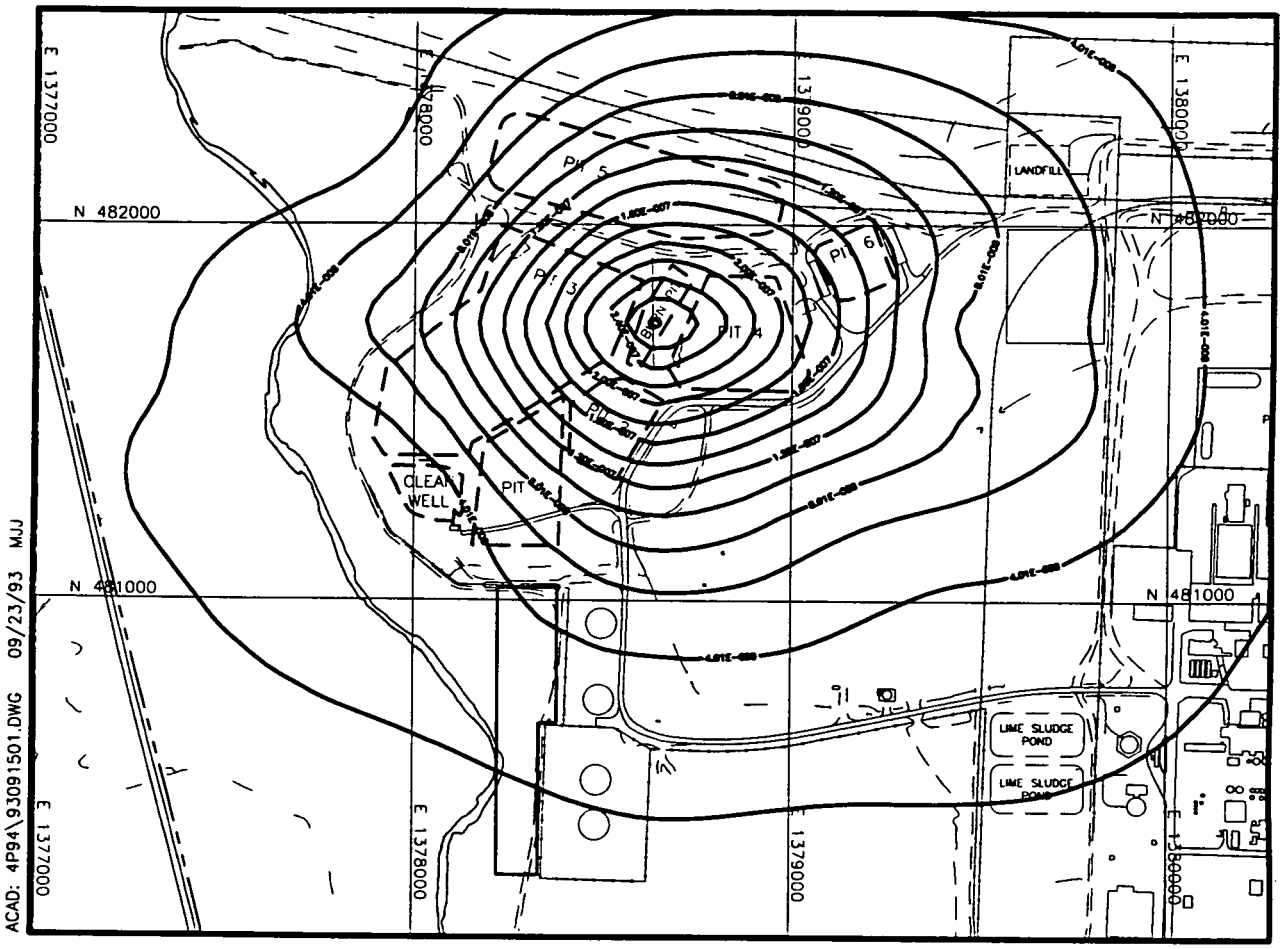
FIGURE 5-15. OPERABLE UNIT 1 SOURCE EMISSION AREAS FERNALD, OHIO



0 2000 4000
SCALE IN FEET

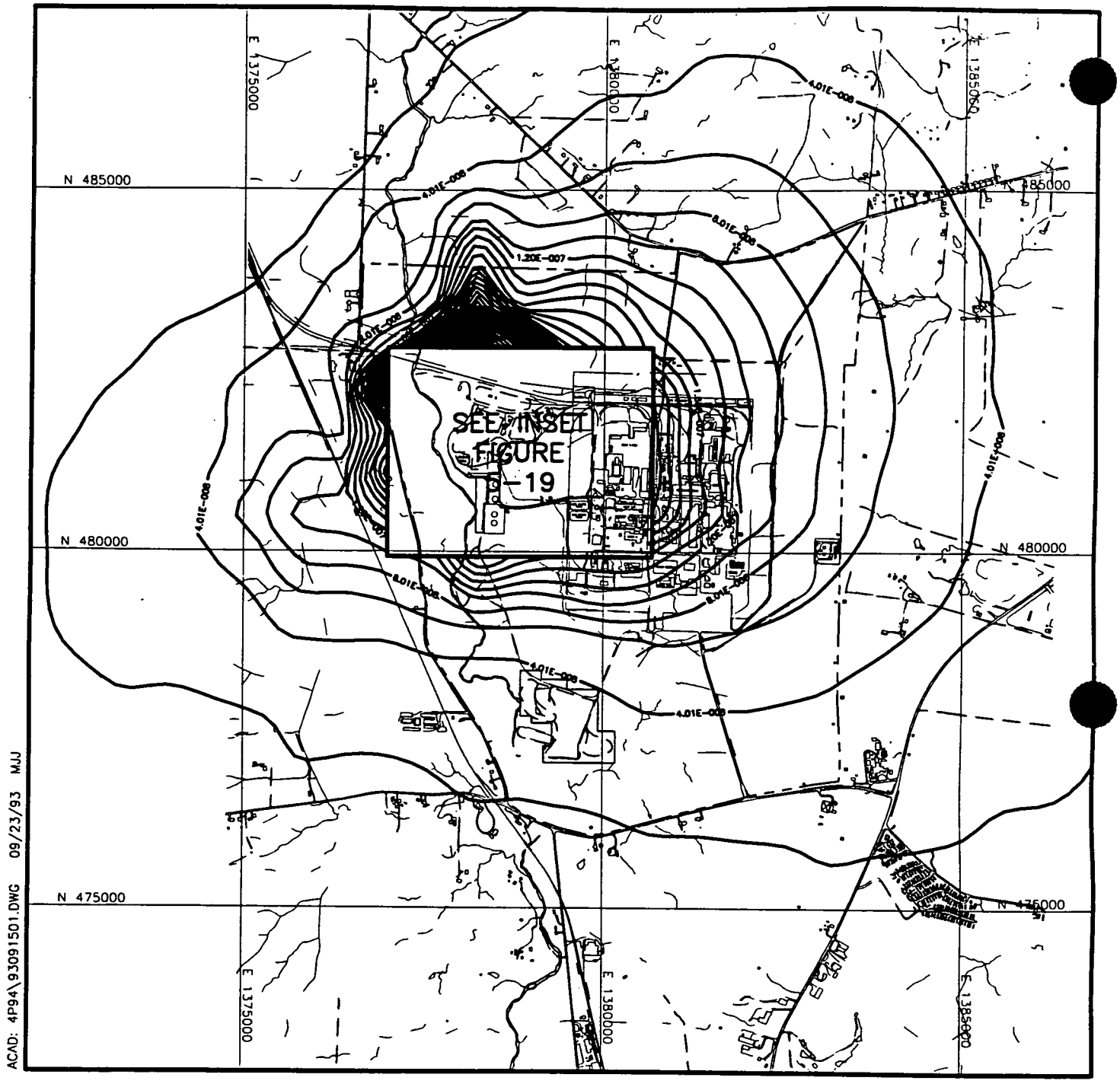
FIGURE 5-16
ISOPLETH OF GROUND LEVEL CONCENTRATION (μg/m3) OF ARSENIC FOR THE OU-1 CURRENT EMISSIONS SCENARIO SITE-WIDE
FERNALD, OHIO

1150



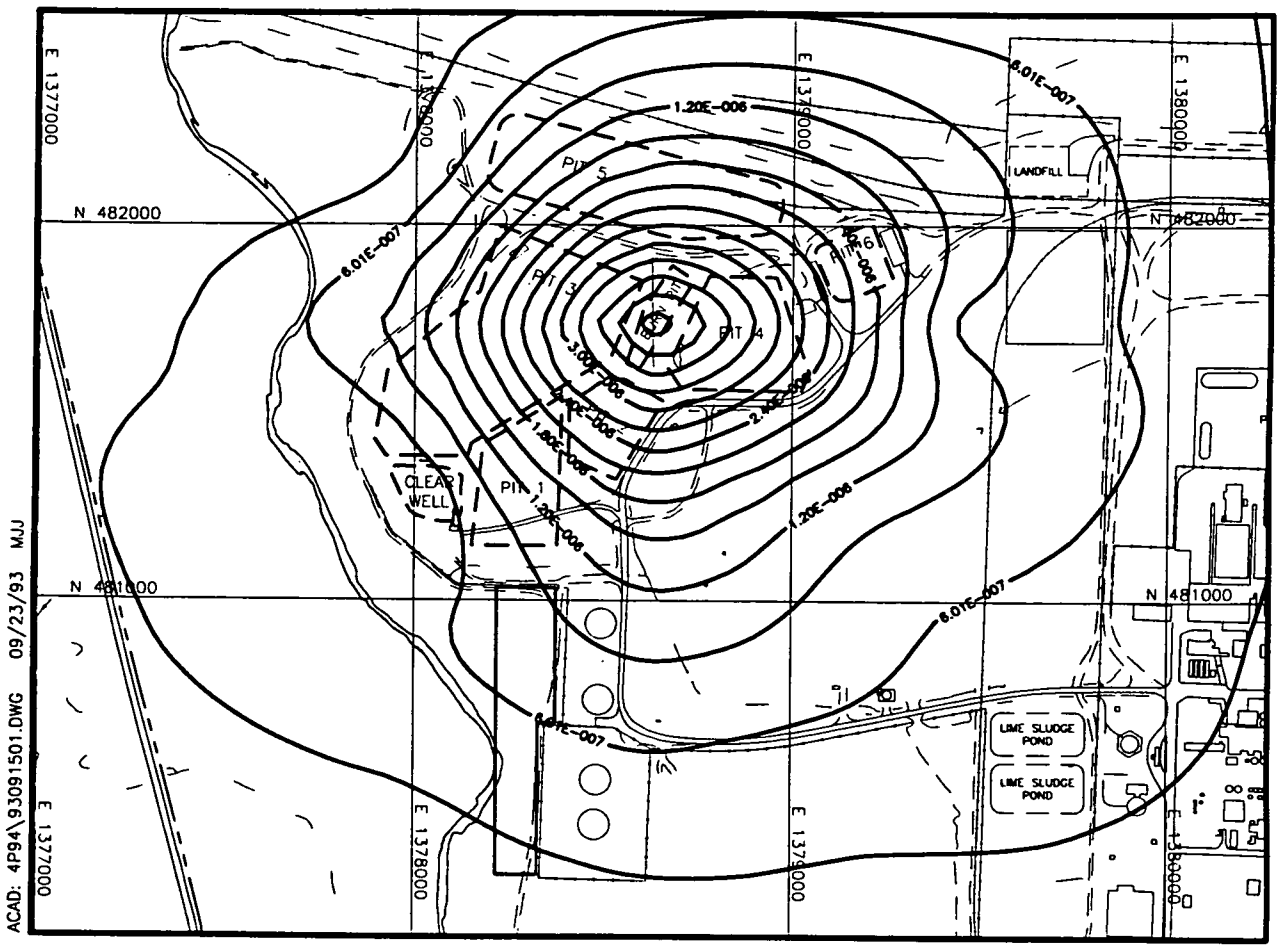
0 500 1000
SCALE IN FEET

FIGURE 5-17
ISOPLETH OF GROUND LEVEL CONCENTRATION ($\mu g/m^3$) OF ARSENIC
FOR THE OU-1 CURRENT EMISSIONS SCENARIO INSET
FERNALD, OHIO



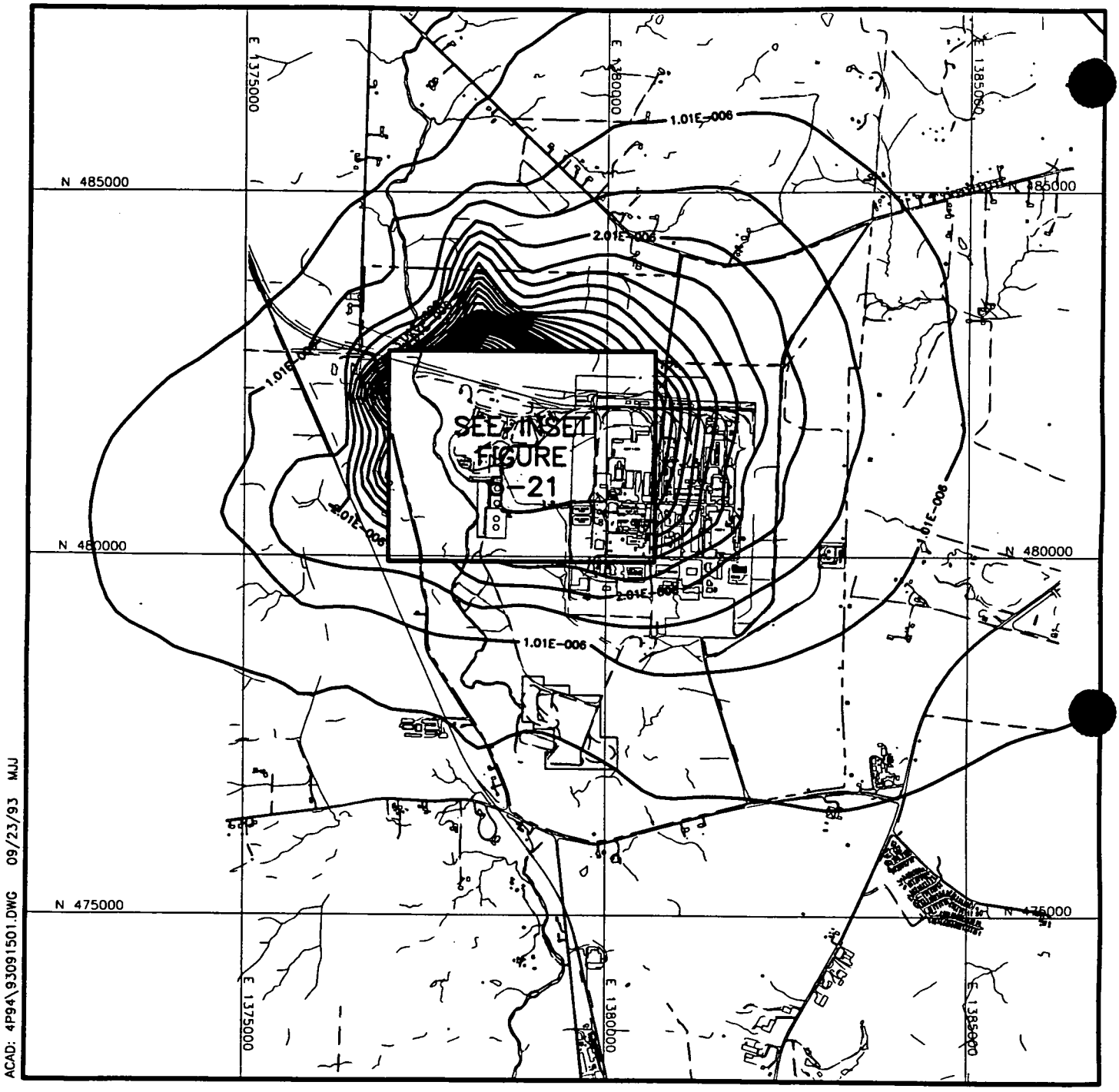
0 2000 4000
SCALE IN FEET

FIGURE 5-18
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m3) OF RADON FOR THE OU-1 CURRENT EMISSIONS SCENARIO SITE-WIDE
FERNALD, OHIO



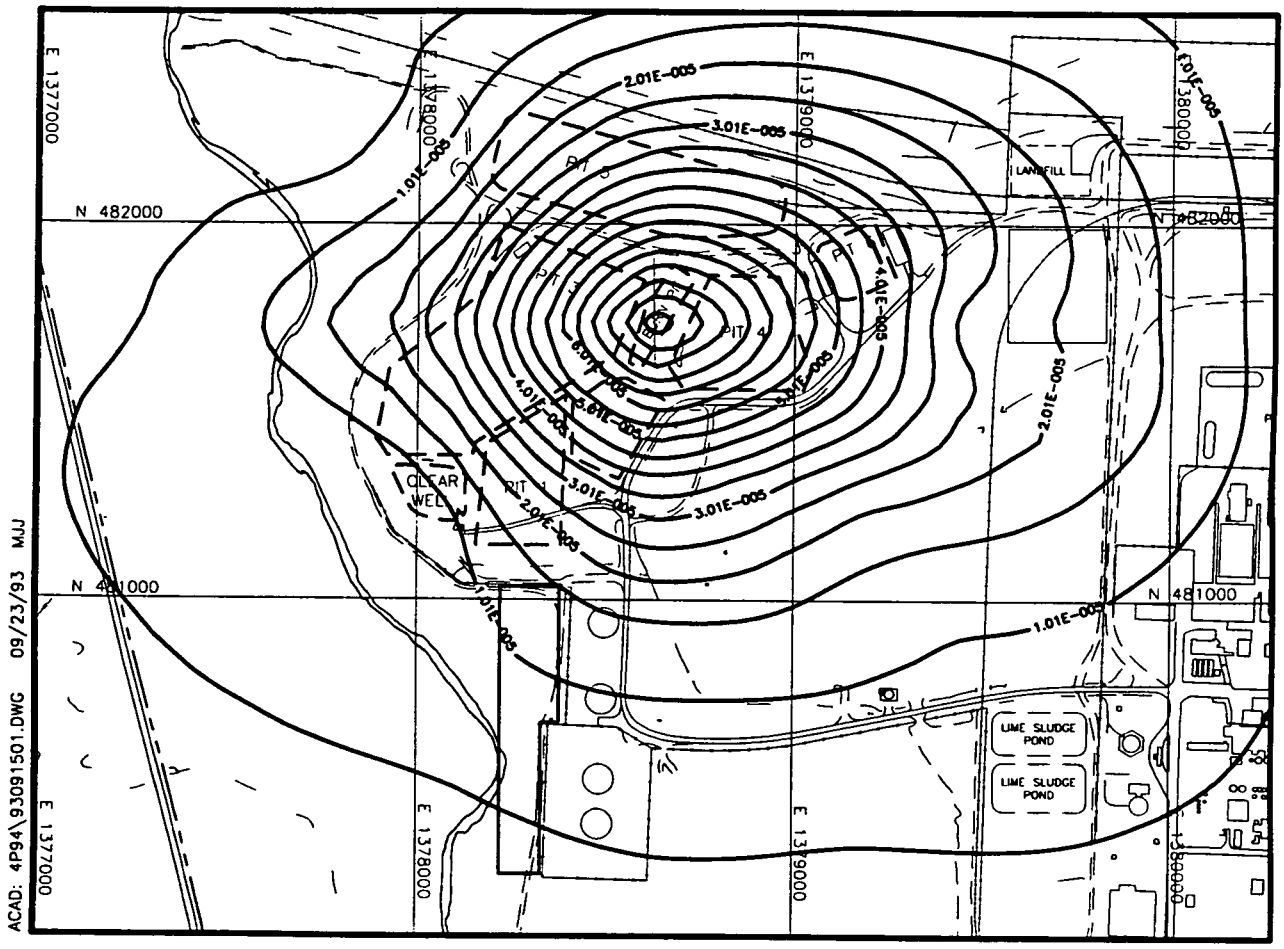
0 500 1000
SCALE IN FEET

FIGURE 5-19
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m3) OF RADON
FOR THE OU-1 CURRENT EMISSIONS SCENARIO INSET
FERNALD, OHIO



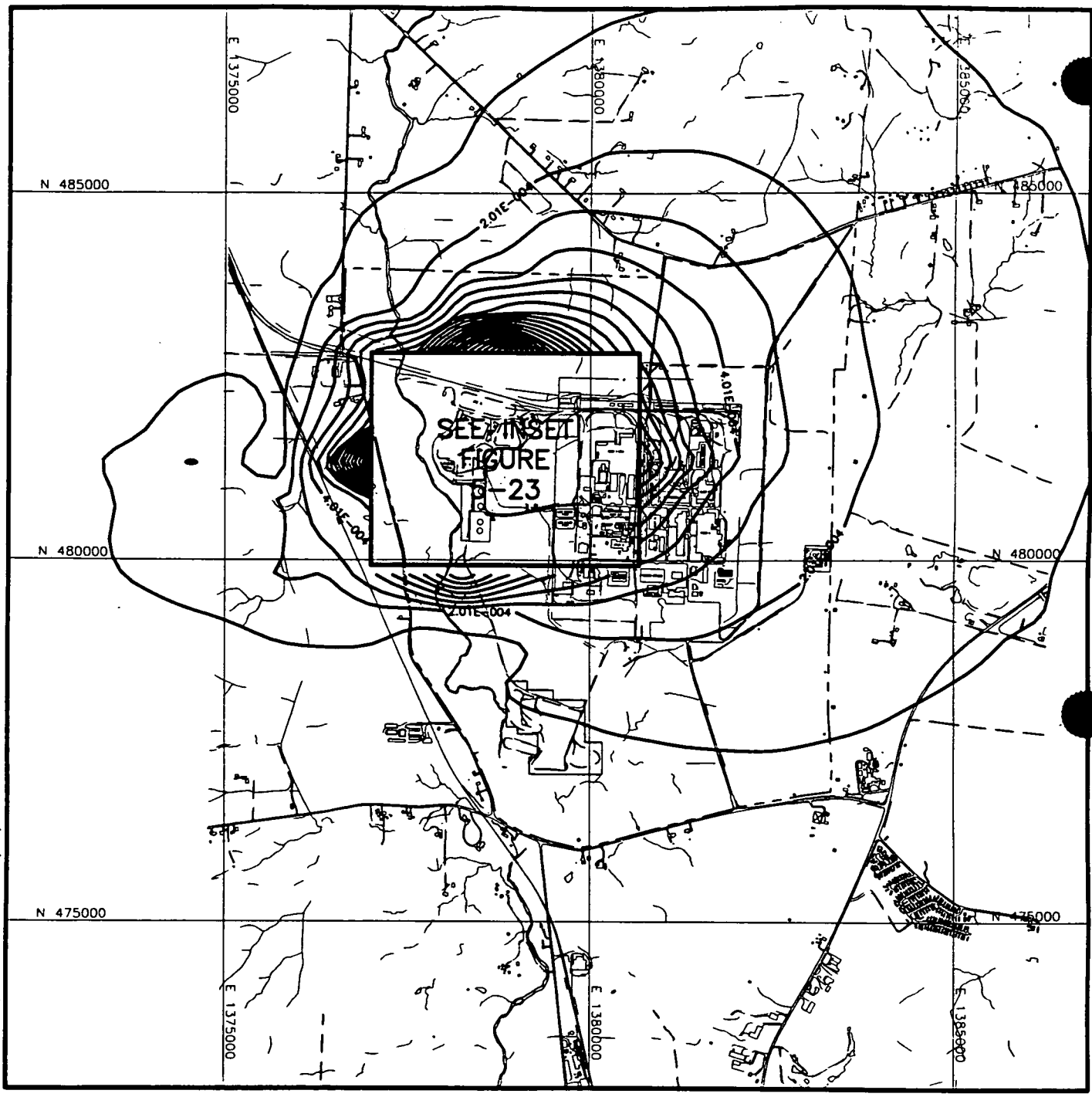
0 2000 4000
SCALE IN FEET

FIGURE 5-20
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m3) OF URANIUM 238
FOR THE OU-1 CURRENT EMISSIONS SCENARIO SITE-WIDE
FERNALD, OHIO



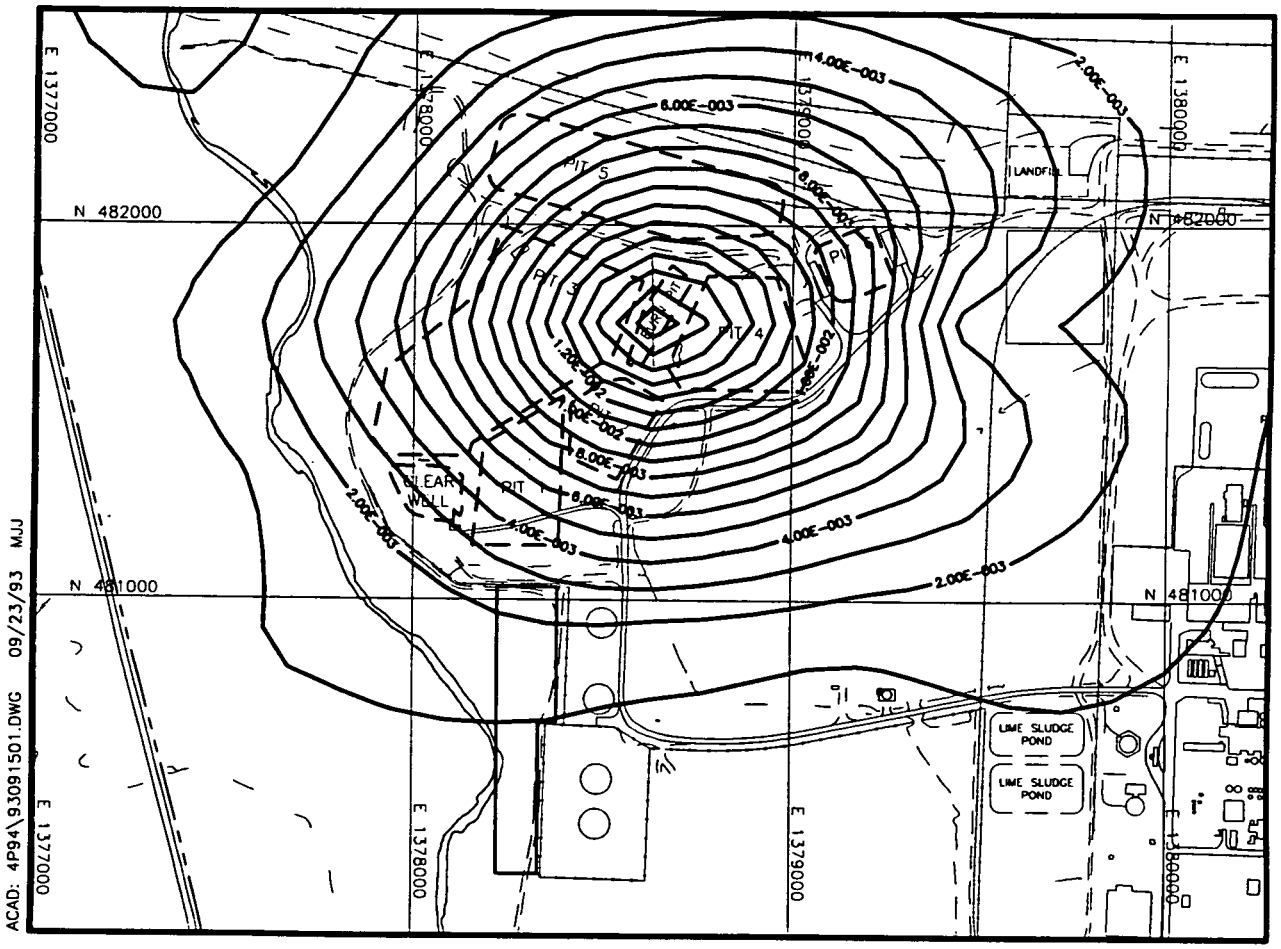
0 500 1000
SCALE IN FEET

FIGURE 5-21
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m^3) OF URANIUM 238
FOR THE OU-1 CURRENT EMISSIONS SCENARIO INSET
FERNALD, OHIO



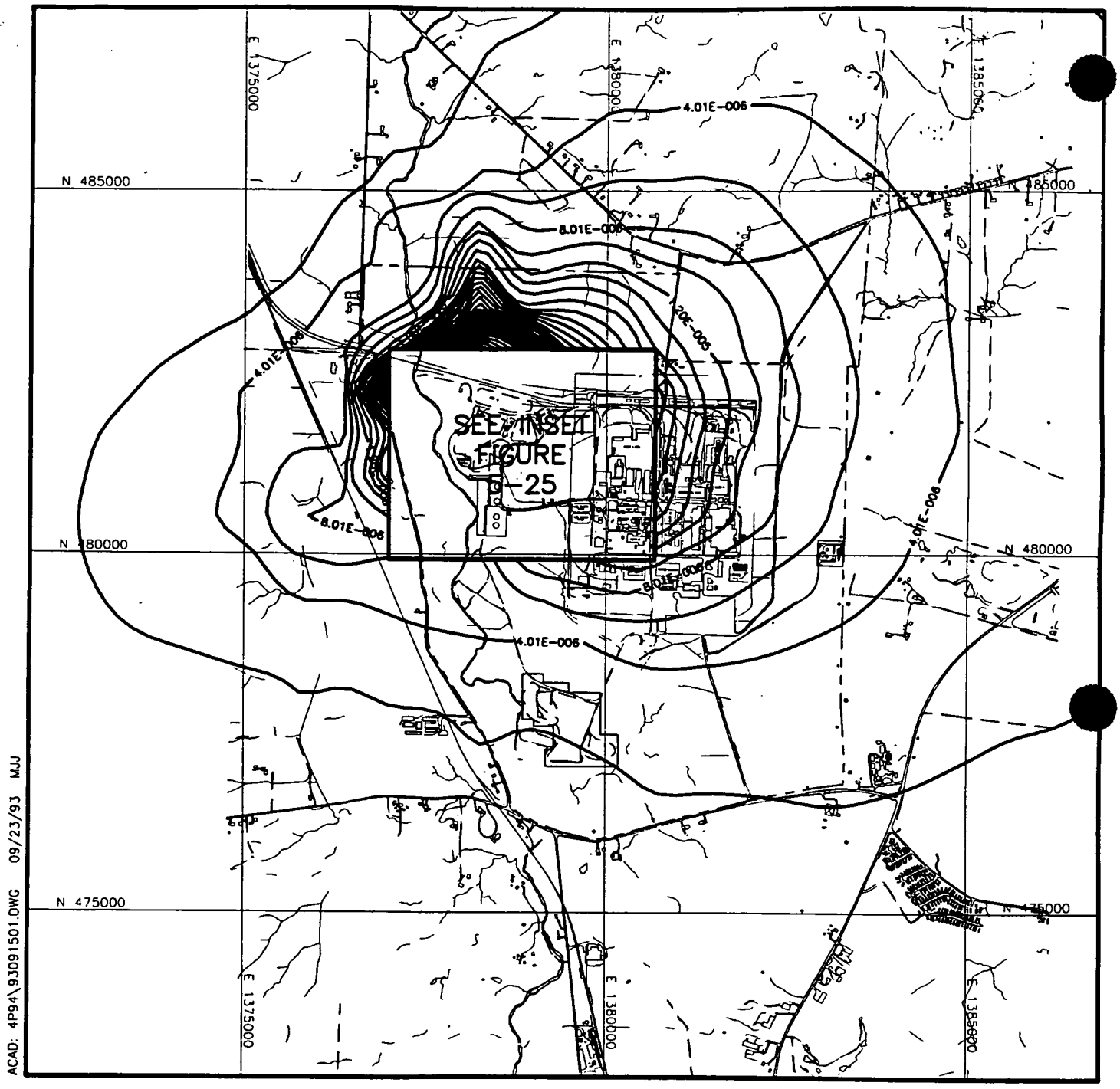
0 2000 4000
SCALE IN FEET

FIGURE 5-22
ISOPLETH OF GROUND LEVEL CONCENTRATION (μg/m3) OF ARSENIC FOR THE OU-1 FUTURE EMISSIONS SCENARIO SITE-WIDE
FERNALD, OHIO



