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FY-87 FEED MATERIALS PRODUCTION CENTER ENVIRONMENT, SAFETY, AND HEALTH MANAGEMENT PLAN
APRIL 1987

04/30/87

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FMPC - 2075
Special
UC - 11

FY-87 FEED MATERIALS PRODUCTION CENTER ENVIRONMENT, SAFETY AND HEALTH MANAGEMENT PLAN

By
W. L. Brown
and
D. J. Loudin

April 1987

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FEED MATERIALS PRODUCTION CENTER
Westinghouse Materials Company of Ohio
P. O. BOX 398704
CINCINNATI, OHIO 45239

PREPARED FOR THE
U.S. DEPARTMENT OF ENERGY
WEAPONS DIVISION OF OAK RIDGE OPERATIONS
UNDER CONTRACT DE-AC05-860R21600

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FMPC-2075
Special
UC-11

FY-87 FEED MATERIALS PRODUCTION CENTER FIVE YEAR ENVIRONMENT, SAFETY AND HEALTH MANAGEMENT PLAN

By

W. L. Brown

and

D. J. Loudin

April, 1987

WESTINGHOUSE MATERIALS COMPANY OF OHIO

P.O. Box 398704

Cincinnati, Ohio 45239

Prepared for:

U. S. Department of Energy
Weapons Division of Oak Ridge Operations
Contract DE-AC05-86OR21600

Approved:

Louis C. Bogar

L. C. Bogar, Vice President & Mgr.
Environment, Safety and Health

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FMPC Environmental, Safety and Health Management Plan

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
AHF	Anhydrous Hydrogen Fluoride
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
AR	Funded by Defense Waste and Transportation Management Program
AR-OP	Operating Costs - AR Budget
BACT	Best Available Control Technology
CAA	Clean Air Act
Ci	Curie
CE	Capital Equipment
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CO	Carbon Monoxide
CPR	Cardio-Pulmonary Resuscitation
CPU	Central Processing Unit (computer)
CY	Calendar Year
CWA	Clean Water Act
DCS	Digital Control System
DOE	Department of Energy
DOELAP	DOE Laboratory Accreditation Program
EIS	Environmental Impact Statement
EOC	Emergency Operating Center
EOP	Emission Offset Policy
EPA	Environmental Protection Agency
ES&H	Environment, Safety and Health
FEMA	Federal Emergency Management Agency

FMPC	Feed Materials Production Center (Fernald Plant)
FSAR	Final Safety Analysis Report
FWPCA	Federal Water Pollution Control Act
FY	Fiscal Year
GE	Funded by Nuclear Materials Production Program
GE-OP	Operating Funds--GE Budget
GOCO	Government Owned Contractor Operated
GPP	General Plant Project
HEPA	High Efficiency Particulate (filter)
HF	Hydrogen Fluoride
HVAC	Heating, Ventilation and Air Conditioning
ICRP	International Commission on Radiological Protection
I&E	Inspection and Evaluation
JPIC	Joint Public Information Center
KG	Kilogram
LI	Line Item (budget or project)
LLWPS	Low Level Waste Processing and Shipping
LLWPSS	LLWPS System
MSL	Management Systems Laboratories
MSSA	Master Safeguards and Security Agreement
MT	Metric Ton
NAAQS	National Ambient Air Quality Standards
NAD	Nuclear Accident Dosimeter
NCP	National Contingency Plan
NCRP	National Commission on Radiological Protection
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutant

NFPA	National Fire Protection Association
NFPC	National Fire Protection Code
NLO	NLO, Inc. (prior FMPC operating contractor)
NO_X	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulation (NRC report numbering system)
OAC	Ohio Administrative Code
ODSA	Ohio Disaster Services Agency
OP	Operating Budget
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
OROC	Oak Ridge Operations Center
OS	Outside Services, (consultants, computer, etc.)
OSHA	Occupational Safety and Health Act
OSR	Operational Safety Requirements
PCBs	Poly-Chlorinated Biphenyls
PRP	Productivity Retention Program
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RDA	Radiation Detection and Alarm (system)
R&D	Research and Development
Rem	Roentgen equivalent man (radiation unit)
RI/FS	Remedial Investigation/Feasibility Study
RMI	Reactive Metals Incorporated (Astabula, OH)
SAR	Safety Analysis Report
SARA	Superfund Amendment and Reauthorization Act

SCBA	Self-Contained Breathing Apparatus
SO_x	Oxides of Sulfur
SO_2	Sulfur Dioxide
SSES	Storm Sewer Evaluation Survey
SWDA	Solid Waste Disposal Act (state of Ohio)
TEC	Total Estimated Cost
TLD	Thermo-Luminescent Dosimeter
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulates
TWA	Time-Weighted Average
VHAP	Volatile Hazardous Air Pollutant
WMCO	Westinghouse Materials Company of Ohio (FMPC operating contractor)
Y-12	Y-12 Plant, Oak Ridge, TN.

FMPC ENVIRONMENTAL, SAFETY

AND HEALTH MANAGEMENT PLAN REPORT

Executive Summary

The Feed Materials Production Center (FMPC) employs a wide variety of chemical and metallurgical processes in the manufacture of uranium metal for use in Department of Energy (DOE) programs. As of January, 1986, Westinghouse Materials Company of Ohio (WMCO) became the site contract operator and is administratively responsible to the Oak Ridge Operations Office of the DOE. A principal goal of the company is to meet production requirements by the use of methods that are compatible with environmental emission regulations and with the health and safety of plant personnel.

Therefore, a comprehensive management plan has been formulated whereby the various environmental, safety and health (ES&H) concerns at the site can be met. This plan, herewith presented, is a compendium of all projects which are proposed to be initiated during the next five years for the purpose of complying with applicable regulations. It represents an important step in the coordination of all ES&H programs into an integrated effort for meeting FMPC site concerns and for supporting continued production operations.

The plan has been compiled and edited from submittals made by the various WMCO groups involved with environmental, safety and health efforts at the FMPC. To permit an orderly treatment of the 124 projects proposed and considered in the plan, the projects have been organized into the following segments:

- Air Pollution Control
- Water Pollution Control
- Solids Waste Management
- Remedial Action
- Health Physics and Safety Analysis
- Industrial Hygiene
- Safety and Fire Protection
- Emergency Preparedness

The projects comprising each of these segments are listed in Figures 1 through 8 and the schedule for the activation and completion of each is graphically indicated in the time period extending from fiscal years 1987 through 1992.

A summary of the estimated costs for the projects is presented in Table 1 together with subdivisions into the various types of funding required for each of the plan segments.

The relative priority established by WMCO for each of the projects included in the plan is shown in Table 2. The table also presents the regulations to be met by each project, the program of funding, and type of funding and its status. Additionally, a page index is provided so that the description for each project may be found.

Executive Summary (Continued)

Several sources were consulted in the preparation of the plan to provide information concerning project costs, schedules and descriptions. These sources are enumerated in Section 5 of the plan.

Since issue of the initial plan (Reference 1) in September, 1986, some projects underway at the FMPC have been completed. Notable among these completed projects are the following:

- The on-site meteorological tower which is now in full operation.
- The hand and foot monitors for prevention of radioactive material carry-over into clean areas.
- The stormwater collection basin for prevention of uncontrolled runoff.
- The biodenitrification systems for decreasing nitrate concentration in aqueous effluents.

During the current year, approximately half of the projects cited in the plan will either be initiated or be continued from the previous year. Therefore, much progress in the address of FMPC concerns is expected to be realized during this period.

106.50

Amended 06/25/87

TABLE 1
ES&H FUNDING SUMMARY FOR FMPC

($ million)

Funding			Fiscal Years						
Program	Type	Total	87	88	89	90	91	92	OY
GE	CE	23.46	6.57	2.52	1.34	3.18	3.21	3.23	3.41
	GPP	13.51	1.47	1.80	2.12	1.52	2.20	2.20	2.20
	EH&SI LI	302.00	9.84	35.00	51.16	53.00	57.00	56.00	40.00
	Total	338.97	17.88	39.32	54.62	57.70	62.41	61.43	45.61
GE	OP	201.91	20.94	22.93	28.48	32.39	32.36	32.19	32.62
Program GE - Total		540.88	38.82	62.25	83.10	90.09	94.77	93.62	78.23
AR	CE	2.00	0.30	0.30	0	0.35	0.35	0.35	0.35
	GPP	8.88	1.40	1.48	0	1.50	1.50	1.50	1.50
	LI	230.00			6.00	2.00	78.00	100.00	44.00
	Total	240.88	1.70	1.78	6.00	3.85	79.85	101.85	45.85
AR	OP	51.37	9.47	8.60	9.00	10.40	5.80	4.00	4.10
Program AR - Total		292.25	11.17	10.38	15.00	14.25	85.65	105.85	49.95
All Programs - Totals		833.13	49.99	72.63	98.10	104.34	180.42	199.47	128.18

LEGEND

CE - Capital Equipment

GPP - General Plant Project

LI - Line Item

OP - Operating Cost

OY - Out Year

TABLE 1
ES&H FUNDING SUMMARY FOR FMPC

($ million)

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Program	Type	Total	87	88	89	90	91	92	OY
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	EH&SI LI	302.00	9.84	35.00	51.16	53.00	57.00	56.00	40.00
	Total	338.97	17.88	39.32	54.62	57.70	62.41	61.43	45.61
GE	OP	201.91	20.94	22.93	28.48	32.39	32.36	32.19	32.62
Program GE - Total		540.88	38.82	62.25	83.10	90.09	94.77	93.62	78.23
AR	CE	2.00	0.30	0.30	0	0.35	0.35	0.35	0.35
	GPP	10.45	2.97	1.48	0	1.50	1.50	1.50	1.50
	LI	230.00			3.00	5.00	78.00	100.00	44.00
	Total	242.45	3.27	1.78	3.00	6.85	79.85	101.85	45.85
AR	OP	51.60	9.70	8.60	9.00	10.40	5.80	4.00	4.10
Program AR - Total		294.05	12.97	10.38	12.00	17.25	85.65	105.85	49.95
All Programs - Totals		834.93	51.79	72.63	95.10	107.34	180.42	199.47	128.18

LEGEND

CE - Capital Equipment

GPP - General Plant Project

LI - Line Item

OP - Operating Cost

OY - Out Year

TABLE 2

SUMMARY OF ES&H MANAGEMENT PROJECTS

PRIOR-ITY	PROJECT NAME	APPLICABLE REGULATION	ES&H CATEGORY	LOCATION PAGE NO.	FUND PROG	TYPE FUNDING	TEC ($1,000's)	STATUS
1	Replace/Upgrade Dust Collection Systems	DOE 5480.4/CAA	E-Air	2-13	GE	CE	5680	
						LI	47479	
2	Stack Sampling Equipment	DOE 5480.4	E-Air	2-14	GE	CE	30	
3	In-Vivo Monitoring Equipment & Facility	DOE 5480.1A/OSHA	H&S	3-13	GE	GPP	975	Started FY 86
4	Interim Pit Stabilization	DOE 5820.2/CERCLA	E-Waste	2-60	AR	OP	256	Started FY 86
5	Emergency Warning System	DOE 5484.1/5500.2/5500.3	H&S	4-9	GE	GPP	365	Started FY 86
6	Remedial Investigation/Feasibility Study	DOE 5820.2	E	2-56	AR	OP	1430	Started FY 86
7	Stack Samplers/Monitors/Alarms	DOE 5480.4	E-Air	2-13	GE	CE	200	Started FY 86
8	Low-Level Waste Operations Procedures	DOE 5820.2	E-Waste	2-44	AR	OP	578	Started FY 86
9	Cover for Pit 4	DOE 5820.2/RCRA	E-Waste	2-60	AR	GPP	505	
10	Waste Inventory Data Base	DOE 5820.2	E-Waste	2-45	AR	CE	75	Started FY 86
11	FMPC Safety Analysis Reports	DOE 5480.1A	H&S	3-2	GE	OP	4066	Started FY 86
12	Locker Room Modifications	DOE 5480.1A/OSHA	H&S	3-11	GE	LI	7163	Started FY 86
13	Plant-Specific Emergency Operating Proc.-Update	DOE 5484.1/5500.2/5500.3	H&S	4-8	GE	OP	20	Started FY 86
14	Gas Calibration Balance	DOE 5480.1	H&S	3-31	GE	CE	8	
15	K-65 Silo Remediation	CERCLA	E-Waste	2-58	AR	OP	1330	Started FY 87
16	Comprehensive Ventilation Survey	DOE 5480.1A/OSHA	H&S	3-34	GE	OP	500	
17	Respirator Washing Facility	DOE 5480.1A/OSHA	H&S	3-33	GE	CE	80	
18	General Plant Housekeeping Equipment	DOE 5480.1A/OSHA	H&S	3-35	GE	CE	160	
19	Replace Medical Ambulance	DOE 5480.1A	H&S	3-40	GE	CE	55	Started FY 86
20	Manhole 175 (River Discharge) Improvements	DOE 5480.4/NPDES/CWA	E-Water	2-35	GE	GPP	400	
21	Surface and Groundwater Controls	DOE 5820.2	E-Waste	2-59	AR	GPP	133	
22	Thorium Removal - Plant 8	DOE 5480.14	E-Waste	2-61	GE	LI	2261	
						OP	2800	
23	Enclose Saws and Lathes	DOE 5480.1A	H&S	3-13	GE	LI	2761	
24	Emergency Operating Center	DOE 5484.1/5500.2/5500.3	H&S	4-8	GE	LI	1700	
25	General Plant Ventilation Upgrade	DOE 5480.1A/OSHA	H&S	3-34	GE	LI	55000	
26	Hexavalent Chromium Removal	CWA/RCRA	E-Water	2-32	GE	LI	350	
27	K-65 Surface Water Control	CWA	E-Water	2-30	GE	GPP	200	
28	Waste Oil Disposition	DOE 5820.2/RCRA/TSCA	E-Waste	2-46	AR	OP	607	
29	Characterization Information Studies	DOE 5820.2/CERCLA	E-Waste	2-58	AR	OP	2090	
30	Chemical Warehouse Study	DOE 5820.2	E-Waste	2-45	AR	GPP	108	
31	Plantwide Fire Protection Improvements	DOE 5480.1A/NFPC	H&S	3-38	GE	LI	852	
32	TSCA Incinerator Support	DOE 5820.2/RCRA/TSCA	E-Waste	2-47	AR	OP	3836	

TABLE 2

SUMMARY OF ES&H MANAGEMENT PROJECTS

PRIORITY	PROJECT NAME	APPLICABLE REGULATION	ES&H CATEGORY	LOCATION PAGE NO.	FUND PROG	TYPE FUNDING	TEC ($1,000's)	STATUS
33	Low-Level Waste Disposal Cost Reduction	DOE 5820.2	E-Waste	2-44	AR	OP	147	
34	Low-Level Waste Processing & Shipping	DOE 5820.2/DOT	E-Waste	2-44	AR	OP	33278	
35	Materials Handling Improvements	DOE 5480.1A/OSHA	H&S	3-11	GE	LI	28683	
36	Respirator Fit-Testing Facility	DOE 5480.1A/OSHA	H&S	3-29	GE	LI	150	Started FY 87
37	Low-Level Waste Volume Reduction	DOE 5820.2/RCRA/CERCLA	E-Waste	2-44	AR	OP	2183	
38	Offsite Groundwater Monitoring System Expansion	CWA	E-Water	2-36	GE	OP	40	
39	Fire Alarm System Expansion	DOE 5480.1A/NFPA	H&S	3-39	GE	LI	372	Started FY 86
40	On-Site Emergency Preparedness	DOE 5484.1/5500.2/5500.3	H&S	4-6	GE	OP	60	
41	New Test Wells	CWA	E-Water	2-35	GE	GPP	560	
42	Training and Employee Incentive Programs	DOE 5480.1A/5483.1A	H&S	3-40	GE	OP	1320	
43	Hazardous Chemical Labeling/Tracking System	DOE 5480.1A/OSHA/TSCA	H&S	3-31	GE	CE	50	
44	Leakproof Dikes	DOE 5480.4/CWA	E-Water	2-33	GE	LI	646	
45	Decontamination & Decommissioning Facility	DOE 5820.2/CERCLA	E-Waste	2-46	GE	LI	6250	
46	Warehouse - North Plant 9	DOE 5480.4/CWA	E-Water	2-33	GE	LI	956	
47	Control Storage Pads	DOE 5480.4/CWA	E-Water	2-33	GE	LI	2621	
48	Mobile Lab Equipment	DOE 5820.2	E-Waste	2-45	AR	CE	161	
49	Uranium Reduction in Offsite Wells	CERCLA/CWA/NPDES	E-Waste	2-59	GE	LI	7376	
50	Surface Decontamination Equipment	RCRA	E-Waste	2-45	AR	CE	60	
51	Receiving and Material Inspection Facility	DOE 5480.1A	H&S	3-11	GE	LI	4290	
52	Plant Evacuation Alarm System	DOE 5480.1A/5483.1A/NFPA	H&S	3-39	GE	LI	512	
53	Asbestos Pipe Insulation Removal	DOE 5480.1A/OSHA	H&S	3-33	GE	GPP	1500	
54	RCRA Oil Incineration	DOE 5820.2/RCRA	E-Waste	2-47	AR	GPP	60	
55	Cover East Storage Pad - Plt. 8	DOE 5480.4/CWA	E-Water	2-33	GE	LI	1369	
56	Uranium Removal From Stormwater	CWA	E-Water	2-27	GE	LI	1629	
57	K-65 Silo Sampling	CERCLA	E-Waste	2-59	AR	OP	518	
58	Support For RCRA/RMI	DOE 5820.2/RCRA	E-Waste	2-46	AR	OP	385	
59	Radiation Detection Alarm Upgrade	DOE 5480.1A CHAPTER V	H&S	3-20	GE	LI	300	
60	Smoke Detection System	NFPC/DOE 5480.1A	H&S	3-38	GE	LI	99	
61	In-House Dosimetry System	DOE 5480.1A/OSHA	H&S	3-13	GE	CE	50	
62	Noise Monitoring Instrumentation	DOE 5480.1A/OSHA	H&S	3-31	GE	CE	15	
63	Plant 1 Control Pad and Shelter	CWA	E-Water	2-34	GE	LI	27567	
64	Repair Boiler Plant Insulation	DOE 5480.1A/OSHA	H&S	3-34	GE	OP	90	
65	Operating Costs-Health Physics & Safety Analysis	DOE 5480.1A	H&S	3-13	GE	OP	18000	
66	Automatic Telephone Dialing System	DOE 5484.1/5500.2/5500.3	H&S	4-10	GE	LI	81	

TABLE 2

SUMMARY OF ES&H MANAGEMENT PROJECTS

PRIOR-ITY	PROJECT NAME	APPLICABLE REGULATION	ES&H CATEGORY	LOCATION PAGE NO.	FUND PROG	TYPE FUNDING	TEC ($1,000's)	STATUS
67	NOx Destructor - Plant 9 Pickling	DOE 5480.4	E-Air	2-13	GE	LI	1547	Started FY 86
68	Emergency Message System Upgrade	DOE 5484.1/5500.2/5500.3	H&S	4-8	GE	CE	130	
69	Storage Building for Analytical Chemicals	DOE 5480.1A/OSHA	H&S	3-34	GE	LI	80	
70	Convert Dry Cleaning System to New Solvent	DOE 5480.1A/OSHA	H&S	3-33	GE	CE	5	
71	Water Quality Improvement, Recycle and Reuse	CWA	E-Water	2-30	GE	LI	76185	
72	Conveyor-Chemical Warehouse	DOE 5820.2	E-Waste	2-45	AR	CE	99	
73	Health and Safety Building Expansion	DOE 5480.1A/OSHA	H&S	3-33	GE	LI	14676	
74	Change General Shop Solvent	DOE 5480.1A/OSHA	H&S	3-33	GE	CE	5	
75	Ferrous Metal Scrap Disposition	DOE 5820.2	E-Waste	2-46	AR	OP	4533	
76	Spectrophotometric Air Monitor for UF6	DOE 5480.1A/OSHA/NESHAP	H&S	3-29	GE	CE	50	
77	Controlled Storage Pad West - Plant 8	DOE 5480.4/CWA	E-Water	2-33	GE	LI	485	
78	Storage Building for Finished U Metal	DOE 5480.1A/CWA	H&S	3-11	GE	LI	1815	
79	20% Storage Racks and Pallets	DOE 5480.3/5480.5	H&S	3-21	GE	CE	95	
80	Pilot Plant Sump System Improvements	CWA	E-Water	2-27	GE	LI	2219	
81	Nuclear Criticality Safety Training	DOE 5480.1A CHAPTER V	H&S	3-20	GE	OP	400	
82	In-House Nuclear Accident Dosimetry	DOE 5480.1A CHAPTER II & V	H&S	3-20	GE	CE	17	Started FY 86
83	Breathing Air System Survey	DOE 5480.1	H&S	3-32	GE	OP	40	
84	Upgrading of Operating Procedures-Air Pol. Control	CERCLA/CAA	E-Air	2-15	GE	OP	60	
85	Existing Landfill Expansion	SWDA	E-Waste	2-48	GE	OP	60	
86	RCRA Storage Facility	DOE 5820.2/RCRA	E-Waste	2-47	AR	OP	35	
87	Respirator Face-Piece Test Fixture	DOE 5480.1A/OSHA	H&S	3-29	GE	CE	20	
88	Surge Lagoon Line Replacement	DOE 5480.4/CWA	E-Water	2-36	GE	GPP	600	
89	Plantwide Lighting Upgrade	DOE 5480.1A	H&S	3-36	GE	LI	6957	
90	2.1% Enriched Metal Transport Safety Studies	DOE 5480.3	H&S	3-21	GE	OP	390	
91	Pilot Plant Green Salt Pad Enclosure	DOE 5480.4/CWA	E-Water	2-34	GE	LI	330	
92	Storage, Maint. & Office Building - Boiler Plant	DOE 5480.1A	H&S	3-38	GE	LI	457	
93	Radiological Assistance Vehicle	DOE 5484.1/5500.2/5500.3	H&S	4-10	GE	CE	75	
94	Modernization of Buildings	DOE 5480.1A/OSHA/NFPA	H&S	3-32	GE	LI	12750	
95	Analytical Facility Upgrade	DOE 5484.1A/5500.2/5500.3	H&S	4-18	GE	LI	15940	
96	Internal Audit Program-Emergency Preparedness	DOE 5484.1A/5500.2/5500.3	H&S	4-10	GE	OP	50	
97	In-Process Storage Improvements	CWA	E-Water	2-29	GE	LI	7639	
98	Air Monitoring Stations	DOE 5480.4	E-Air	2-14	GE	LI	168	
99	Research & Development-Water Pollution Control	CWA	E-Water	2-35	GE	LI	1800	
						OP	240	

TABLE 2

SUMMARY OF ES&H MANAGEMENT PROJECTS

PRIOR-ITY	PROJECT NAME	APPLICABLE REGULATION	ES&H CATEGORY	LOCATION PAGE NO.	FUND PROG	TYPE FUNDING	TEC ($1,000's)	STATUS
100	Nuclear Criticality Safety Studies	DOE 5480.1A CHAPTER V	H&S	3-18	GE	OP	445	
101	Toxic Atmospheric Dispersion Modeling System	DOE 5500.3	E-Air	2-15	GE	LI	887	
						OP	120	
102	Spent Lime Sludge Drying Beds	CWA	E-Waste	2-47	GE	OP	50	
103	Offsite Training-Emergency Preparedness	DOE 5484.1/5500.2/5500.3	H&S	4-8	GE	OP	50	
104	Laundry Detention Sump	FWPCA	E-Water	2-27	GE	GPP	100	
105	Backlog Rubble Segregation	DOE 5820.2	E-Waste	2-60	AR	OP	141	
106	Electrostatic Precipitator - Boiler No. 4	CERCLA/CAA/RCRA	E-Air	2-14	GE	GPP	1000	
107	Abandoned Equipment Removal	DOE 5820.2	E-Waste	2-61	AR	OP	4375	
108	Plant 1 Storage Towers Removal	DOE 5820.2	E-Waste	2-61	GE	OP	350	
109	Remedial Action	CERCLA	E	2-59	AR	OP	2300	
110	Calibration - Wind Tunnel	DOE 5480.1A	H&S	3-29	GE	CE	10	
111	Flyash Stabilization / Disposition	DOE 5820.2/CERCLA	E	2-60	GE	GPP	750	
112	Mobile Offsite Command Post	DOE 5484.1/5500.2/5500.3	H&S	4-9	GE	GPP	125	
113	Warehouse - Plant 8	DOE 5480.4/CWA	E-Water	2-34	GE	LI	1316	
114	Computer for Safety Analysis	DOE 5481.1A/OR 5481.1B	H&S	3-4	GE	CE	25	
115	Development Support Pro.-Air Pollution Control	CERCLA/CAA	E-Air	2-14	GE	OP	720	
116	Audit Program-Health Physics & Safety Analysis	DOE 5480.1A	H&S	3-3	GE	OP	8	
117	UF6 Storage Facility - Building 54	DOE 5480.4/CWA	E-Water	2-34	GE	LI	784	
118	Sewage Treatment Improvements	DOE 5480.4/CWA	E-Water	2-32	GE	GPP	1100	
119	Car/Truck Wash	CWA	E-Water	2-27	GE	GPP	50	
120	Remedial Action Waste Cleanup	DOE 5820.2/CERCLA	E-Waste	2-60	AR	LI	230000	
						OP	535	
121	HEPA Test Equipment	DOE 5480.1A	H&S	3-32	GE	CE	25	
122	Respirator Fit Test Instrumentation	DOE 5480.1A	H&S	3-32	GE	GE	30	
123	Follow-up Ventilation Survey	DOE 5480.1A	H&S	3-32	GE	OP	250	
124	Particulate Air Monitoring Instrument	DOE 5480.1A	H&S	3-32	GE	CE	10	

Figure 1 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Air Pollution Control

Planned Improvements		Fiscal Years						
		87	88	89	90	91	92	OY
Radionuclide Emission	*Replace/Upgrade Dust Collection Systems	▬	▬	▬	▬	▬	▬	
	Stack Samplers/Monitors/Alarms	▬	▬					
NO_x/Criteria Pollutants	*NO_x Destructor - Plant 9	▬	▬					
	Electrostatic Precipitator - Boiler No. 4				▬			
Other Air Pollution Control Improvements	Stack Sampling Equipment	▬	▬					
	*Air Monitoring Stations		▬	▬				
	Development Support Program	▬	▬	▬	▬	▬	▬	▬
	Upgrading Air Pollution Control Op. Procedures	▬						
	*Toxic Atmospheric Dispersion Modeling System	▬	▬					

NOTE: Items with * indicate EH&SI Line Item Project 87-D-159

Figure 2 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Water Pollution Control

Planned Improvements		Fiscal Years 87	88	89	90	91	92	OY
Collection and Pretreatment	*Pilot Plant Sump System Improvements							
	Laundry Detention Sump Uranium Removal Equipment							
	Car/Truck Wash Sump Pollutant Removal Equipment							
	*Uranium Removal from Stormwater							
	*In-Process Storage Improvements							
	K-65 Area Surface Water Control							
Primary Treatment	*Water Quality Improvement, Recycle, and Reuse							
	*Hexavalent Chromium Removal							
	Sewage Treatment Facility Improvements							
Countermeasure Facilities	*Warehouse - North Plant 9							
	*Warehouse - Plant 8							
	*UF_6 Storage - Building 54							
	*Leakproof Dikes Recoating, Maintenance, & Expansion							
	*Control Storage Pads							
	*Plant 1 Control Pad and Shelter							
	*Cover East Storage Pad - Plant 8							
	*Controlled Storage Pad West - Plant 8							
	*Pilot Plant Green Salt Storage							
Monitoring of Effluents	Manhole-175 (River Discharge) Improvements							
	New Test Wells							
	Offsite Groundwater Monitoring System Expansion							
	Surge Lagoon Line Replacement							

NOTE: Items with * indicate EH&SI Line Item Project 87-D-159

Figure 3 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Solid Waste Management

Planned Improvements		Fiscal Years						
		87	88	89	90	91	92	OY
Low-Level Radioactive Waste Management	Low-Level Waste Operations Procedures	■	■	■	■	■	■	■
	Low-Level Waste Processing and Shipping	■	■	■	■	■	■	■
	Low-Level Waste Volume Reduction	■	■					
	Low-Level Waste Disposal Cost Reduction	■	■					
	Waste Inventory Data Base (Ongoing Waste Streams)	■	■	■	■	■	■	■
	Chemical Warehouse Modification	■						
	Conveyor-Chemical Warehouse	■						
	Surface Decontamination Equipment	■						
	Mobile Laboratory Equipment	■						
	Ferrous Scrap Metal Disposition	■	■	■	■	■	■	■
	*Decontamination and Decommissioning Facility	■	■	■				
Hazardous/Mixed Waste Disposition	Support for RCRA/RMI		■	■	■	■	■	■
	Waste Oil Disposition	■			■			
	TSCA Incinerator Support	■	■	■	■	■	■	■
	RCRA Storage Facility	■	■	■				
Conventional Industrial Waste	Spent Lime Sludge Drying Beds		■	■				
	Existing Landfill Expansion	■						

NOTE: Items with * indicate EH&SI Line Item Project 87-D-159

Figure 4 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Remedial Action Projects

Planned Improvements		Fiscal Years 87	88	89	90	91	92	OY
Accumulated Waste Disposition	Remedial Investigation/Feasibility Study (RI/FS)	■	■					
	Characterization Information Study	■						
	K-65 Silo Remediation	■	■					
	K-65 Silo Sampling		■					
	Remedial Action			■	■	■	■	■
	*Uranium Reduction in Off-Site Wells				■	■		
	Surface and Groundwater Controls	■	■					
	Interim Pit Stabilization	■	■					
	Cover for Pit 4	■						
	**Remedial Action Waste Cleanup		■	■	■	■	■	■
	Backlog Rubble Segregation	■	■					
	Fly Ash Stabilization/Disposition		■					
	*Thorium Removal - Plant 8	■						
Surplus Facilities Management	**Abandoned Equipment Removal			■	■	■	■	■
	**Plant 1 Storage Towers Removal			■				

NOTE: Items with * indicate EH&SI Line Item Project 87-D-159
Items with ** indicate Line Item Project 87-D-146
(Major Systems Acquisition)

Figure 5 FMPC HEALTH AND SAFETY MANAGEMENT PLAN

Health Physics and Safety Analysis

	Planned Improvements	Fiscal Years 87	88	89	90	91	92	OY.
Health Physics Radiation Protection	*Storage Building for Finished U Metal		■	■				
	*Material Handling Improvements		■	■				
	*Receiving and Incoming Materials Inspection Area		■	■				
	*Locker Room Modifications	■	■					
	*Enclose Saws and Lathes		■	■				
	In-Vivo Monitoring Equipment and Facility	■	■					
	In-house Hand Dosimetry System		■					
Safety Analysis	Purchase Computer for Safety Analysis		■					
	Complete FMPC Final Safety Analysis Report	■	■	■				
Nuclear Criticality Safety	2.1% Enriched Metal Transportation Safety Studies	■	■					
	Nuclear Criticality Safety Studies	■	■	■	■	■	■	■
	Nuclear Criticality Safety Training	■	■	■	■	■	■	■
	In-House Nuclear Accident Dosimetry	■						
	*Radiation Detection Alarm Upgrade		■					
	20% Storage Racks and Pallets		■					
Administrative	Audit Program	■	■	■	■	■	■	■

NOTE: Items with * indicates EH&SI Line Item Project 87-D-159

Figure 6 FMPC HEALTH AND SAFETY MANAGEMENT PLAN

Industrial Hygiene

	Planned Improvements	Fiscal Years 87	88	89	90	91	92	OY
Industrial Hygiene	Respirator Fit Test Facility	■						
	Respirator Face Piece Test Fixture	■						
	Calibration Wind Tunnel	■						
	Spectrophotometric Air Monitor for UF_6	■						
	Noise Monitoring Instrumentation	■						
	Hazardous Chemical Labeling/Tracking System	■						
	Portable Gas/Vapor Monitor	■		■				
	Gas Calibration Balance	■						
	Stack Samplers		■					
	HEPA Test Equipment			■				■
	Particulate Air Monitoring Instrument		■					
	Calibration Equipment		■					
	Respirator Fit Test Instrumentation	■						
	Breathing Air System Survey		■	■	■	■	■	■
	Follow-Up Ventilation Survey						■	■
	Modernization of Buildings				■	■	■	■
	Convert Dry Cleaning System to a New Solvent	■						
	Change General Shop Solvent	■						
	Respirator Washing Facility	■						
	*Health and Safety Building Expansion	■	■	■	■			
	Asbestos Pipe Insulation Removal			■	■	■		
	Repair Boiler Plant Insulation			■	■			
	*Storage Building and Pad for Analytical Chemicals	■						
	General Plant Housekeeping Equipment	■						
	*General Plant Ventilation Upgrade	■	■	■	■			
	Comprehensive Ventilation Survey	■						

NOTE: Items with * indicate EH&SI Line Item Project 87-D-159

Figure 7 FMPC HEALTH AND SAFETY MANAGEMENT PLAN

Occupational Safety and Fire Protection

Planned Improvements		Fiscal Years						
		87	88	89	90	91	92	OY
Occupational Safety	*Plant Wide Lighting Upgrade							
	*Storage, Maintenance and Office Bldg. - Boiler Plant							
	Training and Employe Incentive Program							
Fire Protection	*Smoke Detection Systems Upgrade							
	*Fire Alarm System Expansion							
	*Plant Evacuation Alarm System							
	Replace Medical Ambulance							
	*Plantwide Fire Protection Improvements							

Note: Items with * indicate EH&SI Line Item Project 87-D-159

Figure 8 FMPC EMERGENCY PREPAREDNESS PROGRAM

	Planned Improvements	Fiscal Years 87	88	89	90	91	92	OY
Training	On-Site Emergency Preparedness	■	■	■	■	■	■	■
	Plant Specific Emergency Operating Procedures	■						
	Off-Site Training	■	■					
	Emergency Message System Upgrade	■	■	■				
	*Emergency Operating Center	■	■	■				
	Mobile Off-Site Command Post				■			
	Emergency Warning System	■						
	*Automatic Telephone Dialing System		■	■				
	Radiological Assistance Vehicle			■				
	*Analytical Facility Upgrade		■	■	■			
Administration	Internal Audit Program	■	■	■	■	■	■	■

Note: Items with * indicate EH&SI Line Item Project 87-D-159

INTRODUCTION

1.0 Introduction

1.1 FMPC Background

The Feed Materials Production Center (FMPC) began in the late 1940's when the United States Atomic Energy Commission initiated a long-term plan to establish an in-house integrated production complex for processing uranium and its compounds from natural uranium-ore concentrates. Current operations no longer involve uranium-ore processing, but various chemical and metallurgical process steps support the primary mission of supplying uranium metal fuel cores for production reactors at Richland, Washington and Savannah River, South Carolina. A secondary mission is to supply metal for special purposes to DOE facilities at Oak Ridge, Tennessee (Y-12 Plant) and Rocky Flats, Colorado. All FMPC operations are administered through the Department of Energy (DOE) Oak Ridge Operations (ORO) Office. As of January, 1986, the Westinghouse Materials Company of Ohio (WMCO) operates the FMPC as a government-owned, contractor-operated (GOCO) facility.

The Richland N-Reactor stream is supported by processing enriched uranium scrap residues generated during metal production, plus Purex UO_3 (uranium trioxide) recycle. Enriched UF_6 (uranium hexafluoride) is required to replenish U-235 values consumed in the N-Reactor. All three material types are converted to UF_4 (uranium tetrafluoride), known as green salt, which is the starting point for metal production operations. Production of depleted uranium metal for the Savannah River Mark 31 stream, the Y-12 Plant , and Rocky Flats begins with UF_4 (uranium tetrafluoride) from FMPC inventories.

Since the FMPC produces uranium metal products in support of various DOE Defense programs, it is important that the FMPC maintain high standards of operation in a safe and environmentally compatible manner. A comprehensive and cost-effective Environmental Safety and Health (ES&H) Management Plan is an important element in achieving that goal.

1.2 Location and Site

The FMPC, near Fernald, Ohio, is often referred to locally as the "Fernald Plant". Fernald is approximately twenty miles northwest of downtown Cincinnati near the communities of Miamitown and Ross, as shown in Figure 1-1. The entire plant was operational by the end of 1954. The population centers, distances and directions from the boundaries of the FMPC are given in Table 1-1. Approximately 100,000 people live within a ten-mile radius of the site.

WMCO retained almost all the employes of NLO, Inc., the former FMPC site operator, to take full advantage of their skills, experience, and knowledge of site operations. Full-time employment will

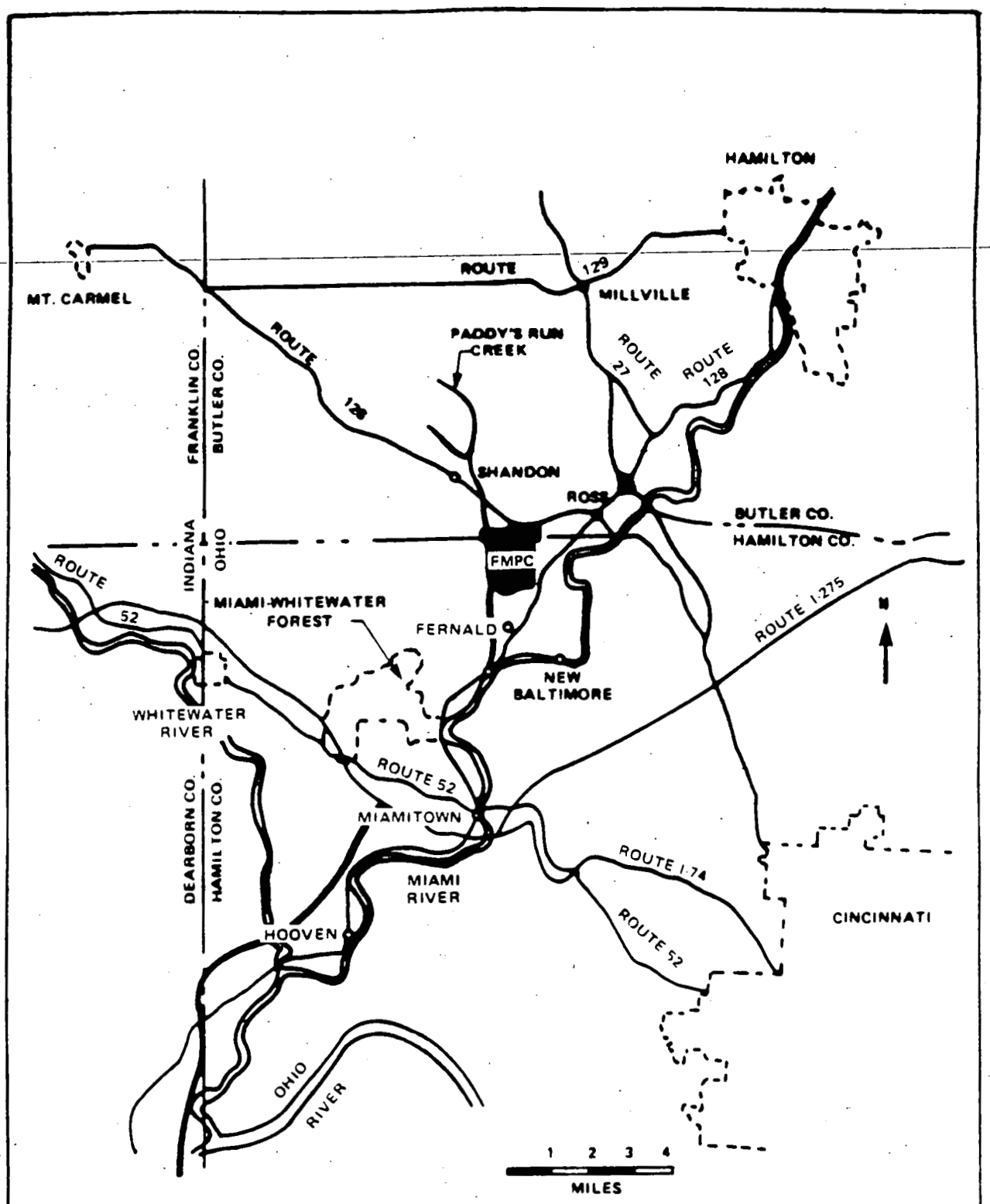


Figure 1-1 Location of Feed Materials Production Center

TABLE 1-1
POPULATION CENTERS WITHIN A
TEN MILE RADIUS

Selected Communities Within 10-mile Radius of the FMPC	Distance (Miles)	Direction	Population[1]
Hamilton (B)	9	NE	63,189
Fairfield (B)	7	ENE	30,777
Ross (B)	3	ENE	5,626
Shandon (B)	3	NW	<1,000
New Haven (H)	3	SW	<1,000
Fernald (H)	1	S	<1,000
New Baltimore (H)	2	SSE	<1,000
Harrison (H)	6	WSW	5,855
Dunlap (H)	3	E	<1,000
Miamitown (H)	7	SSW	<1,000
Millville (B)	7	NNE	<1,000

(H) Hamilton County

(B) Butler County

Note[1] Population figures from US Census Bureau, 9/30/82.

increase from 1352 (as of February, 1986) to approximately 1700 by early 1987. In addition, up to 500 construction and subcontractor personnel are expected on site in 1987 to support various improvement projects. Table 1-2 lists the number of WMCO employes as of December, 1986.

The total area of the site is 1050 acres, of which 850 are in Hamilton County and 200 in Butler County, Ohio. Figure 1-2 shows the current land use at the FMPC, including production facilities; waste pit storage areas; utilities plants and supporting buildings. The layout of the production facilities and support buildings is illustrated in Figure 1-3. This area covers 136 acres and the area under roof is about 19 acres. There are approximately four miles of railroad track and paved road on the site. The paved storage areas total approximately one million square feet.

The elevation of the FMPC is approximately 580 feet. The Great Miami River, into which the site ultimately drains, has a water level elevation of 555 feet at maximum flood stage in the Ross area. Even the worst recorded flood in 1913 would not have affected the area now occupied by the FMPC. Primary environmental features of the FMPC are shown in Figure 1-4. At present, combined liquid effluents from the general sump in the production area, clearwell in the waste pit storage area, sewage-treatment plant and stormwater run-off are discharged to the Great Miami River via an underground line from Manhole-175. During periods of heavy rainfall, stormwater run-off is collected in the Stormwater Retention Basin to prevent discharge to Paddy's Run.

The prevailing winds at the FMPC are from the southwest approximately 34 percent of the time, principally during the warm-weather months. During the winter months the prevailing winds are northerly. Weather data are presently being observed and collected by the recently installed FMPC meteorological tower to provide a more precise picture of actual site meteorology.

1.3 Purpose of the ES&H Management Plan

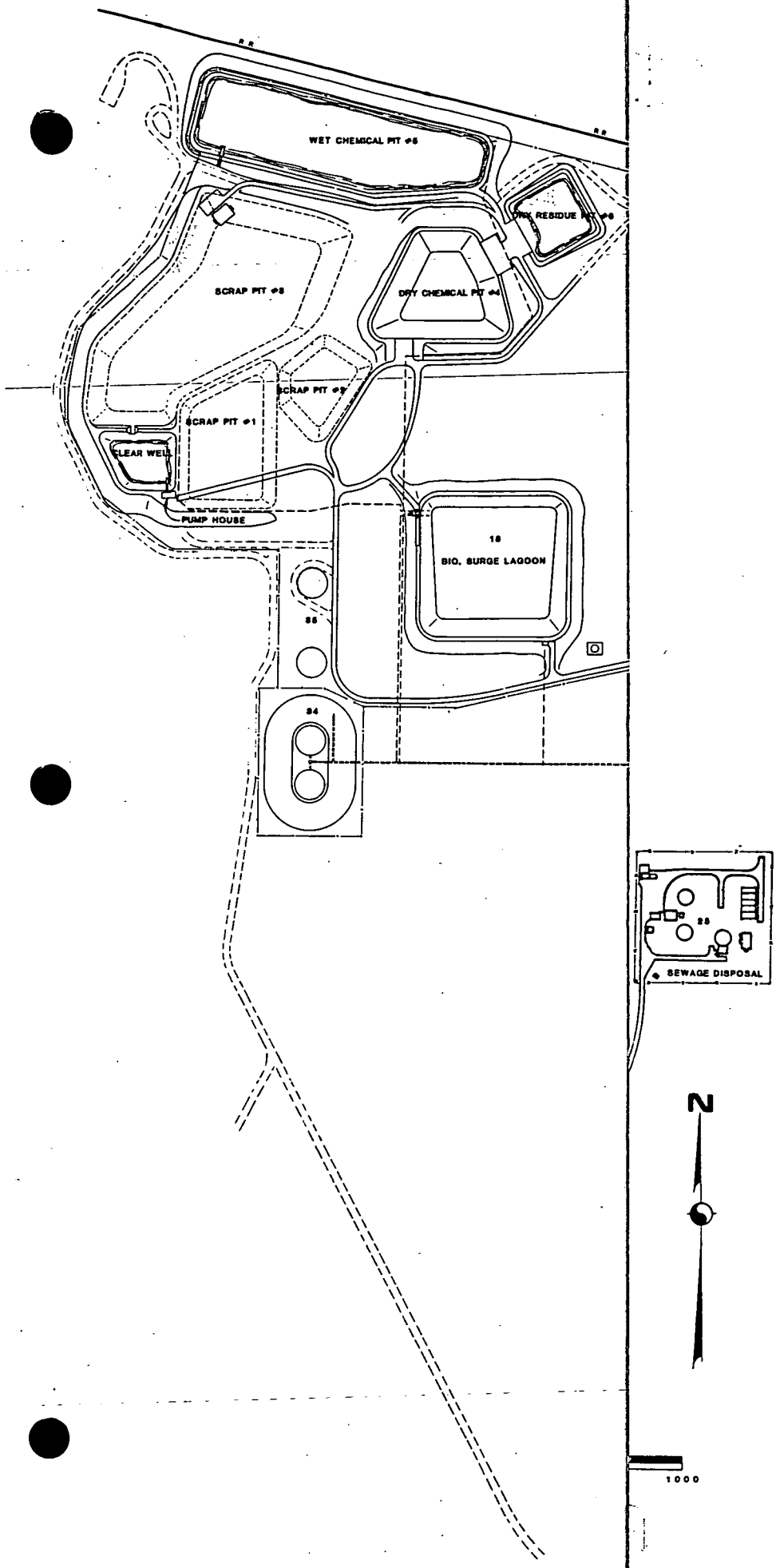
The purpose of the Plan is to provide a comprehensive program that identifies environmental management and health and safety improvement areas by:

- Characterizing the FMPC in terms of potential threats to the environment, safety and health that exist at the site.
- Formulating strategies and programs to maintain the highest standards of operation relative to the environment, safety and health, both on and off site.
- Reviewing applicable regulations and standards, and assuring present and future compliance.

TABLE 1-2

EMPLOYMENT AT FMPC AS OF 12/31/86

Department	Number of Employes		
	Wage	Salary	Total
Administration & Accounting	0	70	70
Community & Environmental Affairs	0	8	8
Office of Counsel	0	4	4
Human Resources	0	22	22
Administrative Services	157	74	231
Quality Assurance	30	34	64
Environment, Safety & Health			
Administrative	0	3	3
Environmental & Radiological Safety	0	50	50
Materials Control & Accountability	0	32	32
Industrial Hygiene & Safety	0	27	27
Medical Services	0	10	10
Regulatory Compliance	0	29	29
Production Operations			
Admin., Training & Scheduling	0	28	28
Maintenance	210	63	273
Power Plant & Utilities	36	12	48
Chemical & Metals Plants	361	72	433
Program Management & Project Integration	0	42	42
Technical			
Administration	0	2	2
Waste Management	0	53	53
4A Program	0	1	1
Construction Coordination	0	4	4
Technical Services			
Support	0	7	7
Analytical	0	74	74
Development	0	8	8
Production Technology	0	27	27
Plant Engineering	0	48	48
Project Engineering	0	22	22
TOTALS	794	826	1620



AREA CODE NUMBER	TITLE
00	General
1	Preparation Plant Silo Storage (South of Sampling Plant)
2	Ore Refinery Plant
3	Nitric Acid Recovery Plant
4	Green Salt Plant
5	Metals Production Plant
6	Metals Fabricating Plant
7	Building 7
8	Recovery Plant
9	Special Products Plant
10	Boiler Plant
11	Service Building
12	Mechanical Shop & Storeroom
13	Pilot Plant (Wet End)
14	Administration Building
15	Laboratories
16	Main Electric Sub-Station
17	General Area Paved Areas (See 74)
18	Water Pollution Control Chemical Feed Building General Sump Biodenitrification Towers Surge Lagoon Storm Water Retention Basin
19	Metal Tank Farm
20	Water Supply System Cooling Tower Cooling Tower Pump House Elevated Storage Tank - East Treated Water Storage Tank Chlorine Building (For Water Treatment Area) Water Wells Reactivator
21	Roads, Sidewalks, Fences, Pits, Etc.
22	Interplant Service & Product Lines Gas Meter House Lift Station Pipe Trestle Truck Scale
23	Communication & Alarm System
24	Railroad System
25	Sanitary Sewer System Sewage Disposal Imhoff Tanks Sludge Beds
26	Fire Protection System Elevated Water Tower - West
27	Mobile Equipment (Also See 47)
28	Security System - Guard House
30	Chemical Warehouse
31	Engine House - Garage
32	Magnesium Storage
34	K-65 Storage Area
35	Metal Oxide Storage Area
37	Pilot Plant Annex (Dry)
38	Propane Storage
39	Incinerator Plant
40	Waste Management - Solids
44	Temporary Structures (Trailers)
45	Building 45
46	Heavy Equipment Garage
47	Mobile Equipment (Also 27)
51	UF_6 to UF_4 Reduction Facility II
53	Health, Safety & Production Control Building
54	UF_6 to UF_4 Reduction Facility I
55	Slag Recycling Plant - East
56	CP Storage Warehouse
60	Quonset Number 1
61	Quonset Number 2
62	Quonset Number 3
63	KC-2 Warehouse
64	Plant 9 Warehouse
65	Plant 5 Warehouse
66	Drum Reconditioning Building
67	Plant 1 Storage Building (No. 1 & No. 2)
68	Pilot Plant Warehouse
69	Decontamination Building
71	General In-Process Storage Warehouse
73	Fire Brigade Training Center
74	Paved Area Storage
75	Site Preparation, Parking Lots

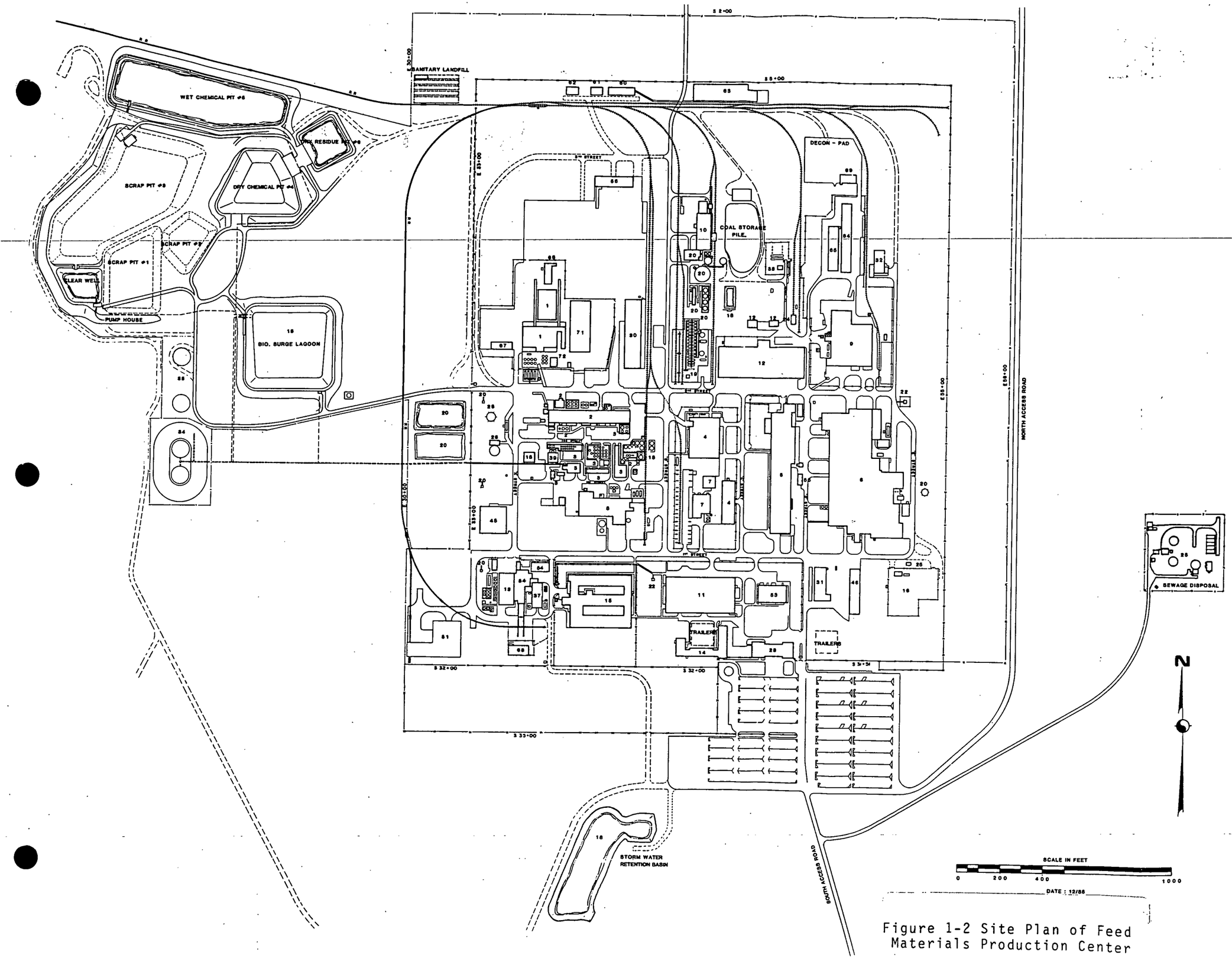


Figure 1-2 Site Plan of Feed Materials Production Center

AREA CODE NUMBER	TITLE
00	General
1	Preparation Plant Silo Storage (South of Sampling Plant)
2	Ore Refinery Plant
3	Nitric Acid Recovery Plant
4	Green Salt Plant
5	Metals Production Plant
6	Metals Fabricating Plant
7	Building 7
8	Recovery Plant
9	Special Products Plant
10	Boiler Plant
11	Service Building
12	Mechanical Shop & Storeroom
13	Pilot Plant (Wet End)
14	Administration Building
15	Laboratories
16	Main Electric Sub-Station
17	General Area Paved Areas (See 74)
18	Water Pollution Control Chemical Feed Building General Sump Biodenitrification Towers Surge Lagoon Storm Water Retention Basin
19	Metal Tank Farm
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21	Roads, Sidewalks, Fences, Pits, Etc.
22	Interplant Service & Product Lines Gas Meter House Lift Station Pipe Trestle Truck Scale
23	Communication & Alarm System
24	Railroad System
25	Sanitary Sewer System Sewage Disposal Imhoff Tanks Sludge Beds
26	Fire Protection System Elevated Water Tower - West
27	Mobile Equipment (Also See 47)
28	Security System - Guard House
30	Chemical Warehouse
31	Engine House - Garage
32	Magnesium Storage
34	K-65 Storage Area
35	Metal Oxide Storage Area
37	Pilot Plant Annex (Dry)
38	Propane Storage
39	Incinerator Plant
40	Waste Management - Solids
44	Temporary Structures (Trailers)
45	Building 45
46	Heavy Equipment Garage
47	Mobile Equipment (Also 27)
51	UF_6 to UF_4 Reduction Facility II
53	Health, Safety & Production Control Building
54	UF_6 to UF_4 Reduction Facility I
55	Slag Recycling Plant - East
56	CP Storage Warehouse
60	Quonset Number 1
61	Quonset Number 2
62	Quonset Number 3
63	KC-2 Warehouse
64	Plant 9 Warehouse
65	Plant 5 Warehouse
66	Drum Reconditioning Building
67	Plant 1 Storage Building (No. 1 & No. 2)
68	Pilot Plant Warehouse
69	Decontamination Building
71	General In-Process Storage Warehouse
73	Fire Brigade Training Center
74	Paved Area Storage
75	Site Preparation, Parking Lots

M-74 (Rev. 11/7/85)

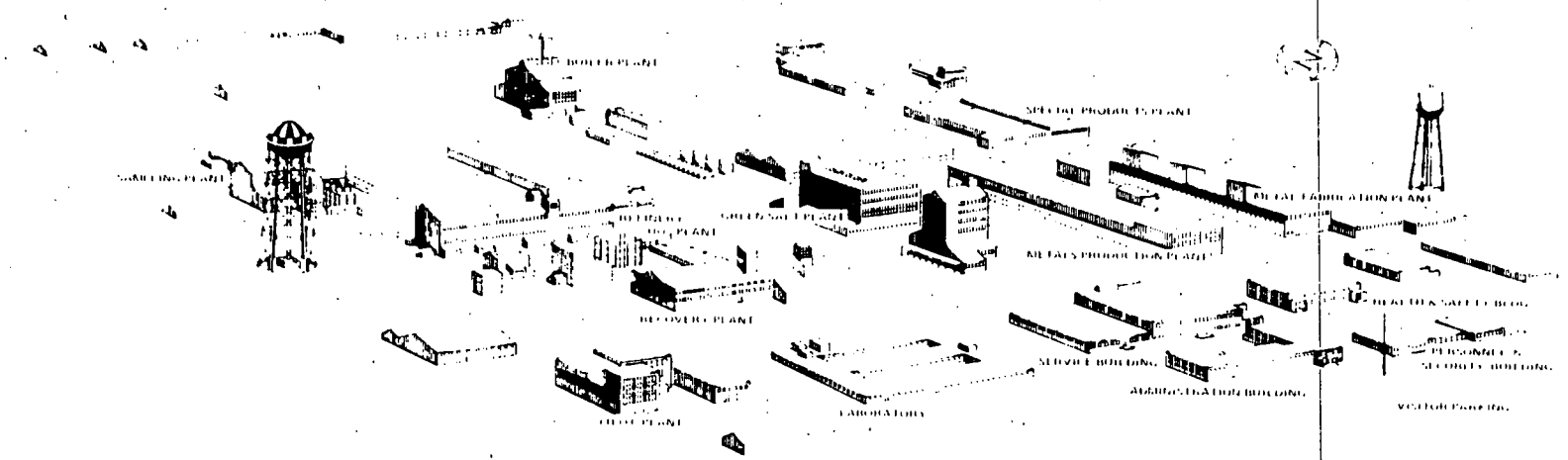

Figure 1-3 Layout of Production Facilities and Support Buildings

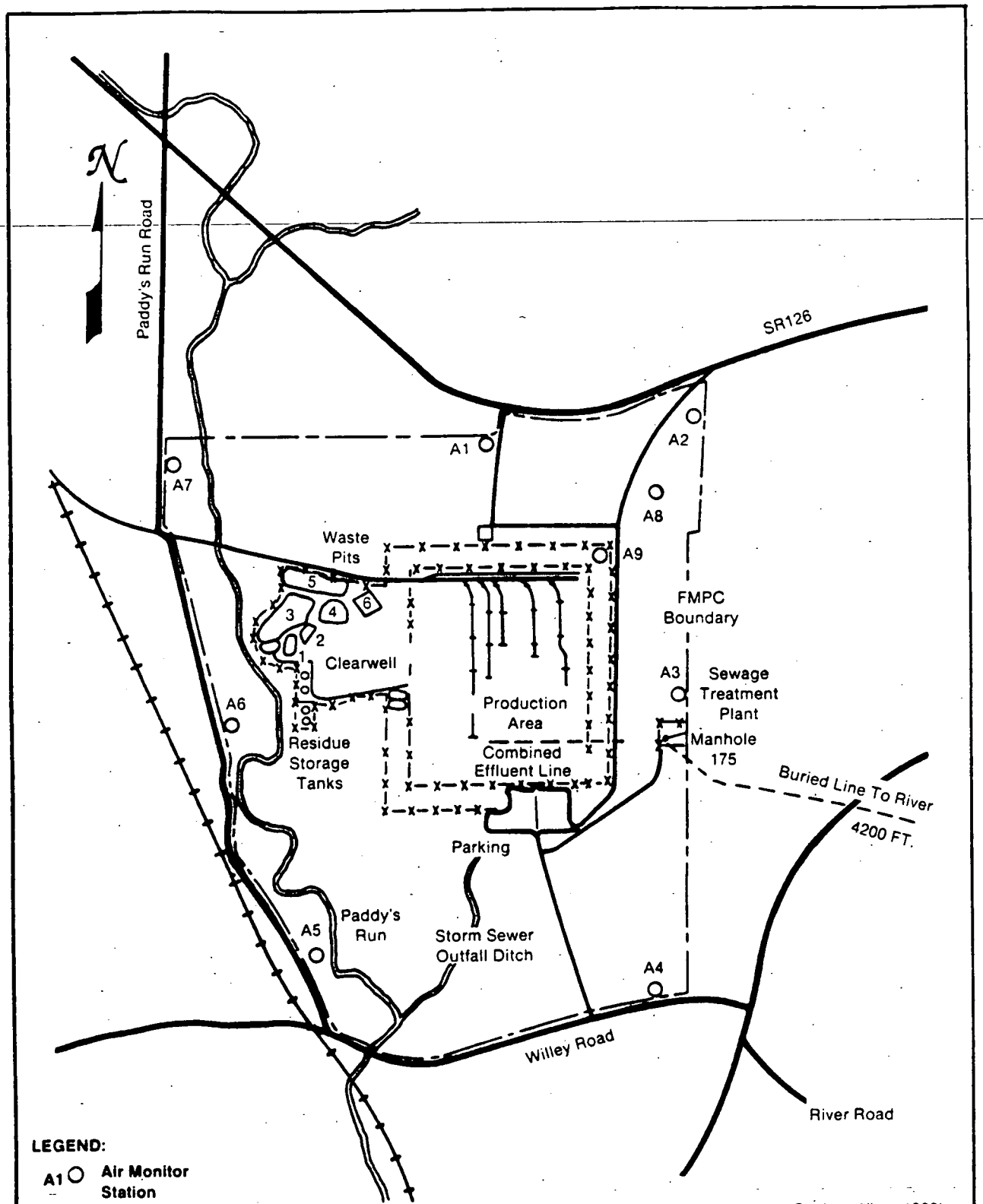

Figure 1-4. FMPC Environmental Features

- Presenting the estimated operating costs and capital expenditures (through FY-92) necessary for ES&H improvement projects at the FMPC.

Although the ES&H Management Plan is not a budgeting document, extensive efforts have been made to assure that it accurately portrays the costs given in the current budget documents for the various projects. Should a disparity exist between the costs presented in the Plan and those provided in the FMPC budget, the budget figure shall govern.

The ES&H Management Plan will be updated as warranted or annually as a minimum.

1.4 Quality Assurance

The programs identified in the Environmental Management and Safety and Health Management Plans will be structured and implemented to meet the requirements of the WMCO Quality Assurance Program. The document review and approval and the internal audit functions will comply with the QA Program requirements applicable to these activities. Provisions of the QA Program that apply to modification and construction programs will be imposed on the facility and equipment upgrading effort.

1.5 Organization of the Report

This Environmental, Safety and Health Management Plan Report is organized into three major sections:

Section 2.0 Environmental Management Plan

Section 3.0 Health and Safety Management Plan

Section 4.0 Emergency Preparedness Management Plan

Each major section begins with an introduction intended to orient the reader to the general nature of potential problems at the FMPC in that particular area.

After the introduction, each section presents a discussion of that portion of the plan in four subsections:

- Characterization of specific concerns in the area;
- Strategy for managing the area;
- Applicable regulations and status of compliance, and
- Plan details .

Thus, each section of this report is arranged similarly to aid the reader in understanding each part.

2.0 Environmental Management Plan

2.1 Introduction

Environmental protection using the ALARA philosophy at and around the FMPC requires an integrated approach that crosses organizational lines. Every department must aim to ensure that current operations are environmentally sound, and that new facilities are designed and constructed so as not to compromise the environment. This integrated approach is achieved through five programs: (1) the New Construction Environmental Review Program, (2) Environmental Management Program Control, (3) Environmental Database Management, (4) the Internal Audit Program, and (5) the Specific Environmental Programs.

The philosophy of ALARA, or limiting all environmental pollutants to levels As Low As Reasonably Achievable, is the cornerstone of the WMCO commitment to environmental protection. By striving to reduce emissions from all past and present FMPC operations through environmentally sound management actions and the institution of best available control technology, WMCO is committed to reducing emissions from all sources at the FMPC. Examples of the results of this commitment include: the dust collector replacement project to reduce emissions, the construction of the Storm Water Retention Basin to reduce uranium emissions in liquid released to the Great Miami River, the Biodenitrification System to reduce nitrates to the Great Miami River, ultraviolet disinfection of the sanitary sewage effluent to reduce fecal coliforms bacteria and the proposed sitewide improvements to the storage pads to minimize uranium materials being washed into the sitewide storm water control system.

Environmental Review Program

All construction and restoration projects are reviewed by the FMPC Environment, Safety & Health and Waste Management Departments together with the DOE for compliance with state and federal regulations and policies. The objective of the review for each project is to characterize and quantify the solid waste, liquid effluents and airborne emissions as early as possible. This information permits a determination of environmental requirements on facility design; defines waste collection and treatment; and identifies permit requirements. Direct contact is maintained by these groups with Engineering to identify new projects that may require environmental management review.

The second phase of the review is to accomplish in a timely manner all permitting requirements of the various environmental regulations for submission by the DOE, such as: air pollution control; wastewater discharge; or hazardous waste storage facility permits.

The third phase is a project review in relationship to the National Environmental Policy Act (NEPA) which provides the procedures, which are being incorporated into WMCO design and construction plans, to ensure identification of the factors within the environment which are potentially impacted by proposed construction and renovation. New permitting needs associated with proposed construction and renovation are also identified. WMCO is currently involved in preparing a sitewide

Environmental Impact Statement (EIS) to evaluate all potential environmental impacts and to identify alternatives which will eliminate or mitigate adverse environmental effects. This will in turn allow construction projects and operations to fulfill their missions on schedule and in compliance with NEPA regulations.

Federal Facilities Compliance Agreement (FFCA)

Upon signature of an agreement by the U.S. Environmental Protection Agency (U.S. EPA) and the DOE on July 18, 1986, the DOE and WMCO management was directed to supply information to the EPA regarding pollution control plans and procedures at the site. A copy of the agreement is furnished in Appendix B of this document.

Under the terms of the agreement, DOE has transmitted over a period of three months, in concert with WMCO management, the following type of information to the EPA:

- CERCLA Actions
  - Procedures to control radioactive emissions including radon gas
  - Work plan for a Remedial Investigation and Feasibility Study (RI/FS) program to be donducted site-wide according to EPA guidelines.
- Clean Air Act
  - Tabulation of major emission points and alarm monitors
  - Control measures and sampling procedures
  - Operation and maintenance procedures for pollution control devices
  - Schedule for stack testing
  - Schedule for placement of control devices
  - Quantity reports of particulate emissions
- RCRA Actions
  - Plans for achievement of compliance with regulations for hazardous waste streams
  - Identification of hazardous waste streams
  - Preparation of groundwater quality assessement program
  - Submittal of detailed groundwater monitoring plan

- Production Discharge Information
    - Details concerning the existing off-site environmental monitoring program and associated Quality Assurance program
    - Quality reports of sampling results for continuous liquid discharges

After review of this information, the EPA will transmit to DOE the recommended programs and procedures to be followed for compliance with pollution control regulations.