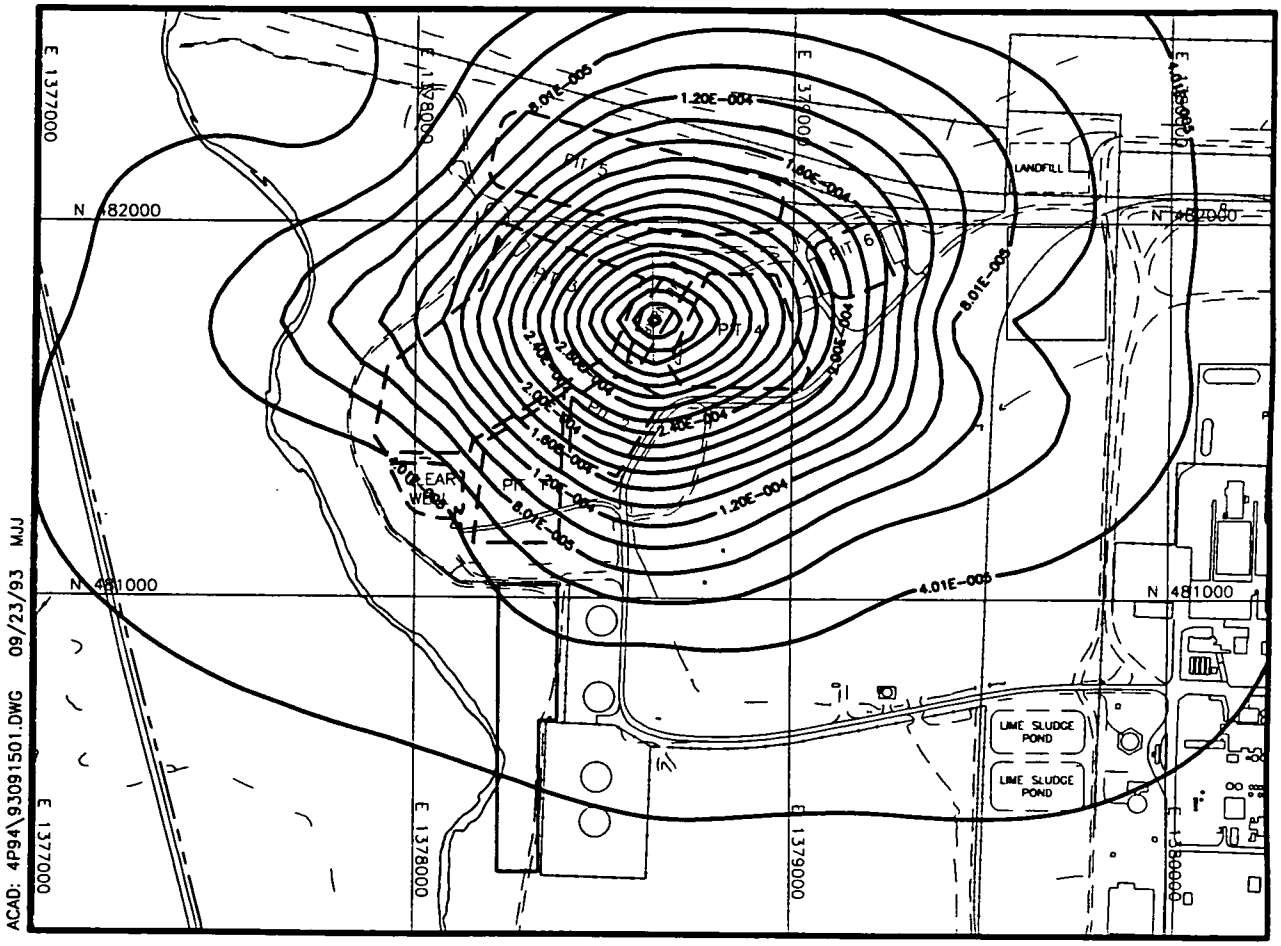
0 500 1000
SCALE IN FEET

FIGURE 5-23
ISOPLETH OF GROUND LEVEL CONCENTRATION ($\mu g/m^3$) OF ARSENIC FOR THE OU-1 FUTURE EMISSIONS SCENARIO INSET
FERNALD, OHIO



0 2000 4000
SCALE IN FEET

FIGURE 5-24
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m^3) OF RADON FOR THE OU-1 FUTURE EMISSIONS SCENARIO SITE-WIDE
FERNALD, OHIO



0 500 1000
SCALE IN FEET

FIGURE 5-25
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m^3) OF RADON
FOR THE OU-1 FUTURE EMISSIONS SCENARIO INSET
FERNALD, OHIO

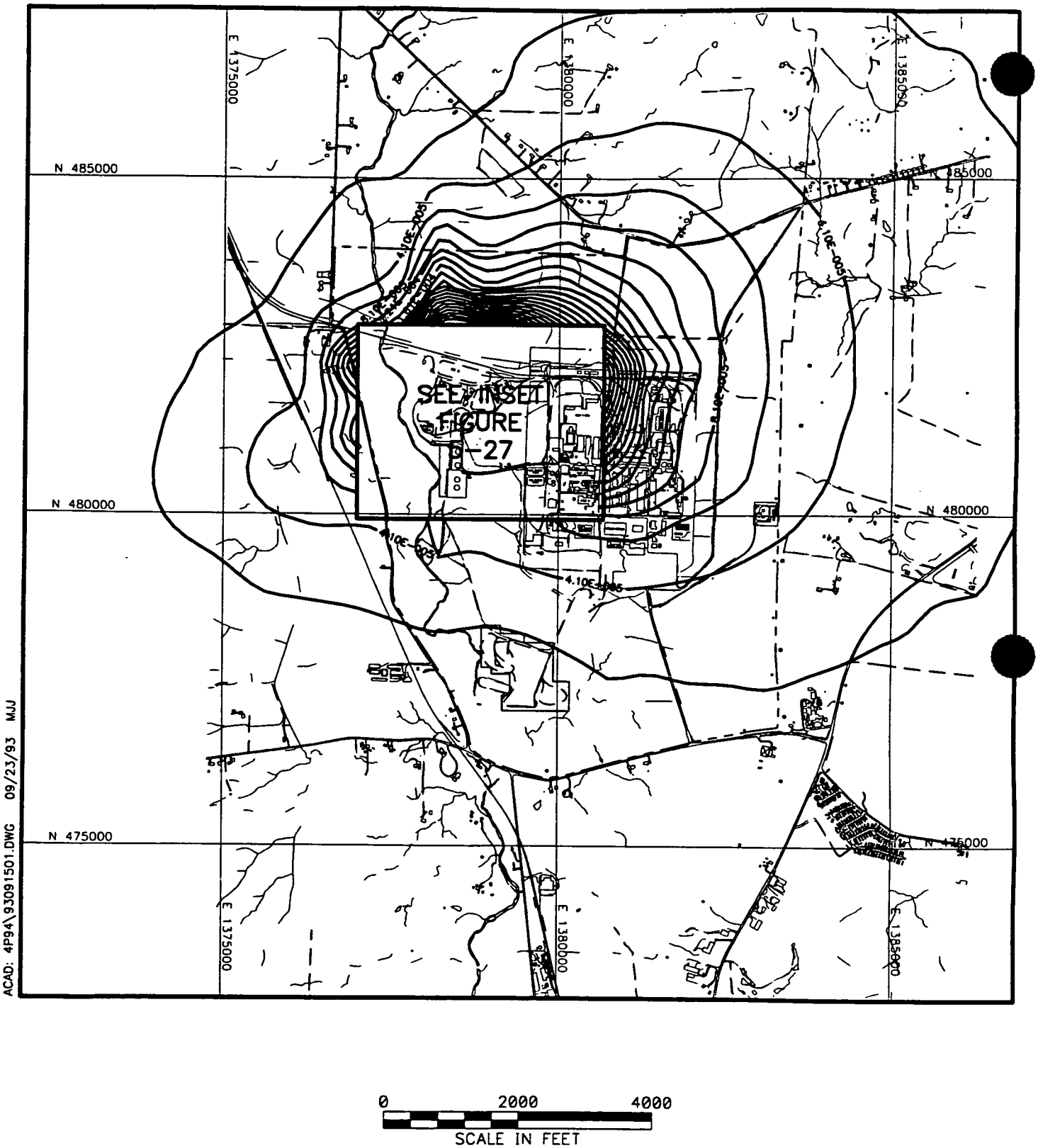
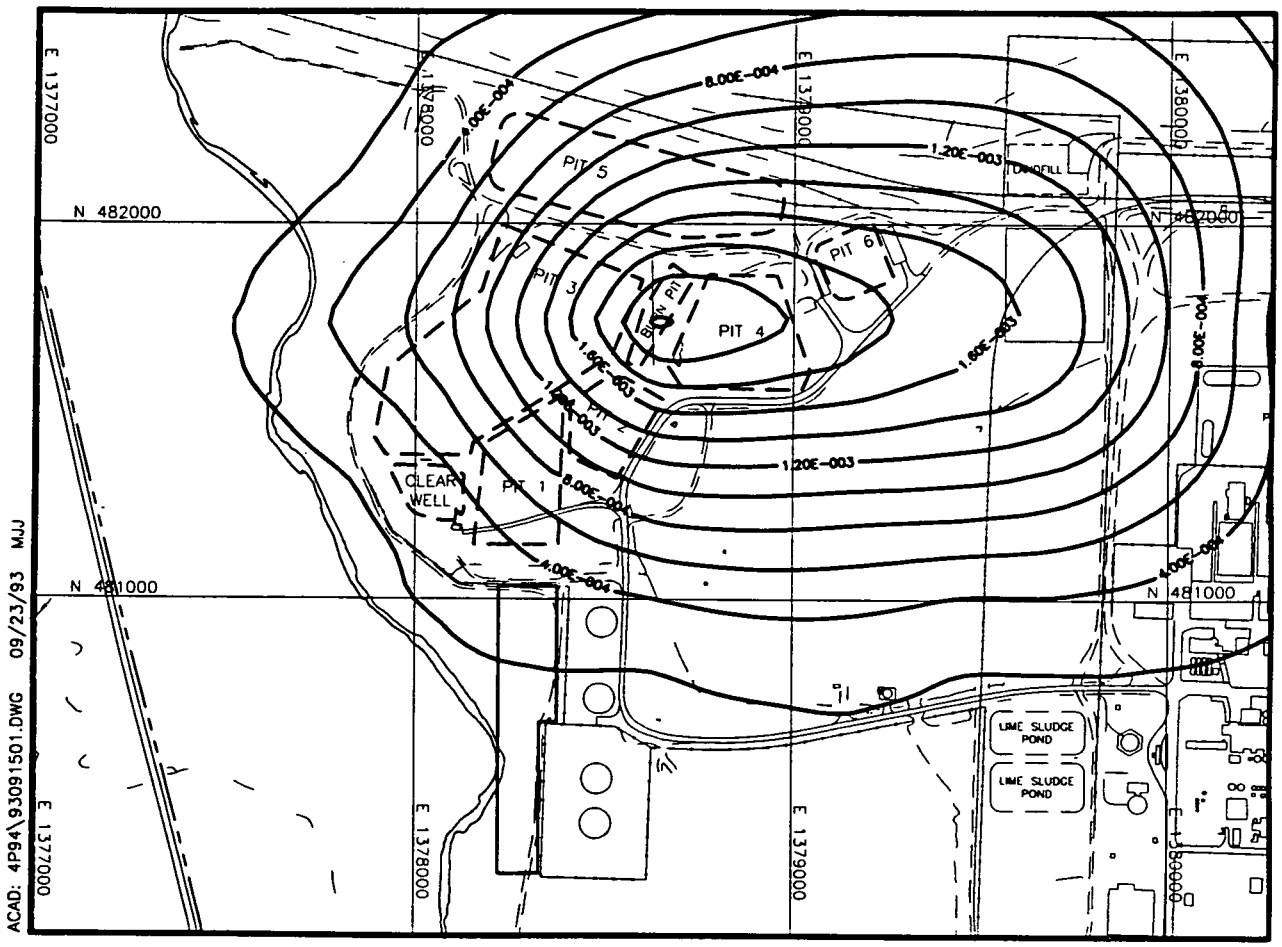


FIGURE 5-26
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m^3) OF URANIUM 238
FOR THE OU-1 FUTURE EMISSIONS SCENARIO SITE-WIDE
FERNALD, OHIO

1160



0 500 1000
SCALE IN FEET

FIGURE 5-27
ISOPLETH OF GROUND LEVEL CONCENTRATION (pCi/m^3) OF URANIUM 238
FOR THE OU-1 FUTURE EMISSIONS SCENARIO INSET
FERNALD, OHIO

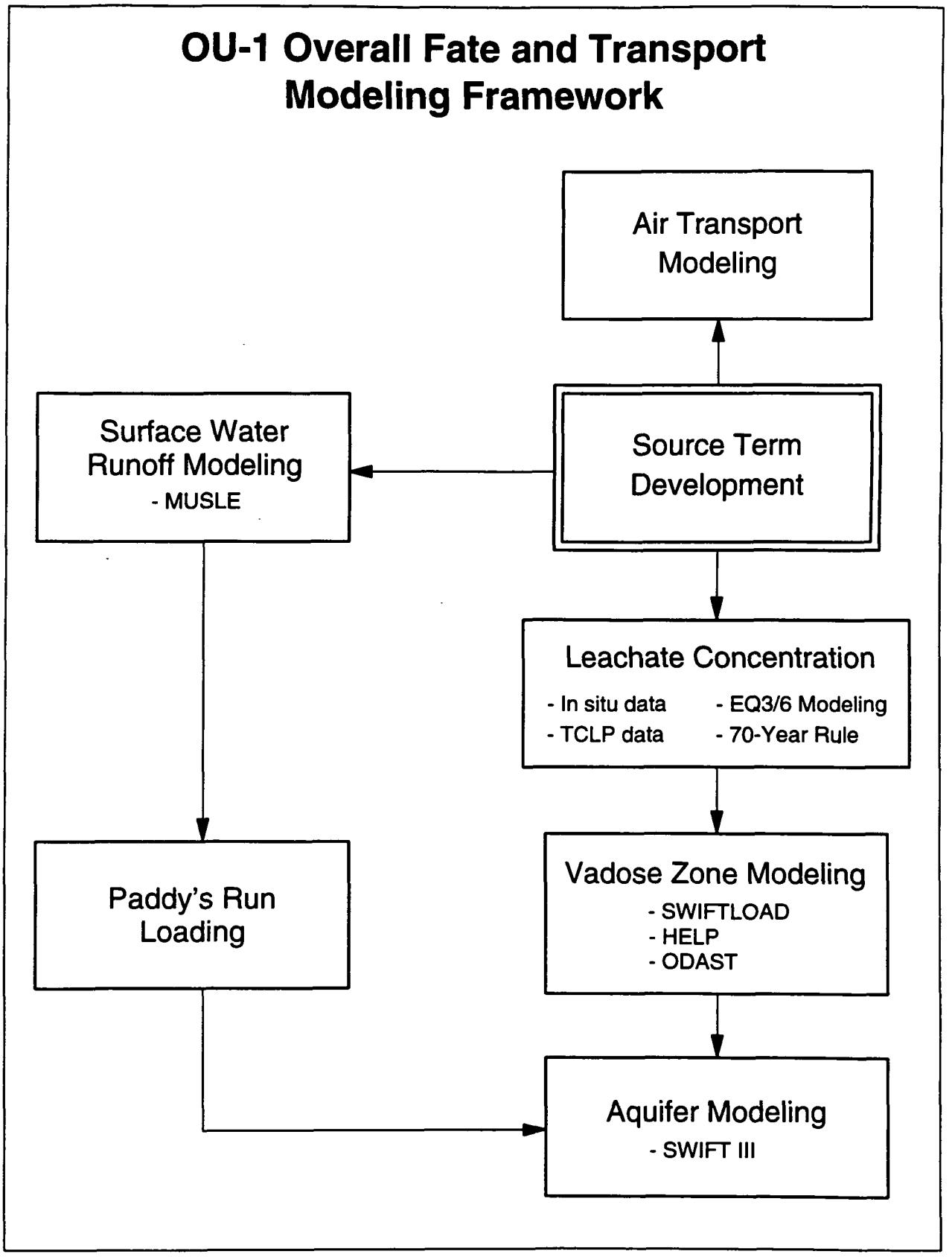

OU-1 Overall Fate and Transport Modeling Framework
Air Transport Modeling
Surface Water Runoff Modeling
- MUSLE
Source Term Development
Leachate Concentration
- In situ data
- TCLP data
- EQ3/6 Modeling
- 70-Year Rule
Paddy's Run Loading
Vadose Zone Modeling
- SWIFTLOAD
- HELP
- ODAST
Aquifer Modeling
- SWIFT III
efats1\vol1:rsapps\rsdata\t&tmodel\hall

Figure 5-28.

6.0 BASELINE RISK ASSESSMENT

Section 6.0 provides an overview of the methodology, results, and uncertainties associated with the human health baseline risk assessment conducted for Operable Unit 1. The baseline risk assessment is an estimate of the risk to hypothetical receptors exposed to site-related constituents, assuming no further remedial actions are taken to address identified concerns. The purpose of the baseline risk assessment is to estimate the possible risk to human health from exposure to the hazardous on-site wastes of Operable Unit 1. Accordingly, the process uses information developed during site investigation to:

- Determine the CPCs for Operable Unit 1
- Assess the potential for and the magnitude of contaminant transport from Operable Unit 1 sources to potential human exposure points
- Quantify potential exposures to receptors under current and future land use scenarios
- Characterize the nature and magnitude of potential baseline risks associated with Operable Unit 1 under current and potential future land use scenarios

The results of the baseline risk assessment will determine the need for remedial action, identify specific media and areas for which cleanup is appropriate, present a "baseline" of potential human health risks for the no-action alternative in the FS, and provide criteria for determining cleanup levels. A summary of the methods used and detailed calculations of the risk assessment are presented in Appendix E.

Section 6.1 describes the referenced methods used to calculate the baseline risk. Section 6.2 discusses the sources of data, methods, and assumptions that identify the CPCs chosen for quantitative risk assessment. Section 6.3 presents the conceptual model for the exposure assessment, including land use scenarios, source term configurations, and potential receptors. It also summarizes methods used to calculate exposure point concentrations. Section 6.4 describes the toxic effects, carcinogenic (incremental lifetime cancer risk [ILCR]) and noncarcinogenic, associated with exposure to the CPCs and references the sections of the report containing quantitative toxicity data for CPCs. Section 6.5 presents a summary of the risk assessment results, including a tabulation of the carcinogenic risk estimates (ILCR's) and hazard indices (HI) for each receptor under the land use scenarios and source term configurations described previously. A summary of the ecological assessment is presented in the SWCR, and is found in Appendix E, Section E.5.4. Section 6.6 references the ecological assessment conducted as a part of the SWCR. Section 6.6 contains a discussion of the sources of uncertainty in the baseline risk assessment.

6.1 METHODS

The baseline risk assessment was performed in accordance with available EPA guidance for the conduct of risk assessments under CERCLA. It is also consistent with the FEMP Risk Assessment Work Plan Addendum, (DOE 1992a). Some procedures were modified, as necessary, to incorporate new information or new guidance that were unavailable during preparation of the Risk Assessment Work Plan Addendum. Any differences between the Risk Assessment Work Plan Addendum and the methods used for this risk assessment are noted in Appendix E.

6.2 CONSTITUENTS OF POTENTIAL CONCERN (CPCs)

CPCs are those chemicals that remain after a two step statistical and toxicological screening process. That screening process focuses on the chemicals and radionuclides that, based on their prevalence, concentration, and toxicity are considered to be of concern to human health. In the first step, statistical analyses compared measured on-property concentrations of each remaining CPC to background concentrations of that constituent in the same media. In the second step, each constituent detected in a given medium was reviewed to determine toxicological significance, and those that were not likely to be of human health concern were excluded. Laboratory contaminants (identified during data validation), essential micronutrients (calcium, magnesium, etc.), ubiquitous minerals (silica, etc), and very low concentration nontoxic chemicals were excluded as CPCs.

The selection of CPCs for Operable Unit 1 included a critical review of site data characterizing pit wastes; surface water in Waste Pits 5, 6, and the Clearwell; and soils within the Operable Unit 1 study area. The raw data sets on which analyses were performed are presented in Section 4.0 of the RI report and are tabulated in Appendices A, B, and C. The list of CPCs for Operable Unit 1 were identified using the methods described in Appendix E, Section E.2. Also, the CPCs are presented in a series of tables in Section E.2.

The selection of chemical and radionuclide CPCs for Operable Unit 1 is based on data developed in the Operable Unit 1 RI/FS and the CIS analytical studies. As described in Section 2 of this RI report, these investigations characterized radiological and chemical composition of solid and liquid media and wastes in the waste pit area. Data were collected in accordance with DQOs established in the Fernald QAPP, as discussed in Section 2.11 and 2.12. Supplemental data characterizing the subsurface waste pit materials in the water-filled waste pits in Operable Unit 1 (i.e., Waste Pits 5, 6, and Clearwell) were obtained during the RI/FS 1992 investigation for treatability and characterization purposes. Although a full radiological and chemical analysis was performed on the sludge samples collected from these waste pits during the RI/FS 1992 investigation, only inorganic and radiological data were determined to be valid. These data were used, along with the RI and CIS data, in selection of CPCs for Operable Unit 1. A detailed discussion of process knowledge is provided in Section 1.

The review of analytical data for selection of CPCs was supported by process knowledge obtained from historical site records and employee interviews. This information was used to support the identity and source of principal constituents placed within the waste pits and the distribution of contaminants in Operable Unit 1.

Because of the heterogeneity of wastes contained in the waste pits of Operable Unit 1, CPCs for waste pit material were selected on a pit-by-pit basis. Surface soils within the Operable Unit 1 boundary were treated as a discrete entity for selection of CPCs.

The methods and results of the CPC screening process are described in Section E.2.0 of Appendix E, the baseline risk assessment. Attachment E.II of Appendix E presents the rationale for exclusion of any constituent as a CPC.

6.3 EXPOSURE ASSESSMENT

The exposure assessment identifies the sources and pathways of chemical exposure and the possible receptors under different land use scenarios. It follows the methodology described in the Risk Assessment Work Plan Addendum with the exception of those items identified in Section E.3 of Appendix E. These exceptions reflect the impacts of EPA guidance and increased site knowledge. The primary source terms identified are the waste pit materials in Waste Pits 1 through 6, the Burn Pit, and the Clearwell; surface water in Waste Pits 5 and 6 and the Clearwell; and surface soil within the Operable Unit 1 study area.

Land-use scenarios addressed in the Operable Unit 1 baseline risk assessment are: (1) current land use with access controls; (2) current land use without access controls; and (3) future land use without access controls.

Under the first scenario (current land use with access control), the site access restrictions historically provided by DOE are assumed to be maintained, and no further remedial actions are assumed to have been taken (other than those completed to date). The scenario further assumes that no members of the public have established residence in the Operable Unit 1 study area, and that DOE maintains a site-specific health and safety program to ensure that nonremediation workers are properly protected. Potential receptors under this scenario include an off-property farmer and a site visitor.

Under the second scenario (current land use without access controls), the FEMP is assumed to be managed by an industrial concern other than DOE. Access restrictions currently provided by DOE are assumed to have been discontinued. No additional remedial actions are assumed to have been taken, and no members of the public are assumed to have established residence within the boundaries of Operable Unit 1. Thus, potential receptors include an off-property resident farmer, a trespassing child,

an off-property user of meat and dairy products from cattle that have grazed on FEMP property, and an off-site user of surface water from the Great Miami River.

The third land-use scenario (future land use without access controls) includes exposure routes associated with development of residences, such as a home and farm, within the boundaries of Operable Unit 1. Access controls are assumed to be absent and no additional remedial actions are assumed to have been taken. Hypothetical receptors under this scenario are a reasonable maximum exposure (RME) resident farmer, a central tendency (CT) resident farmer, a resident child, and an on-property home builder.

In addition to the three land-use scenarios, there are two source-term scenarios: the current source term and the future source term. The current source-term scenario considers the waste pit area as it exists today. The future source-term scenario assumes that all maintenance activities within Operable Unit 1 have been discontinued. The cap on Waste Pit 3 is assumed to have failed, exposing waste pit contents. Caps and covers on Waste Pits 1, 2, and 4 and the Burn Pit are assumed to have remained intact. Water in Waste Pits 5 and 6 is assumed to have evaporated, exposing waste pit contents over half of the surface area of each waste pit. The Clearwell is assumed to have remained filled with water. The surface-water-runoff-control system is assumed to have become nonfunctional under the future source term scenario as maintenance ceases.

The future-scenario configuration was developed as described for a number of reasons. Since the currently submerged surface of Waste Pits 5 and 6 is uneven and higher at one level than the other, a decrease in the water level could result in a significant amount of exposed pit material. For that reason, half of the total surface area was assumed to be exposed in the future scenario. Sediments on the bottom of the Clearwell are assumed to have remained covered with water. The sides of the Clearwell are steep, and removal of part of the water would not result in exposure of this material.

It was assumed that the cover over Waste Pit 3 will have degraded and exposed waste materials because the pit material is semi-solid and, consequently, unstable. This instability is assumed to have affected the integrity of the cover material, resulting in failure. This pit is the largest in surface area and volume, so assuming the eventual exposure of waste material is a conservative assumption. The covers of Waste Pits 1, 2, and 4 and the Burn Pit were assumed to have remained intact in the future scenario. This assumption was made because the materials deposited within these waste pits consisted of solid (dry) wastes. Solid wastes are assumed to be more stable and less likely to settle and result in failure of the cover. Waste Pit 4 is covered with a RCRA cap (a 4-foot-thick clay cover and a polyethylene liner) that is assumed to significantly reduce the potential for failure. Waste Pits 1 and 2 and the Burn Pit are covered with soil and are assumed to have become covered with vegetation, which would increase pit stability.

Of all the pits, Waste Pit 4 is considered to be the most stable. In addition, the groundwater beneath this pit is the most contaminated, so assuming future installation of a well at this location was chosen as a conservative assumption. A home also was assumed to have been constructed over this pit. The presence of the RCRA cap over Waste Pit 4, however, would preclude grass growth, so topsoil was assumed to have been placed over the cap after its construction.

Finally, since the resident farmer is also being evaluated, the only area that would be left for growing crops is the area of Waste Pits 1 and 2, the soil cover of which makes this location suitable for agriculture. It was assumed that the soil covers would have remained intact, otherwise crop growth would be unlikely to occur.

Under the current land use without access control scenario, risks are calculated using both current and future source terms. The current-land-use-with-access-control scenario assumes that the site remains under the institutional control of DOE and that the integrity of the waste pit area is maintained by inspections and repair when necessary. Additional operational information is contained in Section 2 of this report. The current land-use-with-access-control scenario estimates risk using only the current source term. The future land-use scenario is addressed using only the future source term.

The four land use/source term scenario combinations that are evaluated in the Operable Unit 1 baseline risk assessment are:

- Current land use with access control - current source term
- Current land use without access control - current source term
- Current land use without access controls - future source term
- Future land use - future source term

Exposure pathways quantified in the risk assessment for each scenario are shown in Appendix E of this report, Figures E.3-2 and E.3-3, and are discussed in greater detail in Section E.3.0 of Appendix E. That section includes a description of the calculation methods for quantifying receptor exposures and a tabulation of the numerical parameter values (Tables E.3-16 and E.3-17) employed in exposure calculations. The conceptual model depicted in Figures E.3-2 and E.3-3 indicates which exposure routes are quantitatively evaluated in the risk assessment for each receptor and land-use scenario, and the basis for excluding other exposure routes.

Estimated receptor point concentrations used in exposure calculations are tabulated in Tables E.3-3 through E.3-15. Exposure point concentrations for soil, surface water, on-site groundwater, and waste pit material are based on analytical results of the CIS and the RI/FS data. Exposure point concentrations in air, surface water in Paddy's Run (creek) and the Great Miami River, sediment, and groundwater are based on environmental transport modeling from source terms within Operable Unit 1. Exposures to the RME resident farmer due to consumption of groundwater considers two scenarios,

which include water obtained from the Great Miami Aquifer and water obtained from the perched aquifer beneath Operable Unit 1. Section 5 and Appendix D of this RI report address these modeling results in detail. The conceptual model described in Appendix E.3.0 contains the assumptions regarding source terms and potential release mechanisms on which the transport modeling is based.

6.4 TOXICITY ASSESSMENT

Two primary human health hazards are addressed in the toxicity assessment for Operable Unit 1: cancer induction and chemical toxicity. The assessments are conducted and presented as an increased ILCR for carcinogens or a summed HI for a noncarcinogenic chemical toxin. Cancer is a genotoxic effect and may be induced by exposure to a chemical carcinogen or from ionizing radiation from a radionuclide. Chemical noncarcinogenic toxicity refers to the type of toxicity which does not affect the genetic material and includes organ tissue effects. These effects are numerous and range from systemic effects such as kidney or liver damage to localized effects such as skin or eye irritation. For both cancer induction and chemical toxicity, dose-response data from human and animal studies are used to determine the reference doses of each constituent.

For cancer induction, it is assumed that no dose threshold exists. Therefore, for any dose of a carcinogen, there exists a possibility, however small, of developing cancer. Incremental cancer risks are expressed in terms of the probability that a given receptor (person) will develop cancer due to estimated exposures. For example, if the receptor has an additional 1 chance in 10,000 of contracting cancer due to these exposures, the probability is expressed as a 10^{-4} (1/10,000) risk. Chemical intakes calculated in the exposure assessment are used in conjunction with the cancer slope factor (CSF) to determine the ILCR. Cancer risks from exposure to chemical carcinogens and exposure to ionizing radiation are considered separately in the Operable Unit 1 risk assessment.

In the evaluation of potential exposures for the noncarcinogenic assessment, it is assumed that a dose threshold exists below which no toxic effect will occur. This threshold is used to develop an acceptable intake level. To determine if Operable Unit 1 constituents may cause toxic effects, the estimated intake (calculated from the exposure assessment) is divided by the acceptable intake (the reference dose/reference concentration [RfD/RfC]). This ratio is called the hazard quotient (HQ). When HQs for multiple CPCs are summed for a particular pathway, the resultant value is the HI. If the ratio of estimated intake to the acceptable intake is greater than 1, the site-related intake has the potential to cause toxic effects.