Environmental Management Program Control

An integrated FMPC Environmental Project Schedule will be developed. The objective is to define environmental and waste management projects in terms of schedule and interrelationships between tasks. The schedule will be an essential tool in promoting communications and understanding between departments and between WMCO and DOE. Also, meetings will be scheduled and documented to promote communications. The schedule is intended to cover those projects directly related to the FMPC's performance in all areas of environmental management. Major, minor and internal control milestones will be identified and incorporated into the schedule to track and manage the timely accomplishment of the objectives of each program.

Internal Audit Program

Once the Environmental Review Program is implemented, it is necessary to annually audit or review the affected operating groups and facilities to ensure that all programmatic responsibilities and requirements are being met. An Environmental Audit Team, under the direction of the Environment, Safety and Health Department, will be responsible for auditing the various operating groups and facilities to assess their compliance with assigned responsibilities relating to the Environmental Management Program. The Environmental Audit Program is scheduled to be implemented during FY-87.

Environmental Database Management

An environmental management program plan is being developed to provide a complete and concise description of each major environmental project and study. The database system will generate routine data sheets consisting of a project description, scope, justification and funding summary including type, total estimated cost and fiscal year breakdown. The database will be integrated with other project management databases to the maximum extent feasible. The data sheets will provide information on scheduled completion dates, affected environmental media, the applicable environmental program category and any statutory requirement that the project may be fulfilling. The plan will be updated periodically to assure that all changes in project description or funding are reflected.

AIR POLLUTION
CONTROL

Specific Environmental Programs

Specific programs in the areas of Air Pollution Control, Water Pollution Control, Solid Waste Management, and Remedial Action, are described in detail in the following sections.

2.2 Air Pollution Control Management Plan

2.2.1 Specific Air Pollution Concerns at the FMPC

WMCO's Air Pollution Control Program for the FMPC addresses a primary dual concern; protect the workforce health; while advocating and implementing a strong policy of environmental enhancement. In keeping with this organizational policy and with the intent of the As Low As Reasonably Achievable (ALARA) program, the major emphasis of the air pollution control program is to effectively minimize the discharge of air pollutants to the atmosphere from FMPC process emission points. WMCO will reduce FMPC emissions by upgrading control equipment, source improvements, and implementing more stringent operational and administrative controls.

Emissions from the FMPC are generally limited to particulates containing low-level radioactivity, gaseous oxides of nitrogen (NO_x), sulphur dioxide, and trace amounts of hydrogen fluoride and kerosene fumes. Particulates constitute the largest category of air pollutants discharged from the FMPC. These particulate emissions generally contain some radionuclides. WMCO's major concern is to restrict the emission of these radionuclides to ultimately reduce radiological exposures to plant workers and the general public, and to minimize environmental impacts associated with the release of such materials.

Particulates belong to the class of pollutants in the Clean Air Act (CAA) called "criteria pollutants" (see Table 2-1). WMCO is also concerned with reducing the emission of other criteria pollutants, such as NO_x, SO_2 and others, and minimizing public and worker exposure to atmospheric pollutants. To achieve these critical objectives, WMCO has planned many FMPC plant improvement projects.

2.2.2 Control Strategy

General

The FMPC is a large scale production facility operating in excess of 400 air emission sources[1] which have the potential to emit air pollutants to the atmosphere. The FMPC utilizes high efficiency

NOTE: [1] An emission "source" is defined as each individual piece of equipment that generates a potential pollutant. An emission "point" is a stack, or other device, where emission actually takes place. Thus, many "sources" may be involved in a single emission point.

TABLE 2-1

CLEAN AIR ACT (CAA) POLLUTANT CATEGORIES

I. CAA Criteria Pollutants

- Total Suspended Particulates (TSP)
- Sulfur Dioxide (SO_2)
- Nitrogen Oxides (NO_x)
- Carbon Monoxide (CO)
- Ozone
- Hydrocarbons (nonmethane)
- Lead

II. Noncriteria Pollutants

Hazardous Air Contaminants

- Asbestos
- Beryllium
- Mercury
- Vinyl Chloride
- Radionuclides

dust collection and scrubber systems to control particulates and gaseous emissions. Emissions from the facility are limited to quantities of listed criteria pollutants, radionuclides and trace amounts of hydrogen fluoride (HF) and kerosene fumes.

Overview of Current Air Pollution Control Programs

A comprehensive Air Pollution Control Program is in effect at the FMPC to minimize the emission of air pollutants to the atmosphere and to ensure continued regulatory compliance. The objective is to effectively reduce air pollutant discharges from plant emission points and thus minimize worker and public exposure due to plant operations.

All particulate emission points with the potential to emit radionuclides to the atmosphere (there are a total of 59 at the FMPC) are equipped with stack samplers. These samplers draw a continuous sample from a fixed point within the stack across a pleated filter paper at an isokinetic rate. The filter papers are inspected at least once per week and changed if they show soiling. If no soiling is evident, filters are changed monthly, at a minimum. Samplers on critical dust collectors are inspected twice weekly. Critical dust collectors are identified in Appendix C of this document. Upon removal, all filter papers are analyzed to determine both particulate and radionuclide emission levels.

The isokinetic flow rate for each sampler is based upon velocity traverse data obtained in the stack. Traverse data is collected from each stack annually, and the sample flow rate that gives a representative sample is determined. The sample flow is adjusted using a sampler rotometer, and the calibration of sampler rotometer is checked weekly. Plant personnel check rotometer settings hourly to ensure that the proper sample flow is present.

WMCO is now refurbishing FMPC sampler nozzles to minimize entrance disturbance to flow. Approximately one-half of the existing nozzles have been refurbished.

Twenty-two FMPC emission stacks are currently equipped with Ludlum breakthrough monitors. These monitors are designed to give operators an immediate alarm in the event of failure (breakthrough) of the filter system by continuously monitoring the sampler filter paper for radioactivity. All monitors are tied into control panel boards with audible alarms to alert operating personnel. The fifteen most recently installed monitors are linked to the FMPC central alarm system which sounds in the Guardhouse Communications Center. All future breakthrough monitors will be tied to the central alarm system. A data base of monitor count rate records has been established to statistically define optimum monitor action level settings. Monitor settings will be modified, as appropriate, as the data base is further refined. Panel board alarms are checked every two weeks to assure they are functioning properly. Monitors are calibrated electronically and checked with a check source semi-annually.

WMCO has instituted a plantwide program to characterize emissions from all major process emission points. This program is being conducted by a private consulting firm under contract to WMCO. Particle size distributions and a radionuclide scan will be performed on collected materials from each dust collection system. This information will serve as input to collection system upgrading/replacement programs and to atmospheric dispersion analyses.

Tests, designated in EPA regulations as "Method 5 stack tests", are performed on plant stacks on an as-needed basis. All compliance testing is performed in cooperation with the Ohio EPA by a private consulting firm under contract to WMCO.

To assess the effectiveness of the air-pollution controls, high volume ambient air samplers are located along the FMPC boundary to collect continuous samples of airborne particulate matter. Nine on-site stations and two additional off-site stations are operating. At each sampler, air is drawn through a 20 cm X 25 cm pleated filter paper at a rate of approximately 1 cubic meter per minute. Samples from these units are collected and analyzed at weekly intervals. Filters are analyzed for particulate emissions, uranium content and beta activity. Calibrations on the air sampler flow rates are checked once per week at the time the filters are changed, and the flow rates adjusted as necessary.

Organizational Structure

The FMPC Air Pollution Control Program is administered by the Environmental Compliance Group of the Regulatory Compliance Section of the Environment, Safety and Health (ES&H) Department. This group has the responsibility to oversee the program ensures that WMCO's organizational objectives are achieved and all regulatory requirements are satisfied. Programs or projects which have "the potential to affect plant atmospheric discharges must be reviewed and approved by the Compliance Group prior to implementation." Monitoring associated with the air-pollution control program is the functional responsibility of the Environmental and Radiation Monitoring Group of the Environmental and Radiological Safety Section, also of the ES&H Department. Modifications to the monitoring programs (i.e., monitoring procedures, analysis techniques, etc.) for the air pollution control programs are reviewed and approved by the Environmental Compliance Group prior to implementation.

The Production Department is responsible for operations of emission control equipment, exclusive of sampling/monitoring instrumentation. This Department also has responsibility for preventative and routine maintenance. Operational procedures involving emission control systems are reviewed and approved by the Environmental Compliance Group prior to implementation.

Facility upgrades involving emission control systems, and monitoring and sampling equipment are the responsibility of the Project Engineering Department of the Technical Services Group.

Improvements to emission control systems are reviewed and approved by the Environmental Compliance Subsection prior to implementation.

WMCO is currently refining this organizational structure as part of its transition program. Functional responsibilities will be assigned, as appropriate, to optimize plant resources.

2.2.3 Applicable Regulations and Current Status of Compliance

The Clean Air Act (CAA) of 1970 is the basis from which all regulations for the control of air pollution within the United States are mandated. The CAA includes provisions for setting maximum allowable air pollution emission rates, and relies on a combination of a technology-based program and an ambient air quality-based program to protect the nation's air resources. The primary responsibility for carrying out provisions of the CAA lie with the states that must submit plans and strategies to the EPA to enforce CAA requirements. These state-issued plans are known as State Implementation Plans and are the basis for the state's regulatory authority under the CAA. The Ohio implementation plan is executed through the provisions of the Ohio Administrative Code, which is the guiding set of regulations for the FMPC air-pollution controls.

DOE Order 5480.1A provides guidance for the establishment of environmental protection programs for DOE facilities. This Order sets forth the responsibility and authority for carrying out environmental protection programs. Environmental protection standards and guidelines used in conducting the environmental protection programs are defined in DOE Order 5480.4. U.S. DOE environmental protection information reporting requirements for the FMPC are defined in DOE Order 5484.1.

The CAA separates all air pollutants into two specific classes: (1) criteria and (2) noncriteria pollutants (see Table 2-1, CAA Pollutant Categories).

Criteria Pollutant Regulations

The criteria pollutants are those pollutants for which National Ambient Air Quality Standards (NAAQS) have been established and include those air contaminants listed under criteria pollutants in Table 2-1, CAA Pollutant Categories. Once an air pollutant has been listed as a criteria pollutant, and a NAAQS has been set, then geographical regions are evaluated on their ability to comply with an NAAQS for a given pollutant. In the event a region is unable to meet a NAAQS for a specific pollutant, then the region is designated as a nonattainment area for that pollutant (but only for that pollutant), and a special set of stringent air-pollution regulations are put into effect. These nonattainment regulations apply until the region can demonstrate that compliance with the ambient air quality standards for the nonattainment pollutant has again been established, and the area can once again be labeled as an attainment area. The FMPC is located in a nonattainment area for particulates and ozone emissions.

When a geographical region has been labeled as nonattainment for any of the criteria pollutants, industrial growth and expansion in the region is severely restricted due to very stringent air pollution regulations. In nonattainment areas, a special air pollution policy, known as the Emission Offset Policy (EOP) applies. The EOP allows new air pollution sources to be installed within the geographical area only if a greater reduction in the nonattainment pollutant will occur elsewhere. This is usually accomplished through the elimination of old sources located elsewhere in the plant, retrofitting existing sources with additional air pollution control equipment, process modifications resulting in a net plant reduction in the emission of the nonattainment pollutant, etc. The emission offset can also be obtained by "buying" emissions credits through an emission offset "banking system," through a rather complex provision of the law.

In geographical regions where compliance with ambient air quality standards have been demonstrated (attainment areas), no emission offset policy exists; rather an air pollution policy known as the Prevention of Significant Deterioration (PSD) applies to ensure that ambient air quality is not degraded and that the attainment status of the area is not lost. Under PSD regulation, moderate industrial growth is allowed while the ambient air quality of the area is protected. PSD regulations designate geographical regions into categories based upon the intended industrial development of the area and its sensitivity to air pollution. All major industrial activity that subsequently occurs within the PSD region is regulated so that no significant increase of major air pollution sources will occur that can adversely affect ambient air quality. This "incremental consumption" policy of the PSD regulations allows moderate industrial growth, while regulating emissions of major air pollution sources. The FMPC is located in an attainment area for the listed criteria pollutants with the exception of particulates and ozone. In addition to the criteria pollutants, PSD review action levels have also been established for the hazardous air contaminants listed in Table 2-1 (except radionuclides for which levels have not yet been established), and for non-listed fluorides, sulphuric acid mists, hydrogen sulfide, total reduced sulphur, and reduced sulphur compounds. All new sources proposed at the FMPC are evaluated for compliance with these regulations.

Noncriteria Pollutant Regulations

Hazardous air contaminants (See Table 2-1) are any air contaminants which may cause, or contribute to, an increase in serious irreversible or incapacitating reversible illness, as determined by the EPA. The emission of these contaminants into the atmosphere is regulated under the EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) program, which stems from Section 112 of the CAA that mandates the stringent control of hazardous airborne substances.

The NESHAP program currently regulates five specific substances as hazardous air pollutants, although additional substances are currently being studied by the EPA for possible regulation under

this program in the future. Specific emission standards have been set under hazardous air pollution regulations for asbestos, beryllium, mercury, vinyl chloride, and radionuclides. (Due to the impact of hazardous radionuclide regulations on the FMPC Plant, radionuclide regulations are discussed separately below.) While only these five substances are specifically regulated under NESHAP, benzene and arsenic can also be regulated as hazardous pollutants if emitted from fugitive emission sources as a Volatile Hazardous Air Pollutant (VHAP). Radionuclides are currently the only listed NESHAP substance emitted from the FMPC.

Once an air contaminant is declared by the EPA to be a hazardous air pollutant, a very stringent set of air pollution regulations become effective to ensure that public health is adequately protected from the harmful effects of its release into the atmosphere. NESHAP regulations are very specific and tailored to the various pollutants involved. The hazardous air pollution regulations contain provisions for emission control, monitoring, and reporting to ensure that the release of these substances into the atmosphere will not have a significant effect on public health and does not adversely impact ambient air quality.

Airborne Radionuclide Regulations

The EPA has recently issued final NESHAP regulations for the control of airborne radionuclide emissions. These regulations limit off-site radiological dosages to a committed 50 year dose equivalent no greater than 25 mrem whole body and 75 mrem to critical organs of any member of the general public. The EPA will grant waivers of the 25/75 limits if a facility can demonstrate that no member of the public will receive a continuous exposure of more than 100 mrem effective dose equivalent and a noncontinuous exposure of more than 500 mrem effective dose equivalent from all plant sources.

The EPA, under the provisions of the radionuclide emission standards, has made it necessary for states to reapply for delegation authority of the final standards. Blanket delegation authority under existing state implementation plans has been excluded to insure adequate resources exist within the states to properly enforce the regulations.

The recently issued radionuclide emission regulations impose specific monitoring and reporting requirements on DOE facilities. Compliance with the standard is demonstrated through the use of EPA approved sampling procedures and dispersion models.

DOE ambient air concentration standards for radionuclides are established by DOE Order 5480.1A. 10 CFR 20 establishes the NRC ambient air standards for radionuclides. FMPC monitoring data is compared with the most restrictive of these standards for compliance purposes.

Under the provisions of DOE Order 5480.14 and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, the release of one pound of radionuclides above normal

operating losses from a source to the atmosphere mandates the shutdown of processes involved and the implementation of specific response and reporting procedures. Normal operating losses are those levels established by the source operating permits. The FMPC operates in compliance with these regulatory requirements.

Ohio Administrative Code - Permitting Requirements

Under the provisions of the Ohio Administrative Code, certain sources of air emissions are required to obtain a state-issued "Permit to Operate". These permits, which are on a three-year renewal cycle, define the conditions under which the air emission sources must operate in order to be in compliance with state and federal requirements. The conditions of operation establish allowable source emission levels, monitoring, sampling and reporting requirements. Applications have been filed with the Ohio EPA for all existing sources of air emissions at the FMPC.

New sources of air emissions are required to obtain "Permits to Install" before construction activities are initiated. WMCO engineers monitor new installations or source modifications to ensure regulatory compliance. At the present time, "Permit to Install" applications must be submitted nine months prior to planned startups to allow for the lengthy review and issuance process. New air emission sources are required, under the provisions of the CAA, to use the Best Available Control Technology (BACT). Improvements needed for existing sources have been identified and are in the process of being performed. All proposed sources have been, and will continue to be, thoroughly evaluated for CAA compliance.

To ensure compliance with the Prevention of Significant Deterioration guidelines established under the New Source Performance Standards of the Clean Air Act, a ledger is being developed to help assess the potential impact of future projects involving potential air emissions.

2.2.4 Air Pollution Management Plan

In keeping with the WMCO operating policy for reducing discharges of air pollutants to the atmosphere, extensive facilities improvements and operational procedure updates for air-pollution control are planned at the FMPC. The focus of improvements and upgrades to the air-pollution control system are concentrated in three areas:

- Airborne Radionuclide Emission Control Improvements
- Reduction of NO_x and Other Criteria Pollutants
- Other Air Pollution Improvements

The planned improvement projects in these three areas are discussed below. The breakdown by type of funding and Fiscal Year is shown in Table 2-2.

TABLE 2-2

FUNDING SUMMARY FOR AIR POLLUTION CONTROL
($1,000'S)

Funding		Fiscal Years						
Type	Total	1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 6,983	5,112	1,731	70				70
EH&SI LI	$ 76,366	899	10,932	3,235	15,800	17,000	16,700	11,800
GE-OP	$ 11,554	1,373	1,510	1,565	1,777	1,774	1,766	1,789
Totals:	$ 94,903	7,384	14,173	4,870	17,577	18,774	18,466	13,659

KEY

GE-CE - Capital Equipment From GE Budget

EH&SI LI - Items Included in Project 87-D-159

GE-OP - Operating Funds from GE Budget

OY - Out Year

2.2.4.1 Airborne Radionuclide Emission Control Improvements

Two projects are planned in the area of radionuclide emission control improvements over the planning period FY-87 through 92, These projects are:

Replacement/Upgrading of Dust Collection System

Existing FMPC dust collection equipment is from 20 to 30 years old. Most systems are at or are approaching the end of their original design life. As a result of the increasingly stringent environmental regulations and the emphasis on reducing atmospheric discharges of radionuclides, a program has been developed to replace a number of plant dust collection systems. Replacement dust collection systems will include state-of-the-art dust collection equipment, HEPA filtration units, multi-point isokinetic samplers and breakthrough monitors with alarms.

Critical collection equipment slated for immediate replacement is provided by capital equipment, with the remaining collection equipment to be replaced under the EH&SI Line-Item Project 87-D-159.

Stack Samplers/Monitors/Alarms

The FMPC uses a single, fixed point isokinetic sampler on all stacks emitting radionuclides. In order to improve sampling capabilities and better characterize stack emissions, multi-point isokinetic samplers will be installed. In addition, stringent response and notification procedures governing the release of radionuclides to the atmosphere require the immediate identification of emissions of one pound above normal operating losses. To improve response times to these emissions, stack monitors equipped with alarms will be installed. This equipment will be installed on priority dust collection systems. Stack compliance testing and in-stack sampling will require outside services during the period through FY-92.

2.2.4.2 Reduction of NO_x and Other Criteria Pollutants

Extensive facilities improvements for criteria pollution control are planned at the FMPC. Specific projects are briefly described in the following subsections.

NO_x Destructor - Plant 9

In recovering uranium for recycle, nitric acid is employed for pickling scrap materials resulting in NO_x emissions. A scrubber will be installed on the pickling equipment to reduce NO_x emissions and ensure worker protection. This program is included in the EH&SI Line Item Project 87-D-159.

Electrostatic Precipitator - Boiler Plant

Boiler No. 4 is currently in standby status and has not been operated in many years. With the projected increases in production at the FMPC, steam generation will be necessary and must be provided from Boiler No. 4. To meet current Ohio EPA emission control standards, an electrostatic precipitator will be installed prior to boiler startup to remove particulate matter from the boiler offgas stream.

2.2.4.3 Other Air Pollution Control Improvements

Five other projects planned to improve air pollution control are discussed briefly as follows:

Stack Sampling Equipment

Pursuant to the provisions of the Ohio Administration Code, the Clean Air Act and the Federal Facilities Compliance Agreement, Method 5 stack sampling is required to be performed on all particulate emission points. Inhouse capabilities will be developed to perform this stack testing. Two sampling trains with associated support equipment will be required.

Additional Air Monitoring Stations

This project consists of the procurement of air sampler stations for installation at selected on-site and off-site locations. The air sampler units will consist of high-volume air samplers and associated controls installed in a small metal shelter. A thermoluminescent dosimeter and an alpha track type radon monitor will be installed in the shelter. The siting of off-site air monitors is based on meteorological data, availability of electrical power, road access and agreement with property owners. There are currently nine air monitoring stations at various locations around the FMPC. Additional monitor stations are needed to more adequately assess the airborne environmental impact of FMPC operations. This program is included in the EH&SI Line Item Project 87-D-159.

Implementation of a Development Support Program

WMCO is in the process of establishing a development program to support the Air Pollution Control Program at the FMPC. This development progam will optimize both engineering design and operational procedures. The program will not only evaluate new control technology for its applicability, but also source and process modifications to reduce potential emissions.

Upgrading of Operating Procedures

Existing operational procedures pertinent to air-pollution control are currently being reviewed and updated at the FMPC. Both production standard operating procedures (SOP's) and environmental sampling/monitoring procedures are being revised to incorporate the newly issued, more stringent requirements of the CAA and CERCLA (DOE Order 5480.14). There are a total of 25 procedures involved. Emphasis is initially being placed upon updating SOP's involving critical control systems. Tight preventative maintenance and inspection procedures have been implemented on all air emission systems involving potential radionuclide emissions in accordance with the strict release limit standards established through NESHAPS and CERCLA legislation.

Toxic Atmospheric Dispersion Modeling System

The objectives of the Air Pollution Modeling Program are to:

- Provide timely and accurate atmospheric dispersion information in the event of a release of gaseous or airborne radioactive material such that the path of the plume can be determined and the off-site public can be evacuated in a timely manner;

- Assist emergency personnel in making a decision to evacuate or shelter employees and the off-site public; and

- Provide a record of plume behavior after an accidental release to document which locations were affected.

A system is needed to model the dispersion of accidental discharges from the site. This system will include a mini-computer and software package for performing the modeling and for the collection, storage and manipulation of source-release data.

The software will include a database management system to identify emissions from a variety of on-site sources. The database information will be retrievable for: an individual source; a combination of sources; by time, location, height, and expected amount of emissions.

The model, which Oak Ridge National Laboratory (ORNL) will specifically develop for the FMPC site, will be automatically initiated upon an indication of a high reading in any of the sensors located at the source. A system of sensors will be needed to determine when and where a release occurs. Relays will be needed to transmit this data to the computer.

The computed direction and speed of the effluent plume will be based on the source of emissions, its height and meteorological data made available from the site meteorological tower. The tower will provide real-time wind speed, direction, stability class and temperature information needed to perform these calculations.

WATER POLLUTION
CONTROL

This program is included in the EH&SI Line Item Project 87-D-159.

2.3 Water Pollution Control Plan

2.3.1 Water Pollution Concerns

Eliminating the potential for contaminating the local surface waters and underlying groundwater due to process and sanitary wastewater and stormwater runoff is a WMCO priority. To successfully implement a Water Pollution Control Plan at the FMPC, it is essential to monitor and control all liquid effluent discharges, as well as various potential indirect transport mechanisms. These efforts are designed to minimize the effects of process operations at the FMPC on the surrounding environment.

The liquid waste streams from process operations contain various chemical and metal compounds that must be controlled. The uranium production cycle may begin with ore concentrates, recycled uranium, or a variety of other uranium compounds. Regardless of the type of material fed into the cycle, the initial process involves dissolution in nitric acid followed by extraction into a tributyl phosphate and kerosene solution to separate the uranium from most of the impurities. A back-extraction process utilizing dilute nitric acid yields a solution of uranyl nitrate. Evaporation and heating convert the nitrate solution to uranium trioxide. Reduction to uranium dioxide, and subsequent reaction with anhydrous hydrogen fluoride, results in the production of uranium tetrafluoride, which in turn is reacted with magnesium metal to produce metallic uranium. This primary metallic uranium is then combined with scrap uranium metal and remelted to form a purified uranium ingot. All wastewater generated from these processes is collected and treated prior to final discharge to the Great Miami River. Pollutants of primary concern are nitrates, ammonia, chlorine residuals, fluorides, suspended solids, hexavalent and total chromium, uranium, nickel, iron, pH and copper. Sources of process waste streams are indicated in Figure 2-1.

Sanitary wastewater is collected and treated prior to discharge to the Great Miami River. Wastewater is generated from various potable water uses, including laundry operations. Pollutants of primary concern are fecal coliforms, suspended solids, biological oxygen demanding compounds, and uranium.

Surface water runoff generated from precipitation falling on the production area is currently collected and, depending upon the intensity and duration of the rainfall event, either immediately pumped to the Great Miami River or impounded in the new Emergency Spill Containment/Stormwater Retention Basin System. At the conclusion of the rainfall event, the contents of the Emergency Spill Containment/Stormwater Retention Basin System are pumped to the Great Miami River. Should the runoff fill the Stormwater Retention Basin to capacity, it will overflow via a spillway to Paddy's Run. A portion of stormwater runoff originating in the

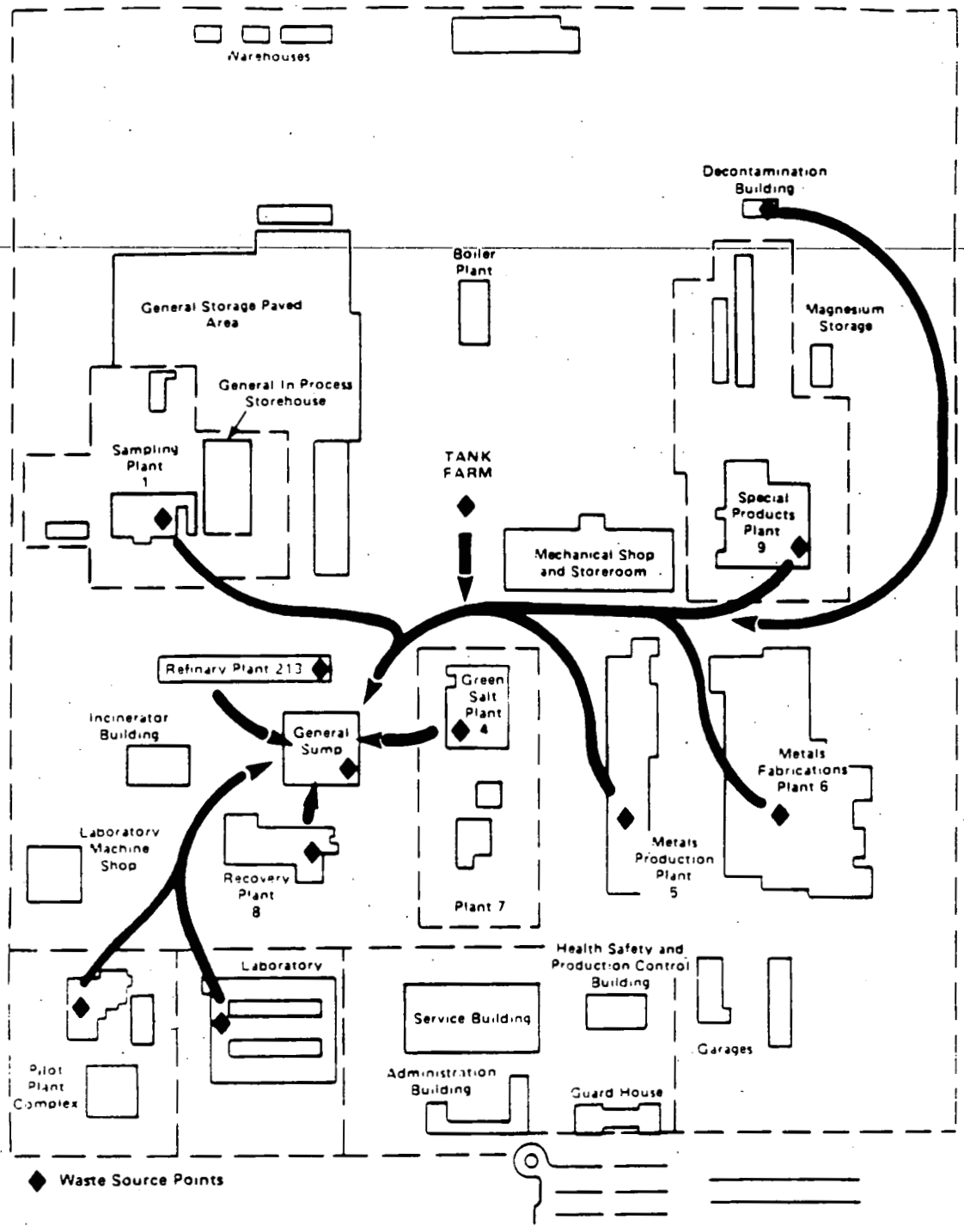

Figure 2-1 Sources of Production Wastes Collected & Treated in the General Sump

waste pit area flows directly to Paddy's Run. Pollutants of primary concern are suspended solids, oil and grease, pH and uranium.

2.3.2 Water Pollution Control Strategy

2.3.2.1 Current System

Liquid wastes are generated to some degree by every operation at the FMPC. The three branches of liquid waste streams are: process water, sanitary water, and stormwater. A schematic drawing which indicates these liquid waste streams is shown in Figure 2-2.

The FMPC uses a combination of wastewater treatment technologies for controlling pollutant discharges to the Great Miami River. All production plants with liquid effluents have plant sumps for the collection and initial treatment of process wastewater. More than 99 percent of the contained uranium is removed by precipitation and sedimentation at these facilities. Effluents from the plant sumps are collected at the General Sump for neutralization with lime and sedimentation. After sedimentation, the treated wastes to be recycled are pumped to Plant 8 for interim processing with the filtrate returned to the General Sump for final processing. Neutralized wastewater from the General Sump is pumped to Pit 5 for further settling prior to sampling at the Clearwell and discharge to the Great Miami River via Manhole-175.

Sanitary wastes may contain small amounts of uranium, derived from the laundry and showering facilities. At the Sewage Treatment Plant any significant amount of uranium is captured in the sewage sludge, and thus removed from the effluent. The stormwater collection system was designed to be uranium-free; however, uranium may enter the system through accidental spills and precipitation runoff from uncontrolled pad areas and roadways. Based upon results of a recent Storm Sewer Evaluation Survey, modifications of the existing storm sewer system may be required to reduce infiltration and inflow containing elevated concentrations of uranium. Although no treatment facility is presently provided, recovery measures required for accidental spills are provided by the Emergency Spill Containment Basin. Spillage can be impounded in this basin and subsequently be pumped to the General Sump for removal of uranium until the source of contamination has been determined and appropriate corrective actions taken.

Monitoring of the FMPC liquid waste streams consists of daily grab and composite samples along with flow metering at various locations such as the General Sump, Storm Sewer Lift Station, Stormwater Retention Basin Overflow, Clearwell, Sewage Treatment Plant, and Manhole-175. Typical analytical parameters are: total suspended solids, pH, BOD_5, fluoride, total and hexavalent chromium, iron, copper, nickel, nitrates, ammonia, grease, oil, fecal coliforms, residual chlorine, gross alpha and beta, and uranium. A portion of these analytical results are submitted monthly to the Ohio EPA as required by a National Pollutant Discharge Elimination System (NPDES) permit for the facility, while a portion is retained on-site for treatment efficiency determinations. Approximately 150 analyses

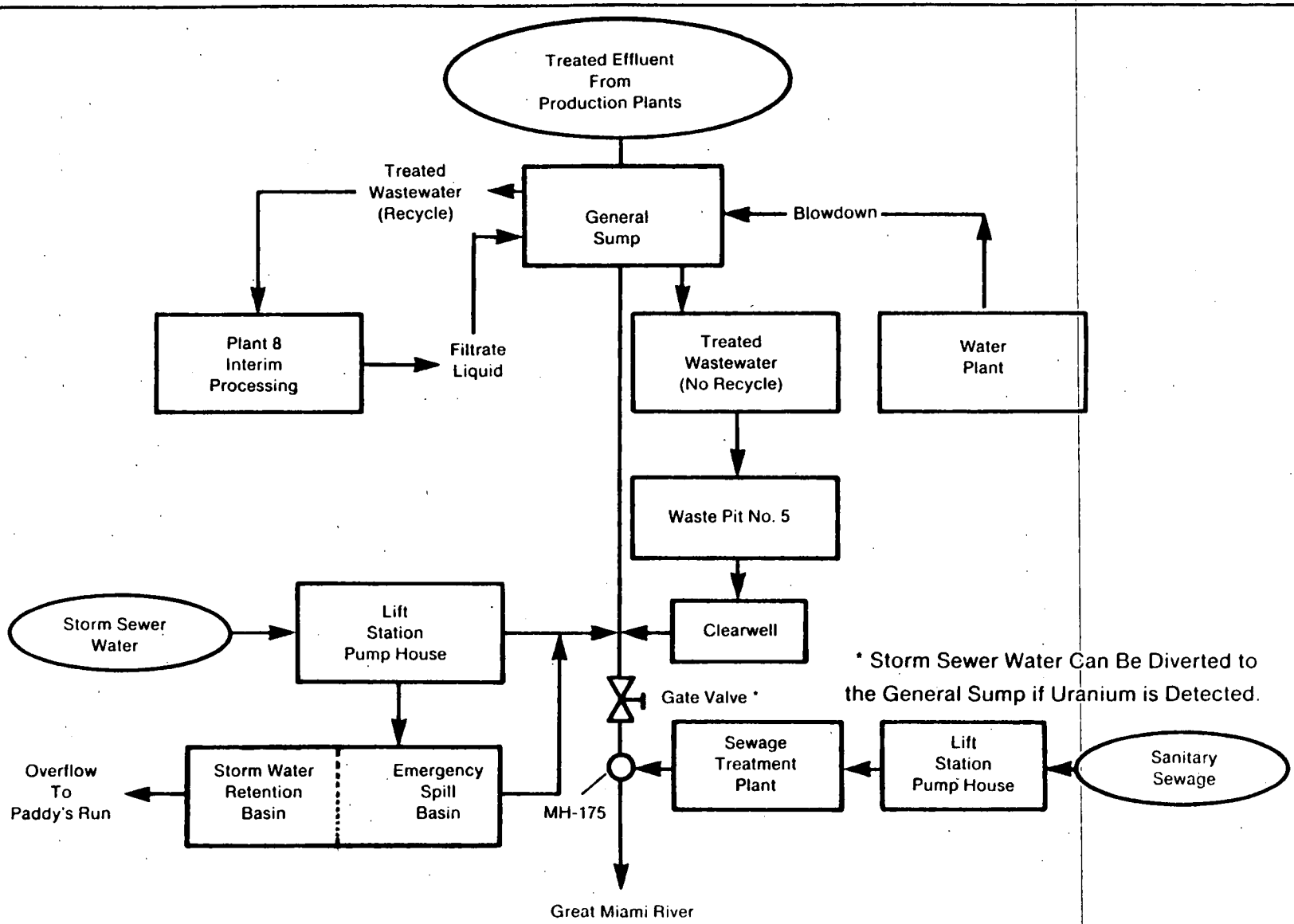

Figure 2-2. Liquid Waste Streams

per month are performed on water samples taken solely for NPDES reporting purposes.

Groundwater samples currently collected monthly from 10on-site wells and approximately 25 off-site wells are analyzed for uranium content. Quarterly samples of groundwater are collected from 35 on-site and 6 off-site wells per RCRA protocol and analyzed for 95 water quality and site-specific pollutant parameters. See Figures 2-3 and 2-4 for locations of on-site and off-site wells.

Daily grab samples are collected at river sampling points W1 (upstream) and W3 (downstream) as shown in Figure 2-5. These samples are composited monthly for radium analyses and a weekly grab sample is taken at W4, which is 7.5 km downstream from the confluence of Paddy's Run with the Great Miami River. At least one sample per week from each of the three river sampling points is analyzed for uranium, alpha and beta activity, chloride, fluoride, nitrates, non-filterable solids, and pH. Grab samples are also collected weekly from each Paddy's Run sampling location. These samples are analyzed for uranium, alpha and beta activity and pH. Chloride, fluoride, and nitrate analyses are performed on one sample each month, while radium 226 and 228 are analyzed on bimonthly composites taken from the W5 location and monthly composites from the W7 location.

2.3.2.2 Proposed System

New water pollution control facilities became operational in FY-86. As indicated in Figure 2-6, the principal components of this new system are the biodenitrification treatment process and the stormwater retention facility. The biodenitrification process removes nitrates from FMPC effluent by use of a biological system consisting of denitrifying bacteria adhering to particles of anthracite coal in a fluidized-bed continuous flow reactor. The denitrifying bacteria convert nitrates in the effluent to nitrogen gas which can then be vented to the atmosphere. Other components provide the containment of runoff water from the coal storage area, the segregation of non-radioactive sludges, and the replacement of chlorine with ultraviolet disinfection to further treat sanitary wastewater.

Other proposed improvements include containment facilities for stored uranium materials to prevent accidental spills from reaching the effluent collection system; renovation of various plant sump systems to provide more efficient wastewater treatment capabilities; and increased monitoring potential with respect to effluent discharges and groundwater to better detect possible contaminant sources and potential migration pathways.

The overall implementation of these projects is designed to systematically reduce the amount of potential pollutants discharging to the Great Miami River and virtually eliminate discharges to Paddy's Run. The completion of the current Water Pollution Control project will continue to lessen the effects of FMPC operations on the local environment and enhance compliance with all applicable

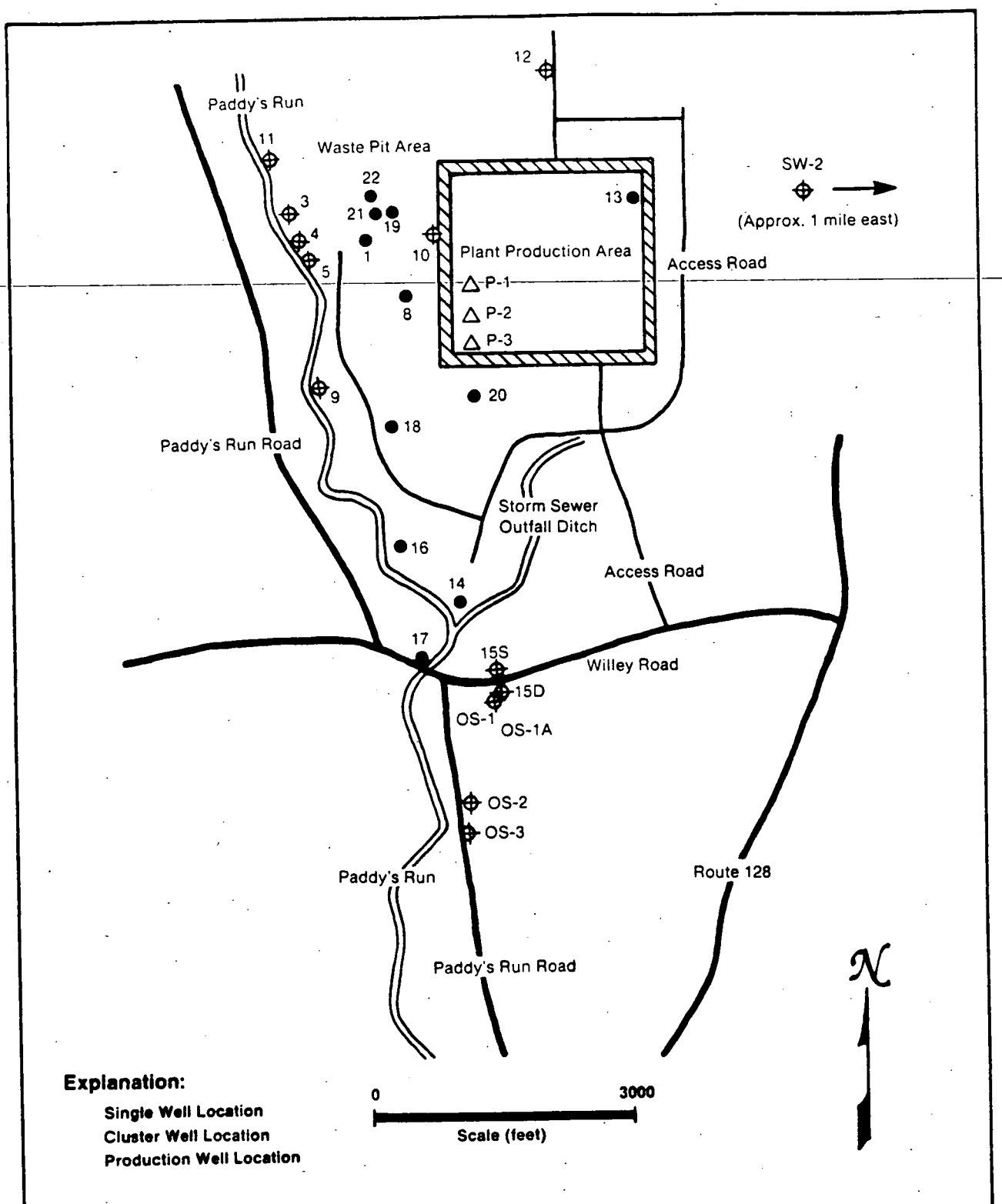

Figure 2-3. Well Locations

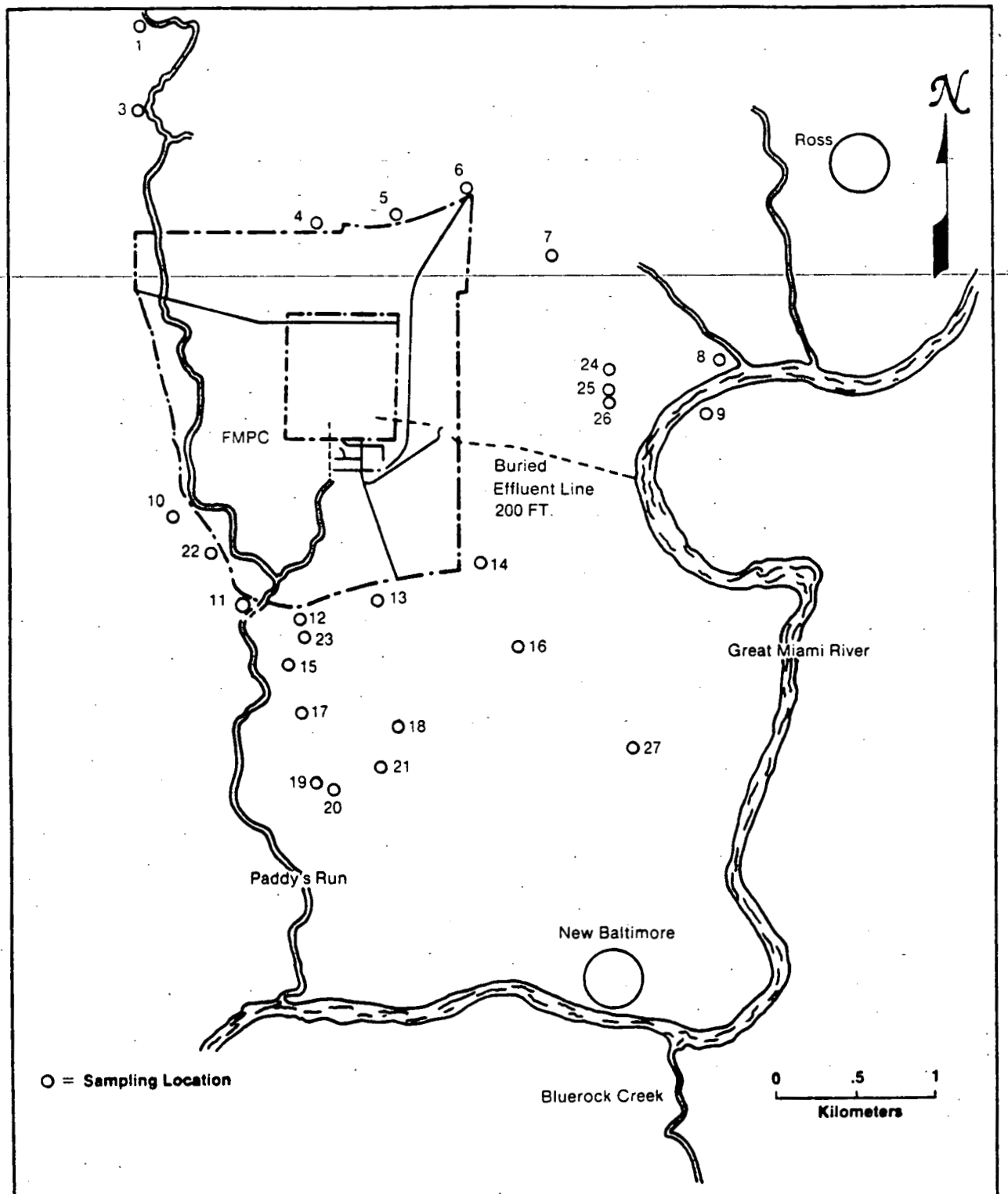

Figure 2-4. Offsite Monitoring Well Locations

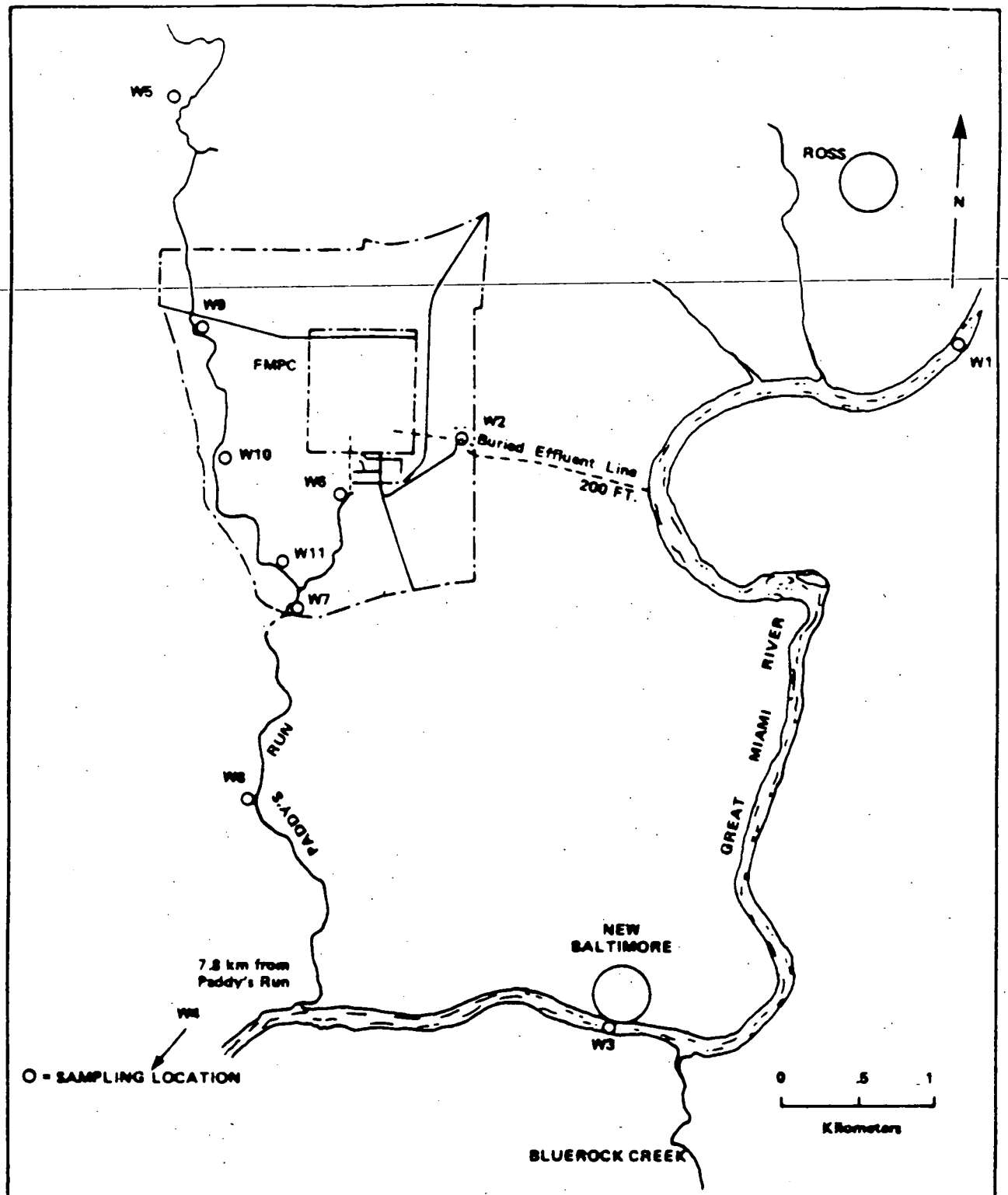

Figure 2-5 Surface Water Sampling Locations

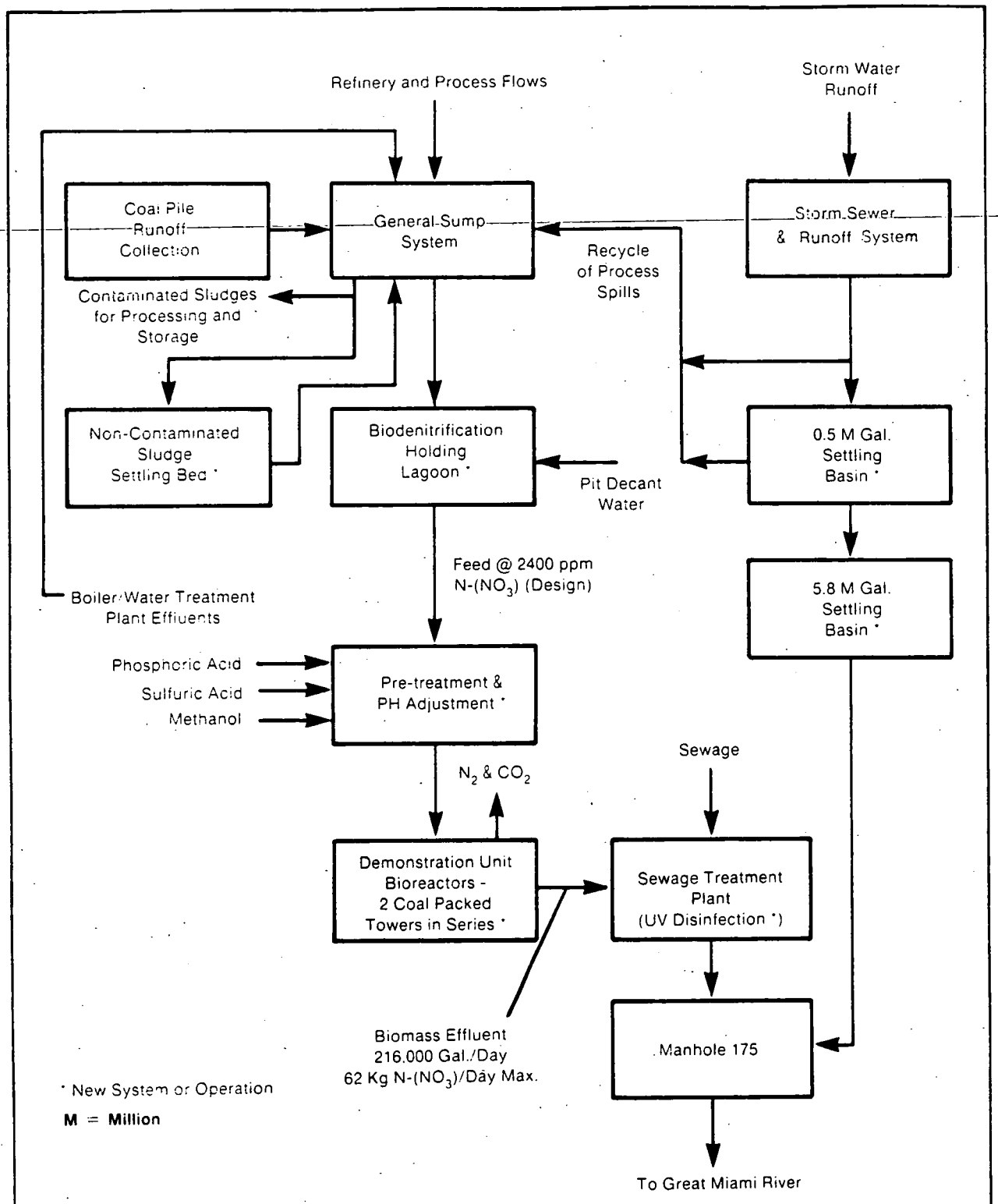

Figure 2-6. FMPC - Integrated Water Pollution Control System

discharge limitations set by Ohio EPA in the NPDES permit for the FMPC.

The goal of research and development related to the Water Pollution Control Program is to develop long range plans for handling stormwater runoff and recycling process water generated at the FMPC. These activities are designed to optimize the biodenitrification system through engineering analysis, and examine state-of-the-art detection and monitoring equipment for process optimization and control. Problem areas such as the presence of excessive hexavalent chromium, fecal coliforms, and nitrates should also be investigated.

Surface water flow directions and quantities for each on-site drainage basin can be identified through a site topographic study and site-specific precipitation data analysis. A project of this type will be necessary for the design of any long-term surface water flow modifications. Also, a water balance for the site should be developed to provide necessary inflow/infiltration and recharge data for future remedial action. Much of this information was obtained in FY-86 from the results of a Storm Sewer Evaluation Survey (SSES) made at the FMPC.

To provide increased capabilities in detecting potential contaminant plumes in groundwater migrating off site, additional monitoring wells at various depths and locations are required. Also, continued RCRA sampling and analysis of all existing and proposed wells was performed quarterly in FY-86 and will continue annually thereafter. Surface water samples were collected from an increased number of Paddy's Run sampling locations to more adequately characterize stream quality.

2.3.3 Applicable Regulations and Status of Compliance

The Water Pollution Control Program for the FMPC is designed to address the concerns and obligations set forth in various Federal regulations and guidelines. DOE Orders 5480.1A and 5480.4 require the FMPC to address the compliance requirements of all applicable Federal, State, and Local environmental regulations, as well as DOE guidelines relating to radioactive emission concentrations in air and water above natural background.

2.3.3.1 Federal Water Pollution Control Act (FWPCA)

Responsibility for enforcing the FWPCA at the FMPC rested with the U.S. EPA until 1977. At that time, the FMPC was to comply with a NPDES permit pertaining to one outfall on the Great Miami River (via Manhole-175). The FMPC was in compliance with the effluent levels specified by the NPDES permit with few exceptions.

The FWPCA was amended in 1977 to yield the Clean Water Act (CWA), thereby specifically subjecting Federal facilities to the substantive and procedural NPDES permitting requirements of delegated states such as Ohio. The Ohio EPA considers all waters originating in the State of Ohio to be eligible for NPDES permitting; therefore, a permit was obtained for the outfall ditch

to Paddy's Run in addition to the Great Miami River discharge. Four on-site sampling locations were also specified in the most recent NPDES permit. The NPDES permit for the FMPC expired in June, 1984 and a renewal permit is currently being processed by the Ohio EPA with an agreement to operate under existing permit conditions during the interim.

2.3.3.2 River and Harbor Act

The U.S. Congress passed the River and Harbor Act in 1899, which directed the U.S. Army Corps of Engineers to reside as the regulatory body over all U.S. navigable waters. The FWPCA, as amended, concentrated the regulatory power regarding the discharge of dredged or fill material into U.S. Waters. This impacts the FMPC whenever any activity is planned that will involve work within the Great Miami River or areas designated as wetlands. An official Corps authorization and required permits must be obtained prior to initiating such work.

2.3.3.2 Resource Conservation and Recovery Act (RCRA)

DOE order 5480.2 is derived from the RCRA which defines a hazardous waste as a solid waste that may cause or significantly contribute to serious illness or death or that may pose a substantial threat to human health or the environment if improperly disposed of. Waste Pit No. 4 is being considered as a RCRA waste unit by the U.S. EPA; therefore, all applicable monitoring and reporting requirements must be addressed. In terms of groundwater monitoring requirements, the RCRA specifies, at a minimum, an upgradient and three downgradient groundwater monitoring wells to be located adjacent to the disposal/storage area in order to adequately detect any migration of hazardous waste constituents. Analytical parameters and the required sampling and reporting time intervals are specified in the RCRA regulations. Currently, all on-site and several off-site groundwater monitoring wells are sampled and analyzed per RCRA requirements (quarterly for FY-86, and annually in subsequent years).

2.3.4 Water Pollution Control Management Plan

The planned improvement projects for water pollution control are described below under five subcategories:

- Collection and Pretreatment
- Primary Treatment
- Countermeasure Facilities
- Research and Development
- Monitoring

The planned improvement projects in these categories are discussed in the following paragraphs. The breakdown by type of funding and Fiscal Year is shown in Table 2-3.

2.3.4.1 Collection and Pretreatment

Pilot Plant Sump System Improvement

The goal of this project is to treat process waste and stormwater collected by the Pilot Plant Sump System. To accomplish this goal, some existing equipment must be replaced and equipment additions made. The Pilot Plant Sump improvements are required in order to assure capabilities for meeting long-term processing requirements, including UF_6/UF_4 wastewaters from existing and expanded facilities.

The existing sump system consists of various floor drains, sumps, pumps, tanks and transfer piping. Many of the floor drains and sumps contain acid resistant brick, which requires upgrading. A survey of replacement drains, etc. will be conducted to establish an inventory of improvement areas. A major renovation of the existing sump system is required to maintain positive control of effluent streams and improve dust ventilation and containment.

This program is included in the EH&SI Line Item Project 87-D-159.

Laundry Detention Sump

The laundry detention sump contains uranium from the clothes and glove washing operations. This wastewater flows to the sanitary lift station and is pumped to the Sewage Treatment Plant for treatment with other wastes. A pretreatment facility must be designed and installed to isolate uranium from the Sewage Treatment Plant stream.

Garage Car/Truck Wash

The car/truck wash sump at the garage contains uranium, oil and other materials which collect as the result of vehicle cleaning. This wastewater flows to the sanitary lift station and is pumped to the Sewage Plant, where it is treated with the other waste. A pretreatment facility must be designed and installed to isolate this uranium from the sewage plant stream.

Removal of Uranium from Stormwater

The Stormwater Retention Basin is operational and surface runoff from the production area is being collected and stored in the 6.3 million gallon basin. This stormwater will then be pumped to Manhole-175 for discharge to the Great Miami River via a buried pipeline. The lined stormwater retention basin will eliminate, except for extreme rainfall conditions, runoff water entering into the Storm Sewer Outfall Ditch and Paddy's Run.

TABLE 2-3

FUNDING SUMMARY FOR
WATER POLLUTION CONTROL
($1,000'S)

Funding Type		Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$	19	19						
GE-GPP	$	2,521	21	1,264	1,209	27			
EH&SI LI	$	84,903		651	7,352	19,900	21,200	20,800	15,000
GE-OP	$	18,042	1,630	1,898	2,620	2,973	2,971	2,955	2,995
Totals:	$	105,485	1,670	3,813	11,181	22,900	24,171	23,755	17,995

KEY

GE-CE - Capital Equipment from GE Budget

GE-GPP - General Plant Project from GE Budget

EH&SI LI - Items Included in Project 87-D-159

GE-OP - Operating Funds from GE Budget

OY - Out Year

WMCO is developing options to further reduce uranium concentrations in the stormwater system. Initial studies have entailed a storm sewer evaluation survey (SSES), which will help identify the source of uranium to its entry point into the stormwater system. Depending upon whether these sources can be identified and remedied, alternate treatment schemes will be required. New facilities are anticipated as a result of this survey.

This program is included in the EH&SI Line Item Project 87-D-159.

In-Process Storage Improvements

Covered Controlled Storage Pad - Plant 5

A 13,500 square foot covered concrete pad with a curb to retain spills and washwater will be constructed north of Plant 5. A sump and an overhead piping system will transport the contaminate to the Plant 5 sump. A pre-engineered metal canopy will be erected on concrete foundations. Stormwater will be collected from the canopy and transported by an underground drainage system to the existing storm sewer system.

Building 30 Repairs

The upgrades to the existing Chemical Warehouse Building 30 will consist of repairing or removing and replacing the concrete floor slab/dock, roof panels, and wall panels. The existing transite skin of the roof and walls will be removed and replaced with exterior metal siding. The existing single glazed window units will be replaced with translucent corrugated fiberglass panels. The existing pedestrian doors will be repaired or replaced, the doors to remain will be primed and painted. Existing overhead coiling doors will be repaired, sandblasted, primed and painted.

Buildings 64 and 65

Buildings 64 and 65 will be upgraded to correct deteriorated conditions. All roof and wall panels will be replaced with non-corrosive metal roof and wall panels. All deteriorated structural components will be repaired and painted. Any damaged existing floor areas will be patched with polyurethane grout; severely deteriorated areas will be replaced with new concrete.

Controlled Storage Pads

Concrete storage pads with a curb to retain spills and rainfall are required as listed below. The pads will have a sump system process contaminated water at the local plant sump systems. Currently some of these areas consist of deteriorated concrete that drains directly into the storm sewer system.

Existing Pad West of Plant 2	14,000 ft^2
Existing Pads West of Warehouse 4	10,000 ft^2

Existing Pads East of Plant 9	15,000 ft^2
Existing Pads East of Plant 6	10,000 ft^2
New Pad South of Building 55	10,000 ft^2

This program is included in the EH&SI Line Item Project 87-D-159.

K-65 Area Surface Water Control

Soluble uranium from the K-65 area surface is washed into the Pit Clearwell during rainfall. The Clearwell is maintained at pH=9.0 or higher, causing soluble uranium to precipitate and settle rather than be pumped to Manhole-175. During heavy runoff periods, adequate settling time is not possible. The area will be studied to determine the most effective way to eliminate all surface uranium or treat it prior to collection in the Clearwell.

2.3.4.2 Primary Treatment

An additional four projects are proposed for primary treatment improvements that require detailed research and development.

Water Quality Improvement, Recycle, and Reuse

This is a major plantwide program designed to virtually eliminate liquid wastewater discharge from the FMPC. The objective is to achieve "zero plant discharge". If discharges (including stormwater) do occur, appropriate water quality based discharge limitations will be followed at the point of discharge. The program consists of four subsections described below.

Wastewater Treatment Improvements

The planned improvements to the wastewater system include:

- Reconfiguring the piping in the vicinity of Manhole-175 to divert water to a water reuse tank rather than permitting discharge from the Wastewater Plant through Manhole-175 to the river

- Installation of a new water reuse tank, pumps, pipe and valving to permit wastewater recovery for reuse

These changes will result in the use of Manhole-175 as an emergency outlet of liquid from the plant property only, and a total recovery and reuse program resulting in a "zero plant discharge".

Pit No. 5 Bypass Piping and Mining

Planned improvements to the Pit No. 5 area include:

- Piping and valves necessary to tie-in near the liquid discharge point into Pit No. 5 and bypass the pit to a point near the pit discharge point. This bypass line would

accommodate continued flow into the Clearwell while Pit No. 5 is dried, and mined.

- Channeling flow within the pit to accommodate liquid removal to the extent possible

- Removal of settled solids from the pit to a packaging area. Hoppers, augers, scales and conveyors will be necessary to load solid material into disposal containers for removal from the site

The pit bypass piping will permit diversion of liquids into the Clearwell until such time as Pit No. 5 is completely mined and repaired. This system will be sized for 300 gpm to accommodate peak anticipated flow.

Nitric Acid Recovery

The planned improvements in the nitric acid recovery area are to accommodate the treatment of the Plant 2/3 raffinate stream to recover nitric acid and provide a manageable level of effluent. The raffinate stream will be processed using a new nitric acid recovery unit. The unit would require vessels, exchangers, pumps, a distillation column, pipe valves and fittings, and instrumentation to control and monitor the process. The Plant 2/3 sump effluent is to be processed using equipment and facilities on the existing nitric acid recovery structure as well as new equipment not presently in place. This will require new exchangers, pumps, agitators and process column. The structure will also be upgraded and all existing instrumentation will be replaced.

Recovery of nitric acid from the Plant 2/3 raffinate stream will provide 6N nitric acid to a storage vessel and recovered process water which will be re-introduced into the process water stream for Plant 2/3. The Plant 2/3 sump stream will be cleaned of suspended solids and sent to a nitric acid recovery unit similar to that used for the raffinate stream. The process water system will receive the recovered water and the recovered acid will be sent to the neutralization sump.

Water Recycle and Reuse

The recycle and reuse improvements are based on a "zero plant discharge" philosophy and will require that the following items be completed:

- Implementation of a process water conservation program specifically requiring a reassessment of process water use plant-by-plant

- Clean-up of process water at each user plant and re-introduction of recovered water into process supply

- Piping and valving changes at each plant process sump/clean-up area to allow re-introduction of recovered water

- Piping and valving required to re-introduce recovered water from the Water Treatment Plant for reduction by multiple effort evaporators.

- Installation of a water clean-up unit for storm water from the storm water retention basin.

- Installation of a water evaporator to reduce storm water and/or waste water volume and also manufacture high purity, deionized water for plant operations

When fully implemented, the water reuse program will provide recovered water for both sanitary and process needs; a reduced need for process water; more efficient waste removal due to clean-up of higher levels of undesirable contaminants in recirculated process streams; reduced volumes of waste water by evaporation; and generation of deionized water for plant use.

These improvements will ensure that water will leave the plant by evaporation (natural means or through installed units), or in slurries shipped for proper disposal.

This program is included in the EH&SI Line Item Project 87-D-159.

Hexavalent Chromium Removal

The new biodenitrification facility is expected to reduce hexavalent chromium. However, it is likely that additional reduction may be required to meet NPDES limits. If so, an alternate treatment facility will be needed at the General Sump to assure compliance with NPDES limits.

Elevated hexavalent chromium concentrations sometimes occur in the Clearwell as the result of Refinery Sump and raffinate filtrates that are pumped from the General Sump. Also, an occasional hexavalent chromium rise occurs in effluents from other areas that are pumped to the General Sump.

Alternative treatment facility design will be based on results of preliminary studies undertaken to identify the sources of elevated chromium.

This program is included in the EH&SI Line Item Project 87-D-159.

Upgrade Sewage Treatment Facility

The existing sewage treatment facility is to be refurbished and upgraded to current standards. The present facilities are in need of major repair. The basins are to be refurbished and the pumps, piping and filter media replaced.

2.3.4.3 Countermeasure Facilities

Leakproof Dikes

Existing dikes are constructed of concrete and/or acid brick and some are lined with a chemical coating on the inside of the dikes only, to protect the concrete and/or acid brick from corrosion. Some of the existing dikes and coatings are in need of repair. Various chemical processing tanks contain corrosive acids and uranium solutions and are surrounded by dikes, designed for spill containment.

The existing concrete and/or acid brick dikes will be upgraded and a chemical coating will be applied to all dike surfaces. Also, the structural pads inside the dikes will be coated to prevent leakage to the ground. Dike sizes will be increased as necessary to assure containment of any spills.