Quantitative toxicity factors (i.e., cancer slope factors [CSFs] and reference doses [RfDs]) are presented in Appendix E, Tables E.4-1 and E.4-2 for radionuclides and chemical constituents, respectively.

For risk assessment purposes, mixtures of CDDs and CDFs are evaluated using EPA's toxicity equivalency method. This approach uses derived toxic equivalent factors (TEFs) to convert the concentration of CDD or CDF congeners into an equivalent concentration of 2,3,7,8 TCDD. Table E.4-3 presents the TEFs for a variety of CDD and CDF congeners.

Carcinogenic risks associated with PAHs are also evaluated using a TEF approach. This approach, requested by EPA Region V, considers the relative potency of the individual PAHs and allows site-specific relative concentration to be expressed in the risk assessment. The relative potency factors for PAHs are presented in Table E.4-4. Results were also presented under the assumption that all carcinogenic PAHs were as potent as benzo(a)pyrene.

6.5 RISK CHARACTERIZATION RESULTS

Risk estimates are derived by combining the results of the exposure assessment and the toxicity information to quantitatively estimate the degree of hazard associated with exposure to CPCs. The results were calculated based on ranges of generally acceptable risk under CERCLA, an ILCR of 10^{-4} to 10^{-6} or an HI equal to or less than 1 (EPA 1992d).

Tables 6-1 and 6-2 summarize the baseline cancer risks and hazard indices for the current source term receptors, respectively. Tables 6-3 and 6-4 summarize the ILCRs and HIs for the future source term. Within each scenario, the receptor that incurs the highest degree of risk, termed the maximally exposed individual, is discussed in the following text. CPCs and the constituents that contribute the largest portion of the calculated risk are also identified.

6.5.1 Current Land Use With Access Controls - Current Source Term

The maximally exposed individual in this scenario is the site visitor. This receptor could represent a security guard, maintenance inspector, or an environmental technician in charge of routine air monitoring. This person, through routine exposure over a period of 25 years, could incur an ILCR of 9×10^{-4} from radiocarcinogens (radionuclides with carcinogenic effects). Exposure to surface soil contributes about 80 percent of the total risk, with most of the remainder from inhalation of dust and radon.

The total chemical carcinogenic risk for this receptor was estimated at 3×10^{-6}, due solely to the inhalation of fugitive dust emissions. This receptor does not experience chemical exposure from any other medium. Chromium and arsenic are the major contributors to the total chemical risk.
The total HI for this receptor was estimated at 0.5, which is within the range generally considered to be acceptable.

6.5.2 Current Land Use Without Access Controls - Current Source Term

Under this scenario, the maximally exposed individual is assumed to be the off-property user of meat and dairy products, based on the carcinogenic assessment. This hypothetical receptor is exposed only to those contaminants that are biotransferred into meat and dairy products from livestock grazed and watered on site.

The total chemical risk is from 2×10^{-3}. The total radiocarcinogenic risk for this receptor was 6×10^{-4}. Aroclor-1254 and arsenic are the major contributors to the chemical carcinogenic risk while Tc-99, Sr-90, and U-238 were the major contributors to the radiological risk. The HI for this receptor was estimated at 11, which exceeds the range generally considered to be acceptable.

Potential risks to the trespassing child and off-property RME resident farmer are lower, with total risks in the range of 10^{-5} for radionuclides. However, these two receptors are more realistic than the off-property user of meat and milk produced within Operable Unit 1. Total radiocarcinogenic risk is comprised of the several exposure pathways with each contributing a risk of similar magnitude. Penetrating gamma radiation exposures from buried waste pit materials, external gamma exposure from surface soil, and inhalation of dust and radon make up 100 percent of the total risk. The most significant contributors to the risk, in descending order, are U-238, Th-230, U-234, and Rn-222 for air exposures, and radium and Th-228 for the external exposures. Chemical carcinogenic risks are 2×10^{-5} for the trespassing child and 3×10^{-6} for the off-property RME resident farmer with PCB Aroclor 1254 contributing the majority to the total risk. The HIs for these receptors are below 1.

6.5.3 Current Land Use - Future Source Term

The receptor subject to the greatest ILCR for this land use/source term configuration is the off-property RME resident farmer. This receptor is only exposed to those media and contaminants subject to transport from the site. Because the source term is varied to account for the assumed exposure of pit materials in Pits 3, 5, and 6, this receptor experiences a higher exposure than from the current source term. In addition, enough time is assumed to pass for groundwater contamination from the operable unit to reach the receptor via groundwater transport (i.e., exposure to contaminants migrating in the Great Miami Aquifer are considered for the future source term).

The total carcinogenic risk from exposure to radionuclides is 2×10^{-3}, and the total chemical carcinogenic risk is 4×10^{-3}. Uranium and thorium isotopes and radon are the primary CPCs in the radiologic risk via inhalation, and U-238 and other isotopes control the groundwater risks from all pathways. Arsenic and nickel are the primary chemical carcinogens, and affect the receptor primarily via inhalation of fugitive dust emissions from the site. While the risks are presented as a total for both air and groundwater exposures, it should be noted that the points of maximum risk for these two media do not coincide.

The total HI for this receptor is 60, with ingestion of fruits and vegetables affected by aerial deposition of metals presenting the majority to the hazard index.

6.5.4 Future Land Use - Future Source Term

The RME receptor for this configuration is the on-property RME resident farmer. This receptor, as discussed in the exposure assessment, is assumed to live in a home in the vicinity of Waste Pit 4 for a period of 70 years, use water from the Great Miami Aquifer for all potable and agricultural purposes, and grow food in the area of Waste Pits 1 and 2. The soil cap over Waste Pit 3 is assumed to have failed and exposed waste materials, and waste material in Waste Pits 5 and 6 is assumed to have been exposed after surface water in the waste pits has partially dried up. ILCRs and HIs for this receptor are provided in Tables 6-3 and 6-4.

Total risks were summed for this receptor based on their combined exposure to CPCs in the air, buried pit material, surface soils and exposed pit materials, sediment, surface water, and groundwater from the Great Miami Aquifer.

Risks associated with ingestion of groundwater from the perched aquifer were not included in the summary of total risk estimates presented and discussed in this section. The assessment of risks from exposure to the perched groundwater was made to consider a worst-case scenario for future on-site receptors. This aquifer is discontinuous and will not yield sufficient water for household uses, making the perched groundwater an unlikely source for potable water; therefore, the risks for perched groundwater are not summed in Tables 6-3 and 6-4 with the other pathway risks.

The total radiocarcinogenic risk for the RME receptor is estimated at 4×10^{-2}, the result of exposures via inhalation of dust and radon and external exposure to soil and exposed waste pit material. As with the other scenarios discussed, uranium and thorium isotopes and radon drive the inhalation risks; uranium, thorium, and radium isotopes drive the external gamma exposure risks.

The chemical carcinogenic risks for this hypothetical receptor are 7×10^{-2}, and are due primarily to ingestion of drinking water from the Great Miami Aquifer, incidental ingestion of soil and ingestion of fruits and vegetables irrigated with groundwater and affected by particulate emissions from the waste pits. Arsenic is, by far, the primary contributor to the chemical carcinogenic risk, although other carcinogenic compounds, such as PAHs and dioxins, are present in the exposed waste pit material. These other compounds, however, present a risk at least an order of magnitude lower than that for arsenic.

HIs were highest for the on-property RME child. Food ingestion pathways primarily influence the HIs, with ingestion of fruits and vegetables irrigated with contaminated groundwater (containing

arsenic and uranium, particularly) having the highest HI, followed by ingestion of fruits and vegetables affected by particulates. The total HI for this receptor was estimated at 3100.

6.5.5 Background Risks

All site-related risks in the risk assessment are calculated without accounting for the contribution from natural background. In many cases, the concentrations of CPCs in the soil at the Operable Unit 1 waste pits are only slightly above natural background concentrations, but the ILCRs or HIs for these site-related concentrations are often greater than 10^{-4} and 1, respectively. Background contributions provide a useful point of comparison for site-related risk estimates.

Risks and hazard quotients are calculated for background concentrations of CPCs in soil. These results are presented in Tables 6-5 and 6-6. Exposure assumptions and models used for these background calculations are the same as those used for evaluating site-related risks to the RME on-property resident farmer. Soil concentrations used for background risk calculations are the UCL values determined for the site-specific background soil sample analytical results.

Background risks from radionuclides and their short-lived progeny (Table 6-5) are 7×10^{-4}. The exposure pathway that contributes nearly all of this risk is external radiation exposure from Ra-226, Th-228, and Ra-228 (and their short-lived progeny) in surface soil. The health risk attributable to the naturally occurring radioactive isotope of potassium, K-40, is slightly larger (within the same order of magnitude) than all other radioisotopes combined. The risk from K-40 was not included in the total risk because K-40 was not selected as a CPC for this operable unit. Including it in the total risk from background could bias decisions, if the total background risk were compared directly with the total site-related risks calculated in this report. It is included here because it is a ubiquitous component of background. It is important to note that, using CERCLA methodology, the overall lifetime risk from natural background radiation sources (such as cosmic radiation, primordial radionuclides in surface soil, and radon) is approximately 1×10^{-2}. Background risks from arsenic and beryllium in soil at background concentrations also exceed 1×10^{-4}.

Background hazard quotients were calculated for natural background concentrations of inorganic chemicals in soil. Results of these calculations for the RME on-property resident adult are given in Table 6-6. Again, the soil concentrations used are the site-specific background soil sample analytical result UCLs. The HI for background concentrations of inorganics is 8. The HQs estimated using the background UCLs and the method described in Sections E.1 through E.5 exceed 0.1 for five metals (arsenic, boron, cadmium, manganese, and thallium), and the HQ for natural background levels of mercury exceeds 1.0. The results of the background risk calculation and the potential for toxic effects to occur from natural background concentrations of radionuclides and inorganic chemicals suggest that the risk assessment methodology has a conservative bias.

6.6 ECOLOGICAL ASSESSMENT

This remedial investigation report does not address the presence of or risks to ecological resources. The SWCR presents the baseline ecological assessment for the site including Operable Unit 1, and presents detailed information concerning site ecological receptors and exposure pathways. Under agreement with the EPA, the Operable Unit 5 remedial investigation will provide a comprehensive baseline ecological assessment. An evaluation of Operable Unit 1 impacts to ecological receptors will also be addressed in the Operable Unit 1 feasibility study. Therefore, ecological resources and any associated impacts are not specifically assessed in this document, but will be addressed in supporting documents.

6.7 UNCERTAINTY ANALYSIS

It is generally recognized that uncertainty is inherent in quantitative risk assessment. The objective of the uncertainty analysis is to identify key site-related variables that contribute most to uncertainty, and to characterize the nature and magnitude of impact of these uncertainties on the conclusions of the risk assessment. The uncertainty analysis provides the risk manager with a qualitative summary of information bearing on the level of confidence in the quantitative risk estimation. A quantitative evaluation of uncertainty is not performed for individual risks in this study, but a qualitative summary is provided in Table 6-7.

Uncertainty is a factor in each stage of the risk assessment process. Uncertainties in the Operable Unit 1 risk assessment are introduced in the initial selection of CPCs used to characterize exposure and risk; the exposure assessment; the toxicity assessment; and the risk characterization. The following sections address major sources of uncertainty associated with the Operable Unit 1 quantitative risk assessment.

6.7.1 Uncertainty in Selection of CPCs

As described in Appendix E, Section E.2.0 of the baseline risk assessment, there are several sources of uncertainty inherent in the CPC selection process. Constituents to be quantitatively addressed in the risk assessment are selected using an iterative process, which includes removal of essential nutrients, constituents present at levels comparable to background, and low toxicity compounds. The resulting CPCs represent those compounds of most potential significance in the overall risk assessment, based on toxicity, concentration, and prevalence. The constituents eliminated as CPCs for the Operable Unit 1 risk assessment are not expected to contribute significantly to risk and do not represent a significant source of uncertainty.

6.7.2 Uncertainties in Exposure Assessment

The land-use assumptions, exposure scenarios, and receptors evaluated in the Operable Unit 1 risk assessment are largely defined by the Risk Assessment Work Plan Addendum (DOE 1992a), and are also based on a number of professional judgements and assumptions. The primary sources of uncertainty associated with scenario development are (1) the definition of current and future land uses

within the boundaries of Operable Unit 1 and (2) the current and future site configurations selected as a basis for the risk assessment. The exposure scenarios and receptors evaluated in the risk assessment are extremely conservative, and are expected to result in significant overestimation of potential health risk.

A site visitor and trespassing child are evaluated in the risk assessment as receptors who may have direct exposure to contaminants in Operable Unit 1 based on current land uses, with and without access restriction. Risk estimates for the site visitor are likely to be overestimated, since this receptor would enter the controlled area of Operable Unit 1 only with permission of DOE, so would be subject to FEMP health and safety requirements. The trespassing child is assumed to wander onto the site in the absence of access controls under the current land use scenario. This scenario appears reasonable, because the waste pits may be an appealing area for a child to explore and play, potentially resulting in exposure to site-related constituents.

There is a high degree of uncertainty associated with the future-land-use scenario evaluated for Operable Unit 1, particularly the quantitative assessment of risks for an on-site resident farm family. There is a low probability that residential development will occur within the boundaries of Operable Unit 1 in the foreseeable future. It is reasonable to assume that some level of site control (i.e., access control or institutional controls) will be maintained for Operable Unit 1, based on the potential physical and health hazards associated with the use of this area as a waste storage facility. The on-site resident farm family is included as the RME receptor for Operable Unit 1 based on guidance in the Risk Assessment Work Plan Addendum. This receptor is less feasible for Operable Unit 1 (because of the scarcity of tillable land) than for other areas of the FEMP, so overestimation of potential health risks for future land use is likely.

More feasible exposure scenarios for Operable Unit 1 are those addressing off-site receptors. These off-site receptors include the off-property resident, the meat and milk user, and the Great Miami River user. These exposure scenarios are consistent with current land use patterns and can thus be reasonably expected to occur in the present or future. The exposures for these receptors are those associated with off-site transport of site-related constituents, and result in levels of potential risk that are at least two orders of magnitude lower than those for on-property residential receptors.

The risk assessment for Operable Unit 1 evaluates potential risks associated with both current and future source terms, reflecting a range of possible exposure conditions for hypothetical receptors. As described in Appendix E, Section E.3.0, the future site configuration for Operable Unit 1 assumes that the area will not have been maintained, resulting in exposed waste in Waste Pits 3, 5, and 6. In addition, the surface water runoff control system is assumed to have become nonfunctional, resulting in contaminant loading to Paddy's Run. This particular combination of site conditions was selected as feasible, and representative of reasonable maximum source term conditions. It is important to note,

however, that there are a wide variety of potential future site configurations that could have been applied in the risk assessment, and a degree of uncertainty is introduced by the selection of this particular configuration over another. If, for example, Waste Pit 3 were assumed to remain intact and the covers on other waste pits were to fail, a receptor could receive different (higher or lower) exposures to any given constituent. Failure of all waste pit covers was not considered a probable scenario and was assumed to exceed the RME scenario. Finally, results of the risk assessment are not expected to change significantly even if other pit covers were assumed to fail. This is because the risk from the operable unit in this configuration already approaches 10^{-1}; the major sources, exposure pathways, and important constituents have been identified using this configuration.

The inherent uncertainty associated with future land use and site configuration is managed in the Operable Unit 1 risk assessment by addressing a wide range of potential receptors and exposure conditions. The receptors evaluated represent both reasonable maximum as well as more likely or average exposure conditions. Based on this conservatism and diversity in the evaluated scenarios, the resulting risk estimates are unlikely to underestimate potential health risks associated with exposure to site-related constituents.

Each exposure factor selected for use in this risk assessment has some uncertainty associated with it. Standard assumptions regarding exposure frequency, duration, population characteristics, and activities may not be representative of exposure conditions for all receptors. Generally these factors are based on surveys of physiological and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally have a broad distribution. To avoid underestimation of exposure, the Operable Unit 1 risk assessment follows EPA's recommendation and uses RME assumptions that correspond to the ninety-fifth percentile for most of the exposure factors. In other words, the values used generally represent the habits of a small percentage of the population representing the upper bound exposure conditions.

The availability of site characterization data (i.e., contaminant types, levels, and distribution) has a direct impact on the estimation of exposure concentrations. Specific and potentially significant sources of uncertainty with relevance to the calculation of exposure point concentrations are the limitations on characterization of waste pit contents, which are known to be heterogeneous in nature; assignment of validation qualifiers on data which limit their usability for quantitative risk assessment; lack of data characterizing environmental media that represent source terms for exposure; and the positive bias associated with the radiological sampling.

The heterogeneity of the waste material in the waste pits contributes to uncertainty in characterization of the types and levels of constituents present in Operable Unit 1. This heterogeneity is not expected to significantly impact the results of the risk assessment for radiological constituents, because radiological surveys of the waste pits were biased toward highest gross radionuclide measurements,

resulting in potential overestimation of health risk. The analytical data for many chemical constituents were highly variable among the waste pits and from one investigation to another. This variability was managed in the risk assessment by utilizing conservative estimates for both the RI/FS and CIS data sets. For example, the 95 percent UCL of the mean or the maximum detected value, as appropriate, was used as the representative exposure concentration for each constituent.

The organic chemical data collected during the RI/FS 1992 investigation of Waste Pits 5 and 6 and the Clearwell were rejected based on exceeded holding times prior to sample analysis. The elimination of these data have resulted in a limited database for characterization of the organic constituents in wastes from these pits. This limitation introduces some degree of uncertainty into the selection of CPCs and calculation of exposure point concentrations for organics for these waste pits. However, a broad range of organic constituents have been identified as CPCs for Operable Unit 1 and where data were limited, the maximum detected concentrations was used as the exposure point concentration. These specific data limitations are of relatively low significance when compared to other sources of uncertainty (e.g., those associated with the toxicity assessment and fate and transport modeling in the risk analysis.

Estimation of exposure point concentrations using environmental fate and transport modeling introduces a number of potentially significant uncertainties into the risk assessment results. This uncertainty results from the use of generalized assumptions regarding contaminant distribution and intermedia transfer processes, as well as from intrinsic uncertainties in the models applied to estimate environmental concentrations. Section 5 of this report and Appendix D provide detailed discussions of the inputs and uncertainties associated with the modeling process. To avoid underestimating the concentrations of contaminants in environmental media, transport parameters are chosen to calculate the upper bound of possible exposure point concentrations (and hence risks). Thus, the uncertainties associated with modeled concentrations may be significant.

The partitioning of contaminants between soil and vegetation (crops for human consumption and food for livestock) is not well-characterized for most compounds. Available data are used to make order-of-magnitude estimates of plant/soil partitioning relationships. The biotransfer factors that express contaminant partitioning between animal intake and animal-based food products (such as meat and dairy products) can only be estimated to within about two orders of magnitude (McKone and Ryan 1989). These limitations have important implications for Operable Unit 1, where food-related pathways are significant for some receptors.

6.7.3 Uncertainty in Toxicity Assessment

Considerable uncertainty is associated with the qualitative (hazard assessment) and quantitative (dose-response) toxicity assessment process. The hazard assessment characterizes the nature and strength of evidence of causation, or the likelihood that a constituent that induces adverse effects in animals will induce adverse effects in humans. Hazard assessment of carcinogenicity is evaluated as a weight-of-

evidence determination, using either the International Agency for Research on Cancer (IARC) 1987 or EPA (1986c) schemes. Positive animal cancer test data suggest that humans contain tissue(s) that may also manifest a carcinogenic response; however, the animal data cannot necessarily be used to predict the target tissue in humans. In the hazard assessment of noncancer effects, however, positive animal data suggest the nature of the effects (i.e., the target tissues and type of effects) anticipated in humans (EPA 1989i).

Uncertainty in hazard assessment arises from the nature and quality (sensitivity and selectivity) of the animal and human data. Uncertainty is decreased when similar effects are observed across species, strain, sex, and exposure route; when the magnitude of the response is clearly dose-related; when pharmacokinetic data indicate a similar fate in animals and humans; when postulated mechanisms of toxicity are similar for humans and animals; and when the CPC is structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose-response evaluation includes the determination of a slope factor for the carcinogenic assessment and derivation of an RfD or RfC for the noncarcinogenic assessment. Uncertainty is introduced from interspecies (animal-to-human) extrapolation, which, in the absence of quantitative pharmacokinetic, dosimetric, or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also results from intraspecies, or individual, variation. Finally, uncertainty arises from the quality of the key study (from which the quantitative estimate is derived) and the database. For cancer effects, the uncertainty associated with dose-response factors is mitigated by assuming the 95 percent upper bound for the slope factor. A source of uncertainty regarding quantitative risk estimation for the carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a nonthreshold assumption of carcinogenesis. An impressive body of evidence, however, suggests that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are noncarcinogenic (Williams and Weisburger 1991); therefore, the use of the linearized multistage model is conservative for chemicals that exhibit a threshold for carcinogenicity.

Uncertainty in the derivation of RfDs is mitigated by the use of uncertainty and modifying factors. An uncertainty factor is applied in the derivation of the RfD or RfC to mitigate poor quality of the key study or gaps in the database. Additional uncertainty for noncancer effects arises from use of an effect level in the estimation of an RfD or RfC, because this estimation is predicated on the assumption of a threshold below which adverse effects are not expected. Therefore, an additional uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arises from estimation of an RfD or RfC for chronic exposure from less than chronic data. Unless empirical data indicate that effects do not worsen with increasing duration of exposure, an additional uncertainty factor is applied to the no-

effect level in the less than chronic study. As a result, a combination of uncertainty and modifying factors may exceed 100, 1000, or more for a particular compound. These uncertainty factors are discussed in Appendix E, Section E.4 for the CPCs in Operable Unit 1.

Additional sources of uncertainty are discussed in greater detail in Appendix E, Section E.6.

To summarize, the uncertainty associated with the toxicity assessment is chemical-specific since it depends on the existing information used to derive the dose-response factor. In general, this uncertainty tends to be high (overestimate risks by two or more orders of magnitude) for the chemical risk assessment, but tends to be low (overestimate risks by an order of magnitude or less) for radionuclides. This difference is the result of animal versus human data used for chemical and radiological compounds, respectively.

6.7.4 Risk Characterization

Uncertainty in risk characterization results from assumptions made regarding additivity of effects from exposure to multiple compounds from various exposure routes. High uncertainty exists when summing ILCR or HIs for several substances across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Often compounds affect different organs, have different mechanisms of action, and differ in their fate in the body where additivity is not appropriate. However, the assumption of additivity is made to provide a conservative estimate of risk.

Risk characterization does not consider antagonistic or synergistic effects. Little to no information is available to determine the potential for antagonism or synergism for CPCs. Therefore, this uncertainty cannot be discussed based on the impact on the risk assessment since it has the potential to either over- or under-estimate potential human health risks.

The additivity of risks from radionuclides and chemical carcinogens is the subject of considerable debate. EPA guidance (EPA 1989a) indicates that the two sets of estimates should be considered separately because (1) chemical CSFs are developed using laboratory experiments and radionuclide toxicity values are based on human epidemiological data, and (2) chemical CSFs represent an upper bound limit value while radionuclide slope factors are "best estimates." Therefore, cancer risks from exposure to radionuclides are presented separately from those from chemical CPCs.

6.7.5 Summary of Uncertainties in Operable Unit 1 Baseline Risk Assessment

Table 6-3 presents a qualitative evaluation of the uncertainties described in the preceding sections. Generally, uncertainty arises wherever data gaps exist. Data gaps in the risk assessment were mitigated by making conservative assumptions for individual parameters. Significant uncertainty results for those particular pathways that required fate and transport modeling to support the assessment of exposure. Such uncertainty was generated for the air and groundwater pathways of

1178

exposure. The high uncertainty, therefore, must be addressed in the interpretation of risk from these media. Certain exposure pathways for a particular medium also tend to have higher or lower uncertainty depending on their assumptions. For example, incidental ingestion of soils by residents tends to have significantly less uncertainty than ingestion of fruits and vegetables, meat, and milk raised on contaminated soils. To assess these indirect exposure pathways, assumptions must be made regarding contaminant uptake from soil to plant, and plant to livestock that are not required for the soil ingestion pathway.

The receptors with the highest uncertainty in the current source term are the off-property resident farmer and off-property user of meat/milk from livestock grazed on site. The off-property resident-farmer scenario was evaluated based on modeled concentrations for the air pathway and results in high uncertainty. The bioaccumulation of CPCs into meat/milk were modeled, and as a result, provide moderate to high uncertainty for this receptor. The greatest uncertainty in the risk assessment of Operable Unit 1 is associated with the assumptions made in the future source term. These particular receptors include the on-property resident farmer, the Great Miami River user, and the off-property user of meat and milk. For the on-property RME resident farmer and home builder, the highest uncertainty is associated with the assumed future land use and potential exposure pathways. This receptor scenario was included in response to guidance and is anticipated to have a low likelihood of occurrence due to the history of the site and the particular waste management activities within Operable Unit 1. Uncertainty associated with the off-property resident farmer and Great Miami River user is primarily the result of surface water, groundwater, and air modeling used to support those scenarios. The modeling assumptions were conservative, and this resulted in conservative estimates for the exposure point concentrations.

Taken together, the uncertainties identified with site data, exposure parameters, fate and transport, toxicity assessment and risk characterization are judged to be high (i.e., potential to overestimate risk by two or more orders of magnitude).

TABLE 6-1

INCREMENTAL LIFETIME CANCER RISK SUMMARY
CURRENT SOURCE TERM

Media	Visitor	Off-Property RME Resident Farmer	Trespassing Child	Off-Property User of Meat and Dairy Products
Air				
Radiocarcinogenic risk	1×10^{-4}	6×10^{-5}	1×10^{-5}	NA[a]
Chemical carcinogenic risk	3×10^{-6}	3×10^{-6}	4×10^{-7}	NA
Total[b]	1×10^{-4}	6×10^{-5}	1×10^{-5}	NA
Buried Pit Material				
Radiocarcinogenic risk	9×10^{-5}	NA	2×10^{-5}	NA
Chemical carcinogenic risk	NA	NA	NA	NA
Total[b]	9×10^{-5}	NA	2×10^{-5}	NA
Surface Soil				
Radiocarcinogenic risk	8×10^{-4}	NA	2×10^{-5}	6×10^{-4}
Chemical carcinogenic risk	NA	NA	2×10^{-5}	2×10^{-3}
Total[b]	8×10^{-4}	NA	4×10^{-5}	3×10^{-3}
Surface Water				
Radiocarcinogenic risk	NA	NA	NA	4×10^{-5}
Chemical carcinogenic risk	NA	NA	NA	7×10^{-6}
Total[b]	NA	NA	NA	5×10^{-5}
All Media				
Radiocarcinogenic risk	9×10^{-4}	6×10^{-5}	5×10^{-5}	6×10^{-4}
Chemical carcinogenic risk	3×10^{-6}	3×10^{-6}	2×10^{-5}	2×10^{-3}
Total[b]	3×10^{-4}	6×10^{-5}	7×10^{-5}	3×10^{-3}

[a]NA - Not applicable. Exposure route not evaluated.
[b]Radiocarcinogenic and chemocarcinogenic risks are not truly additive. Provided for reference only.

TABLE 6-2

HAZARD INDEX SUMMARY
CURRENT SOURCE TERM

Media	Visitor	Off-Property RME Resident Farmer	Trespassing Child	Off-Property User of Meat and Dairy Products
Air	0.5	0.07	0.1	NA
Buried Pit Material	NA	NA	NA[a]	NA
Surface Soil	NA	NA	0.1	7
Surface Water	NA	NA	NA	4
Total - All Media	0.5	0.07	0.2	11

[a]NA - Not applicable. Exposure route not evaluated.

TABLE 6-3

INCREMENTAL LIFETIME CANCER RISK SUMMARY
FUTURE SOURCE TERM

	Current Land Use				Future Land Use			
	Trespassing Child	Off-Property RME Resident Farmer	Great Miami River User	Off-Property User of Meat and Milk	On-Property RME Adult Farmer	On-Property CT Adult Farmer	On-Property RME Child	Home Builder
Air								
Radiocarcinogenic Risk	2×10^{-4}	9×10^{-4}	NA[a]	NA	1×10^{-2}	9×10^{-4}	2×10^{-4}	2×10^{-5}
Chemical Carcinogenic Risk	1×10^{-4}	4×10^{-3}	NA	NA	1×10^{-2}	9×10^{-4}	4×10^{-3}	8×10^{-6}
Total[b]	3×10^{-4}	5×10^{-3}	–	-	2×10^{-2}	2×10^{-3}	4×10^{-3}	3×10^{-5}
Buried Pit Material								
Radiocarcinogenic Risk	7×10^{-6}	NA	NA	NA	1×10^{-3}	2×10^{-4}	2×10^{-7}	3×10^{-6}
Chemical Carcinogenic Risk	NA	NA	NA	NA	NA	NA	NA	NA
Total[b]	7×10^{-6}	-	-	-	1×10^{-3}	2×10^{-4}	2×10^{-7}	3×10^{-6}
Surface Soil/Exposed Pit Material								
Radiocarcinogenic Risk	3×10^{-4}	NA	NA	6×10^{-4}	2×10^{-2}	4×10^{-3}	3×10^{-3}	2×10^{-6}
Chemical Carcinogenic Risk	1×10^{-4}	NA	NA	2×10^{-3}	2×10^{-2}	1×10^{-3}	6×10^{-3}	5×10^{-4}
Total[b]	4×10^{-4}	-	-	3×10^{-3}	4×10^{-2}	5×10^{-3}	1×10^{-2}	5×10^{-4}
Sediment								
Radiocarcinogenic Risk	4×10^{-6}	NA	NA	NA	NA	NA	NA	NA
Chemical Carcinogenic Risk	2×10^{-5}	NA	NA	NA	NA	NA	NA	NA
Total[b]	2×10^{-5}	-	-	-	-	-	-	-
Groundwater								
Radiocarcinogenic Risk	NA	7×10^{-4}	NA	NA	9×10^{-3}	6×10^{-4}	6×10^{-4}	NA
Chemical Carcinogenic Risk	NA	0	NA	NA	4×10^{-2}	3×10^{-3}	1×10^{-2}	NA
Total[b]	-	7×10^{-4}	-	NA	5×10^{-2}	4×10^{-3}	1×10^{-2}	NA
Surface Water								
Radiocarcinogenic Risk	NA	NA	3×10^{-7}	4×10^{-5}	4×10^{-5}	2×10^{-6}	8×10^{-6}	NA
Chemical Carcinogenic Risk	NA	NA	0	7×10^{-6}	7×10^{-6}	5×10^{-7}	2×10^{-6}	NA
Total[b]	-	-	3×10^{-7}	5×10^{-5}	5×10^{-5}	3×10^{-6}	1×10^{-5}	NA

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TABLE 6-3
(Continued)

	Current Land Use				Future Land Use			
	Trespassing Child	Off-Property RME Resident Farmer	Great Miami River User	Off-Property User of Meat and Milk	On-Property RME Adult Farmer	On-Property CT Adult Farmer	On-Property RME Child	Home Builder
Perched Water								
Radiocarcinogenic Risk	NA	NA	NA	NA	6×10^{-1}	5×10^{-2}	4×10^{-2}	NA
Chemical Carcinogenic Risk	NA	NA	NA	NA	1×10^{-1}	1×10^{-2}	4×10^{-2}	NA
Total[b]	NA	NA	NA	NA	7×10^{-1}	6×10^{-2}	8×10^{-2}	NA
All Pathways[c]								
Radiocarcinogenic Risk	5×10^{-4}	2×10^{-3}	3×10^{-7}	6×10^{-4}	4×10^{-2}	1×10^{-2}	4×10^{-3}	3×10^{-5}
Chemical Carcinogenic Risk	2×10^{-4}	4×10^{-3}	0	2×10^{-3}	7×10^{-2}	4×10^{-3}	2×10^{-2}	5×10^{-4}
Total[b]	7×10^{-4}	6×10^{-3}	3×10^{-7}	3×10^{-3}	1×10^{-1}	1×10^{-2}	2×10^{-2}	6×10^{-4}

[a]NA - Not applicable. Exposure route not evaluated.
[b]Radiocarcinogenic and chemical risks not readily summable. Provided for reference only.
[c]Totals do not include ingestion of perched water.