This program is included in the EH&SI Line Item Project 87-D-159.

Cover for East Storage Pad - Plant 8

A control pad shelter will be built over an existing 26,000 square feet storage pad located east of Plant 8. The shelter will minimize the contamination of rainwater, thus avoiding the overloading of both the collection and decontamination systems. This pad will be used to store low-level waste for off-site shipment and many intermediate radioactive materials prior to their being processed. This program is included in the EH&SI Line Item Project 87-D-159.

Controlled Storage Pad West of Plant 8

A 6,000 square foot storage pad with a curb will be built west of Plant 8. The pad will prevent contaminated water from escaping untreated into the Storm Sewer System. This pad will involve the demolition of approximately 6,000 square feet of pad west of Plant 8. Spills and runoffs from the pad will be contained and processed through a sump to the Plant 8 and/or General Sump. This program is included in the EH&SI Line Item Project 87-D-159.

Warehouse North - Plant 9

A 8,050 square foot metal building will be built for storage of uranium ingots in the staging area north of Plant 9. At present, in process uranium derbies are being stored in Plant 9 production areas which increase worker radiation exposure needlessly. The building will minimize contamination of rainwater and permit direct drainage of rainwater to the storm sewer system. Spills and washwater from the pad will be contained and processed through a sump to the General Sump for treatment. This program is included in the EH&SI Line Item Project 87-D-159.

Plant 1 Control Pad and Shelter

A control pad shelter will be built at Plant 1 to assure proper storage of uranium residue materials. This shelter will involve the demolition of approximately 350,000 sq. ft. of existing concrete pad north of Plant 1, and the installation of a covered 375,000 sq. ft., concrete storage control pad. The pad perimeter will be surrounded with a curb. A drainage system will carry any accidental spills or runoff to retention sumps located around the perimeter. The cover will be a standing seam type of roof panel supported by a beam and column type of pre-engineered rigid frame. Runoff from the roof will be directed to the existing Storm Sewer System. Fire protection and alarms will be provided under the canopy area. The sumps will be equipped with pumping systems to carry sump liquors to the General Sump for treatment. This program is included in the EH&SI Line Item Project 87-D-159.

Warehouse - Plant 8

Storage space is required for Purex UO_3 received from Richland. A warehouse approximately 12,000 sq. ft. is needed to protect the UO_3 from excess moisture which adversely affects processing and potential loss of uranium materials to the storm water distribution system. The new building will be located in a level, open area to the southwest of Plant 8. The area is currently covered by gravel. Underground utilities are located immediately adjacent to the construction site. This program is included in the EH&SI Line Item Project 87-D-159.

Pilot Plant Green Salt Interim Storage

The existing Green Salt Storage Pad on the northeast-side of the Pilot Plant is currently covered to reduce green salt exposure to the weather. New walls are required to enclose the storage area, except for the south side of the building which will remain open. Translucent panels will be used for day lighting. Interior lights will be added. Exterior lights will be installed in the south and southwest areas for night operations. Fire protection will include an alarm, dry sprinkler system and portable fire extinguishers. Ventilation will be provided through louvers at each gable. A curb will be provided around the pad for containment. This program is included in the EH&SI Line Item Project 87-D-159.

UF_6 Storage - Building 54

A prefabricated metal building will be provided at the south end of building 54 that will enclose an existing crane-way and pad that is used for unloading, storing and staging UF_6 feed cylinders. The purpose is to create a safer and more efficient all-weather enclosure for handling the UF_6 cylinders. A sump will be provided under the existing floor slab. This improvement will also enhance water-pollution control by containing any accidental material spills. This program is included in the EH&SI Line Item Project 87-D-159.

2.3.4.4 Research and Development

Various research and development projects which are proposed for the planning period pertain to the goals of the Water Pollution Control Program at the FMPC. The proposed projects are designed to optimize the biodentrification system and examine state-of-the-art detection and monitoring equipment associated with process wastewater treatment. Studies involving water treatment technologies through the development of bacteria and botanical systems will require the construction of large construction ponds. Lab facilities and equipment are required to support research and development efforts as well as operating funding support.

2.3.4.5 Monitoring

Manhole-175 Improvements

The total plant effluent monitoring system at Manhole-175 is inadequately sized to contain the necessary instrumentation and treatment equipment. The Manhole-175 building needs to be enlarged to facilitate the installation of all anticipated monitoring equipment; and the need to install pH adjustment equipment at this location must be investigated.

Test Wells at Edge of Property

On-Site Wells

Thirty-seven wells within the FMPC boundaries are being used for groundwater monitoring purposes. Twenty-two of the wells were designed and installed in CY-1984 and 1985, as part of the Dames & Moore Groundwater Study for the FMPC. The remaining wells were installed prior to 1984, and will be upgraded to present day state-of-the-art design and construction technologies.

Sixteen proposed wells will be placed at locations within the FMPC boundaries which require additional groundwater study. These areas will be located on the south and east edges of the production area and will be used to monitor groundwater movement.

The wells are to be installed in cluster formation (two or three wells of varied depths per cluster) in order to obtain representative groundwater data of the major sand and gravel aquifer. Depths range between 50 - 200 feet from ground surface. An upgradient well cluster will be installed at the same time in order to expand onsite data regarding background values of uranium in groundwater.

Soil sampling will be performed during the drilling of each well cluster. A certified geologist will coordinate this work in the field. Each 4-inch-diameter well will be constructed by a licensed well driller.

Downgradient Wells

Additional off-site wells to the south and east of the FMPC are required to better delineate the extent of the plume. Specifically, these wells

SOLID WASTE
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should confirm the existence of high groundwater elevations in the vicinity of the Delta Steel Plant.

Eastern Boundary Wells

A United States Geological Survey potentiometric surface map implies a groundwater divide east of the site boundary. This divide would prevent groundwater flow to the east toward the Great Miami River. To verify the existence of this divide, one to three wells should be drilled east or southeast of well cluster #13. Verification of the groundwater divide would virtually preclude the possibility of any uranium being transported eastward via a groundwater pathway.

Expansion of Off-site Groundwater Monitoring System

The current off-site groundwater monitoring program will be expanded to include wells southeast of the site and adjacent to Paddy's Run which are not currently being monitored.

Surge Lagoon Line Replacement

The surge lagoon supply lines are too close to the lagoon wall. A line rupture could potentially wash away the wall, causing the lagoon to drain into Paddy's Run. These lines have a history of leaks. The replacement of the surge lagoon lines is necessary to ensure safe environment.

2.4 Solid Waste Management Program

2.4.1 Solid Waste Management Concerns at the FMPC

The FMPC's many diverse chemical and metallurgical processes which produce uranium compounds and metal also generate numerous waste materials. These wastes require proper management to assure they do not adversely impact the public, environment or site personnel. The FMPC Waste Management Program addresses two major concerns: the on-site presence of a large quantity of stored wastes resulting from past operations; and the continuing generation of numerous waste streams from ongoing plant operations.

Wastes generated at the FMPC consist of conventional industrial and sanitary wastes, as well as low-level radioactive wastes, and smaller quantities of radioactive/hazardous mixed wastes. Management of these wastes is directed toward eliminating or minimizing potential impacts such as:

- Direct radiation exposure to on-site personnel
- Windblown contamination off site from on-site waste
- Contamination of ground or surface water from stored waste

"Solid waste" is defined as any solid, semi-solid, liquid, or contained gas that is being discarded. At the FMPC, solid wastes are categorized as follows:

- Low-Level Radioactive Waste
- Low-Level Radioactive/Hazardous Mixed Waste, DOE Order 5480.2. (This category consists of low-level radioactive waste which also contains hazardous waste that is identified or listed in 40CFR261. Source, special nuclear material, and by-product material as defined by the Atomic Energy Act of 1954, as amended, are specifically excluded from the term hazardous waste.)
- Conventional Industrial Waste

The significant substances in each category are listed in Table 2-4. These solid waste substances must be handled, treated and disposed of in an environmentally acceptable manner compatible with worker health and safety.

2.4.2 Solid Waste Management Strategy

The FMPC Solid Waste Management Program addresses liquid wastes, any contained gaseous wastes, and solid wastes. WMCO's goal is to minimize solid waste generation, while complying with applicable environmental regulations.

Solid waste management is administered by the Waste Management Group, which is responsible for coordinating the planning, design, construction, and operation of all waste-management systems.

Five major waste minimization techniques currently used at the FMPC are:

- Segregation of radioactive waste from conventional wastes (minimizes the volume of waste that must be handled as radioactive)
- Material Substitution
- Process Innovation
- Mechanical Volume Reduction
- Recycle/Reuse

These techniques involve both waste reduction at the source, and compaction prior to packaging/shipping.

2.4.3 Applicable Regulations and Current Compliance

Regulations Governing Low-Level Radioactive Wastes

Management of low-level radioactive wastes, waste by-products and radioactively contaminated facilities is governed by DOE Order 5820.2. This order applies to all DOE elements, contractors and subcontractors who manage radioactive waste as defined in the Atomic

TABLE 2-4

SIGNIFICANT FMPC SOLID WASTES

Low-Level Radioactive Wastes

- Scrap uranium metal (non-recyclable)
- Process residues (slag, filter cake, sump sludges, etc.)
- Scrap uranium compounds
- Waste cutting oils and cooling fluids
- Items contaminated with the above (tools, gloves, shoe covers, building materials, etc.)

Low-Level Radioactive/Hazardous Mixed Wastes

- Spent salt sludges (containing $BaCl_2$)
- Spent solvents
- Still bottoms (containing PCBs)
- PCB-containing capacitors & PCB contaminated articles

Conventional Industrial Wastes

- Asbestos
- Oil
- Scrap building materials
- Sanitary waste (cafeteria waste)

Energy Act of 1954, as amended. Policies and guidelines are provided for the disposal of LLW and wastes contaminated with naturally occurring radionuclides. Further implementation guidance is provided in DOE/LLW-38T, Guidance for Implementation of DOE Order 5820.2, Chapter III, Management of Low Level Waste, May 1985.

Regulations Governing Radioactive/Hazardous Mixed Waste

Radioactive/Hazardous Mixed Waste management at the FMPC is conducted under DOE Orders 5480.1A and 5480.2, as supplemented by ORO Order 5480.4; the Atomic Energy Act; Resource Conservation and Recovery Act (RCRA); and Appendix A of this document. DOE Order 5480.1A assures that radioactive/hazardous mixed waste generated by DOE-funded activities will be managed in an environmentally acceptable manner. DOE Order 5480.2 provides the requirements for radioactive/hazardous mixed waste management programs implemented at DOE-funded installations. The Atomic Energy Act of 1954, as amended, dictates provisions for the establishment of regulations governing processing and utilization of source, by-product and special nuclear materials.

DOE Order 5480.2 is derived from the Resource Conservation and Recovery Act (RCRA) of 1976. This Order regulates the generation, transportation, treatment and disposal of radioactive/hazardous mixed wastes and regulates facilities disposing of all solid wastes. Source material, special nuclear material, and by-product material are excluded. Radioactive material mixed with hazardous wastes are regulated. Hazardous wastes are defined by specific source listsnon-specific source lists and characteristic hazards. Other portions pertinent to the FMPC include: standards for transporters of hazardous waste; standards for owners and operators of hazardous waste treatment, storage and disposal facilities; permit requirements for treatment, storage or disposal of hazardous wastes; inspections; enforcement; hazardous waste site inventory; and monitoring analysis and testing criteria for sanitary landfills.

The Resource Conservation and Recovery Act of 1976 was amended in October, 1984, by the Hazardous and Solid Waste Amendments. The amendments have two principal purposes: the first is to regulate previously exempt generators and sources; the second is to regulate land disposal more stringently and eliminate it where possible. Requirements imposed by the new RCRA Amendments are very specific, detailing the standards they impose. The amendments reauthorize and expand RCRA through 1988, and require the EPA to promulgate new regulations governing several aspects of waste management.

To obtain compliance with DOE directives, the FMPC must submit permit applications to environmental regulators. Each permit application has two parts (A and B). Both Part A and Part B Permit Applications were submitted for the five radioactive/hazardous mixed waste facilities at the FMPC (see Table 2-5). Part A information was first submitted to EPA on July 6, 1984. The Part B application was submitted on November 8, 1985, with Revision 1 submitted on

February 24, 1986, in response to a Notice of Deficiency received from EPA on January 31, 1986. Information such as process ,

throughput, storage capacities, waste characterization by RCRA hazard code, process description, photographs and sketches were included in the permit applications.

TABLE 2-5

FMPC RADIOACTIVE/HAZARDOUS MIXED WASTE FACILITIES

Mixed Waste Drum Storage Area, No. 1

Mixed Waste Drum Storage Area, No. 2

Spent Solvent Bulk Storage Tanks

Barium Chloride Treatment Facility

Low-Level Radioactive Waste Pit No. 4

Information required for the Part B Permit Application includes general facility descriptions, waste characterization and analysis plans, information on processes generating the waste, procedures to prevent hazards, contingency plans and closure/post-closure plans. After negotiation and acceptance of Part B Permit Applications, the facilities at the FMPC will be fully permitted under RCRA and subject to stringent guidelines specified in 40 CFR Part 264. The FMPC will then be inspected by the EPA, or its designee, DOE and/or internal auditors to assure RCRA compliance.

Section 3002(b) of RCRA was amended to require that hazardous waste generators have a program in place to minimize the amount and toxicity of waste generated. Compliance with Section 3002(b) will be assured by programs initiated at the FMPC and at the RMI Company, in Ashtabula, Ohio, which generates most of the radioactive/ hazardous mixed wastes handled and stored at the FMPC. These programs are outlined in Section 2.4.4 of this plan.

The State of Ohio legislation equivalent to RCRA is the Ohio Hazardous Waste Management Rules found in the Ohio Administrative Code (OAC 3745-54). This legislation is virtually identical to RCRA. Although previously granted authority to regulate RCRA activities, the State of Ohio will need to apply for authorization to administer the Solid and Hazardous Waste Amendments of 1984.

Regulations Governing Toxic Substances

Specific toxic substances are regulated by DOE Orders 5480.1A and DOE and ORO Order 5480.4, which incorporates the substantive provision of the Toxic Substances Control Act (TSCA) of 1976. These substances differ from RCRA hazardous materials and include polychlorinated biphenyls (PCBs). Source materials are excluded

from TSCA. The only TSCA regulation pertinent to the FMPC environmental management is the Polychlorinated Biphenyls (PCBs)

specified in 40 CFR 761. To achieve compliance, WMCO plans to eliminate capacitors and transformers containing PCBs from the FMPC.

Regulations Governing Conventional Industrial Waste

The Ohio Solid Waste Disposal Act and regulations promulgated under this act govern the planning, design, construction, operation and maintenance of solid waste processing and disposal facilities. Solid or dissolved material in domestic sewage flows subject to NPDES permit and special nuclear materials, as defined under the Atomic Energy Act (as amended), are excluded. Special wastes, such as low-level radioactive wastes, asbestos and beryllium oxide, cannot be dispositioned in a conventional facility unless specifically permitted under this act. Any contemplated construction or modification to a solid waste disposal or processing facility requires submission of a feasibility study or modified plan of design and operation, including system and site evaluations to the state for approval. Prior to construction and operation, detailed design drawings, specifications, operating plans and closure plans must be approved by the State. Record-keeping and documents regarding future plans and capacities must also be provided during operation, and reported to the Ohio EPA.

The FMPC sanitary landfill expansion project (described in Section 2.4.4) will be governed by the Ohio Solid Waste Disposal Act regulations. A permit application has been submitted to the state for this project.

2.4.4 Solid Waste Management Plan

There are three subprograms in the Solid Waste Management Program. They are:

- Low-Level Radioactive Waste Management
- Radioactive/Hazardous Mixed Waste Management
- Conventional Industrial Waste Management

Radioactive/Toxic Mixed wastes are managed within the Radioactive/ Hazardous Mixed Waste Management subprogram. Figure 2-7 illustrates the planned flow of solid wastes at the FMPC. Both are described in more detail below. Prior to the completion of the Low Level Waste Processing and Shipping (LLWPS) system in FY-88, existing facilities will process wet-waste streams into a form suitable for shipment to an off-site disposal facility. The planned improvement projects in the three solid waste subprograms are discussed. Breakdown by type of funding and Fiscal Year is shown in Table 2-6.

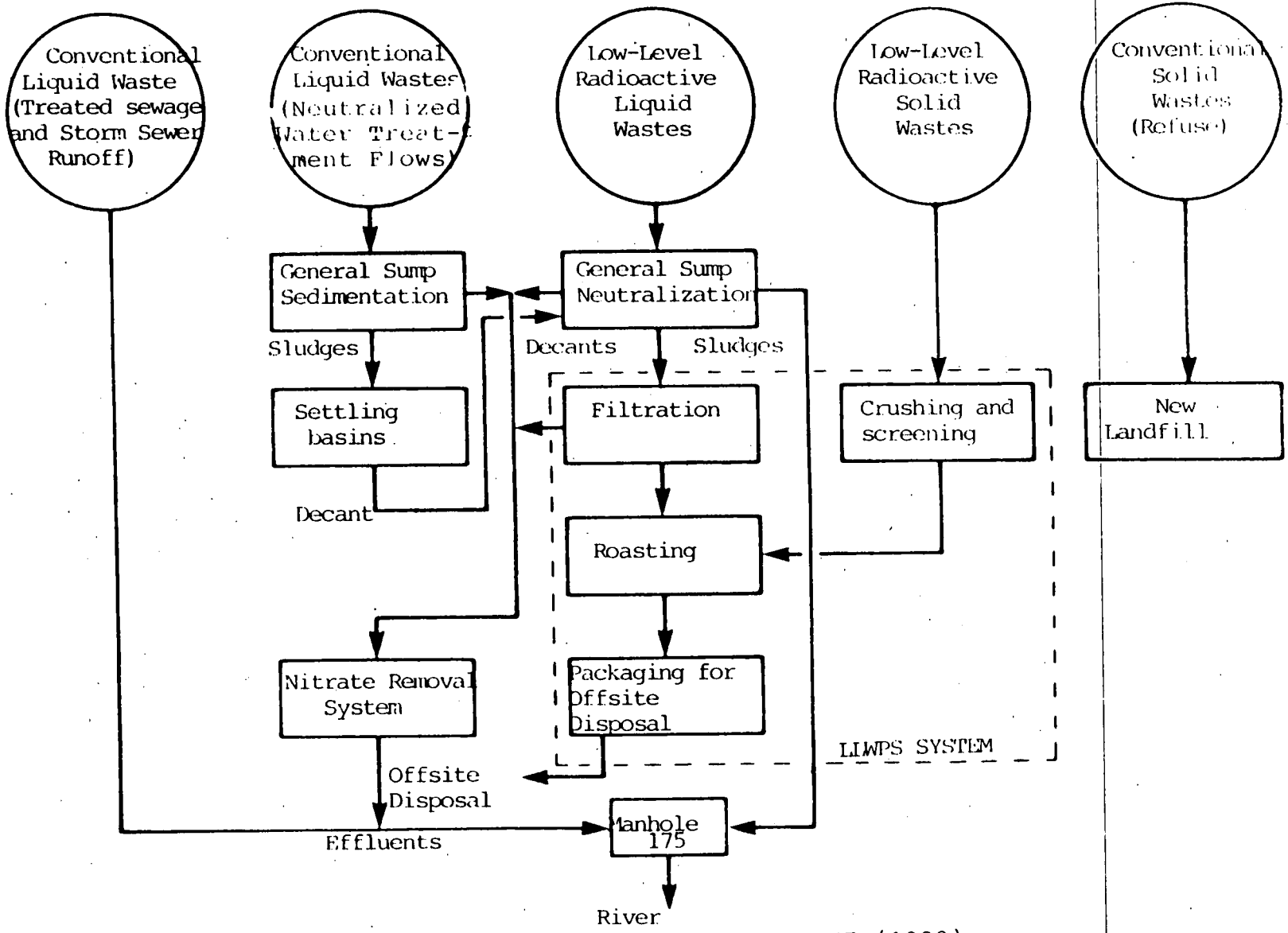


Figure 2-7 FUTURE FMPC WASTE MANAGEMENT (1988)

106.50

Amended 06/25/87

TABLE 2-6

FUNDING SUMMARY FOR SOLID WASTE MANAGEMENT PROGRAM ($1,000's)

Funding		Fiscal Years						
Type	Total	1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 196			150	11	13	11	11
GE-GPP	$ 5,320	209			581	1,510	1,510	1,510
EH&SI LI	$ 47,432	4,317	2,165		10,500	11,300	11,150	8,000
GE-OP	$ 28,186	3,233	3,594	3,855	4,377	4,372	4,350	4,405
Totals GE:	$ 81,134	7,759	5,759	4,005	15,469	17,195	17,021	13,926
AR-CE	$ 2,000	300	300		350	350	350	350
AR-GPP	$ 6,235	758	1,477		1,000	1,000	1,000	1,000
AR-OP	$ 44,106	7,049	7,168	9,000	7,930	5,463	3,733	3,763
Totals AR:	$ 52,341	8,107	8,945	9,000	9,280	6,813	5,083	5,113
Total - All Funds:	$133,475	15,866	14,704	13,005	24,749	24,008	22,104	19,039

KEY

GE-CE - Capital Equipment from GE Budget

GE-GPP - General Plant Projects From GE Budget

EH&SI LI - Items Included in Project 87-D-159

GE-OP - Operating Funds From GE Budget

AR-CE - Capital Equipment From AR Budget

AR-GPP - General Plant Projects From AR Budget

AR-OP - Operating Funds From AR Budget

TABLE 2-6

FUNDING SUMMARY FOR
SOLID WASTE MANAGEMENT PROGRAM
($1,000's)

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 196			150	11	13	11	11
GE-GPP	$ 5,320	209			581	1,510	1,510	1,510
EH&SI LI	$ 47,432	4,317	2,165		10,500	11,300	11,150	8,000
GE-OP	$ 28,186	3,233	3,594	3,855	4,377	4,372	4,350	4,405
Totals GE:	**$ 81,134**	**7,759**	**5,759**	**4,005**	**15,469**	**17,195**	**17,021**	**13,926**
AR-CE	$ 2,000	300	300		350	350	350	350
AR-GPP	$ 7,805	2,328	1,477		1,000	1,000	1,000	1,000
AR-OP	$ 44,336	7,279	7,168	9,000	7,930	5,463	3,733	3,763
Totals AR:	**$ 54,141**	**9,907**	**8,945**	**9,000**	**9,280**	**6,813**	**5,083**	**5,113**
Total - All Funds:	**$135,275**	**17,666**	**14,704**	**13,005**	**24,749**	**24,008**	**22,104**	**19,039**

KEY

GE-CE - Capital Equipment from GE Budget

GE-GPP - General Plant Projects From GE Budget

EH&SI LI - Items Included in Project 87-D-159

GE-OP - Operating Funds From GE Budget

AR-CE - Capital Equipment From AR Budget

AR-GPP - General Plant Projects From AR Budget

AR-OP - Operating Funds From AR Budget

OY - Out Year

2.4.4.1 Low-Level Radioactive Waste Management Program

Low-Level Waste Operations Procedures

This project provides for the technical support required for formulation and improvement of procedures for handling and disposal of low-level waste. It also supports the training of personnel and implementation of new or modified procedures adopted for waste handling and disposal.

Low-Level Waste Processing and Shipping

The continuing program for the processing, shipping and disposal of low-level wastes includes various work activities such as waste certification and waste handling together with waste processing, packaging, shipment and disposal. Major emphasis is focused on the elimination of the current drummed waste backlog.

Low-Level Waste Volume Reduction

Since disposal costs at the Nevada Test Site (NTS) are predicated upon a per unit volume basis, reduction of waste volume is economically attractive. This project provides for operating costs associated with the employment of mechanical waste compaction to achieve a reduction of waste volumes.

Low-Level Waste Disposal Cost Reduction

This program provides for the review and study of various alternative waste processing and handling methods to enhance efficiency and thus reduce incurred costs for waste disposal.

Low-Level Waste Processing and Shipping System

Due to redefinition of FMPC waste handling and processing needs required to meet Nevada Test Site acceptance criteria, the LLWPS system is being reevaluated to assess the possibility of providing some of the required waste processing functions with existing production facilities which are being upgraded as part of the Productivity Retention Project (PRP). In particular, the potential for modifying the new PRP rotary kiln and oxidation furnace to accomodate the additional load of waste stream treatment is beinginvestigated. Functionally, the process requirements remain essentially the same as for the LLWPS:

- Size Reduction
- Oxidation
- Dewatering
- Sampling
- Packaging

Funding requirements have not yet been established for the integrated Production/Waste Management System.

Waste Inventory Database

Personal computers (PC) are now in use by the Waste Management Group in tracking current inventories and shipments of waste materials. In conjunction with the computer system, a bar code labeling/reading system is being procured to track waste shipments off site.

Additional equipment will be required to initiate the barcoding of waste drums as they are filled. This equipment will be located in Plant 5 and will be interfaced with the weigh scales to permit automatic data transmission.

Chemical Warehouse Study

Since a heated area is not currently available at the FMPC for the necessary handling and sampling of drum contents during winter operation, it is proposed to utilize a portion of the chemical warehouse for this purpose by providing heat and insulation.

Drum Conveyor for Chemical Warehouse

A drum handling system consisting of conveyors and crane(s) will be installed in the northeast corner of the Chemical Warehouse to enable operations to increase the number of off-site shipments of MgF_2 and thereby reduce the backlog.

Equipment for Surface Decontamination

As a result of a number of various observations conducted throughout the FMPC during previous years, a need for surface decontamination type equipment has developed. Concrete and asphalt surfaces throughout the FMPC have been contaminated due to saturation and traffic. This program will require the following type of decontamination equipment:

- Surface Decontamination Equipment

  Currently, some of the contaminated areas are cleaned using standard methods such as brooms, rinses, etc. More comprehensive decontamination equipment is needed to remove partial surface areas and decontamination more effectively per ALARA. Such equipment would only remove the surface without the need to remove the bulk of asphalt or concrete.

Mobile Laboratory Equipment

The furnishing of laboratory equipment capable of being transported to various locations is proposed. Such equipment would facilitate the conducting of field tests in connection with waste management projects.

Ferrous Scrap Metal Disposition

As a result of past and proposed renovations to the FMPC production facilities, a large quantity of ferrous-metal scrap has been and will continue to be generated. The current scrap-metal inventory is approximately 6,000 tons. Funding will be required for segregation, sorting and disposition of contaminated ferrous-scrap metal. Additional funding will be required for disposition of expected scrap generation from future renovation activities.

~~Contaminated Scrap Copper Management~~

This scrap will be the subject of technology demonstrations for the decontamination and recovery of copper. A number of private sector contractors will be selected to take part in tests. From the results, options for disposition of the present pile will be evaluated and a plan developed.

Decontamination and Decommissioning Facility

The existing facility has inadequate capacity for handling current and future decontamination effort. There are currently no facilities for the decontamination of numerous items of reusable plant equipment, construction scrap and vehicles. A new decontamination and decommissioning facility is required to meet current and future operational needs and to handle renovation and construction activities. This program is included in the EH&SI Line Item Project 87-D-159.

2.4.4.2 Radioactive/Hazardous, Mixed Waste Management Program

Support for RCRA/RMI

RCRA wastes generated at the RMI extrusion plant are shipped to the RMPC for storage and processing. These shipments are necessary due to limited RCRA storage space at RMI. These wastes include salt (barium chloride Ba Cl_2), salt trash, floor sweepings, and salt brick. The main source is spent salt sludge. Approximately 36,000 pounds of spent salt sludge composed of roughly 55 percent barium chloride are received annually. These materials have been stored in the Pilot Plant Warehouse. Since RMI is expected to continue these shipments in the future, a need for possible additional storage facilities exists. Therefore, an engineering study is required to evaluate storage space requirements and to make recommendations with regard to space and enclosure needs.

Waste Oil Disposition

Approximately 13,000 gallons of mixed-waste solvents containing small quantities of uranium are stored in two large tanks on site. In addition, a substantial quantity of low-level radioactive-waste oil is generated from FMPC production operations. The existing liquid waste incinerator does not have sufficient capacity to keep up with the waste-oil generation, and a backlog of approximately 900 drums is currently stored on site. The preferred option for

disposal is destruction of both the radioactive/hazardous mixed-waste solvents, and the low-level radioactive-waste oil in the TSCA incinerator at the Oak Ridge Gaseous Diffusion Plant (ORGDP). This project provides for the necessary sampling, packaging and shipment of these materials to Oak Ridge.

Still Bottoms Disposition

Sixty-one 55-gallon drums of solvent still bottoms and sludges that are slightly contaminated with uranium and PCB's are stored in a covered, curbed area within an on-site warehouse. Arrangements are being made to ship the still bottoms and sludges to Oak Ridge for destruction in the TSCA incinerator. These still bottoms and sludges resulted from a campaign to recycle spent solvent generated in the CIP/CUP program, and are no longer generated at the FMPC.

PCB Disposition

PCB-containing capacitors are periodically removed from service at the FMPC. These capacitors, and articles used in their removal and handling (rags, clothing, gloves), are stored in drums in the covered, curbed storage area. PCB wastes, not contaminated with radioactivity, are shipped to an EPA-approved disposal site. PCB wastes containing low levels of radioactivity are retained in storage for destruction at the TSCA incinerator.

TSCA Incinerator Support

The planned support for the TSCA incinerator at ORGDP provides for the disposal fee assessed for the incineration of the mixed wastes to be shipped from the FMPC.

RCRA Storage Facility

As the FMPC does not have a centralized facility to handle RCRA hazardous or PCB wastes, a survey of existing space is being made to provide storage for these materials. The facility will comply with all EPA requirements governing the storage of RCRA and PCB wastes.

RCRA Oil Incineration

Provision is made by this project to share in the construction costs for a contaminated oil incinerator being built at Oak Ridge. When construction of the facility is completed, the inventory of oil at the FMPC will be shipped for disposal.

2.4.4.3 Conventional Industrial Waste Management Program

Spent Lime Sludge Drying Beds

Spent lime sludges from water treatment operations are segregated from low-level radioactive waste streams and pumped to an existing lime settling pond that is now nearly filled. Annual operating costs are required.

REMEDIAL ACTION

Expand Existing Landfill

Solid wastes from the Boiler Plant, neutralized coal pile drainage, feedwater treatment sludge and non-contaminated blowdown water willrequire treatment and storage separate from the contaminated waste streams. A landfill to receive these wastes will begin operation in FY-88, contingent upon permit approval from Ohio EPA and will have a capacity of at least 500,000 cubic feet, sufficient for operation through FY-98. Funding will be required to begin construction and operation of the landfill.

2.5 Remedial Action Program

FMPC operations have produced on-site inventories of accumulated low-level radioactive waste materials and contaminated facilities (equipment, concrete pads, etc.). If not managed properly these could potentially contaminate the environment, or increase radiation exposures to site personnel or to the public. WMCO is implementing a Remedial Action Program to manage these materials and facilities.

The Remedial Action Program is divided into two subprograms: Waste Storage Area Management; and Surplus Facilities Management. The first describes facilities and projects for performing Remedial Actions on low-level radioactive wastes stored in on-site waste pits and silos; the second deals with facilities removed from service, abandoned-in-place or put in standby status which may be contaminated.

2.5.1 Remedial Action Concerns at the FMPC

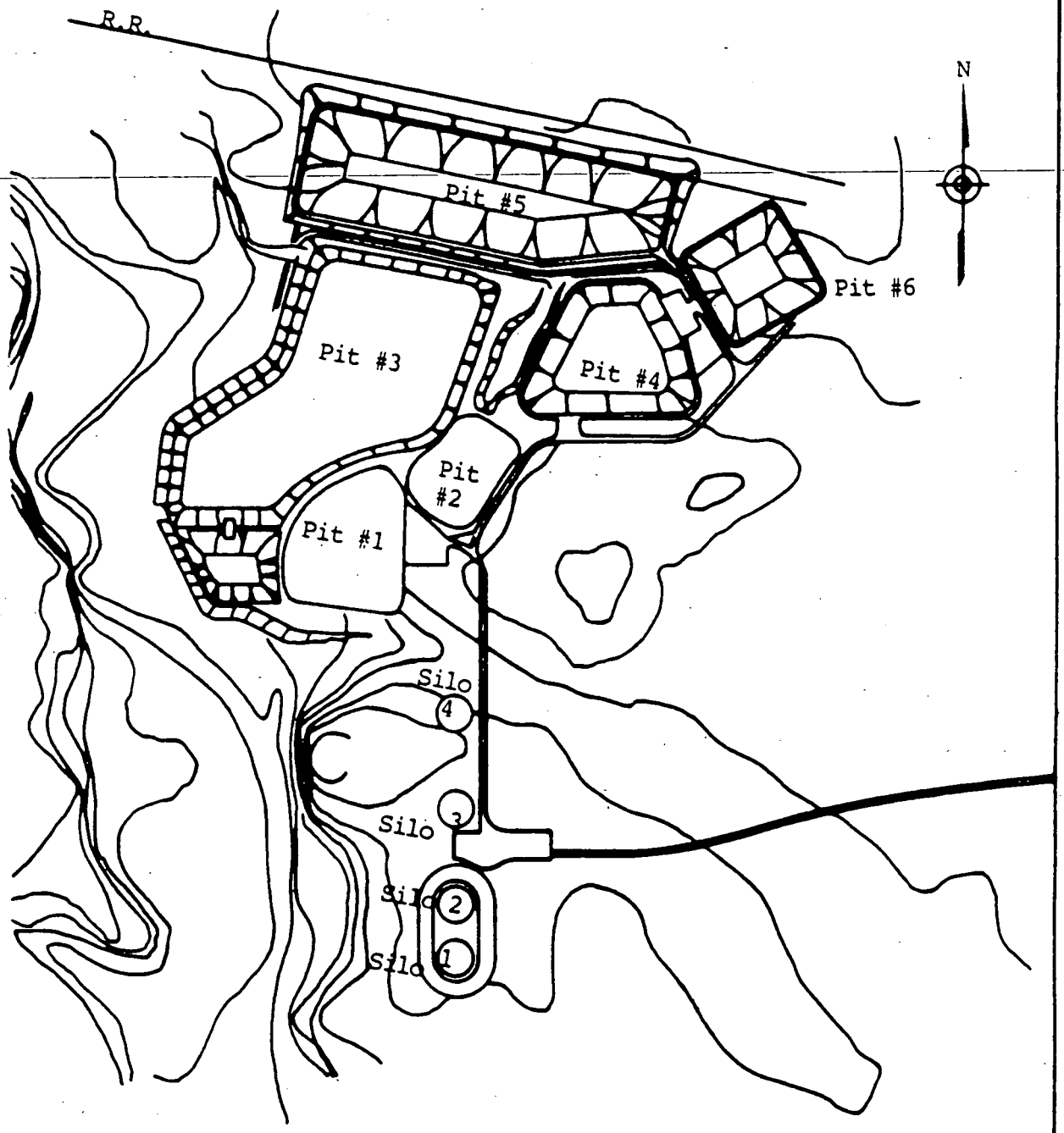
In the past, the FMPC's low-level radioactive waste was discarded to surface impoundments, landfills and silos. Although this practice has been discontinued, a large inventory of accumulated waste is currently on site. Because of their design, the nature of the wastes contained and their location over an extensive aquifer, these impoundments, landfills and silos are not considered suitable for long-term storage or permanent disposal. Planning for the removal, processing and final disposition of these wastes is addressed in this chapter, along with a discussion of interim stabilization measures to isolate the waste from the environment, pending its permanent disposal.

The FMPC waste-storage facilities include six waste pits, (numbered Pit 1 through Pit 6; see Figure 2-8) and four concrete silos (two "K-65 tanks" and two metal oxide tanks) located on the west side of the plant, approximately 900 feet from the site boundary. The current status of each facility is shown in Table 2-7. The area is relatively flat and occupies about 37.7 acres. Paddy's Run, a tributary of the Great Miami River with intermittent flow, runs along the west side of the project between the waste area and the site boundary.

The following background information describes the history and contents of the waste-storage facilities. An estimate of the waste quantities and radionuclide content of each is provided in Table 2-8.

2.5.1.1 Waste Pits

The six waste pits at the FMPC are shown in Figures 1-2 and 2-8 and are identified by numbers based upon the chronological sequence of their



All Pits and Silos are Retired
Pits 1, 2 and 3 are Covered

Figure 2-8 FMPC Solid Waste Storage Facility Layout

TABLE 2-7

WASTE STORAGE FACILITY STATUS

Structure	Type	Volume (Million ft^3)	Status	Contents
Pit 1[1]	Dry	1.08	Retired	U-Bearing Wet & Dry Solids
Pit 2[1]	Dry	0.351	Retired	U-Bearing Wet & Dry Solids
Pit 3[1]	Wet	6.12	Retired	U-Bearing Wet Sludges
Pit 4[1]	Dry	1.43	Retired	Slags, Abrasives, Metals, Dry
Pit 5[2]	Wet	3.10	Retired,[3]	U-Bearing Wet Sludges
Pit 6[2]	Dry	0.375	65% Full	Retired Slags, Misc. Materials, and U-Bearing Wet & Dry Solids
Silo 1	Wet	0.134	Full, Retired Tailings	High Radium
Silo 2	Wet	0.134	Full, Retired Tailings	High Radium
Silo 3	Dry	0.134	Full, Retired Oxides, Dry	Low Radium
Silo 4	Dry	0.134	Empty	

Note[1] Clay-lined
Note[2] Rubberlined
Note[3] Utilized for sedimentation of process waste water

TABLE 2-8

SUMMARY OF RADIOACTIVE WASTES IN FMPC WASTE FACILITIES

STRUCTURE	WASTE QUANTITY (MT)	URANIUM (KG)	U-235 (KG)	THORIUM (KG)	RADIUM-226 (Ci)
Pit 1	40,500	52,000	370	-	Unavailable
Pit 2	13,000	1,206,000	2,550	400	Unavailable
Pit 3	255,000	129,000	1,010	400	19
Pit 4	64,970	3,048,094	5,529	61,700	-
Pit 5	88,348	50,249	420	17,100	118
Pit 6	9,309	843,142	1,740	-	-
Silo 1 & 2 (K-65 Tanks)	8,800	11,200	80	-	1,652
Silo 3	3,500	18,000	130		15
TOTALS[1]	483,427	5,357,685	11,829	79,600	1,804

Note [1] As stored, through December 1985

construction. Pits 1 and 2 are essentially "inground" facilities which were used for disposal of various dry solid radioactive wastes. They were constructed in 1952 and 1957, respectively, by digging large basins into the existing blue clay. Parts of the bottom of Pit 1 were lined with an additional four feet of clay. The walls of each were lined with 1.5 - 2.0 feet of impervious clay as well. The maximum depths of Pits 1 and 2 are 17 and 13 feet, respectively. Pit 1 was used from 1952 to 1957 for the disposal of neutralized waste filter cake, sump cakes from the production plants, depleted slag, scrap graphite, contaminated brick and sump liquor. Pit 2 was used from 1957 to mid-1964 and received the same waste types as Pit 1. From 1958 to 1959, it became necessary to use Pit 2 as a settling basin for neutralized raffinate. The remaining capacity of Pit 1 was used as a clearwell for the effluent from Pit 2 prior to its discharge to the Great Miami River. Both pits have been filled and covered with clean, uncontaminated soil and graded to provide surface drainage to the clearwell.

Pits 3 and 5 were used for disposal of chemical sludges from uranium extraction operations. Pit 3 was constructed between 1958 and 1959, at the west end of the storage plateau, by excavating a large basin into the underlying layer of blue clay. Dirt removed from the excavation formed the west pit wall. After excavation, pit walls were lined with a minimum of one foot of compacted clay. In 1965, pit capacity was expanded by adding two feet of additional material to the walls, providing a maximum depth of 27 feet.

Pit 3 was used as a retention or settling basin for liquid effluent and slurries from 1959 to 1968, and contains solids from the settling process. The waste slurries were pumped from Plant 8 and the general sump to the pit, and the clarified effluent overflowed a concrete spillway into a clay-lined clearwell. From the clearwell, the effluent was discharged to the Great Miami River. The principal waste contained in Pit 3 is neutralized raffinate, which consists of the impurities remaining after uranium is extracted from ores or recycled feed materials. In 1958, lime sludge from the water treatment plant was added to supplement the lime used for raffinate neutralization. During the late 1960's, slag leach residues were pumped to Pit 3 until Pit 5 was available as a settling basin. From 1975 to 1977, the remaining capacity of Pit 3 was filled with filter cake, fly ash and dirt in an effort to solidify the contents sufficiently to support an earthen cover. Pit 3 has been retired and covered with clean fill. The cover was mounded to allow surface water drainage to the Clearwell prior to discharge to the Great Miami River.

Pit 5 was constructed in 1968 as a settling basin to replace Pit 3. It was constructed by cut and fill using the excavated material to build a dike approximately 10 feet above grade. Pit 5 is lined with a 60-mil-thick elastomeric-membrane liner and has a maximum depth of 30 feet. From 1968 to 1983, Pit 5 received slurries from the refinery and Plant 8. The solids, which contained almost all of the uranium, thorium and other radioactive species remaining in the waste, settled out in the pit. The clarified effluent flowed by gravity through an effluent control tower to the Clearwell from which it was discharged to the Great Miami River. Since 1983, solids in the slurried waste streams have been removed by filtration and drummed for interim storage on the Plant 1 concrete pad prior to shipment to the Low Level Waste Repository at the Nevada Test Site. The clarified effluent from this filtration process is then pumped to Pit 5 to facilitate discharge to the Great Miami River.

Pit 5 contains the settled solids from neutralized raffinate, slag leach slurry and sump slurries. Water treatment plant lime sludge was also added to supplement the lime used for raffinate neutralization. Zirnlo slurry and heat-treat quench water were routed directly to Pit 5 to permit the settling of radioactive solids from liquid wastes.

Pits 4 and 6 were used as dry chemical disposal pits for depleted uranium residues including filter cake and sludges from neutralized wastes, low grade thorium residues, contaminated ceramics discarded from production electric furnaces and general noncombustible waste.

Pit 4 was constructed in 1960 by excavating down into the underlying blue clay layer. A minimum of one foot of compacted clay lined the inner slopes of the pit walls. With a maximum depth of 24 feet, Pit 4 was used for the disposal of Plant 8 filter cake, process residues, contaminated graphite, and noncombustible trash. From 1981 to 1983, Pit 4 received approximately 23,500 pounds of radioactive waste contaminated with $BaCl_2$ heat treatment salt. The $BaCl_2$ is a characteristic hazardous waste which is now mixed with 143 million pounds of low-level radioactive waste. Pit 4 currently is retired and is covered with soil. Run on and runoff to Pit 4 is collected and conveyed to the Clearwell.

Pit 6 was constructed between 1978 and 1979. It is lined with an impermeable elastomeric membrane, and has a maximum depth of 30 feet. It has received depleted slag, scrap green salt, process residues, and filter cake. Pit 6 which is approximately 65 percent full, is retired and no longer receives waste material.

Current knowledge of the characteristics of the wastes placed in these pits is generic and does not provide a thorough analysis of their specific contents. Before disposal options can be evaluated, a thorough characterization is necessary to determine the physical, chemical and radiological characteristics, and to assess the status of the waste disposal area.

2.5.1.2 Waste Silos

The four waste storage silos are large cylindrical structures made from post-tensioned concrete. They were used to store radioactive waste generated between 1952 and 1958. Silos 1, 2, and 3 are filled and no longer in use. Silo 4 has never been used and remains empty.

Silos 1 and 2, the "K-65 tanks", were used to store refinery residues from pitchblende-ore processing. These residues, or tailings, contain significant quantities of radium. Pitch blende-ore processing was discontinued at the FMPC in 1959. The residue, formerly the property of the African Metals Corporation, was stored at the FMPC under a lease agreement with the DOE. Under a recent settlement, DOE has assumed ownership and responsibility for this material. A recent study indicates that portions of the K-65 silos may not be structurally sound. A radon monitoring program developed by the Oak Ridge National Laboratory and Monsanto Laboratory is being conducted by WMCO to provide data for the evaluation of short-term stabilization options.

Silo 3, the metal oxide tank, contains similar tailings or residues from FMPC refinery operations. However, the residues are the result of

processing non-pitchblende-ore concentrates and contain only low levels of radium.

2.5.2 Remedial Action Program Strategy

WMCO's chief goal for managing the FMPC Waste Storage Area and Surplus Facilities is to isolate defined hazardous wastes, low-level radioactive wastes and radioactively contaminated-surplus facilities from the environment and to protect the health of the public and site personnel. It is DOE and WMCO policy that exposures to employes and the public as a result of these facilities be maintained As Low As Reasonably Achievable (ALARA). In accordance with ALARA philosophy, WMCO is developing strategies to manage existing waste storage sites and surplus facilities, including identification, characterization and performance of remedial actions. The development of a Waste Storage Area Management Strategy is dependent upon the Remedial Investigation Study. The Surplus Facilities Management Strategy was developed.

Accumulated low-level radioactive wastes stored in pits and silos may be stabilized in place; transferred to more stable on-site facilities; or retrieved and converted to a dry form for off-site disposal. Current planning calls for remedial activities at the waste-storage pits and silos to be done over a ten year period. In the interim, pits will be managed to minimize surface and groundwater infiltration.

Pursuant to the July, 1986 Federal Facilities Compliance Agreement, a comprehensive sitewide Remedial Investigation and Feasibility Study (RI/FS) is being performed at the FMPC to identify and assess existing and potential threats to the environment and the public health. The scope of this investigation addresses all FMPC facilities including waste storage and surplus facilities. The Remedial Investigation portions of the study will identify potential applicable remedial technologies and provide sufficient data to evaluate these technologies in the detailed Feasibility Study. The Feasibility Study will provide an indepth evaluation of applicable remedial alternatives and identify a preferred option(s). U.S. EPA will select the proposed remedial alternatives for implementation by DOE.

The Remedial Investigation and Feasibility Study Process

The most appropriate remedial-action program for a waste disposal site can be selected only after a thorough site characterization and evaluation of available remedial action options. Detailed information must be used to further determine the technical and economic feasibility of potential alternatives. Accordingly, the RI/FS process involves the following: evaluate the nature and extent of contamination; collect site specific data; determine remedial options; compare remedial options to site characteristics; select the best remedial actions; and make preliminary recommendations for site cleanup. The selection of the preferred alternative (s) is made by the U.S. EPA and the implementation of the selected remedial action alternative (s) is made by DOE.

Characteristics of Remedial Action Alternatives

There are three broad categories of remedial action alternatives: surface water controls, groundwater controls and direct treatment methods.

Surface controls are remedial techniques designed to reduce surface water infiltration and to control runoff at waste disposal sites. They also

reduce erosion and stabilize the surface of covered landfills. These controls minimize leachate generation and reduce off-site erosive transport

of cover materials and exposed refuse. Surface control measures include capping, grading, revegetation and runoff diversion/collection. They are generally well established techniques and often are performed in conjunction with site closure and in preparation for potential reuse of the area for nondisposal activities.

Contaminated groundwater can be dealt with in a number of ways. Impermeable barriers constructed of bentonite slurry, cement, chemical grouts, or sheet piling can be installed vertically to prevent groundwater from migrating away from the site, or divert groundwater to prevent contact with waste materials. Another potential method is to allow groundwater to flow through permeable limestone and/or activated carbon treatment beds which trap and retain the contamination.

Depending on their quantity and nature, contaminated sediments may severely disrupt aquatic ecosystems and may even affect public drinking water supplies. Chemicals that settle into the bottom sediments of natural waters may damage or kill benthic organisms, disrupting the aquatic food chain. More seriously, sediments deposited in water supply reservoirs may pose a direct threat to the consuming public.

Remedial techniques for contaminated sediments generally involve removal and subsequent disposal or treatment. Sediment removal methods include well established excavation and dredging techniques. Dredged materials ("spoil") management includes techniques for drying, physical processing, chemical treatment and disposal. Treated sediments, or those that have not been severely contaminated, may be used as construction fill and in reclamation projects. Plans to remove and treat contaminated sediments must be designed and implemented on a site-specific basis. Dredging in wetlands may require revegetation of the area.

These two treatment methods can be considered passive control. Pumping groundwater with subsequent surface treatment is an active remedial measure. Pumping groundwater can be specifically designed to lower the groundwater table, or to contain a contaminated groundwater plume.

Direct treatment provides long-term permanent solutions. The single most important advantage of direct treatment is that it removes pollution at the source, while other methods simply contain the pollution. Direct treatment involves one or more of the following approaches:

- Physical removal of the wastes to a better engineered or environmentally less sensitive area (excavation, hydraulic dredging and land disposal)
- Physical removal followed by waste stabilization (solidification and encapsulation)
- Waste destruction (incineration, wet air oxidation, microbial degradation, etc.)
- Chemical waste treatment within the site (neutralization and solution mining)

Many of these direct treatment methods are not fully developed and their applications and process reliability need to be demonstrated. Their use for waste treatment will necessitate considerable R&D. Others, such as excavation and land disposal, are widely used, although DOE requirements will require significantly greater degrees of monitoring and controls for land disposal techniques. The combined costs of excavation (or dredging) with subsequent treatment can be exorbitant if a large volume of waste is involved.

2.5.3 Applicable Regulations and Current Compliance

Management of low-level radioactive wastes, waste by-products and radioactively contaminated facilities is governed by DOE Order 5820.2. This Order applies to all DOE contractors and subcontractors who manage radioactive waste as defined in the Atomic Energy Act of 1954, as amended. Guidelines are provided for characterization of radioactive waste disposal facilities. Chapter V of the Order establishes policies and guidelines for management, decontamination and decommissioning of surplus facilities under DOE ownership or control.

Waste-storage pits and above-ground silos at the FMPC are potentially impacted by two other DOE orders which incorporate the substantive provisions of Federal laws for the management of waste facilities. These are DOE Order 5480.2, which implements the DOE program for compliance with RCRA and the State of Ohio Hazardous Waste Rules; and DOE Order 5480.14 that implements the DOE program for compliance with CERCLA. The Remedial Action Plan discussed below will be implemented in accordance with the applicable DOE orders.

The Federal Facilities Compliance Agreement established a regulatory framework for examining facilities at the FMPC which demonstrate an existing or potential threat to human health or the environment. Pursuant to this agreement a RI/FS will be performed on all applicable facilities at the FMPC including the production area, the waste storage facilities, and the thorium inventories.

2.5.4 Remedial Action Plan

The planned improvement projects in the two Remedial Action subprograms, are discussed below. The total estimated funding to accomplish planned Remedial Action is identified by type of funding and Fiscal Year in Table 2-9.

2.5.4.1 Waste Storage Area Management Plan

Remedial Investigation/Feasibility Study

A Remedial Investigation/Feasibility Study (RI/FS) program has been initiated. It is structured after a Remedial Investigation/Feasibility Study (RI/FS) as outlined in RI/FS guidance documents and the Federal Facilities Compliance Agreement.

Amended 06/25/87

TABLE 2-9

FUNDING SUMMARY FOR REMEDIAL ACTION ($1,000'S)

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 358		101	210	13	11	11	12
GE-GPP	$ 23			23				
EH&SI LI	$ 2,282	2,282						
GE-OP	$ 25,970	1,634	2,138	4,005	4,548	4,545	4,520	4,580
Totals GE:	$ 28,633	3,916	2,239	4,238	4,561	4,556	4,531	4,592
AR-GPP	$ 2,638	638			500	500	500	500
AR-LI	$230,000			6,000	2,000	78,000	100,000	44,000
AR-OP	$ 7,277	2,423	1,469		2,485	300	300	300
Totals AR:	$239,915	3,061	1,469	6,000	4,985	78,800	100,800	44,800
Total - All Funds	$268,548	6,977	3,708	10,238	9,546	83,356	105,331	49,392

KEY

GE-CE - Capital Equipment From GE Budget

GE-GPP - General Plant Projects From GE Budget

EH&SI LI - Line Item Project 87-D-159

GE-OP - Operating Funds From GE Budget

AR-GPP - General Plant Projects From AR Budget

AR-LI - Line Item Project 86-D-146

AR-OP - Operating Funds From AR Budget

OY - Out Year

TABLE 2-9

FUNDING SUMMARY FOR
REMEDIAL ACTION
($1,000'S)

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 358		101	210	13	11	11	12
GE-GPP	$ 23			23				
EH&SI LI	$ 2,282	2,282						
GE-OP	$ 25,970	1,634	2,138	4,005	4,548	4,545	4,520	4,580
Totals GE:	**$ 28,633**	**3,916**	**2,239**	**4,238**	**4,561**	**4,556**	**4,531**	**4,592**
AR-GPP	$ 2,638	638			500	500	500	500
AR-LI	$230,000			3,000	5,000	78,000	100,000	44,000
AR-OP	$ 7,277	2,423	1,469		2,485	300	300	300
Totals AR:	**$239,915**	**3,061**	**1,469**	**3,000**	**7,985**	**78,800**	**100,800**	**44,800**
Total - All Funds	**$268,548**	**6,977**	**3,708**	**7,238**	**12,546**	**83,356**	**105,331**	**49,392**

KEY

GE-CE - Capital Equipment From GE Budget

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GE-OP - Operating Funds From GE Budget

AR-GPP - General Plant Projects From AR Budget

AR-LI - Line Item Project 86-D-146

AR-OP - Operating Funds From AR Budget

OY - Out Year

The Remedial Investigation consists of eight tasks:

- Description of Current Situation
- Work Plan Requirements
- Site Investigation
- Site Investigation Analysis
- Laboratory and Bench-Scale Studies
- Reports
- Additional Requirements
- Community Relations Support

The Feasibility Study consists of nine tasks:

- Description of the Current Situation
- Work Plan
- Development of Alternatives
- Initial Screening of Alternatives
- Detailed Analysis of Alternatives
- Evaluation and Selection of Preferred Alternative
- Draft Feasibility Study Report
- Final Feasibility Study Report
- Additional Requirements

Characterization Information Study

A study to determine the physical, chemical and radiological characteristics of materials in the waste storage area was originally planned to support the Remedial Action Waste Cleanup (RAWC) project and compliance with CERCLA. The study has been expanded to support requirements of the Federal Facilities Compliance Agreement (FFCA) and the Environmental Impact Statement (EIS). Activities include radiological and geophysical surveys, as well as extensive sampling and analysis of soil and pit contents.

K-65 Silo Remediation

Remedial actions concerning the K-65 silos are the installation of pressure and temperature monitors, and the development of a method to fill the void space in the silos with polyurethane foam. The pressure-temperature monitors have been installed and data are currently being obtained. A Conceptual Design Report is being formulated for injection of foam into the silos to mitigate radon emissions and provide structural reinforcement for the silo domes.

K-65 Silo Sampling

The systematic sampling and analysis of the material stored in the K-65 silos is a special adjunct to the Characterization Information Study cited previously. Costs for this project include those for special preparations and precautions required for safe silo access in addition to sampling costs by a subcontractor.

Remedial Action

A program will be initiated to perform a radiological characterization of the FMPC facility and adjoining areas, if needed. A database will be established to document the extent of contamination to aid development of a comprehensive program aimed at performing interim remedial actions. The database can also provide a planning tool in the event that planning for eventual FMPC decommissioning should begin. Operating funds will be required for characterization studies and establishment of the data base.

Uranium Reduction in Off-Site Wells

During 1984 and 1985, Dames and Moore conducted groundwater studies to determine the possible sources of uranium found in three off-site wells. Based on the findings of those studies, remedial actions to reduce the intrusion of uranium into groundwater were identified consisting of three tasks:

- Task I consists of controlling surface water runoff in the Waste Pit Storage Area west of the FMPC Production Area as outlined below.

- Task II consists of expanding the existing FMPC groundwater monitoring system for the areas surrounding the plant. This expansion will include the identification of existing private wells and their location around FMPC along with the location of six new monitoring wells around FMPC property. In association with this task, a laboratory program for FMPC has been developed. This program identifies the laboratory equipment required for the required analyses.

- Task III consists of excavating existing uranium-bearing sediment which may be acting as an intermediate or secondary uranium source for the groundwater. To determine this quantity, a radiological survey and sampling program was conducted on the storm sewer outfall ditch. This survey will be extended down Paddy's Run to the Great Miami River, but based on the outfall ditch results, as much as 19,000 cubic yards of soil may have to be excavated, packaged, and removed to a storage facility.

This program is included in the EH&SI Line Item Project 87-D-159.

Surface Water and Groundwater Controls

Control of stormwater from the waste-pit storage area is needed to reduce the amount of contaminated runoff entering Paddy's Run. Regrading of the ground surface and diversion of runoff flows to the clearwell biosurge lagoon, or other suitable retention basin is planned.

To maintain the integrity of existing waste impoundments and to minimize surface water infiltration, minor modifications and general maintenance to existing waste impoundments will be required during the planning period.

Routine maintenance and resurfacing of the pit access roadways will be required during this same period.

Interim Pit Stabilization

Currently, Pits 4, 5 and 6 are open surface facilities that are inactive and no longer receive wastes. Pit stabilization activities and studies to identify and evaluate solutions for problems concerning pit area runoff are needed. Implementation of runoff controls or recommendations from RI/FS will be required when they become available.

Cover for Pit 4

In accordance with public commitments made by DOE and WMCO, waste Pit 4 will be provided with a cover that will prevent surface water penetration. To this end, the pit will be completely filled and then covered with a plastic membrane.

Remedial Action Waste Cleanup

The Remedial Action Waste Cleanup (RAWC) project will address the cleanup of the silos and waste pits located on the west side of the plant. Waste characterization studies are in progress and feasibility studies are planned for the second quarter of FY-87. Conceptual design is to be completed in FY-88 and construction should begin in FY-91. Treatment and disposal facilities are expected to be located just east of the waste pits. Further evaluation for the need of a treatment process facility is being considered.

A financial baseline for the RAWC project will be developed during the preparation of the Conceptual Design Report. The project is being considered a Major System Acquisition (MSA). This is Line Item Project 86-D-146.

Backlog Rubble Segregation

Low-level radioactive debris has been placed in an area located 2100 feet SSW of the Pilot Plant, between the patrol road and Paddy's Run and near the old fly ash pile. Periodic spot radiation readings at ground level reach 0.08 mR/hr. No record has been found of disposals in that area. It must be assumed that the rubble was slightly contaminated debris generated during the expansion work in the 1950's. The total surface area involved is unknown but the maximum area would be about 100,000 square feet. A radiological field survey to provide a characterization of the Southfield disposal site, with test borings, will be conducted as part of the RI/FS.

Costs for removing the material will not be known until the survey is conducted.

Fly Ash Stabilization/Disposition

Waste oil containing small amounts of uranium was placed upon the fly ash pile in past years for dust suppression purposes. To characterize the old fly ash pile area, a study will be performed as part of the RI/FS to define the content of radionuclides. Remedial actions are anticipated to remove and/or stabilize materials.

Thorium Removal - Plant 8

The on-site thorium inventory consists of approximately 4.1 million pounds of material containing various concentrations of thorium. Approximately 3.5 million pounds of this inventory is presently stored in drums, and the rest is stored in the 17-foot diameter silo near Plant 8 (60,350 pounds) and two rectangular silos adjacent to Plant 8 (592,000 pounds total).

The thorium residues currently stored in drums will be inspected, repackaged as necessary (due to some deteriorating drums), and shipped to off-site disposal facilities.

The thorium residues currently stored in the Plant 8 silos will be sampled to ascertain their present form (i.e. loose dust, compacted cake, crystalline, solidified) and chemical makeup so that the best remedial action option can be implemented. The options include repackaging by using existing material handling equipment (if operable), or designing new systems to remove the residues to appropriate containers for interim on-site storage. The latter option is preferred, based on preliminary evaluation. The design and procurement of a thorium loading system is included in the EH&SI Line Item Project 87-D-159.

2.5.4.2 Surplus Facilities Management

As a result of FMPC operations, facilities (equipment, buildings, storage pads) may become contaminated with residual levels of radioactivity which exceed the limits for unrestricted release. When taken out of service, many of these facilities have been "abandoned-in-place" or put in "standby" status. A program is being initiated at the FMPC to identify those facilities which are no longer in use, nor have any projected use, and which may pose a potential for increased exposure to radiation and/or hazardous materials. Removal of the facilities cited below will be part of the Remedial Action Waste Cleanup project, 86-D-146.

Removal of Abandoned Equipment

Abandoned equipment will be removed to eliminate potential hazards to personnel and to allow safe and convenient access to equipment now in service. Also, housekeeping efforts will be simplified and enhanced. Present planning for removal of abandoned equipment is to:

- Identify and compile a list of all abondoned-in-place equipment and facilities by April, 1987;
- Survey identified abandoned-in-place facilities and equipment for radiation or other hazards by July, 1987; and
- Develop scope of abandoned equipment program (coordinate with PRP demolition plans).

Specific equipment planned for removal will be identified upon completion of the abandoned equipment program scope.

Plant 1 Storage Towers Removal

Off-site discharges of radioactivity will be reduced by the planned removal of the material storage towers located south of Plant 1. The storage towers are presently empty and have not been used in 25 years. The storage

towers were employed to store uranium concentrates used to produce orange oxide. Residual material from the deteriorating storage towers continues to be washed into the storm sewer system despite the cleanup and residue removal efforts conducted several years ago. No maintenance has been performed for many years and metal components are heavily rusted. Tiles occasionally drop from the tower facing. It is evident that the structure eventually must be razed. Continued deterioration may make the task more difficult. Removal of the Plant 1 storage towers also will eliminate the potential damage to the nearby enriched uranyl nitrate solution storage tanks.

3.0 Safety and Health Management Plan

Introduction

Safety and Health programs for the FMPC cover five areas: (1) Health Physics/Radiation Protection; (2) Nuclear Criticality Safety; (3) Packaging and Transportation Safety; (4) Industrial Hygiene and (5) Occupational Safety/Fire Protection. The five year plan for each of these areas is discussed in Sections 3.2 through 3.6. In addition, FMPC operations are guided by certain Safety Analysis Reports which result from an integrated preparation effort by Production Operations, Engineering and Construction, Quality Assurance, Environment, Safety and Health, and other supporting groups. This ensures that all those affected understand their safety responsibilities and also provides a unified safety approach for the entire plant. The Safety Analysis program is described in Section 3.1.

3.1 Safety Analysis and Review Program

3.1.1 Safety Analysis Concerns

System safety is a concern at the FMPC because large quantities of fissile and hazardous materials are routinely handled and stored in processing and manufacturing. Currently, the only fissile material being processed and stored at the FMPC is low-enrichment uranium with a maximum enrichment of <20% U-235 of which the majority has an enrichment of $\leq$1.25% U-235. Hazardous materials used or stored in large quantities on-site include: Thorium (Th), Uranium Metal, Uranium Compounds (UO_2, UO_3, U_3O_8, UF_4, UF_6, and $UO_2(NO_3)_2$), Anhydrous Hydrogen Fluoride (AHF), Hydrofluoric Acid (HF), Anhydrous Ammonia (NH_3), Nitric Acid (HNO_3), Sodium Hydroxide (NaOH), Potassium Hydroxide (KOH), Kerosene, magnesium metal, Magnesium Fluoride (MgF_2), and process waste products.

Safety analysis is the documented process to: systematically identify the hazards of an operation; describe and analyze the adequacy of the measures taken to eliminate, control or mitigate identified hazards; and analyze and evaluate potential accidents and their associated risks. The safety analysis program excludes those risks which are routinely encountered and accepted in the course of everyday living by the vast majority of the public.

Safety analysis at the FMPC is divided into three categories: existing plant safety analyses; new project safety analyses; and transportation safety analyses.

- The existing plant category covers all existing facilities systems. Safety Analysis Report (SARs) have been prepared for several FMPC facilities since 1979, when safety analyses of FMPC facilities first began.

- The new project category includes line-item projects and capital improvements to the existing plant. There is a program in place to ensure that Safety Assessments and, where needed, SARs are prepared for all engineering projects.

- There are four Safety Analysis Reports for Packaging (SARPs) in effect at the FMPC. As transportation container requirements change these SARPs are revised to reflect container design changes and, where necessary, new SARPs are prepared.

3.1.2 Strategy for the Safety Analysis and Review Program

The Safety Analysis and Review Program includes: the preparation of SARs, formation of an Independent Safety Review Committee, formation of a Configuration Control Program, and formation of an internal Audit Program.

3.1.2.1 Preparation of Safety Analysis Reports

Responsibility for Safety Analysis at the FMPC is shared by two groups: the Technical Department, and the Environment, Safety and Health (ES&H) Department. Project engineers in the Technical Services and Waste Management Sections of the Technical Department prepare the Facility and Process Descriptions for project PSARs and Final Safety Analysis Reports (FSARs). The Safety Analysis Group of the Regulatory Compliance Section of the ES&H Department has the following responsibilities in preparing safety analysis documents:

- Prepares Safety Assessments
- Reviews Project Safety Assessments to ensure compliance with current directives
- Prepares the Accident Analysis portion of project PSARs and FSARs
- Prepares all Safety Studies for existing plant facilities and systems
- Prepares Safety Analysis Reports for Packaging (SARPs)
- Manages the overall FMPC Safety Analysis Program

All project FSARs and existing plant safety studies will be combined to form the Final Safety Analysis Report for the FMPC, which will supercede all previously issued SARs. The Plant FSAR will then be a "living document" which will be updated as changes occur.

3.1.2.2 Independent Safety Review Committee

An Independent Safety Review Committee will be established in FY-87. The Committee functions will include, among other things, the independent and objective review of SARs and Operational Safety Requirements (OSR) documents to ensure technical accuracy and conformity between the two; and pre-operational readiness review of new or modified systems and/or facilities to ensure that the commitments expressed by the OSR document pertinent to them have been satisfied.

3.1.2.3 Configuration Control Program

Configuration control is the system which assures that functional and physical characteristics of components, equipment, structures and systems required for safety are identified and documented; and that all changes are identified, controlled, approved by authorized persons, documented and implemented.

The Configuration Control Program for the FMPC, currently in the formative stage, will ensure the configuration of safety systems; design features for safety; OSR-affected Standard Operating Procedures (SOPs); and other SOPs as they are identified in subsequent SARs and OSR documents. Procedures defining the purpose and goals of the Configuration Control Program and listing the responsibilities of each group in implementing the program are being drafted. The program will be implemented during FY-87.

3.1.2.4 Internal Audit Program

Once a Safety Analysis Program and a Configuration Control Program are implemented, annual audits or reviews of the affected operating groups will be performed to ensure that all programmatic responsibilities and requirements are being met. A systems safety audit team, directed by the Manager of Regulatory Compliance, will audit the various operating groups to assess their compliance with their assigned responsibilities relating to OSR documents and the Configuration Control Program. Management will receive a report of audit results to use as a tool for gauging the effectiveness of the control system, and as assurance that DOE requirements are being met. The internal audit program will be in place by mid FY-87, with the initial audit scheduled during the third quarter of FY-87.

3.1.3 Applicable Regulations and Status Compliance

The overall Safety Analysis and Review Program is governed by DOE Order 5480.5 and DOE Order 5481.1B as supplemented by DOE-ORO Order OR5481.1B.

3.1.3.1 DOE ORDER 5480.5

DOE Order 5480.5 requires a program that includes:

- An independent safety analysis review process, which includes a formal documented system for the identification and control of risks through preparation, independent review and approval of safety analyses

  (WMCO is complying with this requirement by preparing Safety Analysis Reports as described in Paragraph 3.1.2.1.)