TABLE 6-4

HAZARD INDEX SUMMARY
FUTURE SOURCE TERM

	Current Land Use				Future Land Use			
	Trespassing Child	Off-Property RME Resident Farmer	Great Miami River User	Off-Property User of Meat and Milk	On-Property RME Adult Farmer	On-Property CT Adult Farmer	On-Property RME Child	Home Builder
Air	0.8	50	NA[a]	NA	330	180	1,700	0.3
Buried Pit Material	NA	NA	NA	NA	NA	NA	NA	NA
Surface Soil/Exposed Pit Material	3	NA	NA	7	60	20	230	90
Sediment	0.7	NA	NA	NA	NA	NA	NA	NA
Groundwater	NA	10	NA	NA	270	140	940	NA
Surface Water	NA	NA	0	4	4	2	160	NA
Perched Water	NA	NA	NA	NA	6,000	3,100	17,000	NA
Total - All Media[b]	5	60	0	11	670	340	3,100	90

[a]NA - Not applicable. Exposure route not evaluated.
[b]Totals do not include ingestion of perched water.

TABLE 6-5

INCREMENTAL LIFETIME CANCER RISKS FOR SOIL PATHWAYS
RME RESIDENT FARMER
NATURAL BACKGROUND CONCENTRATIONS

Radionuclide	0"-6" UCL Background Soil Concentration[a] (pCi/g)	Background Risk	Cancer Risks OU1
Cs-137 + 1 dtr	4.4×10^{-1}	4×10^{-5}	4×10^{-4}
Ra-226 + 8 dtrs	1.2×10^{0}	3×10^{-4}	1×10^{-2}
Th-230	1.5×10^{0}	1×10^{-7}	1×10^{-4}
Th-232 + 10 dtrs	1.1×10^{0}	4×10^{-4}	2×10^{-2}
U-234	1.0×10^{0}	3×10^{-7}	3×10^{-5}
U-235 + 1 dtr	8.8×10^{-2}	9×10^{-7}	4×10^{-4}
U-238 + 2 dtrs	1.1×10^{0}	2×10^{-6}	1×10^{-3}
K-40[d]	1.7×10^{1}	1×10^{-3}	NA
Total Risk	--	**7×10^{-4}[d]**	**4×10^{-2}**

Chemical	0"-6" UCL Background Soil Concentration[b] (mg/kg)	Background Risk	Cancer Risks OU1
Arsenic	6.0×10^{0}	2×10^{-4}	1×10^{-2}
Beryllium[c]	6.0×10^{-1}	2×10^{-4}	1×10^{-3}
Total Risk	--	**4×10^{-4}**	**1×10^{-2}**

[a]Radionuclide UCL background concentrations in soil (0"-6") are obtained from Attachment E.I, Table I.I-5.
[b]Chemical UCL background concentrations in soil (0"-6") are obtained from Attachment E.I, Table E.I-4.
[c]UCL was not calculated; frequency of detection was 1/30.
[d]The background risk for K-40 was not included in total background risk because K-40 was not selected as a CPC for this operable unit. Including it in the total risk from background could bias decisions if the total background risk were compared directly with the total site-related risks calculated in this report. It is included here because it is a ubiquitous component of background.

TABLE 6-6

TOXIC EFFECTS FOR SOIL PATHWAYS
RME RESIDENT FARMER
NATURAL BACKGROUND CONCENTRATIONS

Chemical	0"-6" UCL Background Soil Concentration[a] (mg/kg)	Background Hazard Quotient	Hazard Quotients OU1
Arsenic	6.0×10^{0}	0.4	26
Beryllium[b]	6.0×10^{-1}	0.009	0.05
Barium	7.9×10^{0}	0.04	0.1
Boron	1.2×10^{1}	0.5	0.004
Cadmium	4.0×10^{-1}	0.1	1.5
Chromium	1.2×10^{1}	0.008	0.06
Cobalt	1.1×10^{1}	0.008	0.009
Manganese	9.8×10^{2}	0.9	0.8
Mercury[b]	3.0×10^{-1}	6	0.04
Molybdenum	ND[c]	--	0.2
Nickel	1.3×10^{1}	0.08	0.1
Silver	ND	--	3
Thallium[b]	5.8×10^{-1}	0.3	0.2
Uranium[d]	2.3×10^{0}	0.02	5
Vanadium	2.2×10^{1}	0.03	0.6
Total Hazard Index	--	**8**	**38**

[a]Chemical UCL background concentrations in soil (0"-6") are obtained from Attachment E.I,
Table E.I-4.
[b]UCL was not calculated; frequency of detection was 1/30 and maximum is presented.
[c]ND - Not detected.
[d]Total uranium arithmetic mean background concentration in soil is obtained from Table 4-9 of
the CERCLA/RCRA Background Soil Study (March 19, 1993).

4783

TABLE 6-7

UNCERTAINTIES ASSOCIATED WITH ESTIMATED RISKS FROM OPERABLE UNIT 1

Source of Uncertainty	Magnitude[a]	Expected Direction[b]	Remark
Selection of CPCs:			
• Adequacy of database	Low	Increases or decreases conservatism	CPCs may be underestimated. Principal constituents were identified.
Exposure Assessment:			
• Calculated exposure point concentrations			
- positive bias in sampling	Moderate	Increases conservatism	Source concentrations based on 95% UCL or maximum. Sampling was biased for radiological CPCs
- conservative modeling assumptions	High	Increases conservatism	Modeled concentrations were conservative.
• Determination of land uses			
- current scenario	Low	Increases conservatism	Scenario based on current environmental setting
- future scenario	High	Increases conservatism	Worst case scenario assumed.
• Assumptions for source terms			
- current source term	Low	Increases or decreases conservatism	Current source term assumes waste pits covered and surface water runoff treated.
- future source term	Moderate	Increases conservatism	Future source term assumes failure of Waste Pit 3 cap.
• Selection of receptors			
- current scenario	Low	Increases conservatism	Scenario based on current environmental setting.
- future scenario	High	Increases conservatism	Worst case scenario assumed.
• Determination of exposure factors	Low to moderate	Increases conservatism	Receptor and exposure pathway specific.

TABLE 6-7
(Continued)

Source of Uncertainty	Magnitude[a]	Expected Direction[b]	Remark
Toxicity Assessment:			
• Dose-response assessment			
- chemical CPCs	High	Increases conservatism	Dose-response based on animal data.
- radiological CPCs			
internal	Low	Increases conservatism	Dose-response based on human data.
external	Moderate to high	Increases conservatism	Conservative assumptions made for external exposure.
• Other OU1 CPCs			
- dose-response for PAHs	Low	Increases conservatism	PAHs pose low risk.
- dose-response for PCBs	Low	Increases conservatism	PCBs pose relatively low risk.
- dose-response for dioxins/furans	Low	Increases conservatism	Furans/dioxins relatively low risk.
- dose-response for Rn-222 (indoors)	Low to moderate	Increases conservatism	Assumptions for indoor Rn-222 differ from those made for the CSF.
Risk Characterization:			
• Additivity	Low to moderate	Increases conservatism	Health effects dominated from few CPCs and exposure pathways.
• Failure to consider antagonism	Unknown	Increases conservatism	Data unknown.
• Failure to consider synergism	Unknown	Decreases conservatism	Data unknown.
• Failure to consider segregation of HIs	Low	Increases conservatism	HIs dominated by few CPCs and exposure pathways.
Overall	High	Increases conservatism	High uncertainty from combining low, moderate, and highly uncertain parameters.

[a]Magnitude is assessed qualitatively based on professional judgment and includes the following:
Low-impact risk by a factor of 10 or less.
Moderate-impact risk by a factor of 10 to 100.
High-impact risk by a factor of 100 or more.
[b]Direction is assessed qualitatively where an increased conservatism increases final health effects and a decreased conservatism decreases final health effects calculated in risk assessment.

7.0 SUMMARY AND CONCLUSIONS

This report documents the RI phase of the FEMP Operable Unit 1 RI/FS. The primary objective of this RI is to define the nature and extent of contamination in Operable Unit 1 in a manner sufficient to (1) perform a baseline risk assessment and (2) develop and evaluate viable remedial action alternatives. This objective has been achieved.

This section provides an overall summary of the RI. Topics addressed include:

- Facility description and history of operations
- Contaminant source description
- Nature and extent of contamination
- Baseline risk assessment
- Data limitations and recommended actions
- Recommended RAOs

7.1 FACILITY DESCRIPTION AND HISTORY OF OPERATIONS

The FEMP is a DOE-operated facility constructed in 1952 to produce high purity uranium metal in support of United States defense programs. Production at the facility was suspended in 1989 to focus on environmental restoration and waste management activities. One of these activities, the RI/FS, is being conducted pursuant to the terms of a Consent Agreement under Section 120 and 106(a) of CERCLA, between DOE and EPA. The purpose of the RI/FS is to identify effective cleanup actions for the FEMP that will address identified environmental concerns. OEPA is also participating in the RI/FS process through direct involvement in review meetings and technical review of project documentation.

To promote a more structured and expeditious cleanup of the FEMP site, the facility and environmental issues associated with the site have been segmented into five operable units. An operable unit is a term used to identify a logical grouping of environmental issues at a cleanup site. Separate RI/FS documentation, including RI and FS reports and RODs, are being issued for each of the five operable units at the FEMP.

Operable Unit 1 can be broadly defined as the facilities and environmental media residing within a 9.4 hectare (37.7 acre) area located west of the former FEMP production area. The area is relatively flat with gentle slopes resulting from the emplacement of soil covers over buried waste and topographical modifications to control surface water runoff. Paddy's Run, an intermittent tributary of the Great Miami River, runs along the west side of Operable Unit 1, between Operable Unit 1 and the FEMP western boundary. Operable Unit 1 consists of the following FEMP facilities and associated environmental media:

FEMP Facilities

- Waste Pits 1 through 6
- Burn Pit
- Clearwell

Environmental Media

- Soil berms around the waste pits, Burn Pits, and Clearwell
- Soil beneath and immediately adjacent to the waste pits
- Perched groundwater encountered during remediation

7.1.1 Waste Pit Construction

Table 7-1 provides a summary of the physical features and operating history of Waste Pits 1 through 6, the Burn Pit, and the Clearwell, along with the predominant radiological and inorganic constituents present within the waste units.

7.1.2 Waste Pit Operation

During the 35 years of operation of the Operable Unit 1, the following waste streams were generated and placed in the waste pits:

- General Sump Sludge: Filtrate from the processing plant filtering operations was pumped to the general sump, adjusted for pH with calcium oxide to obtain maximum precipitation of radioactive materials, mixed, then pumped to Waste Pits 1, 2, 3 and 5. Over 31 percent of the material in the waste pits is sludge from the general sump.

- Neutralized Raffinate: In the refinery operation, uranium-bearing feed materials were digested in nitric acid to solubilize the uranium, leaving the impurities in a waste "raffinate" solution. The aqueous raffinate, containing most of the nitric acid and impurities (including heavy metals and progeny products of the two uranium decay series) and some very small quantities of insoluble nonextractable uranium, were neutralized with lime. Raffinates represent approximately 30 percent of the total material in the waste pits.

- Magnesium Fluoride (MgF_2): The reduction of UF_4 (green salt) using magnesium metal to produce uranium metal generates MgF_2 slag. This material comprises approximately 17 percent of the total material in the waste pits.

- Flyash: Ash from the combustion of coal in the boiler house was deposited in Waste Pit 3 for a 10-year period beginning in 1966. The flyash was used to further neutralize and solidify the waste pit contents and comprises nearly 15 percent of the materials in Waste Pit 3.

- Other Waste: Other waste from the former production area stored in the waste pits includes: uranyl ammonium phosphate waste, depleted residues, water treatment sludge, broken concrete, graphite/ceramic waste, dust collector residues/bags, uncontaminated and contaminated metal scrap, 1,1,1-trichloroethane, spent barium chloride salt, methylene chloride/perchloroethylene degreaser, PCB wastes, contaminated waste oil,

various caustic bases and acids (e.g., anhydrous ammonia, hydrofluoric acid), laboratory wastes, construction debris (e.g., asbestos, paints, etc.), rubble, and nonburnable trash.

The six waste pits are identified as "wet" or "dry" pits based on the physical characteristics of the waste materials intended to be placed in them. Waste Pits 3 and 5 were classified as wet pits and received pumped slurries. Waste Pits 1, 2, 4, and 6 were identified as dry pits because they received primarily dry solids. Some waste materials of a similar nature to those generated at FEMP were received from other AEC facilities for disposal at FEMP. Table 7-2 provides a summary of mass for each waste type disposed in each of the waste pits.

7.2 CONTAMINANT SOURCE CHARACTERIZATION

This section presents characterization data regarding the nature of contaminants, or sources, within the waste units of Operable Unit 1. Contaminant sources considered in this section include Waste Pits 1 through 6, the Burn Pit and the Clearwell. The nature and extent of contamination within environmental media are addressed in Section 7.3.

7.2.1 Radiological Characteristics

Waste materials in Waste Pits 1 through 4 and the Burn Pit were sampled for radiological characterization under the CIS and the 1991 RI/FS waste pit sampling program. Waste materials in Waste Pits 5 and 6 and the Clearwell were sampled under the CIS and the 1992 RI/FS Waste Pit Sampling Program (conducted as part of the Operable Unit 1 treatability program). CIS and RI/FS radiological analytical results are presented Appendices A, B, C, and summarized in Section 4.0. Table 7-3 is a summary of the inventory (mass) of each radionuclide and inorganic constituent identified during site characterization activities. Table 7-4 is a comparison between the estimated quantity (mass) of inorganic metals within each waste pit based on process knowledge and the estimate generated based on RI/FS and CIS sampling results. The process knowledge estimate does not account for all potential sources of metals in the waste pits but focuses on the contribution from raffinates and UAP residues. Other sources which may account for differences in the two estimates include impurities in nitric acid, the magnesium fluoride and dolomite residues, and erosion and corrosion products from reaction vessels and piping.

The comparison is quite favorable for most metals generally within a factor of 10 where raffinates are the principal waste within the pit. RI/FS-based estimates are the greater than process knowledge estimates for the vast majority of the metals. This is expected since not all sources of metals were identified by process knowledge. It can be concluded that the RI/FS sampling database is a representative estimate of the constituents within the waste pits.

The predominant radiological constituents in all waste pits, in terms of activity concentration, include U-238, U-234, Th-230, and Ra-226, all of which are part of the uranium-238 decay series. Results of

both the CIS and the RI/FS confirm that the enrichment level of uranium in the waste pits ranges from depleted to natural. This is consistent with process knowledge, since only limited quantities of enriched uranium were processed at the FEMP. The highest uranium concentrations were found in Waste Pit 6 (greater than 15,000 pCi/g). The lowest average concentrations (less than 1000 pCi/g U-238) were found in Waste Pits 3 and 5 and the Burn Pit.

Waste Pits 3 and 5 showed elevated Th-230 activity concentrations, confirming that these waste pits received raffinate from the FEMP refinery (Plant 2/3). The 1991 RI/FS sampling program revealed elevated Th-230 activity concentrations in a portion of Waste Pit 2. Operational records indicate that approximately 2300 55-gallon drums of cold raffinates from other AEC sites were placed in Pit 2. This would account for elevated Th-230 activity concentration observed in a portion of the pit.

Fission products (Tc-99, Sr-90, Cs-137) were noted in lower concentrations, primarily in Waste Pit 5 and the Clearwell. Tc-99 was the most prevalent fission product. It was found at an average activity concentration of 1300 pCi/g in Waste Pit 5 and 300 pCi/g in the Clearwell. The presence of fission products in the waste pits stems from the processing of recycled tails from several DOE facilities, including the Hanford Purex Fuel Reprocessing Facility.

7.2.3 Chemical Characteristics

Waste material and pit leachate in Waste Pits 1 through 4 and the Burn Pit were sampled for inorganic and organic parameters under the CIS and the 1991 RI/FS waste pit sampling program. Waste material and surface water in Waste Pits 5 and 6 and the Clearwell were sampled under the CIS and the 1992 RI/FS waste pit sampling program (treatability study).

The distribution of metallic parameters in the waste pits is consistent between the CIS and RI/FS data sets. For both data sets, arsenic, barium, chromium, cobalt, copper, lead, magnesium, nickel, silver, and vanadium are the predominant species. Waste Pits 1 and 6 and the Burn Pit contain the lowest levels of inorganic constituents. Waste Pits 3, 4, 5, and the Clearwell contain the highest concentration of inorganic constituents. All of the waste pits contain high levels of magnesium, consistent with the disposal of large quantities of magnesium fluoride slag. Waste Pit 1 is characterized by significant (but lower than other waste pits) levels of cadmium, chromium, and magnesium. Waste Pit 2 is characterized by significant levels of arsenic, cobalt, copper, lead, manganese, and nickel. Waste Pit 3 has the highest levels of arsenic and manganese, but the CIS values are much lower than the RI/FS 1991 values. Waste Pit 4 is characterized by significant levels of antimony, barium, chromium, manganese, and silver. Waste Pit 5 is characterized by significant levels of arsenic, barium, copper, molybdenum, nickel, selenium, thallium, and vanadium. Waste Pit 6 is characterized by significant levels of selenium and thallium. The Burn Pit has lower metals contamination than the other waste pits, but has significant levels of barium, copper, lead, and silver. The Clearwell contains significant amounts of barium, copper, lead, manganese, and vanadium. This

mirrors the concentrations in Waste Pit 5 leachate in accordance with the Clearwell's use as a collection pit for supernatant liquid from Waste Pit 5.

Polynuclear aromatic hydrocarbons, from coal tars, flyash, or fuel oils are concentrated in Waste Pit 2. PCBs are generally distributed throughout the waste pits, but are present only in small amounts in Waste Pit 6 and the Clearwell. Tributyl phosphate exhibits significant concentrations in Waste Pits 1, 2, and 4. Tributyl phosphate was used in the refinery to extract uranium in a nitrate solution. Its presence in the waste pits is significant as a mobilizing agent for uranium.

Polychlorinated benzo-p-dioxins and dibenzofurans are problematic even at low concentration and have been reported in Waste Pits 2, 3, and 4. Waste Pits 5 and 6 and the Clearwell were not analyzed for dibenzofurans. Chlorinated solvents and volatile aromatic compounds were widespread at low concentration in the waste pits.

7.3 NATURE AND EXTENT OF CONTAMINATION

This section summarizes characterization data regarding the nature and extent of contamination in environmental media within Operable Unit 1. Environmental media addressed include surface and vadose zone soil, groundwater, surface water and sediment, air, and direct radiation. Also included is a summary of ecological characterization results.

7.3.1 Surface and Vadose Zone Soil

Surface soil radiological analyses performed under the CIS and the RI/FS show that uranium is the predominant radionuclide contaminant in Operable Unit 1 surface soils. U-238 was present at above-background concentrations in all sample locations. The highest noted U-238 activity concentration was 1500 pCi/g found at sample point SS-46-504 located south of Waste Pit 6 and east of Waste Pit 4. An area east of Waste Pit 2 yielded U-238 activity concentrations in the range of 25 to 750 pCi/g.

U-238 contamination in surface soil may be the result of sporadic spills of waste material prior to disposal, overland storm water drainage flow, and airborne deposition. Based upon the areal distribution of soil contamination at locations east of Waste Pit 2 and south of Waste Pit 6, it is likely that this soil contamination resulted from airborne spreading of dried uranium-bearing wastes placed in the adjacent waste pits (i.e., Waste Pits 6 and 2).

Chemical analyses of surface soil indicate that antimony, calcium, cadmium, magnesium, molybdenum, silver, and sodium are the principal inorganic contaminants. These constituents are consistent with the contents of waste material in the waste pits. Organics sampling revealed elevated concentrations of pesticides and PCBs along the east and west boundaries of Operable Unit 1. These contaminants correspond to the characteristics of waste material contained in the adjacent waste pits. Pesticides and herbicides were used throughout the lifetime of the waste pits for insect control (principally those

waste pits with surface water present) and weed/grass control. Their presence in both the waste pits and Operable Unit 1 was anticipated.

Subsurface soil was analyzed from four geologic zones: (1) glacial overburden, (2) upper saturated sand and gravel layer, (3) lower saturated sand and gravel layer, and (4) the deep saturated sand and gravel layer. Principal radiological constituents in Zone 1 include U-238 and its progeny products (U-234, Th-230, and Ra-226). U-238 activity concentrations range from 2.12 to 4682 pCi/g. The highest activity, 4682 pCi/g U-238, was found at a depth of 1.5 to 3 feet in Boring 1644 immediately southeast of the Burn Pit. Based on the boring logs and the elevated U-238 activity concentration, it is likely that this boring penetrated the southern edge of the Burn Pit.

Zone 2 radionuclide activity concentrations were significantly lower than those found in Zone 1. One sample obtained at a depth of 35 feet, at a location on the southwest corner of Waste Pit 3, showed slightly elevated levels of U-238, U-234, Ra-226, and Sr-90. No detections above background were found for U-235/236, Th-232, Th-228, Ra-228, or Tc-99. No radiological constituents exceeded background in samples from either Zone 3 or 4.

Only one subsurface soil sample, taken at a depth of 4.5 feet near the Burn Pit, revealed elevated levels of organic compounds. One constituent, 2-butanone, may be attributed to migration of waste pit leachate. The other two, acetone and carbon disulfide, are common laboratory chemicals and the measured values are likely due to laboratory cross-contamination.

7.3.2 Groundwater

All of the 1000-series wells in Operable Unit 1 showed elevated concentrations of uranium isotopes. The pattern of elevated uranium concentrations within the Operable Unit 1 perched groundwater appears to be centered in the vicinity of the Burn Pit and surrounds most of Waste Pit 4. Wells with the highest U-238 activities include 1078, 1643, 1022, 1075, 1644, 1021, 1019, 1082, and 1084, ranging from 19.3 to 6300 pCi/L.

The thorium and radium isotope activity levels within the glacial overburden groundwater system display a similar distribution to uranium, although these isotopes are present at much lower concentrations (less than 10 pCi/L for all isotopes, less than 15 µg/L for total thorium). Peak thorium isotope activity concentrations occur in wells within the previously delineated Burn Pit/Waste Pit 4 area. Well 1021, on the southern boundary of Waste Pit 4, displayed the maximum activity concentrations of Th-228, and Well 1022, between the Burn Pit and Waste Pit 4, had the peak detection of Th-232. The peak radium isotope concentrations, 4.2 pCi/L (Ra-226) and 4.6 pCi/L (Ra-228), were observed in Well 1073 near Waste Pit 3.

Compared to the detections of uranium and thorium, the presence and distribution of strontium-90 was limited. There were no reportable detections of Cs-137, Ru-106, or plutonium isotopes. The zone of elevated radionuclides along the southeastern boundary of Waste Pit 5 would appear to be derived from contaminant migration from the Burn Pit and Waste Pit 6, with potential contribution from Waste Pit 4.

In general, the Tc-99 activity levels appear to correlate with the uranium concentrations (i.e., elevated uranium activities were often associated with elevated Tc-99 activities), such as those Tc-99 levels observed for Wells 1073 (2805 pCi/L) and Well 1019 (1070 pCi/L). However, wells along the western and northern portions of Operable Unit 1 displayed lower uranium concentrations than the Waste Pit 4/Burn Pit area, although these wells contained elevated levels of Tc-99. Technetium-99 is more mobile than the other isotopes and could indicate the future distribution pattern of the other less mobile radionuclides in the groundwater.

The majority of the radiological contamination, mainly uranium isotopes and Tc-99, present in the 2000-series wells appears to be localized in the east and northeast portion of Operable Unit 1 in the vicinity of Waste Pits 4, 5, 6, and the Burn Pit. Uranium concentration levels are unvarying in all the wells located in this area. Groundwater at this depth flows from west to east and the wells located west of the four source areas (Waste Pits 4, 5, and 6, and Burn Pit) contained significantly lower levels of radionuclides. It appears that these four source areas are the primary contributors of radiological contamination to the upper horizon of the Great Miami Aquifer.

Elevated uranium concentrations were detected in every 3000-series well except Well 3011, which is located in the northwest corner of Operable Unit 1 (upgradient of the waste pit area). The highest levels of total uranium occurred in Wells 3084 (218 µg/L) and 3019 (56 µg/L), both located in the northeast part of Operable Unit 1. Sampling conducted (after the RI/FS program) as part of the RCRA groundwater monitoring program, revealed upward trends in uranium concentrations. Tc-99 was also detected in these wells by the RCRA program.

Due to the limited amount of data on the 4000-series wells which monitor the lowest portion of the Great Miami Aquifer, it is not currently possible to characterize the radiological extent. The Great Miami Aquifer will be fully characterized as part of the Operable Unit 5 RI. The RCRA program did reveal concentrations of Tc-99 in six wells in the Operable Unit 1 area.

From this data, it appears that Operable Unit 1 is contributing radiological constituents to the upper and middle zones of the Great Miami Aquifer.

Twenty inorganic analytes were detected at above-background levels in the 1000-series wells; most correlate to those detected in the pit waste material and leachate samples. The following analytes are

the more significant constituents that are elevated in both the perched groundwater and waste material leachate samples: arsenic, manganese, beryllium, lead, cadmium, selenium, molybdenum, vanadium, mercury, nickel, and silver.

Organic constituents in the 1000-series wells are limited. Well 1031, located east of the Clearwell, was the only well to identify significant organic constituents in the glacial overburden. The organic compounds trichloroethane (540 µg/L), tetrachloroethane (290 µg/L), 1,2-dichloroethylene (120 µg/L, vinyl chloride (16 µg/L), and 1,1-dichloroethane (31 µg/L) were detected in this well. These same compounds were also detected in the Waste Pit 1 materials and leachate samples. It appears that the majority of the organic constituents in the glacial till may be linked with the wastes in Waste Pit 1.

Six inorganic constituents were detected at above-background concentrations in at least one sample collected from the 2000-series wells. These analytes include: aluminum, cadmium, chromium, magnesium, molybdenum, and vanadium. The three wells that consistently showed elevated levels of these constituents are located in the northeast section of Operable Unit 1. Since regional aquifer groundwater in the area of the waste pits flows from west to east, it appears that the waste pits are serving as a source of inorganic contamination to the Great Miami Aquifer.

A limited number of organic constituents were detected in the 2000-series wells. These include 1,1,1-trichloroethane, 1,2-dichloroethylene, 1,1-dichloroethane, and toluene. Wells 2021 and 2022, located in the vicinity of the Burn Pit and Waste Pit 4, and Well 2649, located east of the Clearwell, have detected concentrations of two to four organic constituents each. All three of these waste areas had detectable concentrations of one or more of these organic compounds in their waste material or sediment samples. The Burn Pit, the suspected source of these contaminants, is unlined and its bottom is in direct contact with the Great Miami Aquifer.

Four inorganic constituents were detected at above-background concentrations in at least one sample collected from the 3000-series wells. These analytes include: aluminum, manganese, mercury, and vanadium. Similar to the 2000-series well characterization, it appears that the majority of the inorganic contamination in the 3000-series horizon is located in the northeast portion of the site, possibly indicating Waste Pit 3 as a source. The 3000-series wells had very limited organic concentration detections. Wells 3001 and 3019 had detectable concentrations of 1,1-dichloroethane, tetrachloroethane, and acetone.

Only three inorganic constituents were detected at above background concentrations in the 4000-series wells. There is no direct correlation to associated pit waste materials.

Only four organic constituents were detected, in low concentrations (5 µg/L each), in the 4000-series wells samples: trichloroethene, tetrachloroethane, 1,1-dichloroethane and chlorobenzene. There is no

1196

indication of significant organic contamination of the deep horizon of the Great Miami Aquifer in the vicinity of Operable Unit 1. However, the Waste Pit Area does appear to be a contributor of low levels of organic constituents in the deep zone of the Great Miami Aquifer, most likely from Waste Pit 1.

7.3.3 Surface Water and Sediment

A review of data from the different studies show a high degree of variability in the surface water contamination concentration pattern. The reasons for the variations in the data could be attributed to the amount of rainfall runoff during the time of sampling, topography which would affect flow from the area, the settling of contaminated suspend solids, and the existence of a contaminant source upgradient of the sampling location.

The highest concentration of contaminants in surface water were detected at drainageways which received surface runoff from Waste Pits 3, 4, 5, and 6 (Figure 4-18). The predominant contaminant is uranium. The two drainageways running east-west between Waste Pits 3, 4, and 5 were found to be contaminated along their total lengths. Uranium contamination in the surface water is as high as 8148 pCi/L. Another drainageway running southeast and turning southwest between Waste Pits 4 and 6 contained water with elevated uranium concentrations. The drainageways in the north part of Operable Unit 1 were found to be the least contaminated. It should be noted that these drainageways were significantly modified as part of the Storm Water Control Removal Action, which included removal of some contaminated soils in these areas and actions taken under removal action No. 22.

Most of the sampling activities took place before the surface runoff was controlled. At that time, surface runoff from the waste pit area discharged into Paddy's Run. With the implementation of the Waste Pit Area Runoff Control Removal Action, potentially contaminated surface water runoff now flows into a catchment basin for treatment before being discharged into the Great Miami River.

Sediments were sampled along drainageways which were considered downstream of potential releases within Operable Unit 1. The highest levels of contaminants were detected at locations downgradient from Waste Pit 4. The predominant contaminant was depleted uranium. Uranium-238 activity was detected at concentrations as high as 761 pCi/g. As shown in Figure 4-19, the drainageway located south of Waste Pit 4 and 6 revealed elevated levels of uranium along its entire length. Another drainageway between Waste Pits 4 and 5 showed elevated uranium concentrations.

7.3.4 Air and Direct Radiation

Airborne radon measurements are routinely collected both on and off the FEMP property as part of the ongoing environmental monitoring program. As part of this program, the FEMP monitors radon concentrations at 21 locations along the FEMP perimeter fence. The average annual radon concentration along the FEMP fenceline for 1989 through 1992 was 0.74 pCi/L in 1989, 0.74 pCi/L in

1990, 0.90 pCi/L in 1991 and 0.57 pCi/L in 1992. The maximum annual radon concentration recorded during this period was 1.5 pCi/L observed at the radon monitoring station located at the northeast corner of the site. None of the observed radon concentrations exceeded either the DOE guideline of 3.0 pCi/L above background or the EPA limit of 4.0 pCi/L for indoor radon concentrations.

In addition to perimeter monitoring, the FEMP performed radon flux measurements in the vicinity of Waste Pits 1 through 4. Elevated radon flux levels were observed at concentrations up to 81 $pCi/m^2/s$ within localized areas over Waste Pits 1, 2, and 3. Average radon flux densities for Waste Pits 1 through 4 were 9.1, 6.4, 2.6, and 0.1 $pCi/m^2/s$, respectively; these levels were well below the NESHAP emission limit of 20 $pCi/m^2/s$.

The FEMP operates nine on-site air monitoring stations to measure the concentration of airborne radioactive particulates along the site perimeter. The average annual concentration of airborne uranium at each fenceline monitoring station was well below the DOE guideline of 0.1 pCi/m^3 during the period 1989 through 1992. Data show a general decrease in airborne uranium concentrations along the FEMP fenceline since production operations ceased in 1989.

Direct radiation measurements were taken throughout Operable Unit 1 to help assess worker health and safety and to identify appropriate soil sampling locations. Localized areas yielded elevated exposure rates greater than 3 mrad/hr. The highest dose rate, 35 mrad/hr, was located near the southwest perimeter of Waste Pit 6. Radiological analyses of soil samples revealed that U-238 and short-lived progeny are the principal constituents causing elevated dose rates.

7.3.5 Ecological Characterization

Radiological constituents were detected at low levels near the analytical detection limit in soil, agricultural crops, and garden produce samples from both off-site control areas and other areas in the vicinity of the FEMP. Ecological concentration ratios indicate limited bioaccumulation at control areas and other areas in the vicinity of the FEMP.

Samples collected near Operable Unit 1 suggest limited evidence of uptake, assimilation, and transfer of radiological constituents through ecological food chains. Although concentrations of uranium in soil and vegetation within Operable Unit 1 were the highest from the site, ratios of radionuclide concentration in the vegetable and soil were generally similar to concentration ratios in garden produce and agricultural crops from control sites and sites in the FEMP vicinity.

Detectable levels of radionuclides in fish collected from Paddy's Run suggest that organisms may have been exposed to FEMP constituents (both hazardous and nonhazardous). Benthic macroinvertebrates collected (such as crayfish, snails, clams, and annelid worms) also exhibited detectable levels of

uranium isotopes. This finding is consistent with uranium's known potential to bioconcentrate in aquatic organisms.

Results of the ecological chemical characterization demonstrate that the only organic CPC in Operable Unit 1 vegetation is butyl benzyl phthalate. In addition, elevated levels of arsenic, barium, mercury, and zinc were noted. Elevated levels of these constituents may have resulted from FEMP releases.

Operable Unit 1 mammals were free of detectable concentrations of organic constituents. However, elevated levels of arsenic, fluoride, sulfate, and zinc were recorded. Fish collected from Paddy's Run yielded no detections of organics or pesticides. However, elevated concentrations of aluminum, arsenic, barium, cadmium, fluoride, mercury, sulfide, and zinc were found. The presence of these constituents suggests that fish and wildlife may have been exposed to inorganic constituents from the FEMP.

7.4 SUMMARY OF CONTAMINANT FATE AND TRANSPORT

The fate and transport of the constituents contained in the Operable Unit 1 waste pits were evaluated to provide a basis for estimating current and future risks posed by Operable Unit 1 and identifying the location of the potential receptors. Contaminant concentrations were estimated for both on-site and off-site areas to provide a range of potential exposure scenarios. The fate and transport evaluation included modeling of surface water, groundwater, and air releases. Conservative assumptions were built into the modeling process in order to provide a reasonable worst-case scenario regarding the migration of constituents from the waste pits and to account for uncertainties associated with the database and models. Screening of CPCs was performed at various stages during the fate and transport assessment process in order to effectively focus the evaluation on those compounds that could potentially pose some measure of risk through the various media.

The fate and transport analysis assumed that the waste pits would remain essentially in their current conditions, without any remedial actions taken. Since the leading alternatives for remediation of the waste pits include active remediation options such as excavation and disposal or capping, the approach taken regarding the waste pit configuration is likely to result in overestimation of future contaminant migration from Operable Unit 1. The following discussions summarize the results of the evaluation of constituent migration from Operable Unit 1 through surface water, groundwater, and air.

7.4.1 Surface Water

The fate and transport evaluation for surface water assessed the potential impacts on Paddy's Run from contaminants transported to the stream via surface water runoff from the Operable Unit 1 area. Concentrations of various constituents were estimated in Paddy's Run for both surface water and sediments. In addition, the impacts of discharges of water from Paddy's Run to both the Great Miami River and Great Miami Aquifer were evaluated.

Based on the modeling results, uranium is the primary CPC migrating to Paddy's Run from the Operable Unit 1 area. Uranium concentrations are at least three orders of magnitude higher than any other constituent, and no other constituent is modeled to reach Paddy's Run at a concentration of 1 µg/L or higher. Paddy's Run surface water concentrations ranged from a minimum of 2.68×10^{-11} µg/L for Cs-137 to a maximum of 255 µg/L (85 pCi/L) for U-238. Paddy's Run sediment is predicted to have a concentration of 742 mg/kg (250 pCi/g) for U-238 (the maximum constituent) and proportionally less of the remaining constituents.

In general, the modeling results compare favorably with actual surface water sampling data for Paddy's Run.

Great Miami River concentrations for the various constituents are approximately three orders of magnitude lower than the Paddy's Run concentrations, due to dilution effects. As a result, no constituent from Operable Unit 1 is projected to increase the respective river concentrations by as much as 1 µg/L.

Because of the infiltration that occurs from Paddy's Run to the Great Miami Aquifer, dissolved contaminants in Paddy's Run can infiltrate into the Great Miami Aquifer in locations where the stream bed lies in direct contact with the aquifer. Modeling of Paddy's Run infiltration to the Great Miami Aquifer indicates that uranium is the dominant constituent that reaches the aquifer, at a projected maximum concentration of 86 µg/L. This value is in general agreement with groundwater sampling data. The only other constituent projected to reach the Great Miami Aquifer as a result of Paddy's Run infiltration at a concentration of 1 µg/L or higher is manganese, at approximately 5 µg/L.

The results of the simulations of Paddy's Run infiltration to the Great Miami Aquifer were used as inputs to the groundwater fate and transport modeling.

7.4.2 Groundwater

Groundwater transport of contaminants from Operable Unit 1 is considered to be the most significant pathway for the migration of the wastes from Operable Unit 1, due to the physical setting of the waste pits. The Great Miami Aquifer, which is designated as a sole source aquifer and is extensively used for water supply in the region, underlies the waste pits with little or no glacial till separating the waste pits from the aquifer. The fate and transport evaluation for groundwater consisted of geochemical modeling to estimate leachate concentrations migrating from the waste pit, modeling of vadose zone transport vertically downward to the Great Miami Aquifer, and modeling of the transport of contaminants through groundwater. In addition, the infiltration of contaminated surface water from Paddy's Run to the aquifer was included as another source of contamination to groundwater.

Each constituent that was included in the groundwater transport portion of the modeling was modeled for a period of 1000 years or until the concentration in the aquifer decreased below 1 µg/L. Two receptor points were evaluated with respect to the modeling: one point on site in the waste pit area and one point at the downgradient property boundary. Modeling results indicate the on-property and off-property maximally expose receptors to be located to the east of the Operable Unit 1 area.

As with the surface water modeling, uranium was modeled to be present in the aquifer at the greatest concentrations, at a maximum concentration of 12.5 mg/L after 630 years. Almost all of the modeled impacts were due to releases from the waste pit leachate as opposed to the waste to surface water to aquifer pathway. The maximum concentrations of other radiological, organic, and inorganic constituents were generally in the low µg/L range or lower.

7.4.3 Air

Air modeling was performed to determine the maximum concentration of contaminants both on-property and off-property. Simulations were completed for the current waste pit conditions (current source-term scenario) and for postulated pit conditions if no active maintenance was performed on the waste pits (future source-term scenario).

Current Source Scenario Results

Based on the calculated on-site concentrations for all potential contaminants in the current emissions scenario, radon was modeled to be present at the highest activity concentration (28 pCi/m^3). Uranium-238, Tc-99, and Th-230 were the radionuclides with the next highest activity concentrations at the location of maximum predicted concentrations, with concentrations in the 10^{-2} to 10^{-3} pCi/m^3 range.

In addition to the identified radionuclides, trace levels of a variety of inorganic constituents were modeled to be present. No inorganic concentration was predicted to exceed a level of 10^{-1} µg/m^3, with manganese the compound with the highest detection at 1.6×10^{-1} µg/m^3. The only organic constituent modeled to be present was Aroclor-1254, at a concentration of 4×10^{-4} µg/m^3.

The maximum off-site annual average concentrations for the current scenario were predicted to occur at the western FEMP boundary. Radon-222, U-238, and Th-230 were the radiological constituents predicted at the highest activity concentrations, ranging from 2.3 (radon) to less than 10^{-3} pCi/m^3.

In addition to the radiological compounds, trace levels of a variety of inorganics were modeled to be present. No predicted inorganic concentration exceeded a level of 10^{-2} µg/m^3, with manganese the compound with the highest predicted concentration at 1.5×10^{-2} µg/m^3. The only organic constituent modeled to move off-site was Aroclor-1254, at a concentration of 3.5×10^{-5} µg/m^3.

1204

Future Source Scenario Results

Based on the calculated on-site concentrations for all potential contaminants in the future emissions scenario, Rn-222 was modeled to be present at the highest activity concentration at 480 pCi/m^3. Uranium-238, Tc-99, and Th-230 were the radionuclides with the next highest predicted activity concentrations at the location of maximum concentrations, with activities in the 10^{-1} pCi/m^3 range. On a comparative basis, the future scenario concentrations were generally about two orders of magnitude higher than in the current scenario. Trace levels of a variety of inorganics were also modeled to be present. No predicted inorganic concentration exceeded a level of 10 µg/m^3, with arsenic and barium the metals with the highest predicted concentrations at 4.2 g/m^3 and 2.8 µg/m^3, respectively. A variety of organics were also modeled to be present at trace levels, with tetrachloroethene the highest predicted concentration of 1.1 x 10^{-3} µg/m^3.

The maximum off-site annual average concentrations for the future scenario were predicted to occur at the western FEMP boundary. As with the other simulations, radon, U-238, Th-230, and Tc-99 were the radiological constituents projected at the highest activity concentrations, ranging from 40 (radon) to less than 10^{-2} pCi/m^3.

Low levels of a variety of inorganics were also predicted at this location. No predicted inorganic concentration exceeded a level of 1 µg/m^3, with arsenic, manganese, and barium the metals with the highest predicted concentrations at 3.4 x 10^{-1} µg/m^3, 2.8 x 10^{-1} µg/m^3, and 2.0 x 10^{-1} µg/m^3, respectively. A variety of organics were also modeled to be present at trace levels, with no predicted value exceeding a concentration of 10^{-5} µg/m^3.

7.5 BASELINE RISK ASSESSMENT

This section summarizes the Operable Unit 1 baseline risk assessment. Included are discussions of exposure scenarios, CPCs, and risk characterization results. Since the estimate of potential risks from Operable Unit 1 require many assumptions and the modeling of future concentrations of contaminants in the environment, a degree of uncertainty is associated with these estimates. This uncertainty is discussed extensively in Appendix E, which contains the entire risk assessment.

The baseline risk assessment evaluates the potential risk to hypothetical receptors, due to sources in Operable Unit 1, which may exist if no remedial actions were taken to correct known environmental deficiencies. The results of the baseline risk assessment are employed to identify the key contaminants and pathways of potential exposure which must be addressed by a remedial action. The baseline risk assessment is often employed as a point of comparison to evaluate the potential reduction in risk from each of the proposed remedial alternatives considered.

7.5.1 Exposure Scenarios

Four land use/source term scenario combinations are evaluated in the Operable Unit 1 baseline risk assessment, including:

Land Use Scenario	Source Term
Current Land Use (Industrial)	
- With Access Controls	Current Source Term
- Without Access Controls	Current Source Term
- Without Access Controls	Future Source Term
Future Land Use (Agricultural)	Future Source Term

Under the first land-use scenario, the site access restrictions historically provided by DOE are assumed to be maintained, and no further remedial actions are assumed to have been taken (other than those completed to date). The scenario further assumes that no members of the public have established residence in the Operable Unit 1 study area, and that DOE maintains a site-specific health and safety program to ensure that nonremediation workers are properly protected. Potential receptors under this scenario include an off-property farmer and a site visitor.

Under the second land-use scenario, current land use without access controls, the FEMP is assumed to be managed by an industrial concern other than DOE. Access restrictions currently provided by DOE are assumed to be discontinued. In addition, no remedial actions are assumed to have been taken, and no members of the public establish residence within the boundaries of Operable Unit 1. Thus, potential receptors include an off-property farmer, a trespassing child, an off-property user of meat and dairy products from cattle grazed on site, and an off-site user of surface water from the Great Miami River.

The third land use scenario, future land use without access controls, includes exposure routes associated with development of residences, such as a home and farm, within the boundaries of Operable Unit 1. Access controls are assumed to be absent and no additional remedial actions are assumed to have been taken. Hypothetical receptors under this scenario are a RME resident farmer, a CT resident farmer, a resident child, and an on-property home builder.

In addition to the three land use scenarios, there are two source term scenarios: the current source term and the future source term. The current source term scenario considers the waste pit area as it exists today. The future source term scenario assumes that all maintenance activities within Operable Unit 1 have been discontinued. The cap on Pit 3 is assumed to erode over time, exposing pit contents. Caps on Waste Pits 1, 2, and 4 are assumed to remain intact. Water in Waste Pits 5 and 6 is assumed to evaporate, exposing pit contents in more than half of the surface area of each pit. The Clearwell is

1788

assumed to remain water-filled. The Surface Water Runoff Control System is assumed to be nonfunctional under the future source term scenario.

Under the current land use without access control scenario, risks are calculated using both current and future source terms. The current land use with access control scenario assumes that the site remains under the institutional control of DOE and the waste pit area is maintained. The future source term, therefore, is not applied in the risk assessment of the future scenario. The current land use with access control scenario estimates risk using only the current source term. The future land use scenario is addressed using only the future source term. In summary, four land use/source-term scenario combinations are evaluated in the Operable Unit 1 baseline risk assessment.

The CT receptor was added in response to new guidance from EPA, which suggests that all risk assessments provide an evaluation of the CT of the risk range, using the best information available to describe the average situation. This scenario is used to provide an estimate of risk closer to average for the resident adult scenario. The CT receptor for this scenario is located at the same location as the RME resident farmer receptor.

7.5.2 Constituents of Potential Concern

In the risk assessment process, CPCs are selected to focus the quantitative risk assessment on those chemical and radiological constituents which are of most of most significance, based on prevalence, concentration, and toxicity. The CPCs for Operable Unit 1 are identified using the methods outlined in Section E.2.0 of the risk assessment report. The selection of CPCs for Operable Unit 1 considers site data characterizing the following environmental media: pit wastes; surface water in Waste Pits 5, 6, and the Clearwell; soils within the Operable Unit 1 study area; berm fill material; and pit leachate. The raw data sets on which analyses are performed are presented in Section 4.0 of the RI report, and are tabulated in Appendices A, B, and C.

The selection of chemical and radionuclide CPCs for Operable Unit 1 is based on environmental characterization data generated in a number of site investigations. The CPC selection is based primarily on data collected in the Operable Unit 1 RI and the CIS. As described in Section 2.0 of the RI report, these investigations characterized radiological and chemical composition of solid and liquid media and wastes in the Waste Pit Area. Supplemental data characterizing the subsurface pit materials in the water-filled waste pits in Operable Unit 1 (i.e., Waste Pits 5, 6, and the Clearwell) were obtained during an investigation by the 1992 RI/FS. Although a full radiological and chemical analysis was performed on the sludge samples collected from these waste pits during the 1992 RI/FS investigation, only inorganic and radiological data were determined to be valid. These data were used, along with the RI and CIS data, in selection of CPCs for Operable Unit 1.

1204

Because of heterogeneity in wastes contained in waste pits of Operable Unit 1, CPCs for waste pit material and pit surface water were selected on a pit-by-pit basis. Surface soils within the Operable Unit 1 boundary were treated as a discrete entity for selection of CPCs.

The CPCs were selected for inclusion in the quantitative risk assessment, based on a three-step process. In the initial step, each constituent detected in a given medium was reviewed for exclusion of those that would not significantly impact the results of the risk assessment. Known laboratory contaminants, essential nutrients, and ubiquitous minerals were excluded as CPCs in a preliminary screening step. In the second step, statistical analyses were used to compare measured on-property concentrations of each remaining CPC to background concentrations of that constituent in the same media. In the third step of the selection process, a technical review is applied to determine whether any constituents eliminated in previous steps should be added back to the CPC list.

The methods and results of the CPC screening process are described in Section E.2.0 of the baseline risk assessment. Attachment E.II of Appendix E presents the rationale for exclusion of any constituent as a CPC.

7.5.3 Risk Characterization Results

Risks resulting from carcinogenic contaminants are assessed in terms of the lifetime cancer risk they present to human populations over and above that to which humans are already exposed. This incremental lifetime cancer risk is referred to as the ILCR. Statistics show a greater than 33 percent (1 in 3) probability that the average human will acquire cancer from all causes. As established by federal environmental regulation (40 CFR 300), risks from waste sites should generally not add greater than 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}) probability of acquiring cancer over the average lifetime of a potentially exposed human.

As a basis for comparison, calculations of the risk associated with the natural background concentration of radionuclides and inorganic metals in soil were performed using the same assumptions as used in the resident farmer scenario. The radiocarcinogenic risk associated with background concentrations of radionuclides under these conditions was calculated as 7×10^{-4} for the soil pathways. A calculation for the risk from natural cosmic radiation yielded a risk of 2×10^{-3}. A hazard index of approximately 8 was calculated for background metals concentrations in soil.

Of the scenarios presented, the current land use with access controls most closely approximates current conditions at the FEMP. However, conservative assumptions were made, consistent with those made for other scenarios, to ensure that the calculated baseline risk represents an upper bound.

Risk estimates are derived by combining the results of the exposure assessment and the toxicity information to quantitatively estimate the degree of hazard associated with exposure to CPCs. The

ranges of generally acceptable risk under CERCLA are an ILCR less than 10^{-4} (1 in 10,000) and an hazard quotient of less than 1.

7.5.3.1 Current Land Use With Access Controls - Current Source Term

Risks for various receptors from all transfer media are presented for the current source term scenario in Table 7-5. The maximally exposed individual in this scenario is the site visitor. This person, through routine exposure over a period of 25 years, could incur a risk of 3×10^{-4} (3 in 10,000) from radiocarcinogens. Inhalation of dust and radon contributes about 40 percent of the total risk, with the remainder deriving from approximately equal contributions from exposure to penetrating radiation from buried waste pit materials (under extremely conservative assumptions) and external exposure from surface soil.

The total chemical carcinogenic risk for this receptor was estimated at 3×10^{-6} and is due solely to the inhalation of fugitive dust emissions. This receptor is not defined as experiencing chemical exposure from any other medium. Chromium and arsenic are the major contributors to the total chemical risk.

The total hazard index for this receptor was estimated at 0.5, which is within the range generally considered acceptable.

7.5.3.2 Current Land Use Without Access Controls - Current Source Term

Under this scenario, the maximally exposed individual is assumed to be the off-property resident farmer. This receptor is exposed only to those contaminants subject to transport through air. Because the current source term is considered, only those contaminants identified in the surface soil were evaluated in the air modeling.

The results of the air modeling indicated that the point of maximum off-property risk was located 450 meters west and 150 meters south of the center of the Burn Pit, which is just off the western fenceline of the site. At this point, risks were evaluated for the off-property resident farmer.

The total radiocarcinogenic risk for this receptor was 5×10^{-5}, with 98 percent due to the inhalation of dust and gaseous emissions. Uranium-238, U-234, Th-230, and Rn-222 were the major contributors to this risk. The food pathways were not significant for the radionuclides.

The total chemical carcinogenic risk for the off-property resident farmer was 3×10^{-6}. This risk was fairly evenly divided between all the food pathways and inhalation of dust. Aroclor-1254, chromium, and arsenic were the primary chemical carcinogens in this assessment.

The hazard index for this receptor was estimated at 0.07, which was within the range generally considered acceptable.

The trespassing child could also experience risks of a similar magnitude. The total radiocarcinogenic risk was estimated at 5 x 10^{-5} (5 in 100,000), which is comprised of several components roughly similar in magnitude of risk. Penetrating radiation exposures from buried waste pit materials, external exposure from surface soil, and inhalation of dust and radon make up 100 percent of the total risk. The most significant contributors to the risk, in descending order, are U-238, Th-230, U-234, and Rn-222 for air exposures, and Ra-226 and Th-228 for the external exposures. The hazard index for this receptor was 0.3.

7.5.3.3 Current Land Use - Future Source Term

Table 7-6 is a summary of risk to various receptors based on the future source term scenario for the current land use (industrial) and future land use (agricultural). The receptor subject to the greatest ILCR for the current land use/future source term configuration is the off-property resident farmer. This receptor is only exposed to those media and contaminants subject to transport from the site. Since the source term is varied to account for erosion of caps, etc., this receptor would experience additional risks over those of the current source term scenario. For example, exposure to contaminants migrating in the Great Miami aquifer are considered for the future source term.

While the risks are presented as a total for both air and groundwater exposures, it should be noted that the points of maximum risk for these two media do not coincide temporally. Risk sums did assume these two occur during the same time frame.

The total carcinogenic risk from exposure to radionuclides is projected at 2 x 10^{-3}, and the total chemical carcinogenic risk is 4 x 10^{-3}. Uranium and thorium isotopes and radon are the primary CPCs in the radiologic risk via inhalation, and U-238 and other radionuclides control the groundwater risks from all pathways. Arsenic and nickel are the primary chemical carcinogens, and affect the receptor only via inhalation of fugitive dust emissions from the site.

The total hazard index for this receptor is 60, with ingestion of fruits and vegetables affected by areal deposition of metals presenting the majority of the risk.

7.5.3.4 Future Land Use - Future Source Term

Table 7-6 is a summary of risk to various receptors based on the future source term scenario. The RME receptor for this configuration is obviously the on-property RME resident. This receptor, as discussed in the exposure assessment, is assumed to live in a home in the vicinity of Waste Pit 4, use water from the Great Miami aquifer for all potable and agricultural purposes, and grow food in the area of Waste Pits 1 and 2. The soil caps over Waste Pit 3 is assumed to have eroded, and waste material in Waste Pits 5 and 6 is exposed after the waste pits partially dry up.

Risks associated with ingestion of groundwater from the perched aquifer was not included in the total risk estimates. The aquifer is discontinuous, and is unlikely to yield enough water for anything other than ingestion alone. Therefore, while risks were calculated, they are not summed with the other pathway risks.

The total radiocarcinogenic risk for this receptor is estimated at 4×10^{-2}; these are primarily risks associated with the inhalation of dust and radon and external exposure to soil and exposed waste pit material. As with the other scenarios discussed above, uranium and thorium isotopes and radon drive the inhalation risks, and uranium, thorium, and radium isotopes drive the external exposure risks.

The chemical carcinogenic risks for this hypothetical receptor are 6×10^{-2}, and are due primarily to ingestion of drinking water from the Great Miami aquifer and ingestion of fruits and vegetables irrigated with groundwater or affected by particulate emissions from the waste pits. Arsenic is the primary contributor to the chemical carcinogenic risk, although other carcinogenic compounds such as PAHs and dioxins are present in the exposed waste pit material. However, these other compounds present a risk at least an order of magnitude lower than that for arsenic.

The food ingestion pathways clearly drive the hazard quotient, with ingestion of fruits and vegetables affected by particulates having the highest hazard index (400), followed by ingestion of fruits and vegetables irrigated with contaminated groundwater (containing arsenic and uranium, primarily). The total hazard quotient for this receptor was estimated at 700.

7.6 DATA LIMITATIONS

This section discusses limitations of the characterization data collected under the RI. The primary objective in characterizing the nature and extent of contamination in the RI was to collect data sufficient to:

- Perform the baseline risk assessment
- Support the development and evaluation of remedial alternatives under the FS for Operable Unit 1

Characterization activities performed under the Operable Unit 1 RI focused on obtaining the quality and quantity of data necessary to meet the stated RI objectives.

During the course of collecting and evaluating data for the Operable Unit 1 RI, the reduced quality or quantity of certain data sets imposed limits in meeting the stated RI objectives. Table 7-7 summarizes observed data limitations, identifies their significance toward achieving the RI objectives, and provides actions taken or recommended to resolve these limitations. As apparent in the table, acceptable means to resolve the data limitation were identified. Each of the data limitations is summarized, however, to demonstrate that it was recognized and addressed as part of the RI.

In general, the majority of the data limitations identified were resolved within the scope of the RI. Those uncertainties requiring further mitigation, while not imposing errors of omission within the scope of the RI, will be appropriately managed within preliminary stages of the FS and through completion of treatability studies.

This identification of data limitations and the recommended actions are not intended to discredit the RI results, but to highlight that the nature and extent of contamination are determined and the risks are calculated for hypothetical receptors using well-defined and strict methods. Refinements of Operable Unit 1 characterization data, exposure assessment models, and risk characterization information could reduce uncertainties in the RI and in the baseline risk assessment methods; however, there is no benefit to be gained since projected risk greatly exceeds acceptable regulatory thresholds for remedial action.

Characterization activities performed as part of the RI and other site programs successfully characterized the properties of the waste units and the nature and extent of contamination associated with Operable Unit 1. These investigations confirmed prior process knowledge regarding the physical, chemical, and radiological characteristics of the stored wastes.

The baseline risk assessment for FEMP Operable Unit 1 has succeeded in establishing an upper bound that is sufficient for risk managers to make decisions regarding the need for remedial actions. Based on the results of the site investigations and risk calculations, the risks associated with Operable Unit 1 exceed generally accepted regulatory thresholds, thereby necessitating the implementation of remedial actions. Viable remedial action alternatives will be evaluated in an FS report to be issued for Operable Unit 1.

7.7 RECOMMENDED REMEDIAL ACTION OBJECTIVES

Operable Unit 1 represents a potential source of contamination to groundwater and other environmental media. As part of the overall strategy for evaluating the need for and determining the effectiveness of candidate remedial action alternatives, remedial action objectives (RAOs) are formulated to achieve the overall goal of protecting human health and the environment by isolating, removing, or treating the source of contamination. RAOs are initially developed and periodically revised during the RI/FS process, from the initial scoping through the establishment of final remedial cleanup levels.

The RAOs presented in the SWCR are revised in this document to reflect the unit-specific information developed by the baseline risk assessment. Further refinement of these objectives will be made during the FS when technology capabilities are recognized and compared against the PRGs. Final cleanup levels will be established in concert with the Proposed Plan.

The primary RAOs are to ensure sitewide compliance with:

- Chemical-specific ARARs and TBCs factors
- EPA guidance for risk to human health form hazardous chemicals
- Regulatory standards for control of radiation and radioactivity in the environment

RAOs are site-specific, qualitative goals that define the objective of taking remedial actions. RAOs specify:

- The constituents of potential concern
- Exposure route(s) and receptor(s)
- An acceptable contaminant level or range of levels for each exposure route (i.e., a preliminary remediation goal)

Because RAOs for protecting environmental receptors typically seek to preserve or restore a resource (e.g., groundwater and surface soil), they are expressed in terms of the medium of interest and target cleanup levels whenever possible (EPA 1988a).

To address the three specific requirements, the development of RAOs is presented in three parts. First, the CPCs, by media, are identified. Second, allowable exposures in terms of the medium of interest are identified, and PRGs are established for environmental media. Third, these data are used to develop RAOs.

7.7.1 Constituents of Potential Concern

Not all constituents identified during the Operable Unit 1 RI pose significant health risks. The baseline risk assessment evaluated constituents and exposure pathways to ascertain their potential present and future impacts on human health. Methods for establishing CPCs are defined in Appendix E of the RI report for Operable Unit 1. In general, constituents that resulted in risks to a receptor of greater than 10^{-6} or which yielded a hazard quotient greater than 0.2 were designated as CPCs.

Radiological CPCs, by media, are shown in Table 7-8. Chemical CPCs, by media, are shown in Table 7-9.

7.7.2 Preliminary Remediation Goals

In the early stages of the RI/FS, as stated in the SWCR (DOE 1993b), PRGs are used as action levels to determine if constituents in the environment need to be further addressed. PRGs are not action levels for remedial actions. PRGs are chemical-specific, medium-specific concentration limits necessary to address all contaminants and all pathways found to be of concern during the baseline risk assessment process. PRGs are based on the following:

- For chemical toxicants, an HI of 0.2
- For chemical and radiation carcinogens, an ILCR of 10^{-6}
- For radionuclides, dose limit ARARs and TBCs requirements
- Pertinent ARARs

PRGs must comply with ARARs and be protective of human health and the environment. However, ARARs do not exist for all CPCs. Moreover, some ARAR-based PRGs are less stringent than PRGs based on a 10^{-6} to 10^{-4} risk range and do not necessarily meet the "protectiveness of human health" objective. Therefore, both ARAR-based and risk-based PRGs have been developed for the FEMP site.

Certain environmental media, such as groundwater, are outside the scope of remedial actions being considered for Operable Unit 1. PRGs are presented for groundwater, however, because groundwater does serve as an environmental receptor and a pathway for uptake of CPCs by man. PRGs are not presented for waste material because this material is heavily contaminated and would never be suitable for release. Table 7-10 summarizes the media addressed within this section and provides the rationale for development of PRGs, or cleanup criteria, for those media.

The following sections identify the basis for the PRGs presented herein. Further, they address the ARARs, TBCs, risk ranges, and hazard quotients for radiological and chemical constituents in surface soil and groundwater used in developing the PRGs.

7.7.2.1 Risk-Based PRG Development

Potential health effects resulting from exposures to radioactive and chemical contaminants are divided into two categories: carcinogenic and noncarcinogenic effects. For carcinogens, EPA has identified in the NCP a target range for incremental risks of 10^{-6} to 10^{-4}, or 1 in 1,000,000 to 1 in 10,000, to limit the possibility that an individual will develop cancer due to exposures to residual contaminants at an NPL site (40 CFR 300). As part of cleanup at NPL sites, EPA strives to manage possible incremental cancer risks within the target range, with 10^{-6} generally serving as the point of departure. For sites where the total estimated ILCR for each receptor is less than 10^{-4} and the HI is less than 1, action is usually not warranted.

Although the upper end of the target range is generally used to make risk management decisions to determine whether or not remedial actions are necessary or warranted, EPA does not consider 10^{-4} a discrete limit; risks above that level may be considered acceptable based on site-specific conditions (EPA 1991). In addition, factors other than the results of the site-specific risk assessment are used to make the final risk management decision, including conservative assumptions applied to estimate risks from possible exposures at the site and other health-based guidance, available for certain constituents.

These considerations were incorporated into the development of PRGs for Operable Unit 1. The following general principles for carcinogenic and noncarcinogenic constituents were applied to identify general risk-based objectives for remedial actions:

- Exposures to radionuclides should be reduced to levels as low as reasonably achievable (ALARA) as limited by the natural presence of radionuclides in the soil and groundwater.