- A system of configuration control that requires independent safety reviews and approvals of all changes to components, equipment, procedures and systems required for facility safety

(WMCO is working toward compliance with this requirement by developing a procedure for configuration control as described in Paragraph 3.1.2.3.)

- Operational Safety Requirements that set the approved limitations of safe operation

  (WMCO is complying with this requirement. OSRs have been prepared for facilities for which FSARs have been completed)

- For new nuclear facilities and for significant modifications to existing ones, review of safety analyses design criteria, environmental assessments and environmental impact statements and other design documents are required to assure adequate environmental protection, safety and health protection

  (WMCO is working toward compliance with this requirements by establishing an Independent Safety and Preoperational Readiness Review Committee as described in Paragraph 3.1.2.2.)

- For new nuclear facilities and for significant modifications to existing ones, reviews and inspections during construction, acceptance of systems, and preoperational phases are required to assure compliance with the appropriate environmental protection, safety and health standards and requirements

  (WMCO is working toward compliance with this requirements by establishing an Independent Safety and Preoperational Readiness Review Committee as described in Paragraph 3.1.2.2.)

- An independent-contract or safety review and appraisal system.

  (While this system is not currently in place at the FMPC, WMCO recognizes it is needed and plans to develop and implement such a system as soon as the supporting programs are in place, as described in Paragraph 3.1.2.4.)

3.1.3.2 DOE Order 5481.1B as Supplemented by OR5481.1B

DOE Order 5481.1B as supplemented by OR5481.1B requires that a safety review shall be performed and safety documentation prepared for all DOE activities where DOE has assumed responsibility for safety. OR5481.1B further specifies the types of safety documentation required.

(WMCO is in the process of complying with these orders by preparing SARs as described in Paragraph 3.1.2.1.)

3.1.4 Safety Analysis and Review Management Plan

The schedule for completing the Existing Plant FSAR by the end of FY-90 has been developed. The schedule for Project Safety Analyses will be dependent on the schedule for projects established by Engineering. There are no Line Item Projects or General Plant Projects associated with the Safety Analysis and Review Program. Capital expenditures for computer equipment are anticipated to support the program. Operating funds for the FMPC staff personnel and outside contractor assistance may be required for some of the analyses. Breakdown by type of funding and Fiscal Year is shown in Table 3-1.

TABLE 3-1

FUNDING SUMMARY FOR
SAFETY ANALYSIS AND REVIEW PROGRAM

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 209		24				185	
GE-OP	$ 6,401	722	803	751	1,141	975	995	1,014
Totals:	$ 6,610	722	827	751	1,141	975	1,180	1,014

KEY

GE-CC - Capital Equipment from GE Budget

GE-OP - Operating Funds from GE Budget

OY - Out Year

HEALTH
PROTECTION

3.2 Health Physics/Radiation Protection Program

3.2.1 Health Physics Concerns at the FMPC

Health Physics/Radiation protection concerns the potential exposure of employes to radioactive materials and other sources of ionizing radiation such as x-ray equipment. Current FMPC production activities involve handling only uranium, an alpha emitter. However, beta emitting thorium and protactinium isotopes from the U-238 decay chain are present in virtually all materials handled at the FMPC, so direct beta radiation exposures are of concern in many parts of the plant. In addition, some of the uranium has been recycled from nuclear reactors and contains extremely small (but significant from a radiation standpoint) quantities of transuranics and fission products which influence the external radiation doses. In addition to current production, the FMPC has large quantities of stored waste from previous operations such as the K-65 silo uranium ore tailings containing small concentrations of radium, a strong gamma emitter, and its accompanying radon gas and daughter products.

The production activity, involving large quantities of uranium, and waste management activities, involving uranium and other radioactive species, necessitate control measures to limit external and internal doses received on the job, to acceptable levels. In addition, to ensure that the hazards are being adequately controlled, a monitoring program is necessary to continuously measure the external dose for all employes (and the internal doses for those working in areas with potential inhalation problems), and maintain permanent records of exposure for each individual.

3.2.2 Health Physics/Radiological Protection Strategy

The strategy for managing the Health Physics activities can be best described by dividing Health Physics functions into four broad areas of required activity:

- Control of Radioactive Materials
- Control of External Radiation Exposures
- Control of Internal Radiation Exposures
- General Health Physics Activities

The last item includes documentation of policies and procedures; training; characterization of the workplace; recordkeeping; radiological review of new facilities; and response to unusual events.

3.2.2.1 Control of Radioactive Materials

It is fundamental to radiation protection that radioactive material be permitted only in areas that are specifically designated for handling these materials in order to protect individuals from unnecessary exposure to radiation and radioactive materials. Areas where radioactive materials cannot be handled must be clearly

defined. Measures must be adopted to ensure that radioactive materials are not inadvertently carried into non-handling areas.

There is a five-part strategy for control of radioactive materials:

- Classify all areas of the plant into three categories, depending upon the amount of unsealed radioactive material that can be tolerated. Category I includes administrative offices; Category II includes process area offices and breakrooms; and Category III includes actual production areas.

- Minimize traffic between areas in different categories, especially between Categories I and III.

- Require protective clothing in Category III areas, and perhaps in Category II areas, while forbidding it in Category I areas.

- Monitor all personnel and objects that enter a Category I area from a different area, and perhaps those that enter Category II from Category III.

- Develop an evaluation and control program with routine surveys and action levels applicable to each category.

Another aspect of controlling radioactive materials is ensuring that the radiological characteristics of the materials being handled are well established. Although the FMPC handles only uranium, some of it has been recycled from reactor sites and contains extremely small quantities of transuranics and fission products. In order to maintain certain monitoring action levels, the quantity of constituents in the recycle material must be known. Plant feeds, products, and residues are routinely sampled for transuranic contaminants to ensure that they comply with specifications for radiological impurities. When appropriate, action levels are adjusted to reflect the radiological effects of those contaminants. Out-of-specification materials are processed only after special evaluation and development of additional radiological controls. The specification for transuranics in recycled materials were developed as a result of the work of the DOE Joint Task Force on Recycle Material Processing, and have been approved by DOE.

3.2.2.2 Control of External Radiation Exposures

Apart from removal of radioactive material from the work area, the strategy for limiting exposures to external radiation calls for placing shielding material between employes and radiation sources; decreasing the time that employes must be in close proximity to radiation sources; increasing the distance between employes and radiation sources; and decreasing the intensity of radiation sources. Because uranium at the enrichments commonly handled at the FMPC emits very little gamma radiation, shielding is usually employed against beta radiation only. Therefore, relatively

lightweight materials can be used and be moved to the most effective position as the character of the workplace changes. Exposure time can be reduced and exposure distance increased by automating processes or using remote handling equipment.

Efforts that are underway for reducing the intensity of radiation sources are: cleaning ingots to remove beta-emitting daughters from their surfaces; renovation of remelt furnaces to incorporate automatic crucible cleaning; and investigation of placing additives in remelt charges to decrease the migration of beta-emitting daughters to ingot and crucible surfaces.

3.2.2.3 Control of Internal Radiation Exposures

Internal radiation exposures are controlled by limiting the amount of radioactive material that is inhaled or ingested. This is done by containment of radioactive materials to the maximum extent possible, ventilating areas where containment is impossible; and minimizing exposure/contact of personnel in the workplace.

The EH&SI Line Item project includes a multimillion dollar subproject for general ventilation upgrades, beginning in FY-87. This subproject includes HEPA filtration downstream of primary air cleaning devices, and thus will not only improve the removal of airborne contaminants from the workplace, but will also sharply curtail environmental emissions from ventilation systems.

Additional air sampling instrumentation is being procured in order to characterize workplace airborne contamination levels. This instrumentation includes beta constant air monitors as well as air samplers without real-time monitors. The contamination control program, which is outlined in Section 3.2.2.1, also serves to control internal exposures, as does the respiratory protection program which includes periodic training and fit-testing.

3.2.2.4 External Dosimetry System

To control external radiation exposures, it is necessary to evaluate actual employe exposures. This is accomplished by providing employees with thermoluminescent dosimeters (TLD's) capable of measuring both penetrating and non-penetrating radiation. In addition, employes whose hands are frequently in proximity to appreciable radiation sources are provided with extremity dosimeters. Until now, these have been worn on wrists, and hand doses were estimated from readings. Recent studies indicate that dosimeters should be worn on the hands of some employes to accurately determine hand doses. This program will be initiated during FY-87.

At present, employes are monitored for external radiation by dosimeters contained in their security badges. During FY-87, separate dosimetry and security badges will be put into use. At that time, dosimeters will no longer be issued to personnel who do not work with or near radioactive materials.

3.2.2.5 Internal Radiation Dosimetry

In order to determine if internal exposures are being adequately controlled, it is necessary to evaluate actual doses caused by internal deposition of radioactive material. This is done by urinalysis and in-vivo monitoring. The capability for performing both of these functions must exist onsite.

An extensive urinalysis program is in place at the FMPC, but in-vivo monitoring is performed only during visits of the Martin Marietta mobile in-vivo monitoring facility (approximately twice a year). An onsite in-vivo monitoring facility has been funded in order to alleviate the shortcoming.

3.2.2.6 General Activities

The following activities support the objectives previously described in Section 3.2.2.

Documentation of Policies and Procedures

Written policies and procedures are required to ensure that Health Physics activities are performed properly and consistently. These documents provide auditability and consistency to Health Physics activities.

Training

The work practices of individual employes greatly influence the magnitude of radiation exposure and how well radioactive materials are controlled. Training employes for their roles in controlling radioactive materials and radiation exposures is essential for a successful program.

Characterization of the Workplace

Characterization of the workplace includes measurement of direct radiation, surface contamination and airborne radioactivity. The radiological condition of the workplace must be characterized so that exposure reduction efforts can be directed toward the areas where they will be most effective, and so that employes know exactly what protective measures to take.

Recordkeeping

A flexible comprehensive recordkeeping system is required to identify work locations, job classifications or individuals that warrant dose reduction efforts. Because of the large amount of data that must be stored and the many variables that can affect radiological conditions, a computerized recordkeeping system is necessary. A commercially available occupational health database has been purchased to fulfill recordkeeping needs.

Radiological Review of New Facilities

New facility designs must be reviewed by Health and Safety professionals to ensure that new facilities incorporate adequate exposure control features (e.g., ventilation, shielding, remote handling).

Response to Unusual Events

In order to effectively respond to unusual events, the most probable events must be identified, their consequences evaluated and mitigating actions planned.

3.2.3 Applicable Regulations and Current Compliance

The governing document for health physics/radiation protection is DOE Order 5480.1A Chapter XI, entitled "Requirements for Radiation Protection", which specifies requirements in the following areas:

- Occupational exposure of individuals in controlled areas;
- Exposure of individuals and population groups in uncontrolled areas;
- Nuclear accident dosimetry;
- Quality factors to be applied in converting rad to rem;
- Guidance for emergency exposure during rescue and recovery activities;
- Guidance on maintaining exposures to as low as reasonably achievable (ALARA); and
- Internal audits program.

In addition to keeping employe radiation doses below specified numerical limits, it is a requirement to maintain doses as low as reasonably achievable (ALARA).

In addition to abiding by DOE Orders, the radiation protection program should also meet the requirements of national concensus standards and codes of good practice. These include publications by NCRP, ICRP, ANSI Standards and NRC Regulatory Guides.

Recent recommendations by standard-setting bodies (i.e., ICRP and NCRP) have resulted in a comprehensive revision of the radiation protection portions of DOE Order 5480.1. The proposed new order (designated 5480.11) includes many new requirements that will have an impact on the FMPC. Those having the greatest impact are: 1) basing exposure limits on effective dose equivalents, this will require calculation of organ doses from internal exposures; 2) reducing annual extremity dose limits from 75 Rem to 50 Rem; and 3) reducing derived concentration guides for insoluble uranium.

3.2.4 Health Physics/Radiation Protection Program

The planned improvement projects in the Health Physics/Radiological Protection area are discussed below. The breakdown by type of funding and Fiscal year is shown in Table 3-2.

Storage Building - Finished U Metal

A new storage facility is proposed for construction east of Plant 6. The pre-engineered, free-span, steel frame building of 17,000 square feet will be used for short and long-term storage of uranium products for staging into the Plant 6 inspection area or for shipment off site. A remote storage facility will minimize the radiation exposure levels to operating personnel and relieve the existing congestion caused by storage of these materials in plant work areas. This program is included in the EH&SI Line Item Project 87-D-159.

Material Handling Improvements

Material handling improvements are proposed for many areas in the production process. These improvements involve increased use of conveyors and remote handling equipment in order to minimize direct handling of radioactive materials by operators. In virtually every production plant, there are work stations where operators must directly handle radioactive materials, which may or may not be in containers. Installing remote handling equipment will decrease employe exposures and personal contamination as well as reduce the opportunities for injury. This program is included in the EH&SI Line Item Project 87-D-159.

Receiving and Incoming Materials Inspection Area

A new Receiving/Inspection Facility has been proposed for construction at the south fence line. It will contain 12,000 square feet of receiving and inspection area and 1,000 square feet of office area. This facility will allow receipt and inspection of incoming materials for conformance to specifications before they enter the process area. At present, the FMPC Receiving facility is at a location requiring trucks to enter the process area to make deliveries. This program is included in the EH&SI Line Item Project 87-D-159.

Locker Room Modifications

Modifications to the existing facilities in Building No. 11, the Service Building, will include: removal or relocation of existing walls, doors, etc.; refurbishing the men's locker area with additional showers and change facilities; providing access for women into their locker area from the process side of the building; expansion of the women's facilities to meet proposed future needs; and adding new fencing in critical areas to help maintain the separation between process and non-process areas.

TABLE 3-2

FUNDING SUMMARY FOR
HEALTH PHYSICS/RADIOLOGICAL PROTECTION
($1,000's)

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 11,612	216	414	315	2,836	2,890	2,560	2,381
GE-GPP	$ 3,409	405	357	592	675	460	460	460
EH&SI LI	$ 62,281	1,883	11,345	25,645	3,358	7,500	7,350	5,200
GE-OP	$ 63,438	6,941	7,250	8,799	10,094	10,177	9,860	10,317
Totals:	$140,740	9,445	19,366	35,351	16,963	21,027	20,230	18,358

KEY

GE-CE - Capital Equipment From GE Budget

GE-GPP - General Plant Projects From GE Budget

EH&SI LI - Items included in Project 87-D-159

GE-OP - Operating Funds From GE Budget

OY - Out Year

This subproject will provide separation between process and non-process areas for health and safety considerations, and provide adequate facilities for the increased numbers of personnel projected in the near future. This program is included in the EH&SI Line Item Project 87-D-159.

Enclose Saws and Lathes - Plants 5 & 9

The chips generated by cutting and machining uranium are pyrophoric, tending to burn unless submerged in machining fluid. While basins of machining fluid are provided under saws and lathes, chips still burn when they fall outside the basin, when they accumulate to a level above the machining fluid and before they fall into the basin (e.g., while adhering to the saw blade). Since smoke generated by burning chips is at least part uranium oxide, installation of ventilated enclosures at these locations would shield operators from beta radiation and prevent airborne exposure. This project is included in the EH&SI Line Item Project 87-D-159.

In-Vivo Monitoring

Funding has been approved for an in-vivo monitoring facility for measuring uranium lung burdens of employes. Housed in a new building south of the existing Health & Safety/Production Building, the facility will consist of a shielded counting chamber, gamma radiation detectors, associated electronics and a computer for control and data analysis. An architect engineer has been retained and design has begun. The facility is scheduled for completion in FY-88.

Determination of uranium lung burdens is an important part of assessing employe exposures. Currently, a mobile in-vivo monitor is brought to the FMPC from the Y-12 Plant twice a year for a limited time. It is difficult to complete all the required monitoring in the time allowed. Special monitoring can be performed only by sending the involved employes off site.

In-House Hand Dosimetry System

TLD's and ring badges have been procured and hand dosimetry will be performed in-house starting in FY-87. Performing hand dosimetry in-house will provide quicker results and improved information about employe hand exposures.

Operating Costs

The Health Physics Staff to support the ES&H improvements and the ongoing Health Physics Programs consists of five managers and supervisors, nineteen professionals, three secretaries and thirty eight technicians over the planning period through FY-92.

This staff is required in order to perform the following functions:

- Develop and implement the FMPC ALARA Program.

- Develop a comprehensive air monitoring program.
- Develop an integrated bioassay program that incorporates air sampling and contamination monitoring results, as well as bioassay results.
- Develop and implement a comprehensive contamination control program.
- Provide technical support for the dosimetry program including improvements in recordkeeping systems.
- Provide reviews of the radiological impacts of new and modified procedures and facilities.
- Document the FMPC radiation protection program.
- Develop radiation control measures for special operations.
- Develop a comprehensive radiation safety training program.
- Ensure safe transportation of hazardous materials.
- Provide health physics support, including radiological monitoring, for Waste Management activities.
- Evaluate workplace conditions and work practices for adequacy of radiation controls.
- Provide radiological monitoring services in support of chemical and metals plants operations.
- Provide radiological monitoring services for receipt and shipment of radioactive materials.
- Conduct a routine radiological survey and monitoring program of plant areas, building and equipment.
- Conduct an environmental monitoring program at the FMPC and at specified offsite locations.
- Provide radiological monitoring services for maintenance, renovation, construction, and Rust Engineering projects.
- Conduct a training program for Environmental & Radiological Monitoring technicians through in-house and offsite agencies.
- Maintain and operate necessary counting equipment for analysis of smears and airborne radioactivity samples.
- Maintain an inventory of ES&H instrumentation and spare parts.
- Provide maintenance for all ES&H instrumentation and records thereof.

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- Calibrate ES&H instrumentation.
- Maintain radioactive source control program.

3.3 Nuclear Criticality Safety Plan

3.3.1 Nuclear Criticality Safety Concerns

The Nuclear Safety Group, part of the Environment, Safety and Health Department, is responsible for Nuclear Criticality Safety at the FMPC. Nuclear Criticality Safety is concerned with the prevention or termination of inadvertent nuclear criticality, mitigation of consequences, and protection against injury or damage due to an accidental criticality. An inadvertent nuclear criticality is possible wherever enriched uranium (over 0.71% U^{235}) is processed or stored. Presently, the FMPC is approved for handling uranium with an enrichment of <20% U^{235}.

The predominant means of criticality control has been through administrative controls based on the double contingency principle; i.e., two independent incidents must occur before an accident can occur. Generous safety factors are then applied to assure that should the double contingency be breached, an accident still will not occur. Administrative controls enforced at the FMPC include: minimum spacing of two feet between safe masses; mass restrictions on certain enriched materials; and restricted concentrations on certain enriched solutions. The Nuclear Criticality Safety Group provides Nuclear Criticality Safety Training to all employes to ensure an understanding of the administrative controls.

While the FMPC presently handles incoming uranium compounds containing <20% U^{235}, the metal end product has a maximum enrichment of only 1.25% U^{235}. Future plans call for the possibility of increasing the enrichment of the metal end product to 2.1% U^{235}. This seemingly small increase in enrichment would have a large impact on criticality safety. For example, using mass restrictions as a criticality control lowers the amount of uranium chips which can be stacked together from 805 lbs. for 1.25% U^{235} to 152 lbs. for 2.1% U^{235}. If this plan goes into effect, new analyses will be required to confirm or modify the administrative controls for each situation. Also, as new facilities are built, such as the UF_6/UF_4 reduction facility, extensive computer analyses must be performed.

Another Nuclear Criticality Safety concern is the transportation of fissile and radioactive materials in-plant and to other DOE sites. The Nuclear Criticality Safety Group provides advice on non-routine fissile shipments, coordinates the design of fissile shipments, and assists in the design of fissile material containers. The Packaging and Transportation Safety Plan is described in Section 3.4.

3.3.2 Strategy for Nuclear Criticality Safety

As the primary means of criticality control, the Nuclear Criticality Safety Group will continue to use administrative controls based on the double contingency principle. These controls will be backed up by computer analyses and enforced by regular process area inspections by Nuclear Safety personnel.

As higher enrichments are encountered, consideration may also be given to constructing equipment which prohibits the violation of one or more components of the double contingency principle. One example would be to construct physical barriers limiting the minimum spacing between individual elements in a array, such as the "rabbit hutches" which store uranium oxides (<20% U^{235}) in Plant 1. Another example could be the use of "safe-geometry" equipment, which has already been installed on a limited basis at the FMPC. This equipment includes a safe geometry calciner and safe geometry extraction columns (currently abandoned in place), and a safe geometry digester. The safe geometry digester is currently approved for 16% U^{235} enrichments, and could have been approved for 20% U^{235} with slight modifications. However, the lack of acceptable benchmark experimental data prevented this. Should the DOE require future use of these facilities, experiments for 20% U^{235} oxide and uranyl nitrate should be conducted.

Because so many operations are handled by Administrative controls, an extensive training program is conducted for all FMPC employes, who receive a Nuclear Safety Orientation during their first week on the job. Refresher training is held annually. Job specific training is conducted for all Production area employes at least once annually, and Advanced Criticality Safety Training is held annually for engineers and scientists. Nuclear Accident Cadre Training is also conducted annually.

In addition, criticality analyses are being performed for all the new facilities proposed for the FMPC. Many of these studies require computer simulation techniques to study neutron behavior. The principal codes for performing these analyses are KENO IV and KENO Va. KENO IV has recently been obtained and loaded onto the VAX 750. When needed, KENO Va is available through Oak Ridge National Laboratory via the Nuclear Criticality Information System network.

3.3.3 Applicable Regulations and Status of Compliance

Overall Nuclear Criticality Safety for DOE facilities is governed by DOE Orders 5480.3 and 5480.5. The FMPC's Criticality Safety Program is also governed by the DOE Uranium Recycle Task Force Recommendations, Code of Federal Regulations, ANSI Standards, and DOE Order 5480.1A Chapter XI.

DOE Order 5480.3

DOE Order 5480.3 establishes the requirements for packaging fissile and other radioactive materials. While the FMPC is currently in compliance with this Order, new analyses must be performed in support of the 2.1% metal program (if funded) and to support the replacement of wooden shipping containers with metal containers.

DOE Order 5480.5

Process Analysis

Before beginning an operation involving significant quantities of

fissionable materials, or changing an existing operation, a preoperational audit must be made to determine that the entire process will be subcritical under both normal and abnormal operating conditions that could reasonably be expected to occur. Limits for nuclear criticality safety must be established from data derived from experiments. In the absence of directly applicable experimental measurements, the limits may be derived from calculations made by a method shown to be valid by comparison with experimental data, provided allowances are made for uncertainties in the data and in the calculations.

The FMPC is currently in compliance with this section of the Order. As outlined in Section 3.3.4, new computer analyses must be performed as new processes are built or old ones modified.

Written Plans and Procedures

Operations must be governed by written plans and procedures, which must take into account limits on receiving, storing, and processing fissionable material.

The FMPC is currently in compliance with this section of the Order.

Personnel Selection and Training

A program must be established for the selection, training, and retraining of all individuals who operate, maintain, or supervise activities in nuclear facilities.

While the FMPC is currently in compliance with this section of the Order, under recommendations from the DOE Uranium Recycle Task Force, an across-the-board upgrade of all phases of training is underway. Refer to Section 3.3.4 for details.

Criticality Alarm System

A monitoring system using gamma or neutron sensitive radiation detectors, which will initiate a clearly audible alarm, distinctive in tone, if accidental criticality occurs, is required.

While the FMPC has such a system which will detect most criticalities, additional detectors must be purchased if a low power criticality is to be detected, as is required by this Order and ANSI Standard 8.3. Refer to Section 3.3.4 for details.

Physical Separation of Enriched Materials

All material shall be stored in racks or equivalent equipment (such as birdcages) capable of securely locating stored material to prevent displacement, to assure spacing control, and to meet designs for safety under operational and credible accident conditions. Floor storage within the storage facility will be permitted only

where control of location and other safety requirements (equivalent to those of racks) are inherently provided by the individual containers and their restraints.

While the majority of material handled at the FMPC is stored in 30-gallon and 55-gallon drums, which are stable enough to ensure that they will not be knocked over, a small amount of higher enriched material is handled in 6 inch diameter by 15 inch cans, which can easily tip over. In order to meet this requirement, storage racks and pallets must be designed and purchased to ensure physical separation is maintained even under accident conditions.

Internal Audits and Appraisals

Internal audits at the operational level and independent appraisals by outside experts are required for all DOE programs.

The Nuclear Safety Program is currently in compliance with this section of the Order.

DOE Order 5480.1A Chapter XI

Nuclear Accident Dosimeters

A system of fixed (wall mounted) units capable of yielding burst size and approximate neutron spectrum at all locations is required.

While the FMPC currently has such a system, its reliability and compliance is questionable. A new system has been developed and will be installed in FY-87. Refer to Section 3.3.4 for details.

3.3.4 Criticality Safety Management Plan

The planned improvement projects in the Nuclear Criticality Safety area are discussed below. The breakdown by type of funding and Fiscal Year is shown in Table 3-3.

Nuclear Criticality Safety Studies

In order to accomplish the FMPC's objectives of enhanced productivity and criticality safety, use of neutron transport computer codes such as KENO IV and KENO Va must be increased. Currently, the FMPC has KENO IV on its VAX 750 computer and simple analyses may be performed using this code. However, for complex analyses, such as a mockup of an entire facility, the more complex code, KENO Va, must be used. In order to have direct access to KENO Va, the development of a remote connection to the mainframe computer at Oak Ridge National Laboratories is being pursued. The objective would be to use an existing HP-150 personal computer and a 1200 baud modem to access the host IBM computer and use its existing software. The FMPC would then be charged for the time spent on the host computer. It is estimated this arrangement, after a one year learning period, would result in a 30% reduction in the cost of computer analyses when compared with the current

TABLE 3-3

FUNDING SUMMARY FOR
NUCLEAR CRITICALITY SAFETY
($1,000'S)

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 325		140				185	
GE-OP	$ 6,710	1,307	1,471	1,605	660	650	500	517
Totals:	$ 7,035	1,307	1,611	1,605	660	650	685	517

KEY

GE-CE - Capital Equipment from Budget

GE-OP - Operating Funds from GE Budget

OY - Out Year

system of having ORNL set up the problem under purchase agreements. To aid in computer analyses, the VAX computer system will be upgraded in 1988 by the addition of a computer output microfiche processor and VAX compatable software.

Nuclear Criticality Safety Training

In response to the DOE Uranium Recycle Task Force Recommendations, a commitment was made to develop and implement a Nuclear Safety Training Program for FMPC Supervisory and Management Personnel. A course workbook, videotape, and testing procedure will also be developed.

Job-specific training programs will be developed and implemented for each plant within the FMPC. Currently, programs for the Pilot Plant, Plant 1 and Plant 2/3 are scheduled for FY-87; Plants 5, 6, and 9 for FY-88; and Plant 4, Plant 8, and Transportation in FY-89. The Advanced Nuclear Criticality Safety Training Program and the Nuclear Accident Cadre Training Program are to be expanded during FY-91. Some outside services will be required for these training programs.

In-House Nuclear Accident Dosimetry

In the event of a criticality at the FMPC, the Nuclear Accident Dosimeters (NAD's) located throughout the plant would be collected and sent to Oak Ridge, Tennessee, for analysis, along with hair and blood samples from affected individuals. This analysis would determine an estimate of burst size and personnel exposure.

However, the delay in analysis caused by sending these samples to Oak Ridge introduces inaccuracies in the estimates. Because an accurate estimate of dose to an individual is essential after a criticality accident, an in-house method of analyzing the NAD's and hair/blood samples is needed.

During FY-86, new NAD's were purchased and assembled. During FY-87, the new NAD's will be installed in all buildings which process or store uranium. A sodium-iodide (NaI) well detector with shielding and a multichannel analyzer and the appropriate software were also purchased during FY-86 to enhance the capabilities of the multichannel analyzer.

Radiation Detection Alarm Upgrade

The new RDA System, which became operational at the end of 1985, will not adequately cover all process areas in case of low power, steady-state criticality. This system was planned several years ago and does not take into account shielding factors of buildings, machinery, etc., or the reactivation of abandoned equipment. Also, there is presently no means of remotely reading the detectors or resetting alarmed units.Purchasing and testing 4 additional RDA (2 detectors per unit), 4 Multiplexer Plops units and 1 Central Control Console will give the FMPC the flexibility of meeting ANSI Standard 8.3 ("Criticality Accident Alarm System").

The estimated cost takes into account purchasing the detectors, multiplexing units, and control console, testing them at ORNL, computer calculations to determine proper locations for them, and installation of the units and associated equipment such as lights, horns, and relay boxes.

This program is included in the EH&SI Line Item Project 87-D-159.

20% Storage Racks and Pallets

Currently, the FMPC has 8 storage racks approved for storing 20% enriched uranium. The total capacity of the existing racks is only 72 cubicles capable of holding the 6 inch diameter by 15 inch cans used by production for 20% material. Not only is the number of cubicles insufficient, but the racks themselves are in desperate need of replacement. Several audits of the Nuclear Criticality Safety Program within the last year have recommended that new racks be purchased. The purchase of 16 racks with a total capacity of 240 containers will give the FMPC sufficient storage space to handle all of the higher enriched material which is normally on-site.

In order to safely transport the 6 inch diameter by 15 inch cans between buildings, it is necessary to purchase special pallets which will prevent these cans from tipping over.

The cost includes the designing and purchasing of the storage racks and pallets as well as installation of the racks in Plant 1.

2.1% Enriched Metal Transportation Safety Studies.

Before full production of the 2.1% enriched metal for the N-Reactor Tritium Program can begin, a project must be completed for the design and evaluation of shipping containers. If this project is approved, shipping containers must be designed, constructed, tested, and licensed. Outside services (computer) will be required for the transportation safety studies of these containers. At present, there have been no funds allocated for this project.

Audit Program

The Nuclear Criticality Safety Audit Program is management review of the WMCO Nuclear Criticality Safety Program. An outside auditor will be brought in, either from the University of Cincinnati or another DOE site to review the criticality safety program.

3.4 Packaging and Transportation Safety Plan

3.4.1 Proper Packaging of Radioactive and Non-Radioactive Hazardous Materials Concerns

The Traffic Department, part of the Administrative Services Department, is responsible for proper packaging and transport of radioactive and other non-radioactive materials at the FMPC.

Traffic is concerned with the prevention of improper packaging and transport of these materials off-site, whereby, inadvertent release

could cause personal bodily injury, an insult to the environment, and/or violations of Department of Transportation, Department of Energy or WMCO guidelines and regulations.

The predominant means of packaging and transport control has been through administrative controls based on Standard Operating Procedures and/or Manufacturing Specifications for specific packages of specific type and form of materials being packaged for transport.

The FMPC ships fissile, depleted and limited quantities of radioactive materials. The majority of these materials are in the Low Specific Activity (LSA) and limited quantity range. Off-site shipments of fissile material consists of one stream; the N-Reactor ingots. Producing streams which require packaging of LSA and limited quantity shipments consists of solid metals; such as, ingots, derbies, fuel cores and flat pieces. In addition, low level waste consisting of oxide residues, trash, gloves, clothing, wooden boxes, wooden pallets and metal scrap are also packaged and shipped.

Another concern is the packaging and transport of both radioactive and non-radioactive hazardous materials on the plant site. Receipt of radioactive and non-radioactive hazardous materials are a concern in the movement in carrier conveyances to unloading areas, unloading of the material and in-house movement to storage and/or use areas.

3.4.2 Strategy for Packaging and Transport Safety

As the primary means of packaging and transportation safety control, the Traffic Department will continue to use administrative controls based on Standard Operating Procedures. These controls will be backed up by inspections by Traffic and Quality Assurance personnel. Fissile material receipts and shipments will be inspected by Traffic, Quality Assurance and Nuclear Safety personnel.

Because so many packaging, handling, loading and receipt operations are handled by administrative controls, a Hazardous Materials Training Program is being conducted for all FMPC personnel involved in these operations.

A Hazardous Materials Training Program has been developed and all FMPC employes involved will be trained by the end of February, 1987 and implementation on new employes' training by the end of May, 1987. Refresher training will involve employes on a biennial basis.

3.4.3 Applicable Regulations and Status of Compliance

Overall packaging and transportation safety for DOE facilities are governed by DOE Orders 1540.1, 1540.1A, 5480.3, Title 49 CFR and Title 10 CFR 71.

INDUSTRIAL HYGIENE

DOE Order 1540.1

DOE Order 1540.1 establishes the requirements for packaging fissile and other radioactive materials and references other DOE Order and Federal Regulations necessary for full compliance.

The FMPC is in compliance with these orders and Federal Regulations by utilization of Type 7A, and B and Strong Type containers.

Written Plans and Procedures

Operations must be governed by written plans or Standard Operating Procedures, which governs the use of specific packages for specific types and forms of materials. The FMPC is in compliance with this requirement.

Personnel Selection and Training

A program must be established for the selection, training and retraining of individuals who participate in the packaging, handling or transportation of radioactive or non-radioactive hazardous materials. For Training Compliance refer to Section. 3.4.2.

Fissile material receipts, handling, transport and storage are in accordance with Nuclear Safety Procedures.

3.5 FMPC Industrial Hygiene Program

3.5.1 Industrial Hygiene Concerns at the FMPC

The major industrial hygiene concern at the FMPC is the potential exposure of employes to hazardous substances which are not radioactive or for which radioactivity is of secondary importance to toxicity. Hazardous substances of concern at the FMPC may be placed in three categories; airborne particulates, hazardous chemicals, and solvents. The use of personal protective equipment is a means of minimizing employe exposure and the industrial hygiene group is charged with the responsibility to ensure that properly fitted equipment and training in its use is provided to all personnel who may be exposed to hazardous materials. In addition, other potential industrial hazards exist, such as high noise levels, non-ionizing radiation (e.g. microwaves) and pathogens. To combat these hazards, the industrial hygiene section is given the responsibility of improving the working environment by measures such as noise level attenuation and improvements in plant ventilation.