- Exposures to carcinogenic chemicals should not result in an ILCR of more than 10^{-6} to 10^{-4} as limited by the natural presence of chemicals in soil and groundwater.

- Exposures to noncarcinogenic constituents should not result in significant adverse health effects, indicated by a HI greater than 1.0, as limited by the natural presence of chemicals in the soil and groundwater.

- Exposures of biota should be limited to levels that are not associated with significant adverse ecological effects as limited by the natural presence of radionuclides and chemicals in the soil and groundwater.

In developing risk-based PRGs, target risk levels are established for carcinogens, and target hazard quotients and target HIs (the sum of the target hazard quotients) are established for noncarcinogens. Once established, these target risk levels are used in calculating the PRGs. Toxicity data used to develop PRGs are cancer slope factors and reference doses from the Integrated Risk Information System (IRIS) database (EPA 1992a) and Health Effects Assessment Summary Tables (HEAST) (EPA 1992b).

One goal of the NCP is to manage total, site-wide risks such that the sum of all risks does not exceed 10^{-4}. The default target risk of 10^{-6} is suggested by EPA (1991) as the point of departure. In keeping with the NCP, PRGs were calculated for both 10^{-4} and 10^{-6} risk levels, using 10^{-6} as the target risk to ensure that cumulative site-wide risk does not exceed 10^{-4}.

EPA indicates that the cumulative site HI should be less that 1.0. However, no EPA guidance is available on apportioning the allowable level among the range of constituents in various environmental media. The most relevant guidance is provided by the Office of Drinking Water which, in calculating maximum contaminant level goals (MCLGs), uses a relative source contribution (RSC) factor to account for other sources of exposure (EPA 1989a). Because it is not known what additional sources are contributing to total exposure, this default RSC of 0.20 was used to develop chemical- and media-specific PRGs to ensure that the total HI does not exceed 1.0.

Following completion of the baseline risk assessment, the land use scenarios, exposure parameters, and CPCs employed to derive PRGs were reviewed to determine whether refinements were required. As a result of this review, the PRGs originally appearing in the SWCR have been revised to more appropriately reflect Operable Unit 1 conditions. The risk-based PRGs presented in Part III of the

SWCR were typically based on the consideration of a single exposure pathway for each media for the identified receptors. For example, for the groundwater media, an ingestion pathway was examined assuming consumption of 2 liters of water per day for 52 years. An exception to this single pathway framework was the development of PRGs for the recreational user as defined in the SWCR. For the recreational user, the SWCR report considered ingestion and external exposure for the development of PRGs for the soil media. Subsequent to the SWCR, the baseline risk assessment provided a more comprehensive quantitative examination of the viable pathways of exposure to each of the receptors considered. The relative significance of a given pathway to an individual receptor was examined in the baseline risk assessment through the derivation of unit risk factors. Unit risk factors were derived for each CPC to describe the risk contribution by pathway for a unitized (i.e., typically per pCi/g or pCi/m^3) exposure point concentration. These unit risk factors were then multiplied by the respective exposure point concentrations determined from fate and transport modeling for each CPC to arrive at ILCRs. Unit risk factors from the RI report for Operable Unit 1 were employed to support development of the PRGs appearing in this section.

While the RI report/baseline risk assessment presented risk information, including unit risk factors, for a range of receptors under current and future land use scenarios, these land use assumptions and receptors were refined to provide managers with the range of necessary information to support informed decisions in establishing final cleanup goals. In accordance with the Risk Assessment Work Plan Addendum (DOE 1992a) and to ensure consistency with EPA's guidance (EPA 1991f), the baseline risk assessment evaluated a future land use scenario which included the loss of federal/governmental ownership of the FEMP and the establishment of a family farm on the site. This land use scenario was evaluated to understand the potential worst-case exposures to site contaminants. In addition to the future land use scenario examined in the RI report, it is conceivable that as part of any future land use of the FEMP, the federal government could retain ownership of the property to preclude further development of the property, including the establishment of residential or farming units. This future land use scenario, termed future land use with continued federal ownership, does not assume any form of perpetual maintenance or active access restrictions to the site following the completion of remedial actions and attainment of site-wide remedial goals. This retention of ownership would support the application of some form of institutional control.

For purposes of providing added information for use in decision-making, PRGs were developed for the future land use both with and without the assumption of continued federal ownership. To establish the PRGs for the future land use without continued ownership scenario, a on-property resident farmer was adopted as the receptor. For PRG development, the on-property resident farmer was assumed to be exposed to CPCs in the soil via the inhalation of dusts, consumption of farm products contaminated by dust deposition, oral ingestion of soil, dermal contact, and external radiation pathways associated with the soils. Additionally, the on-property farmer was assumed to be exposed to CPCs in groundwater through ingestion.

For the purposes of establishing a PRG for the future land use with continued federal ownership scenario, an on-property receptor was employed assuming a recreational type exposure scenario. The recreational type scenario was employed because it represents an upper bound estimate of the exposures a receptor could reasonably be expected to receive under the assumption that the federal government continues to exercise its rights of ownership to preclude site development.

The recreational user of the site was not evaluated in the baseline risk assessment since it assumes continued institutional control of the site. Equations used for evaluating exposure under the future land use with continued federal ownership scenario are modified versions of the equations employed for the future land use without federal ownership. The receptor considered for PRG development for the future land use with continued federal ownership is an individual who plays on the property as a child and uses the property less frequently for recreational activities as an adult, perhaps for baseball games, picnics, or similar activities. It is assumed that the child is exposed to the site 2 hours/day for 120 days/year over a period of 6 years (age 7-12). The adult is assumed to visit the site 1 hour/day for 40 days/year over a period of 32 years. To evaluate cancer risk, both the child and adult exposure periods were evaluated. The recreational user is assumed to be exposed to soil contaminants via the oral ingestion, dermal contact, inhalation of dusts, and external radiation pathways. Groundwater PRGs were not developed for the recreational user because there were no viable pathways of exposure.

Finally, PRGs were developed for soil for an off-property farmer. Exposure pathways from soil to this receptor were considered identical for both the future land use with and without continued federal ownership scenarios. The off-property farmer is assumed to be impacted by soils within the Operable Unit 1 area through the inhalation of resuspended dust containing CPCs and the consumption of farm products (i.e., milk, meat, and vegetables) contaminated by dust deposition.

ARAR/TBC PRG Development

Chemical-specific ARARs were also examined to identify PRGs for Operable Unit 1 constituents of concern. These ARARs included nonzero MCLGs and Maximum Contaminant Levels (MCLs) for drinking water. Select other considerations, including available guidance and health advisories were examined to identify PRGs, termed TBC-based PRGs. TBC guidance examined included DOE orders, ecological benchmark criteria, and drinking water health advisories.

7.7.2.2 As Low As Reasonably Achievable

In addition to establishing PRGs that comply with ARARs and are protective of human health and the environment, DOE plans to apply the principles of ALARA during remedial actions at the FEMP site. The goal of DOE's ALARA process is to reduce exposures and the risk associated with residual contamination to levels that are as low as reasonably achievable considering technical, economic, and social constraints as appropriate. In applying the ALARA process at the FEMP site, the two factors used in developing PRGs (ALARA-based environmental standards and protectiveness of human health

and the environment) are combined with technical and economic considerations in order to identify the levels of risk reduction that might reasonably be achieved.

The ALARA process includes both planning and field components. The discussions presented in this section are consistent with the planning component of ALARA, in which PRGs are estimated for residual contamination based on hypothetical exposures. This initial analysis will be used to support implementation of ALARA in the field, where additional contamination might be removed below those levels determined in the planning phase when reasonably achievable based on specific field conditions.

As specified previously, ALARA is site specific. The application of ALARA at another site, with different contaminants and exposure scenarios, would invariably produce different results.

7.7.2.3 Preliminary Remediation Goals for Soils

Table 7-11 presents the PRGs for soil. It should be noted that PRGs for soils were only derived for those carcinogenic CPCs exhibiting an ILCR greater than 10^{-6} to the on-property farmer, under a current source term scenario as defined in the baseline risk assessment. As previously discussed, risk-based PRGs have been derived for receptors under two land use scenarios: future land use with and without continued federal ownership. For the derivation of these risk-based PRGs, the short half-life progeny of radionuclides present at the FEMP site have been included within the results of the PRG calculation for the parent isotope. For example, U-238 is a radionuclide of concern at the FEMP site. If the presence of its two short-lived progeny is neglected, the risk-based PRG for a residential farmer exposed to U-238 in soil is approximately 23 pCi/g. Including its two short-lived progeny produces a PRG of 0.47 pCi/g (Table 7-11). In another example, Ra-226 without progeny would have a PRG of about 1.5 pCi/g for the same scenario. Including its short-lived progeny reduces the PRG in soil to 0.04 pCi/g (Table 7-11). The PRGs presented in Table 7-10 consider contributions of radioactive progeny to be an integral part of the total risk from the parent nuclide.

The PRGs for soils were calculated using the unit risk factors presented in Appendix E for all receptors with the exception of the recreational user. One example calculation is provided for each of the receptors below.

For each of the receptors, the PRG was derived as being:

$$PRG = \frac{Target\ Risk}{Sum\ of\ Unit\ Factors}$$

To support the derivation of PRGs, it is assumed that dust from soils are inhaled by the receptor and deposited on the crops and forage. The on- and off-property farmers are assumed to consume the crops, eat meat from cows grazing on the forage, and drink milk from cows grazing on the forage.

Dust resuspension and transport modeling was performed for the RI report for Operable Unit 1 to examine exposure point concentrations both on-property and off-property as a result of baseline conditions with Operable Unit 1. These modeling results were used to calculate transport factors and ultimately soil concentration based PRGs.

$$Transport\ Factor = \frac{CPC\ Exposure\ Point\ Concentration\ from\ E.3}{CPC\ Soil\ Concentration\ Source\ Term\ in\ E.3}$$

For U-238:

Off-property Farmer - 2.5×10^{-5} (g/m^3)
On-property Farmer - 2.84×10^{-4} (g/m^3)
Recreational User - Same as On-property Farmer

To convert from a given exposure point air concentration to a soil concentration:

$$Soil\ concentration\ (pCi/g) = \frac{Air\ Concentratin}{Transport\ Factor}$$

For the off-property farmer for U-238, the PRG was calculated as follows:

The off-property farmer is assumed to inhale the dust particulate and consume the farm produce contaminated by particulate deposition from Operable Unit 1 for a lifetime of 70 years.

Unit Risk Factor Inhalation of Dust	= 6.0×10^{-3} (pCi/m^3)$^{-1}$
Unit Risk Factor Ingestion of Vegetables	= 4.3×10^{-5} (pCi/m^3)$^{-1}$
Unit Risk Factor Ingestion of Meat	= 6.1×10^{-7} (pCi/m^3)$^{-1}$
Unit Risk Factor Ingestion of Milk	= 7.3×10^{-6} (pCi/m^3)$^{-1}$
Sum Unit Risk Factor	= 6.1×10^{-3} (pCi/m^3)$^{-1}$

Air PRG = $1 \times 10^{-6} / 6.1 \times 10^{-3}$ (pCi/m^3)$^{-1}$ = 1.64×10^{-4} (pCi/m^3)

Soil PRG for U-238 for the off-property farmer then would be calculated as:

Soil PRG (pCi/g) = 1.64×10^{-4} (pCi/m^3) / 2.5×10^{-5}(g/m^3) = 6.6 pCi/g

For the on-property resident farmer for U-238 for 10^{-6} ILCR, the PRG was calculated as follows:

The on-property resident farmer is assumed to live on the residual soils within Operable Unit 1. The resident farmer is exposed to CPCs in soils by incidental ingestion, dermal contact, consumption of

1216

meat, milk, and produce, and direct radiation. These are summarized through the use of unit risk factors for air and soil exposure pathways as follows:

Air Exposures:

Unit Risk Factor Inhalation of Dust	$= 6.0 \times 10^{-3}\ (pCi/m^3)^{-1}$
Unit Risk Factor Ingestion of Vegetables	$= 4.3 \times 10^{-5}\ (pCi/m^3)^{-1}$
Unit Risk Factor Ingestion of Meat	$= 6.1 \times 10^{-7}\ (pCi/m^3)^{-1}$
Unit Risk Factor Ingestion of Milk	$= 7.3 \times 10^{-6}\ (pCi/m^3)^{-1}$
Sum Unit Risk Factor	$= 6.1 \times 10^{-3}\ (pCi/m^3)^{-1}$

Soil Exposures:

Unit Risk Factor Incidental Ingestion	$= 1.2 \times 10^{-7}\ (pCi/g)^{-1}$
Unit Risk Factor External Radiation	$= 1.5 \times 10^{-6}\ (pCi/g)^{-1}$
Unit Risk Factor Ingestion of Vegetables	$= 1.4 \times 10^{-7}\ (pCi/g)^{-1}$
Unit Risk Factor Ingestion of Meat	$= 9.5 \times 10^{-9}\ (pCi/g)^{-1}$
Unit Risk Factor Ingestion of Milk	$= 1.1 \times 10^{-7}\ (pCi/g)^{-1}$
Sum Unit Risk Factor	$= 1.9 \times 10^{-6}\ (pCi/g)^{-1}$

These two exposure pathways were then combined to arrive at a soil PRG.

Air Unit Risk-Based on Soil Concentration = Air Unit Risk x Transport Factor

$$= 6.1 \times 10^{-3}\ (pCi/m^3)^{-1} \times 2.84 \times 10^{-4}\ (g/m^3) = 1.7 \times 10^{-6}\ (pCi/g)^{-1}$$

Sum air and soil pathways:

Air Exposure Unit Risk Factor	$= 1.7 \times 10^{-6}\ (pCi/g)^{-1}$
Soil Exposure Unit Risk Factor	$= 1.9 \times 10^{-6}\ (pCi/g)^{-1}$
	$3.6 \times 10^{-6}\ (pCi/g)^{-1}$

$$\text{Soil PRG} = \frac{1 \times 10^{-6}}{3.6 \times 10^{-6}\ (pCi/g)^{-1}} = 0.28\ pCi/g\ (U\text{-}238)$$

For the recreational user for U-238 for 10^{-6} ILCR, the PRG was calculated as follows:

The recreational user is assumed to be exposed to Operable Unit 1 soil via incidental ingestion, inhalation of particulates, and external radiation. The recreational user is assumed to be present with Operable Unit 1 as an adult and a youth for 40 days and 110 days respectively each year for a period of 1 and 2 hours per day, respectively. The breathing rate is assumed to be 20 m^3/day and the ingestion rate is assumed to be 100 mg soil per day.

The Unit Risk Factors are:

Unit Risk Factor Incidental Ingestion	= 5.5×10^{-10} (pCi/g)$^{-1}$
Unit Risk Factor External Radiation	= 1.6×10^{-8} (pCi/g)$^{-1}$
Unit Risk Factor Inhalation of Particulates	= 3.7×10^{-11} (pCi/g)$^{-1}$
Sum Unit Risk Factor	1.67×10^{-8} (pCi/g)$^{-1}$

The soil PRG for the recreational user for a 10^{-6} ILCR for U-238 then would be calculated as:

$$\text{Soil PRG (pCi/g)} = 1 \times 10^{-6} / 1.67 \times 10^{-8} \text{ (pCi/g)}^{-1} = 60 \text{ pCi/g}$$

Values representing 10^{-6} risk-based PRGs under the future land use without continued federal ownership residential farmer scenario differ from the ARARs-based PRG for Ra-226 by several orders of magnitude. Moreover, the 10^{-6} risk-based PRGs for U-238 and Ra-226 are 3 and 200 times less than background, respectively.

EPA has promulgated standards for Ra-226 and Ra-228 in soil at uranium and thorium mill tailings sites (40 CFR 192 Subpart B). In brief, these radionuclides are not to exceed background concentrations by more than 5 pCi/g in the top 15 cm (6 inches) of soil or 15 pCi/g in each 15 cm (6 inches) layer beneath the surface, averaged over an area of 100 m^2 (1100 ft^2). Because the FEMP site is not a mill tailings site, these standards do not specifically apply. However, the requirements are considered relevant and appropriate because the waste material at the site is similar to mill tailings.

EPA has identified standards for airborne emissions of radionuclides other than Rn-222 which limit exposures such that a member of the public will not exceed an effective dose equivalent of 10 mrem/year (40 CFR 61 Subpart H). EPA has also identified annual dose limits of 25 mrem/year whole body, 75 mrem/year to the thyroid, and 25 mrem/year to any other organ for exposures associated with management of uranium and thorium by-product material.

As a general standard for radiological exposures, DOE requires compliance with all federal requirements for limiting doses from specific exposure modes. DOE Order 5400.5 also establishes requirements for nonspecific radiological exposures from DOE facilities. This order requires that the committed effective dose equivalent to a member of the public not exceed 100 mrem/year above background from all nonoccupational exposure routes and that these exposures be reduced to ALARA levels. With this order, DOE defines the ALARA process for reducing residual exposures and risks to levels as low as reasonably achievable below applicable standards considering technical, economic, and social constraints as appropriate. This DOE Order is comparable to the requirements of 10 CFR 20 for the exposure of the public to radioactive materials.

These radiological dose standards and requirements are considered as applicable, relevant and appropriate or TBCs for remediation efforts at the FEMP site. Current dose estimates for the site perimeter are within the specified limits. Applying ALARA to reduce residual concentrations of specific radionuclides would result in a similar reduction in the resulting radiological exposures and associated risk.

EPA has identified two different guidelines for establishing a residual level for lead in soil in a residential setting. These guidelines are considered TBCs. The first is an interim guidance that considers the natural presence of lead in soil and recommends a cleanup level of 500 to 1000 mg/kg, as determined by site-specific conditions (EPA 1992a). The second quideline is draft guidance in the form of an uptake/biokinetic model that can be applied to site-specific data to estimate lead levels in blood for children, the most sensitive population. A blood lead level of 10 µg/L or less is EPA's preferred level. This model yields a health-based level of 450 mg/kg for lead in surface soil.

A standard for cleanup of soil following a spill of material containing more than 50 mg/kg PCBs is identified in the Toxic Substances Control Act. The standard indicates that soil in areas of unrestricted access at which a spill occurs can be decontaminated to 10 mg/kg by weight by excavating at least 25 cm (10 inches) of soil and backfilling with material containing less than 1 mg/kg PCBs. Because PCB contamination in soil would have resulted from spills of material that occurred long before the effective date of these standards, they do not specifically apply; however, they are considered relevant and appropriate.

A literature search was conducted to identify any ecological benchmark criteria for use as guidelines for establishing PRGs for soils. No relevant criteria could be identified for the Operable Unit 1 CPCs.

7.7.2.4 Preliminary Remediation Goals for Groundwater

Table 7-12 presents the PRGs for groundwater. For groundwater, the PRGs for the future land use with continued federal ownership (off-property farmer) are the same as those for the future land use without continued federal ownership (RME resident farmer). The only difference is the source of groundwater. Under the RME resident farmer scenario, it is assumed that an individual takes up residence on the FEMP site and installs a domestic drinking water well at that location. Under the recreational user scenario, there are no individuals establishing residences on the FEMP site. Consistent with this assumption, there will be no domestic drinking water wells on the FEMP site. Thus, the groundwater PRGs established under the recreational use scenario must be met at the FEMP site boundary, while PRGs under the RME resident farmer scenario would need to be met for groundwater directly beneath the FEMP site. For most radionuclides listed in Table 7-12 and one of the metals (beryllium), values representing risk-based PRGs differ from the ARARs-based PRGs by at least one order of magnitude.

The risk-based PRGs for groundwater were calculated using the unit intakes presented in Appendix E and appropriate slope factors or reference doses. For the off-property farmer and on-property resident farmer, the PRG for U-238 was calculated as follows:

The off-property and on-property resident farmer are assumed to drink the groundwater, bathe in the groundwater, and consume the farm produce contaminated by irrigation with the groundwater for a lifetime of 70 years.

Unit Risk Factor for Water Consumption	=	1.4×10^{-6} (pCi/L)$^{-1}$
Unit Risk Factor for Irrigation of Vegetables	=	4.4×10^{-7} (pCi/L)$^{-1}$
Unit Risk Factor for Irrigation of Forage; Meat	=	3.5×10^{-9} (pCi/L)$^{-1}$
Unit Risk Factor for Irrigation of Forage; Milk	=	4.3×10^{-8} (pCi/L)$^{-1}$
Sum of Unit Risk Factors		1.9×10^{-6} (pCi/L)$^{-1}$

Groundwater PRGs for U-238 for the off-property and on-property resident farmer then would be calculated as:

$$\text{Groundwater PRG (pCi/L)} = 1.0 \times 10^{-6} / 1.9 \times 10^{-6} \text{ (pCi/L)}^{-1} = 0.5 \text{ pCi/L}$$

For organics, most PRGs based on the 10^{-6} risk level are well below the CRQLs established by EPA. To date, these CRQLs have been used for the site characterization study at the FEMP site. MCLs for many of the organic carcinogens appear to be equivalent to a 10^{-4} risk level (e.g., for PCBs, benzo(a)pyrene, chlordane, and vinyl chloride). For noncarcinogens, the MCLs appear to be close to risk-based values. This is not surprising because the method used to develop MCLs is the same method used to develop the risk-based values.

EPA has promulgated standards for Ra-226 and Ra-228 in groundwater through three separate regulations, all with the same basic requirements. The regulations include 40 CFR 141.15, 40 CFR 141.15, and 40 CFR 257.3-4. Similar Ohio state regulations include OAC 3745-81-15, OAC 3745-27-10, and OAC 3745-1-32. In brief, the regulations specify that the combined concentration of Ra-226 and Ra-228 in groundwater used as a drinking water source is not to exceed 5 pCi/L. In addition, the gross alpha particle activity (including Ra-226 but excluding radon and uranium) is not to exceed 15 pCi/L.

EPA has proposed standards for uranium and Rn-222 and revised standards for Ra-226 and Ra-228 in drinking water. Under these proposed regulations, the concentration of uranium in drinking water is not to exceed 0.02 mg/L or 30 pCi/L, Rn-222 is not to exceed 300 pCi/L, and the combined concentrations of Ra-226/228 are not to exceed 20 pCi/L.

As a general standard for radiological exposures, the DOE requires compliance with all federal requirements for limiting doses from specific exposure modes. DOE Order 5400.5 also establishes standards for nonspecific radiological exposures. These standards require that the effective dose equivalent to a member of the public not exceed 100 mrem/year above background from all nonoccupational exposure routes and that these exposures be reduced to ALARA levels.

The Safe Drinking Water Act, 40 CFR 141, establishes MCLs and MCLGs for specific inorganic and organic chemicals to protect drinking water quality. MCLs are the maximum permissible levels of a contaminant in water that is delivered to a free flowing outlet of the ultimate user of a public water system. The MCLs are not directly applicable because no public water system, as defined in 40 CFR 141, is involved. However, the MCLs are relevant and appropriate to protect the underlying aquifer, which may be used as a drinking water source, from contaminants that may leach or migrate from waste materials contained in Operable Unit 1.

The State of Ohio also provides MCLs in OAC 3745-81-11. The state MCLs are more stringent than the federal MCLs for barium, cadmium, chromium, silver, and selenium.

EPA provides additional MCLs in RCRA, Subtitles D and C, 40 CFR 257 and 264, respectively. These MCLs are also continued in Ohio state regulations, OAC-3745-27. The regulations require that a facility must comply with the requirements specified in the facility permit (i.e., the MCLs) for the uppermost aquifer underlying the waste management area beyond the point of compliance, which is a vertical surface located at the hydraulically downgradient limit of the waste management area.

The Safe Drinking Water Act also establishes MCLGs for specific inorganic and organic chemicals. The MCLGs are reflected in Ohio regulations OAC 3745-81-11. MCLGs are nonenforceable drinking water health goals intended to represent a contaminant concentration that presents "no known or anticipated adverse effects on the health of persons" while allowing for an adequate margin of safety. The MCLG is more stringent than the MCL for thallium. Similar to the MCLs, the MCLGs are considered to be relevant and appropriate. CERCLA Section 121(d)(2)(A) requires on-site remedies to attain MCLGs where relevant and appropriate under the circumstances of the release. If MCLG is equal to zero, EPA believes it is not appropriate for setting cleanup levels, and corresponding MCL will be the relevant and appropriate requirement.

Beyond the MCLGs, the Safe Drinking Water act establishes secondary MCLs in 40 CFR 143. Secondary MCLs are also contained in Ohio regulations OAC 3745-82-02. Secondary MCLs are nonenforceable goals for drinking water established for contaminants whose presence in excessive quantities may discourage the use of a public water supply due to poor qualities such as taste, color, odor, and corrosivity. The secondary MCLs are a TBC in evaluating potential remedial actions.

A summary of the MCLs, MCLGs, and secondary MCLs previously discussed is presented in Table 7-13.

7.7.2.5 Surface Water

Table 7-14 lists ambient water quality criteria (AWQC) and State of Ohio regulations that can be used to develop surface water PRGs. AWQC are guidelines for the states to use for developing ambient water quality standards. These guidelines represent level for chemicals that likely will not cause impairment to aquatic problems.

7.7.3 Development of Remedial Action Objectives

EPA guidance requires that RAOs be developed in the initial phase of the RI/FS and used as the framework for developing remedial alternatives. RAOs are presented in Table 7-15 for Operable Unit 1 waste materials and environmental media within or potentially impacted by Operable Unit 1. These objectives serve as a foundation for the evaluation of remedial alternatives in the Operable Unit 1 feasibility study, currently in preparation.

7.8 FINDINGS AND CONCLUSIONS

The following is a summary of the findings and conclusions as presented in this section of the RI report:

Facility Operation

- The FEMP was operated from 1952 through 1989 as a uranium metals and thorium refining facility with associated waste processing and storage operations.
- Most hazardous substances found at FEMP were introduced as feed materials (i.e., uranium ore, uranium ore concentrates, thorium ore, irradiated uranium from plutonium production facilities) and their associated impurities to the refining process.
- Extensive process knowledge was utilized to assist in characterization of the waste pits and in determination of CPCs.

Contaminant Source

- Waste pits contain uranium isotopes and their decay products; thorium isotopes and their decay products; fission products such as Tc-99; inorganic metals originating as impurities in the ores (or ore concentrates) used as feed to the uranium metal and thorium refining processes.
- Limited quantities of organic constituents are present; most notable are 1,1,1-TCA, PCBs, dioxins, and furans which likely originated in pesticides and herbicides used in the waste pit area, degreasers, flyash disposal, and miscellaneous plant processes.
- Dioxins and furans found in Waste Pit 3 are thought to have originated from the processing for recovery of uranium of paper ash residue (from the site incinerator).

1222

- Significant quantities of leachate are present within both covered and open pits, the Burn Pit, and the Clearwell which constitute a mobile contaminant source. Leachate depths the waste pits range from a few feet to tens of feet.

- While many pits are lined with either native clay or synthetic membranes, the pit bottoms of some waste units extend to depths near the highly permeable sand and gravel aquifer.

- Adequate characterization of the waste materials was completed to meet the objectives of the RI and to support the FS as supplemented by treatability studies.

Surface Soils

- The entire lateral extent of surface soils in Operable Unit 1 have above-background concentrations of uranium and these materials may have been transported in the past to Paddy's Run via storm water overland flow and direct discharge.

- The surface soils covering and surrounding the pits contain elevated levels of uranium isotopes and lesser quantities of progeny, inorganic metals, and organic compounds such as polyaromatic hydrocarbons and Aroclor-1254.

- The likely sources of these contaminants are operational spills during disposal operation, overland transport by surface water, and airborne deposition from sources in the former production area or open waste pits.

- Soils in the vadose zone adjacent to the waste pits reveal constituent concentrations consistent with leachate movement from the waste units.

- Out of numerous 2000-series boring soil samples, contaminants were in one sample below the glacial overburden. However, no samples were collected directly beneath the waste pits.

- Adequate characterization of the surface soils was achieved to meet the objectives of the RI and support the development of a feasibility study.

- Little information on the nature and extent of contaminants in the soils directly beneath the waste pits is available. RI/RA informational needs were, therefore, supplemented with fate and transport modeling.

Groundwater

- Perched water zones are present in the glacial overburden with radiological and chemical characteristics similar to waste pit leachate, indicating lateral movement of waste constituents from several waste pits.

- Uranium and Tc-99 appear to be the most mobile radiocontaminants. Uranium is likely mobilized by tributyl phosphate which was used in the plant uranium extraction process.

- Technetium-99 is an indicator of future flow patterns of less mobile contaminants.

- The upper portion of the Great Miami Aquifer has been impacted by waste disposal operations in Operable Unit 1.

- Uranium, Tc-99, cadmium, and chromium are the most significant constituents, with respect to concentration and potential hazard, present in the regional aquifer in the area of Operable Unit 1.

- Organic constituents (1,1,1-trichlorethane, 1,2-dichloroethylene, 1,1-dichloroethane, and toluene) are also present in the regional aquifer with Waste Pits 1 and 4 and the Burn Pit as the most likely sources.

- Adequate characterization of the nature of contaminants present in groundwater was achieved to meet the objectives of the RI. Although definition of the extent of the contamination in groundwater is not an objective of the Operable Unit 1 RI (this will be addressed in the Operable Unit 5 RI), sufficient information is available to identify Operable Unit 1 as the most likely source of contamination within perched and regional aquifers.

Surface Water and Sediment

- Operable Unit 1 CPCs were identified in surface waters flowing over and from the waste pit area.

- A removal action has been implemented to control surface water flow from the waste pit area to Paddy's Run. However, no action was taken to remove all areas of contaminated sediments in the drainways within Operable Unit 1.

Air and Direct Radiation

- Radon flux measurements performed on the closed waste pits revealed average flux rates below the NESHAP limit of 20 $pCi/m^2/s$. However, some individual measurements were above this threshold.

- Airborne contaminant concentrations in the area of Operable Unit 1 appear to be associated with the pre1990 uranium refining activities based on the little impact (reduction in airborne concentrations) removal actions to lower potential airborne releases from Waste Pits 5 and 6 have had on airborne concentrations.

- Significant airborne releases of radiological and chemical contaminants were projected by transport models if the waste pits are not maintained but allowed to naturally degrade.

- Direct radiation measurements from Operable Unit 1 suggest significant potential risk to human receptors if the present system of access control were abandoned.

Ecological Characterization

- Although ecological receptors outside of the operable unit will be more fully addressed on a site-wide basis by Operable Unit 5, current data was evaluated in the SWCR to determine any impacts which would be directly attributable to Operable Unit 1. No such impacts were identified.

1224

Baseline Risks

- Sufficient information was assembled during the course of the RI to permit the assessment of baseline risk to potential future receptors. Due to identified data limitations, certain assumptions were made the aggregate of which are judged to positively bias the potential risk (i.e., over-estimate risks to the RME receptor). However, the confidence level of the risk assessment is sufficient to support base risk-management decisions.

- Risk assessment for current land use and the current level of access control; estimate the risk to a maximally exposed off-site farmer of up to 5×10^{-5} (5 chance in 100,000).

- The estimated risk to a future farmer residing in the waste pit area and farming the adjacent area is up to 1×10^{-1} or one chance in ten of acquiring cancer over a 70-year residence.

Data Assessment

- The data as assembled in the RI is sufficient to meet the stated objectives of the RI by providing a detailed understanding of the nature of the stored wasted materials, their impact on the surrounding environment, and the associated risks posed to human health and the environment, both at present and for future postulated conditions.

- The RI is sufficient to meet the informational needs of the Operable Unit 1 Feasibility Study and support the detailed analysis of potential remediation actions.

- No additional site characterization activities are planned nor necessary to support decision-making and preparation of a ROD.

The baseline risk assessment for FEMP Operable Unit 1 has succeeded in establishing an upper bound that is sufficient for risk mangers to make decisions regarding the need for remedial actions. Based on the results of the site investigations and risk calculations, the risks associated with Operable Unit 1 exceed generally accepted regulatory thresholds, thereby necessitating the implementation of remedial actions. Viable remedial action alternatives will be evaluated in a Feasibility Study Report to be issued for Operable Unit 1.

TABLE 7-1

WASTE UNIT CHARACTERISTICS

Waste Unit	Operation Period	Cover Type	RCRA Status	Liner Type	Est.Waste Volume (CY)	Est. Total Volume (CY)	Approx Depth (feet)	Surface Area (acre)	Principal Constituents
Pit 1	1952 - 1959	Soil	SWMU[a]	Clay[b]	48,500	68,400	29.5	2.11	U-238, Th-230, U-234, B, Cd, Cr, Mg
Pit 2	1957 - 1964	Soil	SWMU	Clay	24,200	37,400	23.5	0.90	U-238, U-234, Th-230, Ra-226, As, Ba, Be, Cd, Co, Cu, Pb, Mo, Ni, Zn
Pit 3	1958 - 1977	Soil	SWMU	Clay	204,100	307,500	42	5.00	Th-230, U-238, U-234, Ra-226, As, Ba, Cd, Cr, Cu, Pb, Mg, Mo, Ni, V, Zn
Pit 4	1960 - 1986	RCRA Cap	HWMU[c]	Clay	55,100	72,800	32	1.50	U-238, U-234, Th-230, Th-232, Sb, Ba, Be, Cr, Mg, Mo, Ni, Ag
Pit 5	1968 - 1983	Water	HWMU[e]	EPDM[d]	97,900	97,900	29	3.74	Tc-99, U-238, U-234, Th-230, As, Ba, Be, Cu, Mg, Mo, Ni, Tl, V, Zn
Pit 6	1979 - 1985	Water	SWMU	EPDM	9,600	9,600	20	0.74	U-238, U-234, U-235, As, Mg, Se, Tl
Burn Pit	1957 - 1968	Soil	SWMU	None	30,300	30,300	26	0.50	Th-230, U-238, U-234, Ba, Cr, Co, Cu, Pb, Mg, Ni, Ag, Zn
Clearwell	1959 -1987	Water	SWMU	Clay	3,700	4,300	12	0.65	U-238, U-234, Th-230, U-235, As, Ba,Cr, Cu, Pb, Mg, Mn, Ni, Zn

[a] - RCRA Solid Waste Management Unit
[b] - Native clay liner
[c] - RCRA Hazardous Waste Management Unit
[d] - 60-mil thick Royal Seal ethylene propylene diene monomer elastomeric membrane
[e] - Classification currently under reconsideration

1226

4783

TABLE 7-2

SUMMARY OF OPERABLE UNIT 1 WASTE PIT CONTENTS BASED ON PROCESS KNOWLEDGE

Source	Solids to Waste Pits[a]																	
	Waste Pit 1			Waste Pit 2			Waste Pit 3			Waste Pit 4			Waste Pit 5			Waste Pit 6		
	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)	Uranium (MTU)	Mass (MT)	Volume (m^3)
General Sump Sludge[b]	2	10,764	7,500	1	6,578	4,600	12	41,720	29,000				20	53,493	37,100			
Raffinate[c]				7	433	500	633	39,754	41,400				501	30,070	31,300			
Magnesium Flouride																		
Depleted Slag[d]	636	6,783	4,700	59	634	400				329	7,845	5,300				332	8,082	5,500
Trailer Cake[e]	92	18,401	13,000	71	14,208	9,900	150	30,072	20,900	55	11,137	7,700						
Slag Leach[e]							63	12,605	8,700				26	5,239	3,600			
UAP Filtrate[f]	3	1,712	1,200	8	3,763	2,600												
Depleted Residues[g]	339	2,163	1,500	32	202	100				1,818	3,590	2,500				1,100	1,853	1,200
Graphite/Ceramics[h]	3	150	60	0	13	5				1	450	230						
Water Treatment Sludge[i]							0	2,669	1,900				0	3,857	2,700			
Thorium Wastes[h]		80	100		0	0		89	100		1,093	800		1,007	1,000		0	0
Totals	1,075	40,054	28,060	178	25,832	18,105	858	126,909	102,000	2,203	24,115	16,530	547	93,666	75,700	1,432	9,935	6,700

Notes: a) See Appendix F.6.3.
b) See Appendix F.6.4.
c) See Appendix F.6.7.
d) See Appendix F.6.5.
e) See Appendix F.6.8.
f) See Appendix F.6.6.
g) See Appendix F.6.9.
h) See Appendix F.6.10. Note that the thorium values are not included in the uranium column totals and do not include thorium deposited in the waste pits through the general sump.
i) See Appendix F.6.11.

TABLE 7-3

WASTE UNIT CONSTITUENT INVENTORY[a] BASED ON ANALYTICAL RESULTS

Constituent	Pit 1	Pit 2	Pit3	Pit 4	Pit 5	Pit 6	Burn Pit	Clearwell	Total
Radionuclides (Ci)									
Cesium-137	0.06	0.02	0	0.05	3.1	0.29	0.02	0.55	4
Neptunium-237	0	0	0	0.03	4.7	0.03	0.03	0	5
Plutonium-238	0	0.01	0.09	0.03	0.24	0.01	0.01	0	1
Plutonium-239/240	0	0.01	0.19	0.02	0.59	0.15	0.01	0	1
Radium-226	4.7	7.7	40	2.3	9.9	0.07	1.0	0.21	66
Radium-228	1.9	3.1	29	5.8	2.3	0.91	0.45	0.05	44
Ruthenium-106	0	0.07	0	0.43	0.14	0	0.13	0	1
Strontium-90	0.23	0.05	0.33	4.4	1.2	0.07	0.05	0.02	6
Technetium-99	0.37	2.3	55	7.9	180	2.1	2.0	1.0	250
Thorium-228	27	12	66	94	3.7	0.02	7.9	0.11	210
Thorium-230	350	180	1400	99	530	0.54	80	4.9	2,600
Thorium-232	17	3.8	40	23	3.6	0.01	3.8	0.06	91
Uranium-234	53	68	150	270	75	57	49	1.3	670
Uranium-235/236[b]	7.8	1.3	12	38	1.7	3.4	3.6	0.54	63
Uranium-238	360	83	220	1900	75	290	57	2.4	2,700
Inorganics (kg)									
Antimony	4500	700	7500	9900	4400	84	660	35	28,000
Arsenic	600	3000	2,100,000	330	140,000	690	1200	100	2,200,000
Barium	23,000	19,000	1,100,000	240,000	2,600,000	1600	87,000	9700	4,100,000
Beryllium	400	290	2300	1700	1200	96	230	10	6,200
Boron	52,000	2800	23,000	25,000	0	0	2100	-	100,000
Cadmium	830	160	3100	1100	730	96	450	13	6,500
Chromium	10,000	3200	29,000	46,000	9500	500	3700	300	100,000
Cobalt	1700	11,000	5400	5800	2900	440	2900	47	30,000
Copper	4600	12,000	250,000	17,000	700,000	3700	9700	4200	1,000,000
Cyanide	18	25	260	62	200	0	7	11	580
Lead	2900	8700	89,000	4200	16,000	1000	11,000	780	130,000

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TABLE 7-3
(Continued)

Constituent	Pit 1	Pit 2	Pit3	Pit 4	Pit 5	Pit 6	Burn Pit	Clearwell	Total
Manganese	130,000	25,000	2,200,000	290,000	160,000	2700	37,000	21,000	2,900,000
Mercury	18	30	380	30	140	5	40	5	650
Molybdenum	1500	1700	33,000	3500	46,000	300	1100	67	87,000
Nickel	2800	14,000	37,000	8300	11,000	860	6100	310	80,000
Selenium	18	800	6100	20	2900	3300	88	5	13,000
Silver	5400	510	6800	24,000	1200	2700	980	17	42,000
Thallium	28	16	920	20	2600	780	20	3	4,400
Tin	2500	0	18,000	6400	3800	170	0	30	31,000
Uranium (MT)	1600	51	810	5700	250	210	140	3.5	8,400
Vanadium	4600	4500	700,000	18,000	380,000	1700	4300	2800	1,100,000
Zinc	1800	15,000	31,000	6700	20,000	810	19,000	490	95,000

[a]Summarized from Tables 4-1.1A through 4-1.8B with values rounded to two significant figurse.

TABLE 7-4

COMPARISION OF PROCESS KNOWLEDGE AND RI/FS SAMPLING[a] ESTIMATE WASTE PIT INVENTORIES

Constituent	Pit 1				Pit 2				Pit 3			
	Process Knowledge[b]			RI/FS[c] Samp. Est.	Process Knowledge			RI/FS Samp. Est.	Process Knowledge			RI/FS Samp. Est.
	Min	Max	Best Est.		Min	Max	Best Est.		Min	Max	Best Est.	
Uranium	--	--	1075	1600	--	--	175	51	--	--	846	810
Antimony	--	--	0	4.5	--	--	0	0.7	0	2	1	7.5
Arsenic	--	--	0	0.6	0	7	1	3.0	2	460	64	2100
Barium	--	--	5	23	--	--	12	19	--	--	75	1100
Berylluim	--	--	--	0.4	--	--	--	0.3	--	--	--	2.3
Boron	--	--	0	52	--	--	0	2.8	0	5	1	23
Cadmium	--	--	0	0.8	--	--	0	0.2	4	4	4	31
Chronium	--	--	0	10	--	--	0	3.2	2	30	4	29
Cobalt	--	--	0	1.7	--	--	0	11	1	2	1	5.4
Copper	--	--	2	4.6	--	--	4	12	3	180	22	250
Cyanide	--	--	--	0	--	--	--	0	--	--	--	0.3
Lead	--	--	0	2.9	--	--	0	8.7	1	11	4	89
Manganese	--	--	4	130	--	--	9	25	2	150	26	2200
Mercury	--	--	--	0	--	--	--	0	--	--	--	0.4
Molybdenum	--	--	0	1.5	0	6	1	1.7	6	460	54	33
Nickel	--	--	0	2.8	--	--	0	14	1	3	1	37
Selenium	--	--	--	0	--	--	--	0.8	--	--	--	6.1
Silver	--	--	--	5.4	--	--	--	0.5	--	--	--	6.8
Thallium	--	--	--	0	--	--	--	0	--	--	--	0.9
Tin	--	--	1	2.5	--	--	2	0	0	88	7	18
Vanadium	--	--	0	4.6	0	27	5	4.5	2	1500	395	700
Zinc	--	--	0	1.8	--	--	0	15	3	82	9	31

TABLE 7-4
(Continued)

Constituent	Pit 4				Pit 5				Pit 6			
	Process Knowledge			RI/FS Samp. Est.	Process Knowledge			RI/FS Samp. Est.	Process Knowledge			RI/FS Samp. Est.
	Min	Max	Best Est.		Min	Max	Best Est.		Min	Max	Best Est.	
Uranium	--	--	2203	5700	--	--	527	250	--	--	1432	210
Antimony	--	--	--	9.9	--	--	0	4.4	--	--	0	0.1
Arsenic	--	--	--	0.3	1	310	41	140	--	--	0	0.7
Barium	--	--	--	240	--	--	45	2600	--	--	0	1.6
Beryllium	--	--	--	1.7	--	--	--	1.2	--	--	--	0.1
Boron	--	--	--	25	--	--	0	0	--	--	0	0
Cadmium	--	--	--	1.1	3	3	3	0.7	--	--	0	0.1
Chromium	--	--	--	46	1	15	2	9.5	--	--	0	0.5
Cobalt	--	--	--	5.8	1	2	1	2.9	--	--	0	0.4
Copper	--	--	--	17	2	100	13	700	--	--	0	3.7
Cynanide	--	--	--	0	--	--	--	0.2	--	--	--	0
Lead	--	--	--	4.2	0	8	3	16	--	--	0	1.0
Manganese	--	--	--	290	1	80	14	160	--	--	0	2.7
Mercury	--	--	--	0	--	--	--	0.1	--	--	--	0
Molybdenum	--	--	--	3.5	0	300	35	46	--	--	0	0.3
Nickel	--	--	--	8.3	--	--	0	11	--	--	0	0.9
Selenium	--	--	--	0	--	--	--	2.9	--	--	--	3.3
Silver	--	--	--	24	--	--	--	1.2	--	--	--	2.7
Thallium	--	--	--	0	--	--	--	2.6	--	--	--	0.8
Tin	--	--	--	6.4	0	50	4	3.8	--	--	0	0.2
Vanadium	--	--	--	18	1	1000	257	380	--	--	0	1.7
Zinc	--	--	--	6.7	2	54	6	20	--	--	0	0.8

[a] All units are metric tons.
[b] Based on information from Table 1-12 and Appendix F.6.
[c] Based on information in Table 4-1.2.B through 4-1.8.B.

1231

TABLE 7-5

SUMMARY OF BASELINE RISK BY MEDIA AND RECEPTOR
CURRENT SOURCE TERM

Media	Visitor	Off-Property RME Resident Farmer	Trespassing Child	Off-Property User of Meat and Dairy Products
Incremental Lifetime Cancer Risk Summary				
Air				
Radiocarcinogenic risk	1×10^{-4}	5×10^{-5}	1×10^{-5}	NA[a]
Chemical carcinogenic risk	3×10^{-6}	3×10^{-6}	4×10^{-7}	NA
Total[b]	1×10^{-4}	5×10^{-5}	1×10^{-5}	NA
Buried Pit Material				
Radiocarcinogenic risk	9×10^{-5}	NA	2×10^{-5}	NA
Chemical carcinogenic risk	NA	NA	NA	NA
Total[b]	9×10^{-5}	NA	2×10^{-5}	NA
Surface Soil				
Radiocarcinogenic risk	8×10^{-5}	NA	2×10^{-5}	6×10^{-4}
Chemical carcinogenic risk	NA	NA	2×10^{-5}	2×10^{-3}
Total[b]	8×10^{-5}	NA	4×10^{-5}	3×10^{-3}
Surface Water				
Radiocarcinogenic risk	NA	NA	NA	3×10^{-5}
Chemical carcinogenic risk	NA	NA	NA	7×10^{-6}
Total[b]	NA	NA	NA	4×10^{-5}
All Media				
Radiocarcinogenic risk	3×10^{-4}	5×10^{-5}	5×10^{-5}	6×10^{-4}
Chemical carcinogenic risk	3×10^{-6}	3×10^{-6}	2×10^{-5}	2×10^{-3}
Total[b]	3×10^{-4}	5×10^{-5}	7×10^{-5}	3×10^{-3}

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1232

TABLE 7-5
(Continued)

Media	Visitor	Off-Property RME Resident Farmer	Trespassing Child	Off-Property User of Meat and Dairy Products
	Toxicity Summary			
Air	0.5	0.07	0.1	NA
Buried Pit Material	NA	NA	NA	NA
Surface Soil	NA	NA	0.1	7
Surface Water	NA	NA	NA	4
Total - All Media	0.5	0.07	0.2	11

[a]NA - Not applicable. Exposure route not evaluated.
[b]Radiocarcinogenic and chemocarcinogenic risks are not truly additive. Provided for reference only.

TABLE 7-6

SUMMARY OF BASELINE RISK BY MEDIA AND RECEPTOR
FUTURE SOURCE TERM

	Current Land Use				Future Land Use			
	Trespassing Child	Off-Property RME Resident Farmer	Great Miami River User	Off-Property User of Meat and Milk	On-Property RME Adult Farmer	On-Property CT Adult Farmer	On-Property RME Child	Home Builder
	Incremental Lifetime Cancer Risk							
Air								
Radiocarcinogenic Risk	2×10^{-4}	9×10^{-4}	NA[a]	NA	1×10^{-2}	8×10^{-4}	2×10^{-4}	2×10^{-5}
Chemical Carcinogenic Risk	1×10^{-4}	4×10^{-3}	NA	NA	1×10^{-2}	9×10^{-4}	4×10^{-3}	8×10^{-6}
Total[b]	3×10^{-4}	5×10^{-3}	-	-	2×10^{-2}	2×10^{-3}	4×10^{-3}	3×10^{-5}
Buried Pit Material								
Radiocarcinogenic Risk	7×10^{-6}	NA	NA	NA	1×10^{-3}	2×10^{-4}	2×10^{-7}	3×10^{-6}
Chemical Carcinogenic Risk	NA	NA	NA	NA	NA	NA	NA	NA
Total[b]	7×10^{-6}	-	-	-	1×10^{-3}	2×10^{-4}	2×10^{-7}	3×10^{-6}
Surface Soil/Exposed Pit Material								
Radiocarcinogenic Risk	3×10^{-4}	NA	NA	6×10^{-4}	2×10^{-2}	4×10^{-3}	3×10^{-3}	4×10^{-4}
Chemical Carcinogenic Risk	2×10^{-4}	NA	NA	2×10^{-3}	1×10^{-2}	1×10^{-3}	7×10^{-3}	5×10^{-4}
Total[b]	5×10^{-4}	-	-	3×10^{-3}	3×10^{-2}	5×10^{-3}	1×10^{-2}	9×10^{-4}
Sediment								
Radiocarcinogenic Risk	5×10^{-6}	NA	NA	NA	NA	NA	NA	NA
Chemical Carcinogenic Risk	2×10^{-5}	NA	NA	NA	NA	NA	NA	NA
Total[b]	3×10^{-5}	-	-	-	-	-	-	-
Groundwater								
Radiocarcinogenic Risk	NA	7×10^{-4}	NA	4×10^{-5}	9×10^{-3}	7×10^{-3}	6×10^{-4}	NA
Chemical Carcinogenic Risk	NA	0	NA	7×10^{-6}	4×10^{-2}	3×10^{-3}	1×10^{-2}	NA
Total[b]	-	7×10^{-4}	-	5×10^{-5}	5×10^{-2}	1×10^{-2}	1×10^{-2}	NA
Surface Water								
Radiocarcinogenic Risk	NA	NA	3×10^{-7}	NA	5×10^{-4}	4×10^{-5}	1×10^{-4}	NA
Chemical Carcinogenic Risk	NA	NA	0	NA	7×10^{-6}	5×10^{-7}	2×10^{-6}	NA
Total[b]	-	-	3×10^{-7}	NA	5×10^{-4}	4×10^{-5}	1×10^{-4}	NA

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4783

TABLE 7-6
(Continued)

	Current Land Use				Future Land Use			
	Trespassing Child	Off-Property RME Resident Farmer	Great Miami River User	Off-Property User of Meat and Milk	On-Property RME Adult Farmer	On-Property CT Adult Farmer	On-Property RME Child	Home Builder
Perched Water								
Radiocarcinogenic Risk	NA	NA	NA	NA	5×10^{-1}	4×10^{-2}	4×10^{-2}	NA
Chemical Carcinogenic Risk	NA	NA	NA	NA	1×10^{-1}	1×10^{-2}	4×10^{-2}	NA
Total[b]	NA	NA	NA	NA	6×10^{-1}	5×10^{-2}	8×10^{-2}	NA
All Pathways[c]								
Radiocarcinogenic Risk	5×10^{-4}	2×10^{-3}	3×10^{-7}	6×10^{-4}	4×10^{-2}	1×10^{-2}	4×10^{-3}	5×10^{-4}
Chemical Carcinogenic Risk	3×10^{-4}	4×10^{-3}	0	2×10^{-3}	4×10^{-2}	5×10^{-3}	2×10^{-2}	5×10^{-4}
Total[b]	8×10^{-4}	6×10^{-3}	3×10^{-7}	3×10^{-3}	8×10^{-2}	2×10^{-2}	2×10^{-2}	1×10^{-3}
Toxicity Summary								
Air	0.8	50	NA[a]	NA	400	200	2,000	0.6
Buried Pit Material	NA	NA	NA	NA	NA	NA	NA	NA
Surface Soil/Exposed Pit Material	3	NA	NA	7	60	20	200	70
Sediment	0.7	NA	NA	NA	NA	NA	NA	NA
Groundwater	NA	10	NA	NA	300	100	900	NA
Surface Water	NA	NA	0	4	4	3	200	NA
Perched Water	NA	NA	NA	NA	6,000	3,000	20,000	NA
Total - All Media[b]	5	60	0	11	800	300	3,000	70

[a]NA - Not applicable. Exposure route not evaluated.
[b]Radiocarcinogenic and chemical risks not readily summable. Provided for reference only.
[c]Totals do not include ingestion of perched water.

TABLE 7-7

DATA LIMITATIONS AND RECOMMENDED ACTIONS

Data Limitation	Significance to Alternatives Evaluation	Significance to Baseline Risk Assessment	Recommended Action/Justification
The site characterization did not obtain samples of materials from beneath the waste pits to allow evaluation of contaminant migration through the pit bottom.	Increased uncertainty in the depth to which contaminants have migrated will increase the uncertainty in the excavation cost estimate for ex situ options and increase the uncertainty in residual risk for in situ options.	Increased uncertainty in the baseline risk due to reliance on transport modeling to establish rate of contaminant movement.	DOE and U.S. EPA reached a consensus that sampling of the soils beneath the waste pits was deemed impractical. Any attempt to collect samples by boring through the bottom of the pits ran the risk of releasing pit leachate into the Great Miami Aquifer. Transport modeling is used to establish the movement of contaminants from the waste pits into the soil beneath the pit. This allows the estimation of the quantity of contaminants beneath the pits and their volume to a sufficient level of confidence to meet the objectives of the detailed analysis of alternatives. No additional action is warranted nor advisable at this time. Additional characterization to limit uncertainty in residual risk could be obtained using extraordinary measures (e.g., tunnelling) at a later time if in situ options are not eliminated during the feasibility study. While additional samples from beneath the pits might slightly increase the confidence in the baseline risk assessments, conservative assumptions were used to ensure that risks to potential receptors were not underestimated. Such sampling would only allow one to determine the magnitude of the positive bias introduced by the conservative assumption used in the risk assessment.

TABLE 7-7
(continued)

Data Limitation	Significance to Alternatives Evaluation	Significance to Baseline Risk Assessment	Recommended Action/Justification
Limited organic analyses for the waste contained in Pits 5, 6 and the Clearwell. All organic analyses collected under the 1992 RI/FS treatability program were rejected due to missed holding times.	Limited information on which to base treatment options for these waste units. This requires a conservative approach in assuming these contaminants to be present in the waste stream when evaluating process options.	Increased uncertainty in the total source available for leaching from the waste pit. Uncertainty in the selection of constituents of potential concern (CPC).	No additional sampling is warranted. Organic analytical results were available from the CIS for both waste material and leachate. These data were not collected in order to meet the objectives of the RI but were to be evaluated to supplement and confirm the limited data set available from the CIS thereby increasing the confidence level of any decision made. The level of confidence is high for decision making for treatment options based on the extensive treatability studies currently being conducted on all Operable Unit 1 wastes. Further, based on process knowledge there is no reason to assume that significant differences exist in the organic waste characteristics between the waste pits. Because many organics are present in the waste stream from other waste pits, the treatment options must accommodate their presence. Little impact to the overall uncertainty in the baseline risk assessment arises from the total inventory of organics in these waste units. Sufficient information is available to characterize the leachate migrating from these areas by using the surface liquid collected from each unit. For transport via air, organic constituents in general contributed little to the overall risk for any of the modelled waste units. Finally, risks projected for most receptors already exceed the regulatory threshold recommending remedial actions be conducted.

TABLE 7-7
(continued)

Data Limitation	Significance to Alternatives Evaluation	Significance to Baseline Risk Assessment	Recommended Action/Justification
There is no analytical results available for dioxins and furans for Waste Pits 5 and 6 and the Clearwell. No analyses were performed for the CIS and all organic analyses were rejected for the 1992 RI/FS Treatability Sampling Program due to extended holding times and unacceptable storage methods.	Limited information on which to base treatment options for these waste units.	Increased uncertainty in the total source available for leaching from the waste pit. Uncertainty in the selection of constituents of potential concern. Potential for negative bias in risk characterization for future source term scenario via the air pathway.	Waste Pit 5 and Waste Pit 3 are similar in the types of waste placed within them. Waste Pit 3 was found to have measurable concentration of dioxin and furans. Based on process knowledge, these constituents are thought to have originated in during the incineration of paper and its subsequence processing through Plant 2/3 to remove uranium. The fate of these constituents during uranium removal is the raffinates which were disposed in Waste Pit 3. The practice of incineration residue processing was discontinued prior to the operation of Waste Pit 5; therefore, their presence is not expected in this waste pit. The treatability program is based on the knowledge that dioxins and furans are present in Waste Pit 3. Their presence or absence in Waste Pit 5 will not impact the treatability program. Dioxin and furans were identified as constituents of potential concern for the waste units and fate and transport modeling was performed for these constituents. Air modeling for release of material from Waste Pit 3 (following cover failure) and risk characterization to the on-property and off-property farmer concluded that dioxins and furans were extremely small contributors to risk for these individuals. Therefore, lack of data for Waste Pit 5 and the Clearwell are judged to have no significant impact to the risk assessment. Waste Pit 6 did not receive wastes identified as potential contributors of dioxins and furans.

1238

TABLE 7-7
(continued)

Data Limitation	Significance to Alternatives Evaluation	Significance to Baseline Risk Assessment	Recommended Action/Justification
Sample preparation methods for samples collected by the CIS sampling program, resulted in high sample quantitation limits for chemical analyses.	Limited data sets available for determining treatability needs.	Increased uncertainty in the source term present for migration.	No additional sampling is warranted. An extensive treatability program is in progress to determine the applicability of various treatment alternatives. These studies are not impacted by the SQL of chemical analyses performed on the untreated wastes. The treated wastes will be analyzed at appropriate quantitation limits. The baseline risk assessment was conducted using one-half the SQL for all non-detects in accordance with EPA guidance for contaminants selected as constituents of potential concern. Based upon the chemical quantitation limits and detections of the 1991 RI/FS sampling program it is judged that this practice would tend to overestimate the projected risk to the receptors.

TABLE 7-7
(continued)

Data Limitation	Significance to Alternatives Evaluation	Significance to Baseline Risk Assessment	Recommended Action/Justification
The waste pits are very heterogeneous and due to the limited number of samples collected per pit, the characterization data may not be fully representative of the distribution of the waste constituents.	Increased uncertainty in the maximum concentration of any individual constituent present in a pit (waste unit) hampering the evaluation of the suitability of treatment options.	The source term defined by the mean of the sample distribution may not represent the "true" average concentration within the waste unit. Utilizing the calculated mean in fate and transport modeling could lead to underestimation of the exposure point concentration in a transfer medium, since limited sampling may not identify "hot spots" within the pits (waste units).	Collection of additional data is not warranted. The program for collection of samples from within the pits was biased toward collection of those materials with the highest concentration of contaminants. This was accomplished by the use of field screening techniques, specifically, beta-gamma detection equipment to select samples with high radiological concentrations and sampling to select material highest in organic chemicals. Samples for use in treatability analyses were bestowed over larger regions of the pit. In addition, the upper confidence level (95 %) of the mean (UCL) was utilized in calculating the quantity of a contaminant present within a waste unit which is likely to overestimate this value. These UCL values were also used in air contaminant transport modeling. For extremely small data sets the maximum detected concentration was used as the source concentration. Both of these techniques lead to the potential for a positive bias in risk results. Leachate from the waste unit is a natural mechanism for "averaging" the contents of a waste unit. Leachate concentrations were preferred for use as source terms in contaminant fate and transport via groundwater from the waste unit.

TABLE 7-7
(continued)

Data Limitation	Significance to Alternatives Evaluation	Significance to Baseline Risk Assessment	Recommended Action/Justification
Even with the large numbers of surface soil samples evaluated it remains uncertain that all localized areas with elevated constituent concentrations have been detected.	The uncertainty in the concentration of contaminants present in the surface soil yields uncertainty in the short term effectiveness for worker health and safety due to air transport of surface soil contaminants during the remedial action. Further, similar uncertainty would result in establishing residual risk in situ alternatives and in volume and cost estimates for ex situ alternatives.	The uncertainty in surface soil contaminant concentrations yields uncertainty in the exposure point concentrations used in risk characterization.	No additional sampling is warranted. Localized areas of elevated contaminant concentrations are anticipated in preparation of health and safety plans for workers. Further, localized areas of elevated contaminant concentrations are assumed in the evaluation of remedial action alternatives through the use of the UCL of the mean to represent contaminant concentration. Finally, any remedial actions undertaken in Operable Unit 1 will significantly disturb the surface soil over the entire unit area, necessitating systematic monitoring and/or sampling of surface soil during such activities. The baseline risk assessment follows U.S. EPA guidance by using the UCL of the mean as the exposure point concentration. This method is judged by U.S. EPA to "account" for any missed "hot spots" during the soils characterization program. Conservatism is also achieved by assuming that the receptor spends long periods of time in the Operable Unit 1 area.

TABLE 7-8

RADIOLOGICAL CONSTITUENTS OF POTENTIAL CONCERN
OPERABLE UNIT 1

Constituent	Pit 1	Pit 2	Pit 3	Pit 4	Pit 5	Pit 6	Burn Pit	Clear-well	Soil
Cs-137 + daughter	•	•			•	•		•	•
Np-237 + daughter			•	•	•	•	•	•	•
Pu-238		•	•	•	•	•	•	•	•
Pu-239/240		•	•	•	•	•	•	•	•
Ra-226 + 5 daughters	•	•	•	•	•	•	•	•	•
Ra-228 + daughter	•	•	•	•	•	•	•	•	•
Sr-90 + daughter	•	•	•	•	•	•	•	•	•
Tc-99	•	•	•	•	•	•	•	•	•
Th-228 + 7 daughters	•	•	•	•	•	•	•	•	•
Th-230	•	•	•	•	•	•	•	•	•
Th-232	•	•	•	•	•	•	•	•	•
U-234	•	•	•	•	•	•	•	•	•
U-235 + daughter	•	•	•	•	•	•	•	•	•
U-238 + 2 daughters	•	•	•	•	•	•	•	•	•

TABLE 7-9

CHEMICAL CONSTITUENTS OF POTENTIAL CONCERN
OPERABLE UNIT 1

Constituent	Waste Material	Soil
Inorganics		
Antimony	•	•
Arsenic	•	•
Barium	•	•
Beryllium	•	•
Boron	•	
Cadmium	•	•
Chromium	•	•
Cobalt	•	•
Copper	•	•
Cyanide	•	
Lead	•	•
Manganese	•	•
Mercury	•	
Molybdenum	•	•
Nickel	•	•
Selenium	•	
Silver	•	•
Thallium	•	
Tin	•	
Uranium	•	•
Vanadium	•	•
Zinc	•	•
Organics		
2,4,5-Trichlorophenol	•	
2-Methylnaphthalene	•	
4,4-DDT	•	

TABLE 7-9
(Continued)

Constituent	Waste Material	Soil
4-Nitroaniline	•	
4-Nitrophenol	•	
Acenaphthene	•	
Acenaphthylene	•	
Anthracene	•	
Aroclor-1016		
Aroclor-1221	•	
Aroclor-1242	•	
Aroclor-1248	•	
Aroclor-1254	•	•
Aroclor-1260	•	
Benzene	•	
Benzo(a)anthracene	•	
Benzo(a)pyrene	•	
Benzo(b)fluoranthene	•	
Benzo(g,h,i)fluoranthene	•	
Benzo(g,h,i)perylene	•	
Benzo(k)fluoranthene	•	
Chrysene	•	
Dibenzo(a,h)anthracene	•	
Dichlorodifluoromethane	•	
Fluoranthene	•	
Fluorene	•	
Indeno(1,2,3-cd)pyrene	•	
Naphthalene	•	
Pentachlorophenol	•	
Phenanthrene	•	
Pyrene	•	
Tetrachloroethene	•	
Tributyl phosphate	•	

TABLE 7-9
(Continued)

Constituent	Waste Material	Soil
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	•	
Heptachlorodibenzo-p-dioxin	•	
Heptachlorodibenzofuran	•	
Octachlorodibenzo-p-dioxin	•	
Octachlorodibenzofuran	•	
Hexachlorodibenzofuran	•	
Hexachlorodibenzo-p-dioxin	•	
1,2,3,7,8-Pentachlorodibenzo-furan	•	
2,3,4,7,8-Pentachlorodibenzo-furan	•	
Pentachlorodibenzofuran	•	
2,3,7,8-Tetrachlorodibenzofuran	•	
3,3-Dichlorobenzidine	•	
Tetrachlorodibenzofuran	•	
Vinyl chloride	•	

1245

TABLE 7-10

DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS OPERABLE UNIT 1

Medium	Source of Preliminary Remediation Goals	Comments
Waste Material	Preliminary remediation goals are not relevant for waste material. This material is heavily contaminated and would not be considered releasable. Residual material remaining after the potential removal of wastes will be addressed as soil.	Exposure mitigation measures (e.g., containment, treatment, removal and disposal) will be considered as part of the FS.
Soil	Regulatory-based chemical and radiological cleanup criteria are not available for most constituents of concern in soil. FEMP site soil cleanup criteria will be developed as part of OU5, which includes remediation of site-wide soils. Soil PRGs developed within the RI will be subject to modification on the basis of additional information developed through Operable Unit 5.	No comments.
Surface Water (Impoundments)	Regulatory-based cleanup criteria are not available for all constituents of concern existing in impounded liquids or that may be transported from OU1 sources. Impounded liquids will be directed through existing plant wastewater treatment systems. Discharges will be consistent with existing NPDES permit requirements and commitments defined under the South Groundwater Contamination Plume Removal Action. PRGs were therefore not derived for impounded water within Operable Unit 1.	No comments.
Groundwater	Regulatory-based chemical and radiological cleanup criteria are not available for all contaminants of concern in groundwater. Final FEMP site groundwater cleanup criteria will be developed as part of OU5 which includes remediation of site-wide groundwater. The chemical and radiological PRGs developed here represent the concentration of a particular constituent of concern in groundwater presenting a specific ILCR or HI. These concentrations could occur in groundwater as a result of migration from residuals within OU1 or stabilized source materials.	Decisions regarding remediation of groundwater will be addressed by DOE as a part of FEMP site OU5. Separation of final groundwater cleanup decisions from those considered under OU1 allow further characterization of groundwater and consideration of remedial action for site groundwater as a whole.

TABLE 7-11
PRELIMINARY REMEDIATION GOALS - SOIL

Constituent	Future Land Use WIthout Cotinued Federal Owership (Resident Farmer)			Future Land Use WIth Cotinued Federal Owership (Recreational User)			Off-property Resident Farmer			Background 95th Percentile
	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	
Radionuclides(pCi/g)										
Cs-137 + daughter		1	0.01		100	1		10,000	100	0.71
Np-237 + daughter		0.4	0.004		500	5		1000	10	-
Pu-238		40	0.4		22,000	220		800	8	-
Pu-239/240		40	0.4		21,000	210		800	8	-
Ra-226 + 5 daughters[f]		0.4	0.004		40	0.4		1600	16	1.45
Ra-228 + daughter[f]		0.8	0.008		70	0.7		17,000	170	1.19
Sr-90 + daughter		2	0.02		13,000	1300		25,000	250	-
Tc-99		2	0.02		3.7×10^6	37,000		4.1×10^5	4100	-
Th-228 + 7 daughters		0.4	0.004		40	0.4		440	4.4	1.43
Th-230		100	1		34,000	3400		1200	12	1.97
Th-232		100	1		38,000	3800		1200	12	1.36
U-234		90	0.9		29,000	2900		1300	13	1.24
U-235 + daughter		9	0.09		900	9		1400	14	0.15
U-238 + 2 daughters		30	0.3		6000	60		660	6.6	1.22
Inorganics (mg/kg)										
Antimony	2			1030			1			7.7
Arsenic	5	4	0.04	770	1600	16	2	1100	11	8.5
Barium	370			9120			15			91
Beryllium	14	0.3	3.17×10^{-3}	13,000	1600	16	32	670	7	0.6
Boron	6			c			340			22
Cadmium	38	860	9	2560			0.1	9800	98	0.8
Chromium	53	130	1	13,000			9	1500	15	16
Cobalt	3			6800			0.04			15
Copper[g]										14
Cyanide	0.2			780			140			0.25
Lead				1800						26
Manganese	260			c			13			1800
Mercury	5.02×10^{-3}			780			0.04			0.3
Molybdenum	5			c			6			2.6

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TABLE 7-11
(Continued)

Constituent	Future Land Use WIthout Cotinued Federal Owership (Resident Farmer)			Future Land Use WIth Cotinued Federal Owership (Recreational User)			Off-property Resident Farmer			Background 95th Percentile
	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	
Nickel	47	6500	65	c			14	7400	740	21
Selenium	12			c			3			0.7
Silver	0.5			2560			0.4			2.6
Thallium	0.3			150			0.04			0.6
Tin[a]										-
Uranium	28			c			23			3.7
Vanadium	170			c			34			30
Zinc	5			c			0.6			62
Organic (mg/kg)										
2,4,5-Trichlorophenol	780			TBD			980			
2-Methylnaphthalene[a]										
4,4-DDT	1	3	0.03	1300	40,000	400	0.9	2500	25	
4-Nitroaniline	2400			TBD						
4-Nitrophenol	0.7			TBD			83			
Acenaphthene	67			1.6×10^5			530			
Acenaphthylene[a]										
Anthracene	240			7.9×10^5			2200			
Aroclor-1016[b]	0.1	0.1	1.1×10^{-3}		1800	18	0.4	390	4	
Aroclor-1221[b]	0.09	0.08	8.3×10^{-4}		1800	18	0.4	400	4	
Aroclor-1242[b]	0.09	0.08	8.5×10^{-4}		1800	18	0.4	400	4	
Aroclor-1248[b]	0.2	0.1	1.4×10^{-3}		1800	18	0.1	130	1	
Aroclor-1254[b]	0.08	0.07	7.2×10^{-4}		1800	18	0.05	50	0.5	
Aroclor-1260[b]	0.1	0.1	1.1×10^{-3}		1800	18	0.07	66	0.7	
Benzene										
Benzo(a)anthracene		0.06	6.3×10^{-4}		7.9	0.079		180	2	
Benzo(a)pyrene		0.04	3.5×10^{-4}		7.9	0.079		82	0.8	
Benzo(b)fluoranthene		0.04	3.9×10^{-4}		3.8	0.38		28	0.3	
Benzo(g,h,i)fluoranthene[a]										
Benzo(g,h,i)perylene[a]										
Benzo(k)fluoranthene[a]										

FER/OU1RI/DC.1229.710/09-30-93/11:52pm

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4783

TABLE 7-11
(Continued)

Constituent	Future Land Use WIthout Cotinued Federal Owership (Resident Farmer)			Future Land Use WIth Cotinued Federal Owership (Recreational User)			Off-property Resident Farmer			Background 95th Percentile
	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	HI = 0.2 RfD-Based PRG	10^{-4} Risk Based PRG	10^{-6} Risk Based PRG	
Chrysene		0.06	6.3×10^{-4}		7.9	0.079		170	2	
Dibenzo(a,h)anthracene		0.06	5.6×10^{-4}		7.9	0.079		93	0.9	
Dichlorodifluoromethane	26			TBD			80			
Fluoranthene	80			1.1×10^{5}			160			
Fluorene	51			1.1×10^{5}			350			
Indeno(1,2,3-cd)pyrene		7.8×10^{-3}	7.8×10^{-5}		73	0.73		2	0.02	
Naphthalene	22			1.1×10^{5}			330			
Pentachlorophenol	76	11	0.1	79,000	1.2×10^{5}	1200	170	24,000	240	
Phenanthrene[a]										
Pyrene	60			79,000			120			
Tetrachloroethene	2	2	0.02	26,000	1.2×10^{5}	1200	79	76,000	760	
Tributyl phosphate	5			TBD			37			
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin										
Heptachlorodibenzo-p-dioxin		7.9×10^{-6}	7.9×10^{-8}		TBD	TBD		0.05	4.6×10^{-4}	
Heptachlorodibenzofuran		7.9×10^{-6}	7.9×10^{-8}		TBD	TBD		0.05	4.6×10^{-4}	
Octachlorodibenzo-p-dioxin		7.9×10^{-5}	7.9×10^{-7}		TBD	TBD		0.5	4.6×10^{-3}	
Octachlorodibenzofuran		7.9×10^{-5}	7.9×10^{-7}		TBD	TBD		0.5	4.6×10^{-3}	
Hexachlorodibenzofuran		7.9×10^{-7}	7.9×10^{-9}		TBD	TBD		4.6×10^{-3}	4.6×10^{-5}	
Hexachlorodibenzo-p-dioxin		7.9×10^{-7}	7.9×10^{-9}		TBD	TBD		4.6×10^{-3}	4.6×10^{-5}	
1,2,3,7,8-Pentachlorodibenzofuran		7.9×10^{-8}	7.9×10^{-10}		TBD	TBD		4.6×10^{-4}	4.6×10^{-6}	
2,3,4,7,8-Pentachlorodibenzofuran		7.87×10^{-8}	7.9×10^{-10}		TBD	TBD		4.6×10^{-4}	4.6×10^{-6}	
Pentachlorodibenzofuran		1.6×10^{-7}	1.6×10^{-9}		TBD	TBD		9.2×10^{-4}	9.2×10^{-6}	
2,3,7,8-Tetrachlorodibenzofuran		7.9×10^{-7}	7.9×10^{-9}		TBD	TBD		4.6×10^{-3}	4.6×10^{-5}	
3,3-Dichlorobenzidine		12,000	120		TBD	TBD		1.4×10^{5}	1400	
Tetrachlorodibenzofuran										
Vinyl chloride		4.2×10^{-3}	4.2×10^{-5}		7000	70		2100	21	

TABLE 7-11
(Continued)

[a] PRG developed using unit Risk Factors from the OU1 baseline risk assessment.
[b] PRG developed using unit Risk Factors from the OU1 baseline risk assessment.
[c] PRG is greater than 10,000 mg/kg
[d] PRGs developed using parameters for recreational exposures and HEAST.
[e] PRGs developed using parameters for recreational exposures and HEAST and IRIS.
[f] 40 CFR 192 is an ARAR - based cleanup level of 5 pCi/g of radium in the first 15 cm of soil.
[g] No toxicity data available to develop a PRG.
[h] Requirements for PCB Spill Cleanup, 40 CFR 761.125, 10 mg/hg.

TABLE 7-12

PRELIMINARY REMEDIATION GOALS - GROUNDWATER

Constituent	Risk-Based PRGs			ARAR/TBC-Based PRGs		
				Federal Standards		State Standards
	HI=0.20 RfD-Based PRG[a]	10^{-4} Risk-Based PRG, Above Background[b]	10^{-6} Risk-Based PRG, Above Background[b]	Source[c]	Concentration[d]	Groundwater[e]
Radionuclides (pCi/L)						
Cs-137 + 1 progeny		7	0.07	MCL	110	
Np-237 + 1 progeny		7	0.07	4 mrem dose[f]	1	
Pu-238		7	0.07	4 mrem dose	2	
Pu-239/240		40	0.4	4 mrem dose	2	
Ra-226 + 5 progeny		10	0.1	PMCL[g]	20	5
Ra-228 + 1 progeny		15	0.2	PMCL[g]	20	5
Rn-222				PMCL[g]	300	
Sr-90		30	0.3	MCL	4	
Tc-99		7	0.07	MCL	3800	
Th-228 + 7 progeny		20	0.2	4 mrem dose	14	
Th-230		120	1.2	4 mrem dose	10	
Th-232		130	1.3	4 mrem dose	2	
U-234		100	1	PMCL[g]	7	
U-235 + 1 progeny		100	1	PMCL[g]	0.3	
U-238 + 2 progeny		50	0.5	PMCL[g]	7	

TABLE 7-12
(Continued)

Constituent	Risk-Based PRGs			ARAR/TBC-Based PRGs		
				Federal Standards		State Standards
	HI=0.20 RfD-Based PRG[a]	10^{-4} Risk-Based PRG, Above Background[b]	10^{-6} Risk-Based PRG, Above Background[b]	Source[c]	Concentration[d]	Groundwater[e]
Inorganics (g/L)						
Antimony	0.9			MCL	6	
Arsenic	0.9	2	0.02	MCL	50	50
Barium	100			MCL	2000	1000
Beryllium	14	0.6	0.006	MCL	4	
Boron	300					
Cadmium	0.2			MCL	5	1
Chromium	0.1			MCL	100	50
Cobalt	120					
Copper[h]				MCLG[i]	1300	
Cyanide	52			MCL	200	
Lead				MCLG	5	50
Manganese	9					
Mercury	0.2			MCL	2	2
Molybdenum	10					
Nickel	15			MCL	100	
Selenium	6					

FER/OU1RI/JK.1229.712/09-30-93 12:01am

1252

4789

TABLE 7-12
(Continued)

Constituent	Risk-Based PRGs: HI=0.20 RfD-Based PRG[a]	Risk-Based PRGs: 10^{-4} Risk-Based PRG, Above Background[b]	Risk-Based PRGs: 10^{-6} Risk-Based PRG, Above Background[b]	ARAR/TBC-Based PRGs: Federal Standards: Source[c]	ARAR/TBC-Based PRGs: Federal Standards: Concentration[d]	ARAR/TBC-Based PRGs: State Standards: Groundwater[e]
Silver	2			MCL	50	50
Thallium	0.1			MCL	2	
Tin	1000					
Uranium	10			PMCL	20	
Vanadium	19					
Zinc	3					
Organics (g/L)						
2,4,5-Trichlorophenol	120					
2-Methylnaphthalene[h]						
4,4-DDT	0.2	0.6	0.006			
4-Nitroaniline	2200					
4-Nitrophenol	25					
Acenaphthene	110					
Acenaphthylene						
Anthracene	220					
Aroclor-1016	0.1	0.1	0.001	MCL	0.5	
Aroclor-1221	0.1	0.1	0.001	MCL	0.5	

TABLE 7-12
(Continued)

Constituent	Risk-Based PRGs			ARAR/TBC-Based PRGs		
				Federal Standards		State Standards
	HI=0.20 RfD-Based PRG[a]	10^{-4} Risk-Based PRG, Above Background[b]	10^{-6} Risk-Based PRG, Above Background[b]	Source[c]	Concentration[d]	Groundwater[e]
Aroclor-1242	0.1	0.2	0.002	MCL	0.5	
Aroclor-1248	0.03	0.03	3E-04	MCL	0.5	
Aroclor-1254	0.02	0.02	2E-04	MCL	0.5	
Aroclor-1260	0.03	0.03	3E-04	MCL	0.5	
Benzene		78	0.8	MCL	5	5
Benzo(a)anthracene		0.01	1E-04	PMCL	0.1	
Benzo(a)pyrene		0.009	9E-05	MCL	0.2	
Benzo(b)fluoranthene		0.003	3E-05	PMCL	0.2	
Benzo(g,h,i)fluoranthene[h]						
Benzo(g,h,i)perylene[h]						
Benzo(k)fluoranthene[h]				PMCL	0.2	
Chrysene		0.01	1E-04	PMCL	0.2	
Dibenzo(a,h)anthracene		0.01	1E-04	PMCL	0.3	
Dichlorodifluoromethane	580					
Fluoranthene	10					
Fluorene	44					
Indeno(1,2,3-cd)pyrene		7E-04	7E-06	PMCL	0.4	

FER/OU1RI/JK.1229.712/09-30-93 12:01am

TABLE 7-12
(Continued)

Constituent	Risk-Based PRGs			ARAR/TBC-Based PRGs		
				Federal Standards		State Standards
	HI=0.20 RfD-Based PRG[a]	10^{-4} Risk-Based PRG, Above Background[b]	10^{-6} Risk-Based PRG, Above Background[b]	Source[c]	Concentration[d]	Groundwater[e]
Naphthalene	95					
Pentachlorophenol	31	5	0.05	MCL	1	
Phenanthrene[h]						
Pyrene	9					
Tetrachloroethene[j]	27	54	0.5	MCL	5	
Tributyl phosphate	11					
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin[h]						
Heptachlorodibenzo-p-dioxin		2E-06	2E-08			
Heptachlorodibenzofuran		2E-05	2E-07			
Octachlorodibenzo-p-dioxin		2E-05	2E-07			
Octachlorodibenzofuran		2E-04	2E-06			
Hexachlorodibenzofuran		2E-06	2E-08			
Hexachlorodibenzo-p-dioxin		2E-07	2E-09			
1,2,3,7,8-Pentachlorodibenzofuran		2E-07	2E-09			

TABLE 7-12
(Continued)

Constituent	Risk-Based PRGs			ARAR/TBC-Based PRGs		
				Federal Standards		State Standards
	HI=0.20 RfD-Based PRG[a]	10^{-4} Risk-Based PRG, Above Background[b]	10^{-6} Risk-Based PRG, Above Background[b]	Source[c]	Concentration[d]	Groundwater[e]
2,3,4,7,8-Pentachlorodibenzofuran		2E-07	2E-09			
Pentachlorodibenzofuran		4E-07	4E-09			
2,3,7,8-Tetrachlorodibenzofuran		2E-06	2E-08			
3,3-Dichlorobenzidine[h]						
Tetrachlorodibenzofuran[h]						
Vinyl chloride		2	0.02	MCL	2	2

TABLE 7-12
(Continued)

[a]PRG developed using equation and parameters for drinking water ingestion and chemical-specific RfDs from Health Effect Assessment Summary Tables (HEAST) and the Integrated Risk Information System (IRIS).
[b]PRG developed using equations and parameters for drinking water ingestion and chemical-specific Slope factors from HEAST and IRIS values represent cleanup goal above background since 10^{-6} represents an incremental lifetime cancer risk goal.
[c]ARAR-based PRGs are developed from several sources. The primary source is promulgated or proposed Maximum Contaminant Levels (MCLs) developed under the Safe Drinking Water Act, 40 CFR 141, 142. If no MCL exists that strictly applies to the individual radionuclide, a PRG is developed using the 4 mrem dose limit that strictly applies to man-made beta and gamma emitters.
[d]Concentration in pCi/L for radionuclides and g/L for chemicals corresponding to MCL or proposed MCL (PMCL) values.
[e]Based on OAC 3745-81-16; for many radionuclides, values are based on an average dose of beta particle and photon (e.g., gamma) of 4 mrem/yr.
[f]PRG based on interpretation to 4 mrem/yr dose limit for beta and gamma emitters may be applicable to alpha emitters. PRG developed using Committed Effective Dose Equivalents (CEDE) to 4 mrem/yr of intake at a rate of 730 L/yr, using Dose Conversion Factors from Ferderal Guidance Report No. 11; EPA-520/1-88-020; "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion."
[g]Proposed MCLs from "Federal Register," Vol. 55, No. 138, p. 33050. Uranium isotope PMCLs are developed assuming a natural isotopic distribution.
[h]No toxicity data available to develop a PRG.
[i]MCL goal based on best available treatment technology, no value for MCL.
[j]Tetrachloroethene also commonly referred to as Tetrachloroethylene.

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TABLE 7-13

SUMMARY OF MCLs, MCLGs, AND SECONDARY MCLs

Constituents	40 CFR 141.62 SDWA MCL (mg/L)	OAC 3745-81-11 MCL (mg/L)	40 CFR 257.3-4 and 264.94 Subparts C and D OAC-3745-27-10 MCL (mg/L)	40 CFR 141.50 and 141.51 SDWA-NPDWS OAC 3745-81-11 MCLG (mg/L)	40 CFR 143 OAC 3745-82-02 SMCL (mg/L)
Antimony	0.006			0.006	
Arsenic	0.05[a]	0.05	0.05		
Barium	2.0	1.0	1.0	2.0	
Beryllium	0.004			0.004	
Cadmium	0.005	0.001	0.01	0.005	
Chloride					250
Chromium	0.1	0.05	0.05	0.1	
Copper	1.3			1.3	1.0
Cyanide	0.2			0.2	
Fluoride					2.0
Iron					0.3
Lead	0.015	0.05	0.05		
Manganese					0.05
Mercury	0.002	0.002	0.002		
Nickel	0.1			0.1	
Nitrate			10.0		
Radium-226/228	20 pCi/L[b]	5 pCi/L			
Radon-222	300 pCi/L[b]				
Selenium	0.05	0.01	0.01	0.05	
Silver					
Thallium	0.001			0.0005	

FER/OU1RI/TK.1229.713/09-30-93 12:07am

1058

4783

TABLE 7-13
(Continued)

Constituents	40 CFR 141.61 SDWA MCL (mg/L)	OAC 3745-81-12 MCL (mg/L)	40 CFR 257.3-4 and 264.94 Subparts C and D OAC-3745-27-10 MCL (mg/L)	40 CFR 141.50-51 SDWA-NPDWS OAC 3745-81-11 MCLG (mg/L)
2,4-D			0.1	
2,4,5 - TP Silvex			0.01	
Benzo(a)anthracene	0.0001[b]			
Benzo(a)pyrene	0.0002			
Benzo(a)fluoranthene	0.0002[b]			
Carbon tetrachloride	0.005	0.005		
Chrysene	0.0002[b]			
Dibenzo(a,h)anthracene	0.0003[b]			
Endrin	0.002	0.002	0.002	0.002
Heptachlor epoxide	0.0002			
Indeno(1,2,3-c,d)pyrene	0.0004[b]			
Lindane			0.004	
Methoxychlor			0.1	
Polychlorinated biphenyls	0.0005			
Toluene	1.0			1.0
Toxaphene			0.005	
Trihalomethanes	0.10[c]	0.10		
Xylenes	10.0			10.0

5.0

FER/OU1RI/TK.1229.713/09-30-93 12:07am

1259

7-4288

TABLE 7-13
(Continued)

[a]The MCL for arsenic, contained in 40 CFR 141.11, is the only inorganic MCL not superseded by 40 CFR 141.62.
[b]Proposed MCL
[c]The MCL for total trihalomethanes, contained in 40 CFR 141.12, is the only organic MCL not superseded by 40 CFR 141.61.

TABLE 7-14

PRELIMINARY REMEDIATION GOALS FOR SURFACE WATER BASED ON PROTECTION OF AQUATIC SPECIES

Chemical	ARAR/TBC-Based PRGs		Other Considerations	
	Federal Ambient Water Quality Criteris[a] (acute/chronic) (mg/l)	Ohio State Water Quality Standards[b] (maximum/30-day average) (mg/l)	Background Upper Tolerance Limit[c] (mg/l)	Contract Required Detection Limit[d] (mg/l)
INORGANICS				
Antimony	9/1.6(*)	0.65/0.19		0.06
Arsenic	0.36/.10(*)	0.36/0.19		0.01
Beryllium	0.13/0.0053(*)	3.75/0.17		0.005
Cadmium	0.0039/0.0011(+)	0.02/0.02	0.0002	0.005
Chromium	1.7/0.210	4.92/0.46	0.027	0.01
Copper	0.018/0.012(+)	0.06/0.04	0.01	0.02
Iron	-/1.0		1.30	0.1
Lead	0.082/0.032(+)	0/63/0.03	0.002	0.005
Mercury	0.0024/0.000012	0.001.0.0002		0.0002
Nickel	1.4/0.16(+)	4.51/0.50	0.036	0.04
Selenium	0.28/0.036	0.02/0.005		0.005
Silver	0.0041/0.00012(+)	0.01		0.01
Thallium	1.4/0.04(*)			0.01
Zinc	0.12/0.11(+)	0.33/0.30	0.014	0.02
Cyanide	0.022/0.0052	0.046/0.012 (E)		0.01
ORGANICS				
1,1,2-Trichloror-1,2,2-trifluoroethane	2.4/9.02(*)			
1,1,2,2-Tetrachloroethane		1/0.36		
1,1,1-Trichloroethane	31.2/ - (*)	2/0.088		0.005
1,1-Dichloroethene	11.6/ - (*)	1.5/0.078		0.00
1,2-Dichloroethane	118/20(*)	12/3.5		0.005

TABLE 7-14
(Continued)

Chemical	ARAR/TBC-Based PRGs		Other Considerations	
	Federal Ambient Water Quality Criteris[a] (acute/chronic) (mg/l)	Ohio State Water Quality Standards[b] (maximum/30-day average) (mg/l)	Background Upper Tolerance Limit[c] (mg/l)	Contract Required Detection Limit[d] (mg/l)
1,2-cis-Dichloroethene	11.6/ - (*)			
1,2-trans-Dichloroethene	11.6/ - (*)			0.005
2,4-Dimethylphenol	2.12/ - (*)			0.01
Acenapthene	1.7/0.52(*)	0.067/0.067		0.01
Acetone		0.55/0.078		0.01
Aroclor-1242	0.002/0.000014	-/0.001		0.0005
Aroclor-1248	0.002/0.000014	-/0.001		0.0005
Aroclor-1254	0.002/0.000014	-/0.001		0.001
Aroclor-1260	0.002/0.000014	-/0.001		0.001
Benzene	5.3/ - (*)	1.1/0.56		0.005
Bis(2-ethylhexyl)phthalate		1.1/0.0084		0.01
Butyl benzyl phthalate		0.23/0.049		0.01
Carbon Tetrachloride	35.2/ - (*)	1.8.0.28		0.005
Chlordane	0.0024/0.0000043	0.00001/0.0000048		0.0005
Chlorobenzene	0.25/0.05(*)	0.59/0.026		0.005
Chloroform	28.9/1.24(*)	1.8.0.079		0.005
DDT	0.0011/0.000001	0.000001/0.00000024		
Di-n-Butyl Phthalate		0.35/0.19		0.001
Ethylbenzene	32/ - (*)	1.4/0.062		0.005
Flouranthene	3.9 - (*)	0.2/0.0089		0.01
beta-Hexachlorocyclohexane	0.002/0.00008	0-0.00055		0.00005
Mehtylene Chloride		9.7/0.43		0.005
N-nitrosodiphenylamine		0.29/0.013		0.01
Naphthalene	2.3/0.620	0.16/0.044		0.01

TABLE 7-14
(Continued)

Chemical	ARAR/TBC-Based PRGs		Other Considerations	
	Federal Ambient Water Quality Criteris[a] (acute/chronic) (mg/l)	Ohio State Water Quality Standards[b] (maximum/30-day average) (mg/l)	Background Upper Tolerance Limit[c] (mg/l)	Contract Required Detection Limit[d] (mg/l)
Pentachlorophenol	0.02/0.013(++)	0.04/0.22		0.05
Phenol	10.2/2.5(*)	5.3/0.37 (E)		0.01
Tetrachloroethene	5.28/0.84(*)	0.54/0.073		0.005
Toluene	17.5/	2.4/1.7		0.005
Trichloroethene	46/21.9(*)	0.0 1.7/0.0075		
Vinyl Chloride	0.002	/5.25		0.01
Xylenes (total)	10			0.005

[a] Federal ambient water quality criteria from "Quality Criteria for Water 1986" (EPA, 1986b). Values are for freshwate species. Footnotes as listed in EPA (1986b) include: (*) - hardness dependent criteria (100 mg/l used); (+) - insufficient data to develop criteria, value presented is the LOEL (Lowest Observed Effect Level; (++) - pH dependent criteria (7.8 pH used).

[b] Numerical criteria from Ohio Water Quality sTandards, Chapter 3745-1 of the Ohio Administrative Code. Values are for modified warm water habitats unless noted by (E), which represent "exceptional" warm water habitat.

[c] Ohio EPA data from the Great Miami River (Ohio Environmental Protection Agency, 1989, "Great Miami River Intensive Stream Survey").

[d] From CLP Statement of Work 3900LM01.08.

TABLE 7-15

REMEDIAL ACTION OBJECTIVES
OPERABLE UNIT 1

Medium	Remedial Action Objective
Waste Material	For Human Health: Prevent direct contact with or ingestion of waste material. Prevent leaching of waste material which would result in soil concentrations in excess of the PRGs identified in Section 7.7.2.3 and Table 7-11. Prevent leaching of waste material which would result in groundwater concentrations in excess of the PRGs identified in Section 7.7.2.4 and Table 7-12. Prevent exposures to waste material which may cause an individual to exceed annual dose limits of 25 mrem/yr whole body, 75 mrem/yr to the thyroid or 25 mrem/yr to any other organ. Prevent exposures to waste material which may cause an individual to exceed a 100 mrem/yr effective dose equivalent, above background, from all exposure routes. For Environmental Protection: Prevent leaching of waste material which would result in groundwater concentrations in excess of the PRGs identified in Section 7.7.2.4 and Table 7-12. Prevent release or leaching of waste materials which would result in surface water concentrations in excess of the PRGs identified in Section 7.7.2.5 and Table 7-14.
Surface Water (Impoundments)	For Human Health: Prevent direct contact with or ingestion of impounded water having constituent concentrations in excess of PRGs identified in Section 7.7.2.4 and Table 7-12. Prevent release of impounded water which would result in groundwater concentrations in excess of the PRGs identified in Section 7.7.2.4 and Table 7-12. For Environmental Protection: Prevent release of impounded water which would result in surface water concentrations in excess of the PRGs identified in Section 7.7.2.5 and Table 7-14.

TABLE 7-15
(Continued)

Medium	Remedial Action Objective
Soil	<u>For Human Health:</u> Prevent direct contact with, inhalation of, or ingestion of soil having constituent concentrations in excess of the PRGs identified in Section 7.7.2.3 and Table 7-11. Prevent leaching of soil constituents which would result in groundwater concentrations in excess of the PRGs identified in Section 7.7.2.4 and Table 7-12. Prevent exposures to soil materials which may cause an individual to exceed annual dose limits of 25 mrem/yr whole body, 75 mrem/yr to the thyroid or 25 mrem/yr to any other organ. Prevent exposures to soil materials which may cause an individual to exceed a 100 mrem/yr effective dose equivalent, above background, from all exposure routes. <u>For Environmental Protection:</u> Prevent leaching of soil constituents which would result in groundwater concentrations in excess of the PRGs identified in Section 7.7.2.4 and Table 7-12. Prevent release or leaching of soil which would result in surface water concentrations in excess of the PRGs identified in Section 7.7.2.5 and Table 7-14.

1265