The major industrial hygiene concerns are summarized in Table 3-4.

Because the FMPC is an aging facility, it urgently needs modernization and new facilities (particularly in plant ventilation) to prevent any worsening of conditions affecting employe health.

TABLE 3-4

MAJOR INDUSTRIAL HYGIENE CONCERNS AT THE FMPC

A. Prevention of Harmful Exposures and Application of ALARA Principles to the following:

Airborne Particulates

Asbestos
Fluorides
Metal Fumes
UF_6, UF_4, UO_2F_2
Various Dusts and Mists

Note:

All the asbestos at the FMPC is contained and is therefore not hazardous unless cut into for demolition or refurbishing.

Hazardous Chemicals

Ammonia
Analytical Chemicals
Hydrogen Fluoride
Hydrofluoric Acid
Nitric Acid
NO_x (oxides of nitrogen)
PCBs
Various Chemical Products (coolants, oils, cleaners, coatings, mortars, etc.)

Solvents

Oil-base paint/solvents
Perchlorethylene (dry cleaning fluid)
1,1,1 -trichlorethane (general shop solvent)

Other Industrial Hazards

Noise
Nonionizing Radiation
Pathogens

B. Provision of Continued Respirator Training and Fit-Test Services.

C. Surveillance of the Adequacy of Health Hazard Controls.

3.5.2 Industrial Hygiene Strategy

Overall responsibility for the Industrial Hygiene Program rests with the Industrial Hygiene Group of the ES&H Department. This group provides industrial hygiene evaluations of FMPC operations; reviews procedures for approval; evaluates employe exposures; makes recommendations for control; provides industrial hygiene training assistance; and communicates findings to management, to division staff having direct-line safety and health responsibilities, to the medical staff, and to employes. The FMPC Health and Safety Manual outlines the responsibilities of management and employes to maintain and enforce health and safety procedures, and follow all health and safety rules, practices and protective equipment requirements.

The strategy to control industrial hygiene problems includes engineering controls, administrative controls and protective equipment. The planning and engineering design of facilities and equipment is most important to provide for health protection, including the use of process enclosures; ventilation of particulates, fumes and heat; cleaning of exhaust air; and the use of noise control measures. Existing facilities and equipment are retrofitted with such engineering controls as feasible, and consideration is given to substitution or elimination of defined hazardous chemicals. Administrative controls include compliance with all plant operating procedures designed to minimize exposure to potential risks. Protective equipment is used for exposure control where engineering or administrative controls are not feasible for the equipment or operation involved, or for nonroutine situations.

The recognition of potential industrial hygiene health risks is accomplished through various means, which include: periodic surveys conducted by professional staff; surveillance and monitoring of ventilation systems; reviews of processes; review of all preliminary engineering designs of facilities process additions or modifications; review of maintenance work to be performed; review of FMPC standard operating procedures and intended changes; review of routine bioassay results; collection and review of routine air sampling data; review of all defined hazardous chemicals onsite; and follow-up on requests for investigation and assistance from supervisory personnel, employes, medical staff and others.

Industrial hygiene exposure results obtained through these evaluations are being used to establish a database. Evaluation of control measures includes measurements of the effectiveness of ventilation systems; area sampling and monitoring audits of compliance with requirements for use of personal protective equipment; and audits of respiratory protective equipment. Reliability and quality assurance of the industrial hygiene data require that calibration equipment be available for all industrial hygiene sampling and monitoring instrumentation.

The concept of As Low As Reasonably Achievable (ALARA) is being applied to industrial hygiene concerns. ALARA concepts emphasize

minimizing exposure of employes to chemical and physical hazards. These concepts are applied in a step-by-step fashion through the establishment of annual ALARA goals for industrial hygiene.

Communication strategy includes assisting the first-line supervisor in developing appropriate employe information and training programs. These include: providing monitoring results required by DOE Orders and referenced standards; informing management, medical and other environmental, safety and health personnel of monitoring results as needed; and recommending corrective measures. The potential hazards of exposure to toxic or hazardous chemical materials used at the site are made known to employes, and, similarly, FMPC product hazards are communicated to customers.

These strategies for industrial hygiene are accomplished through the air sampling, respiratory protection, hearing conservation, hazard communication, ventilation monitoring and permit programs. Other industrial hygiene responsibilities include heat stress, carcinogen control, dermatitis investigation, non-ionizing radiation, laser safety and control of biological risks.

Air Sampling

The primary purpose of the FMPC Air Sampling Program is to determine the level of the employe exposure to airborne emissions and to protect employe health. Air sampling may be performed to determine:

- Employe exposures to potential health risks
- Magnitude of employe exposure at the start-up of a new process or a change in a process or material used
- Justification of employe complaints or grievances concerning an alleged health risk
- Performance of engineering control measures
- Chemical and/or physical characteristics of gaseous and airborne emissions for engineering design or R&D purposes
- Whether the FMPC is in compliance with DOE health standards

Air sampling is conducted in conformance with DOE Order requirements and reference standards, and good industrial hygiene practice. The program considers principles of air sampling, sampling equipment, types of samples, including personal breathing zone and fixed area sampling of various durations, number of samples and exposure calculations. The program also includes procedures to calibrate sampling pumps and to collect samples.

Respiratory Protection

A Respiratory Protection Program has been established at the FMPC to

coordinate the selection, use, maintenance and inspection of respirators. The program is designed and implemented to comply with DOE regulations which incorporate the substantive provisions of OSHA, and will also meet the recommendations of ANSI. This program describes the duties of the program administrator and other FMPC personnel with respect to respiratory protection; lists respirators approved for use at the FMPC; and describes procedures for conducting respirator storage audits for performance of medical evaluation of respirator users, for respirator reconditioning, and for monitoring of FMPC breathing air quality. All users of respirators at the FMPC must be fitted and trained as part of this program.

Hearing Conservation

A Hearing Conservation Program has been established as a positive measure to protect the hearing acuity of employes and to prevent noise-induced hearing loss. This program provides for identification of noise hazard areas, reduction of the noise exposure to safe levels and hearing measurement. Each employe exposed to noise levels at a Time-Weighted Average (TWA) of 85 dBA (slow) or more is included in the program.

This program is designed and implemented to comply with DOE regulations which incorporate the substantive provisions of OSHA. Procedures describe the authority and responsibility of the program administrator and Industrial Hygiene Department in implementing the program, equipment operation and methods of conducting surveys.

Hazard Communication

A Hazard Communication Program was instituted to comply with DOE regulations and the new DOE hazard communication standards which incorporate the substantive provisions of OSHA. This program will provide formalized procedures for many practices which have been implemented at the FMPC. The standard mandates employe training and requires that a list of all chemicals in use at the site, Material Safety Data Sheet files, and employe information and training files be maintained.

Ventilation Monitoring

There are various FMPC production processes that require ventilation to contain vapors, gases and particulates; to direct them to control equipment for treatment; and to prevent them from escaping into the workplace environment. Proper ventilation of process equipment is necessary to protect the health of plant personnel. These ventilation systems are designed to remove contaminants and maintain workplace conditions well within the industrial hygiene standards included by reference in DOE Orders 5480.4 and 5480.10. Engineering control of air contaminants using ventilation forms the basis for the Industrial Hygiene Exposure Control Program.

The ongoing Industrial Hygiene Ventilation Monitoring Program is designed to verify the adequacy of ventilation controls in use at the FMPC. The program includes procedures for monitoring plant workplace and laboratory hood ventilation. Industrial Hygiene procedures describe methods for use of instruments to measure static pressure and air velocity in ducts and to measure air velocity at ventilation enclosure or hood openings.

Work Permits

Permitting at the FMPC is administered by the Environment, Safety and Health Group. Industrial Hygiene procedures cover the issuance of permits for entry into enclosed spaces where harmful quantities of gases or vapors may be present or where an oxygen deficiency may occur. Industrial hygiene procedures also cover the issuance of permits for work involving asbestos, which may be present in old insulation but which has been prohibited for all new and replacement work.

3.5.3 Applicable Regulations and Current Compliance

The authority and regulatory basis for the Industrial Hygiene Program is contained in DOE Order 5480.1A, DOE Order 5480.4 and DOE Order 5480.10. Order 5480.1A is the overall Environmental Protection, Safety, and Health Protection program for the DOE Oak Ridge Operations. Order 5480.4 updated the ES&H standards to be applied to Oak Ridge Operations, and Order 5480.10 contains specific industrial hygiene programs required of all Government-Owned Contractor-Operated (GOCO) facilities operating out of the Oak Ridge Office. These orders incorporate other regulations such as OSHAstandards, those of the American Conference of Governmental Industrial Hygienists (ACGIH) and of other organizations, and provide the basis for the FMPC Industrial Hygiene Program.

The functions of the Industrial Hygiene Program as set forth in DOE Order 5480.10 are:

- Identification of health hazards
- Hazard evaluation
- Control measures
- Periodic review
- Employee education
- Medical monitoring

The FMPC has in place all of these functions. As a result of the ongoing hazard evaluations and reviews, the following proposed improvements have been identified.

3.5.4 Industrial Hygiene Program

The planned improvement projects in the Industrial Hygiene area, are described below under two subcategories:

- Industrial Hygiene Group Equipment and Projects.

- FMPC Equipment and Projection Support of Industrial Hygiene Control Strategory.

The breakdown by type of Funding and Fiscal Year is shown in Table 3-5.

3.5.4.1 Industrial Hygiene Group Equipment and Projects

Respirator Fit Test Facility

Expansion of the current program and the increasing number of employes served by the respiratory protection program require a permanent respirator fit-testing facility to replace the current temporary facility. This project will include a permanent fit-test enclosure, respirator storage racks, computer and furniture. This facility will save time by consolidating respirator fitting work now performed in several areas, and by being more accessible to process area personnel. The collection of fit-test leakage data by computer and the data evaluation and storage by computer will provide increased accuracy and reliability of results, improve record-keeping, and save time. This project is now included as part of the Training Center Project 53-86101.

Respirator Facepiece Test Fixture

A respirator facepiece test fixture will be employed to check the integrity of cleaned/reconditioned respirators prior to reissue. This is especially important for the more complex full-face models which are more difficult to visually inspect. This system should also be able to check the integrity of filter cartridges and would save costs by allowing the testing of used filter cartridges for recertification for reuse.

Calibration Wind Tunnel

As part of the Industrial Hygiene Air Sampling and Ventilation Monitoring Programs, the accuracy of sampling pumps and airflow measuring devices must be verified for quality assurance by proper calibration of instruments. Procurement of a wind tunnel for these calibrations will improve the volume flowrate and air speed measurements used in industrial hygiene. This is a secondary calibration standard for volumetric air flow rates. It will supplement current techniques for calibration of air sampling pumps and will be used to calibrate pitot-tubes, anemometers or other instruments.

Spectrophotometric Air Monitor for UF_6

Current methods of sampling and evaluation for control of UF_6 are time consuming. An instrument which will provide rapid results of workplace concentrations is needed. Funding will be required to contract for the development and purchase of two portable monitoring instruments to enable real-time monitoring for determination of UF_6 or its byproduct, UO_2F_2. These instruments will be available for

TABLE 3-5

FUNDING SUMMARY FOR
INDUSTRIAL HYGIENE
($1,000'S)

Funding Type	Funding Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 3,373	890	58	595	320	296	278	936
GE-GPP	$ 2,077	675	179	296	237	230	230	230
EH&SI LI	$ 5,582	256	4,262	264	800			
GE-OP	$20,840	2,005	2,110	2,805	3,398	3,394	3,705	3,423
Totals:	$31,872	3,826	6,609	3,960	4,755	3,920	4,213	4,589

KEY

GE-CE - Capital Equipment From GE Budget

GE-GPP - General Plant Project From GE Budget

EH&SI LI - Items Included in Project 87-D-159

GE-OP - Operating Funds From GE Budget

OY - Out Year

routine area monitoring or for monitoring during maintenance work. An additional unit will be required in FY-92.

Noise Monitoring Instrumentation

A new sound level meter needed in support of the Industrial Hygiene Hearing Conservation Program will be a lightweight sound level monitoring instrument with digital display, measurement integration, peak level and 1/3 octave band features. It will measure noise level and evaluate noise sources and noise reduction measures. Two data logging programmable noise dosimeters will also be required for monitoring and documenting the noise exposure received by personnel who will wear the dosimeters. These instruments will improve existing sound level measurement capabilities and support the program. Replacement noise monitoring instrumentation will also be needed in FY-92, for continuation of programs.

Hazardous Chemical Labeling/Tracking System

A hazardous chemical labeling and tracking system is needed to ensure compliance with hazard communication standards. Funding is needed for acquisition of a system to provide labels which give required health and safety information for chemicals used at the FMPC.

Portable Gas/Vapor Monitor

The capabilities of the industrial hygiene monitoring programs will be extended with the purchase of a portable instrument for the monitoring of airborne contaminants. A reliable instrument for the measurement of HF and possibly other contaminants is needed.

Gas Calibration Balance

A sensitive analytical balance is needed for the weighing of gas standards required for the calibration of industrial hygiene monitoring instruments.

Stack Samplers

Procurement of two stack samplers for performance of emissions testing in accordance with EPA - Method 5 techniques is necessary. These samplers will be used for stack testing FMPC sources.

HEPA Test Equipment

Procurement of 2 sets of equipment for the in-place testing of HEPA filters is needed. HEPA filters will be tested for compliance to DOE requirements at off-site facilities. However, testing of the entire HEPA dust collection system is required after installation of the filters to ensure proper seating of the filters and that no filter damage has occurred prior to or during installation. This system is anticipated to consist of a particulate generator and a detector unit.

Particulate Air Monitoring Instrument

Procurement of an instrument for real-time monitoring of particulates in air is needed for workplace air contaminant screening surveys.

Calibration Equipment

Procurement of equipment to be used for the calibration of instrument used for measurement of airborne particulates, hazardous chemicals and solvents is needed. These calibrations are needed for routine industrial hygiene measurements validation.

Respirator Fit-Test Instrumentation

Procurement of instrumentation to replace worn-out respirator fit-test instrumentation is required in order to maintain necessary fit-test services.

Breathing Air System Survey

A survey is planned to provide a comprehensive evaluation of the FMPC in-plant breathing air system. The report will identify the need for any upgrades, will present an evaluation of the existing system and will be a basis for future surveillance programs.

Follow-up Ventilation Survey

A comprehensive survey of all in-plant ventilation systems designed for contaminant containment and control is planned. This survey will be conducted after currently planned renovations and additions to ventilation systems are completed. It will document existing conditions and form a basis for future surveillance programs.

3.5.4.2 FMPC Equipment and Projects in Support of Industrial Hygiene Control Strategy

Modernization of Buildings

Most of the buildings at the FMPC were constructed with transite roofing and siding. Building roofing and siding are composed of corrugated cement-asbestos (transite) and will be removed with disposal at an approved site. FMPC structures will be prepared for installation of new asbestos-free fire-and corrosion-resistant siding and roofing. Interior flat asbestos sheeting and building insulation will be removed, and new insulation, sheeting and support systems with fire and corrosion resistance will be installed.

Modernization will improve the structural stability and overall appearance of site buildings. An additional long-term benefit of this work will be the removal of an asbestos source from the site. While asbestos in transite is not a health hazard, construction and maintenance work involving the transite can generate dust.

Convert Dry Cleaning System to New Solvent

Perchloroethylene is used in the laundry for dry cleaning leather-palm gloves. In anticipation of more stringent industrial hygiene controls in the use of perchloroethylene, and regulatory requirements for solvent disposal, the system must be converted to a different solvent. Only minor costs are expected for tests of candidate solvents. Revisions to the solvent still may be needed.

Change General-Use Shop Solvent

A general use solvent (1,1,1 - trichloroethane) is used as a degreaser in the Garage and Mechanical Shops. Substituting another solvent for trichloroethane will be investigated. Minor costs are anticipated for facility revisions.

Respirator Washing Facility

A Respirator Washing Facility will improve the efficiency and effectiveness of respirator cleaning, cause less damage to the respirators and increase the throughput of the cleaning process. The facility will provide equipment for ultrasonic cleaning, low water temperature washing and controlled rapid forced air drying of respirators.

Expansion of Health and Safety Building

The existing Health and Safety Building will be enlarged by an addition to the west side, which will enlarge medical facilities to accomodate an increased plant population, and permit a much needed consolidation of personnel from the Health and Safety group, with provisions for adequate office and laboratory space. This program is included in the EH&SI Line Item Project 87-D-159.

Asbestos Removal from Pipe

Some insulation on equipment installed in the 1950's and later contains asbestos. The asbestos insulation on pipe lines has been protected from the elements with various types of jacketing since the insulation was installed. Also, this jacketing prevents the release of asbestos fibers at all times except when tie-ins and repairs are made. As repairs are needed, preventive maintenance is performed and equipment retired from service, this asbestos insulation will be removed and disposed of at an appropriate location. Removal will be done by trained specialists who will be carefully protected and monitored.

Boiler Plant Insulation

Damaged portions of Boiler Plant insulation will be repaired or replaced in accordance with accepted procedures to eliminate potential health and safety problems.

Storage Building and Pad for Analytical Chemicals

Hazardous chemicals are stored within the analytical laboratory stockroom of the Technical Laboratory. Personnel must frequently enter the stockroom to obtain supplies, nonhazardous chemicals, laboratory equipment, etc. Such chemicals should be stored in a separate building. This program is included in the EH&SI Line Item Project 87-D-159.

Comprehensive Ventilation Survey

A ventilation survey is needed at this time to determine the condition of existing ventilation systems which are not being evaluated in Productivity Retention or EH&SI Line Item Project. This survey will determine the condition of existing ventilation systems to evaluate their ability to handle additional work stations, and/or to evaluate their adequacy for current applications. This data will be the basis for ventilation improvements or upgrades, will identify existing capacity for new operations requiring ventilation, and will form the basis for further ventilation studies.

General Plant Ventilation Upgrade and Improvements

Plant ventilation surveys indicate that the breathing levels of uranium isotopes in the work areas are erratic and at times exceed maximum permissible levels. The wide range of readings in many cases is due to ineffective ventilation system operation and particulate control. The General Plant Ventilation Upgrade item in the EH&SI Line Item Project 87-D-159 addresses ventilation upgrade, replacement of dust collectors, and emergency shelter improvements. This section discusses only the ventilation upgrade; the replacement of dust collectors is discussed in Section 2.2 "Air Pollution Control" and emergency shelter improvements in Section 4.4, "Emergency Preparedness Program".

In the ventilation upgrade portions of this EH&SI Line Item, new process ventilation equipment will be installed in virtually every section of the plant. The new equipment will be state-of-the-art design and sized to maintain satisfactory cleanliness of the process and work area. New work stations and areas will be designed to provide a better environment for the worker.

The ventilation system capacity will be increased, in most cases, to serve equipment in a satisfactory manner. New ductwork, dust collectors, HEPA filters, and fans will extend the life of the ventilation system approximately 30 years. New filter buildings located adjacent to the process buildings will house the new equipment as required.

Energy conservation and control will be partly accomplished by using variable speed drives for electric motors and direct digital controllers for HVAC systems.

SAFETY &
FIRE PROTECTION

General Plant Housekeeping Equipment

WMCO plans to assign a roving cleaning crew to the Production Department. The primary duty of the cleaning crew will be high-level cleaning in all buildings. Additional duties will consist of general housekeeping, and cleaning equipment to be removed for Productivity Retention Projects. Funding is needed for a high-pressure liquid blaster.

3.6 Occupational Safety & Fire Protection Plan

3.6.1 Occupational Safety Concerns at the FMPC

The FMPC has active Safety and Fire Protection Programs to maximize personnel safety and prevent property loss and/or interruption of production. The Safety and Fire Protection areas are continually reviewed, and needed improvements have been identified for the five year planning period, FY-87 through FY-92.

3.6.2 Occupational Safety and Fire Protection Strategy

Occupational Safety and Fire Protection of the FMPC is administered by the Fire and Safety Group of the Environment, Safety and Health Department, but is the responsibility of line managers in each plant area. Much of the safety strategy is derived from intensive training of employees and management in safety awareness and safety implementation, including CPR and first aid training, crane and hoist operator training, and material handling training. The improvements planned during FY-87 through FY-92 include additional Fire and Safety staffing, and increased training and physical improvements in the plant. All these improvements will assure continued plant safety and meet the safety needs of the expanding workforce. In addition, over the next five years, safe work practices will be encouraged by incentive award programs, internal audits and other structured training. The projects planned are described in Section 3.6.4.

An internal audit program to confirm the adequacy of plant fire protection and identify areas needing improvement is in place. Fire and Safety personnel conduct these audits, which consist of a review of each department's performance and ongoing efforts in the field of safety. With the recent computerization of accident statistics, only the inspection and procedural searches need be performed.

3.6.3 Applicable Regulations and Current Compliance

The guiding document for safety at the FMPC is DOE Order 5483.1A, "Occupational Safety and Health Program for Government-Owned Contractor-Operated (GOCO) Facilities." This document essentially requires operation in accordance with OSHA standards. Reporting of information having environmental protection safety, or health protection significance, is required by DOE Order 5484.1 as supplemented by OR 5484.1. The FMPC is in compliance with all the written requirements, and, as mentioned above, has an active safety program aimed at identifying and correcting incipient safety problems before they progress into accidents.

Fire protection is governed by DOE Order 5480.1A, Chapter VII, "Fire Protection." Basically this chapter requires a level of fire protection that qualifies the FMPC as an "improved risk" facility, as used in the insurance industry. Generally, an improved risk property would qualify for complete insurance coverage by the Factory Mutual System, the Industrial Risk Insurers, and other industrial insurance companies that limit their insuranceunderwriting to the best protected class of industrial risk. The objectives are four-fold:

- No threat to the public from fire
- No undue hazards to employes from fire
- No unacceptable delays of vital DOE programs as a result of fire
- Potential property damage from fire will be held to manageable levels

The FMPC is in compliance with these objectives, and the ongoing fire protection program seeks continual improvement in this area.

Other regulations involving safety and fire protection are applied to the FMPC operation as appropriate. For example, DOE Order 5480.1A, Chapter IX, "Construction Safety and Health Program," applies to construction at the site and to crane operations.

3.6.4 Safety and Fire Protection Program

The planned improvement projects in the occupational safety and fire protection area, are described below. The breakdown by type of funding and Fiscal Year is shown in Table 3-6.

Plantwide Lighting Upgrade

The existing illumination at various FMPC facilities will be modernized. Based upon studies of specific locations and illumination standards, modern fixtures and lamps, complete with required auxiliaries, will replace existing installations on a prioritized basis. Equipment selection will depend upon minimum energy consumption, ease of maintenance and availability of replacement parts. This program is included in the EH&SI Line Item Project 87-D-159.

Storage, Maintenance and Office Bldg. - Boiler Plant

A 2,400 square foot metal building will be constructed near the Boiler Plant and Water Treatment Plant to store chemicals, lubricants and various equipment used in the two plants, and to provide two new offices, two rest rooms and a utility closet. This new building is needed because the Boiler Plant and Water Plant

TABLE 3-6
FUNDING SUMMARY FOR
OCCUPATIONAL SAFETY/FIRE PROTECTION
(1,000s)

Funding Type	Total	Fiscal Years 1987	1988	1989	1990	1991	1992	OY
GE - CE	$ 333	333						
GE-GPP	$ 160	160						
EH&SI LI	$ 11,682	155	1,080	10,447				
GE-OP	$ 18,447	1,848	1,891	2,225	3,042	3,113	3,146	3,182
Totals	$ 30,622	2,496	2,971	12,672	3,042	3,113	3,146	3,182

KEY

GE - CE - Capital Equipment From GE Budget

GE-GPP - General Plant Project From GE Budget

EH&SI LI - Items Included in Line Item Project 87-D-159

GE - OP - Operating Funds From GE Budget

OY - Out Year

work areas and aisleways contain hoses, fittings, portable pumps and other equipment essential to operation. Maintenance tasks and spare parts are mandatory in both plants because they operate twenty-four hours a day and are vital to the entire FMPC operation. The additional space would eliminate forced storage in passageways and ensure compliance with OSHA 1910.22 which states "aisles and passageways shall be kept clear and in good repair with no obstruction across or in aisles that could create a hazard." This program is included in the EH&SI Line Item Project 87-D-159.

Smoke Detection Systems Upgrade

The four smoke detection systems located in the Magnesium Storage Warehouse, Plant 5 Motor Generator Room, Plant 5 Magnesium Storage Area and the Isotopic Verification Facility in Building 71 need to be replaced. Although all function properly at this time, repairs are becoming more frequent and replacement parts more difficult to locate. The present systems cannot be expanded as needed since they employ high voltage (110V) and are not compatible with newer type smoke detection systems. These systems detect the presence of particles of combustion, sounding a local alarm transmitting an alarm to the plant Communications Center. The type systems are totally supervised to promptly detect tampering, loss of power or other trouble with the equipment. This program is included in the EH&SI Line Item Project 87-D-159.

Plantwide Fire Protection Improvements

This project consists of the following fire protection improvements planned as part of the EH&SI Line Item Project.

- Halon System - Pilot Plant (DCS Room):

  A halon dry chemical fire protection system will be installed under the raised metal floor in the DCS room, which will upgrade fire protection in the Pilot Plant facility.

- Sprinkler System - Administration Building 14

  This sub-project will change the water supply piping to Building 14 from the existing gravity system to the pressure system, thus enhancing the ability of the existing system to control a fire. In addition to changing the piping, the areas of the building not currently provided with fire protection will be provided with automatic sprinklers designed and installed for ordinary hazard (Group 1) as they are remodeled. Manually operated outside sprinklers will be installed along the north side of the Administration

Building. This system will protect those areas from a fire originating in the wood frame offices installed next to the building. The sprinkler system will also provide better protection for personnel and files in the Administration Building.

- Automatic Sprinklers - Buildings 64 and 65

  This sub-project will provide for a complete dry sprinkler system for Building 64 and replacement of all existing piping and sprinkler heads in Building 65. The new sprinkler system will allow Building 64 to be used for combustible storage, thus easing the shortage of combustible storage space. Replacing the piping inBuilding 65 is necessary due to the deteriorated condition of the existing system. Upgrading this system will also ease the shortage of space for combustible storage.

- Fire Department Tanker

  A new 3500 gallon tanker truck complete with hoses, valves, pump and all other equipment necessary to make the new tanker conform to National Fire Protection Code (1985) Volume 6, Section 1901, will be provided.

This program is included in the EH&SI Line Item Project 87-D-159.

Fire Alarm System Expansion

The present Honeywell fire alarm system was installed in 1980. At that time, it accomodated about 400 alarm points. To accomodate projected increases in activity, this system needs to be expanded and the information retention/retrieval methods associated with it must be improved. An additional Central Processing Unit (CPU) and upgrading the existing CPU will key the alarm system operational at all times. This program is included in the EH&SI Line Item Project 87-D-159.

Plant Evacuation Alarm System

All of the major production and administration buildings will be supplied with local electronic controlled evacuation sirens capable of audible voice transmission.

A Building Command Center will be located in each major building. The Building Command Center will allow actuation of the evacuation sirens in the building and also audible voice communication through those same evacuation sirens with a microphone.

A Central Command Center, located in the new Emergency Operations Center will network each of the Building Command Centers. This Central Command Center will be capable of activating, individually

or collectively, the evacuation alarm systems in all of the major buildings. In addition, the Central Command Center will be capable of audible voice communication, individually or collectively, through the local building evacuation siren systems.

This program is included in the EH&SI Line Item Project 87-D-159.

Replacement of Medical Ambulances

The replacement of medical ambulances is guided by the requirements stipulated in the Federal Property Management Regulations Subpart 101-25.4 "Replacement Standards." Both ambulances at the FMPC far exceed these standards; however, they are in excellent operating condition. They will be replaced because spare parts are no longer obtainable. Design of the new ambulances will be in accordance with Federal Specifications for "Star of Life Ambulance" KKK-A-1822A. The project will be in two segments.

Training and Employee Incentive Programs

Areas which require additional employee training include: upgrading the existing safety programs for initial employe training, Cardio-Pulminary Resuscitation and First Aid Training for selected personnel; crane and hoist operator training; material handling equipment training; and supervisor safety training. This training will greatly enhance the FMPC occupational safety program, which can be functional by FY-87.

A new employee safety incentive program is needed to provide greater interest in safety job performance. Presently, awards are issued based on the achievement of a preset goal by the entire plant. Incentive awards will be established based on individual safety performance throughout the award period. To better inform employees about their safety program and their rights and responsibilities under this program, a pocket-sized handbook will be published and issued to each present and new employee.

The current Fire Brigade Training Program uses the International Fire Service Instructor's Training Manual as a guide. These manuals are general in nature and do not cover the unique situations encountered in handling uranium. Since the Brigade will be called upon to assist in controlling fume releases and handling other uncommon emergencies, a separate training manual covering these emergencies will be completed by FY-87.

To further enhance the construction safety program, an information booklet will be issued to all subcontractors and vendors performing work on site. The booklet describes the general health and safety requirements, the various emergency alarms and necessary action and other information pertinent to their visit to the FMPC.

EMERGENCY
PREPAREDNESS

4.0 Emergency Preparedness Program

4.1 Introduction

The FMPC has two primary emergency preparedness objectives: first to protect the health and safety of plant employes and off-site populations, and second to protect plant processes, property, and inventory. These objectives are met through prevention (which includes engineered safety features and safety-oriented worker training) and emergency response activities. All FMPC personnel, facilities, equipment, plans and procedures are part of the emergency preparedness program.

Emergency planning is based on hazards identified in facility Safety Analysis Reports (SARs) and other documents either in draft or in development, such as the Master Safeguards and Security Agreement (MSSA) and the FMPC Environmental Impact Statement (EIS).

The FMPC emergency preparedness program is documented in the FMPC Emergency Management Document Set currently under development. It will include Volume One, Emergency Plan (FMPC 2046A), and Volume Two, Emergency Procedures (FMPC 2046B). These documents address the principal elements of a comprehensive emergency preparedness program, including:

- worst-case hazards planning basis
- procedures for incident classification and the communication of this classification among FMPC managers and organizations and off-site authorities
- a clearly defined emergency organization with specific and integrated responsibilities
- a defined sequence of response actions for all levels of responders that supports departmental and other emergency procedures
- an off-site warning system and predetermined protective action recommendations for off-site populations
- emergency public information and equipment
- pre-emergency public information and media coordination programs for community awareness
- clear, precise, and comprehensive procedures for all emergency responders
- facilities and equipment to support management and response activities
- a training program to ensure all of these elements is used to form an effective emergency response team.

The FMPC Emergency Management Document Set is comprehensive and includes guidance for all plant personnel and organizations. It also defines interfaces between FMPC, Butler and Hamilton County, the Department of Energy (DOE) Site Office, DOE Oak Ridge Operations Office, the media and off-site populations.

4.2 Emergency Preparedness Strategy

The FMPC emergency preparedness organization includes dedicated and task-specific personnel. The dedicated organization includes an Emergency Preparedness Engineer. The emergency preparedness organization has been moved from the Environment, Safety and Health Department to a new organization led by Vice-President and Emergency Preparedness Director. Other ES&H personnel, including Industrial Hygienists and Meteorologists have been assigned emergency preparedness responsibilities to support preparation for the FMPC's exercise "JOINT RESPONSE 87", scheduled for April 25, 1987.

Several programmatic activities have been targeted for immediate improvement. These activities are detailed and include: documentation, training, on-site/off-site cooperation (integrated response), facilities, communications and emergency public information.

4.2.1 Documentation

The FMPC Emergency Plan (FMPC 1199) is being significantly improved. The new document set will include two volumes, Volume One, Emergency Plan (FMPC 2046A), and Volume Two, Emergency Procedures (FMPC 2046B).

Volume One, Emergency Plan was delivered as a partial first draft in October, 1986, and as a complete second draft in December, 1986. The Emergency Plan will be issued in February, 1987, and revised in Summer of 1987 to incorporate lessons learned from the April, 1987 emergency exercise.

Most of the operational emergency response (field response) procedures have been developed by departments and plants. These procedures are being reviewed by Management Systems Laboratory (MSL) for completeness and to ensure integration with the Emergency Plan. In addition, emergency procedures are being developed by MSL for the Emergency Operations Center (EOC), the Off-Site Emergency Warning System, the Joint Public Information Center (JPIC), and the Communications Center. These procedures are assembled in Volume Two, Emergency Procedures (FMPC 2046B). Lessons learned from the April, 1987 emergency exercise will be incorporated into the procedures in Summer of 1987. Procedures for Volume Two include:

- Checklists for EOC Staff
- FMPC Off-Site Emergency Warning System Procedure,
- FMPC Joint Public Information Center Procedure,
- FMPC Communications Center Emergency Procedure,
- FMPC Emergency Operations Center Procedure.

4.2.2 Training

A comprehensive program of onsite emergency response training has been initiated and is being coordinated with off-site (Butler and

Hamilton counties) emergency response training. Specific training includes:

- Plant worker general emergency response
- Emergency Brigade
- Emergency Brigade Chief
- Emergency Duty Officer
- Assistant Emergency Duty Officer
- Building Warden
- mutual aid (fire, medical, life squad, etc.)
- JPIC Staff
- EOC Staff
- local hospitals (radiological and hazardous materials related injuries)
- county (EOC staff and communications coordination and mutual aid responders)

Most of this training will be conducted by the FMPC Training Department with guidance from the FMPC Emergency Preparedness Group.

4.2.3 On-site/Off-site Cooperation

Concurrent with on-site emergency preparedness program enhancement, the Butler and Hamilton County emergency preparedness programs are being upgraded to assure integrated planning and response capability. FMPC-specific hazardous materials emergency response plans have been prepared for both Butler and Hamilton counties. These plans were delivered to the counties in August 1986 and will be revised (at FMPC expense) in 1987 to ensure continued close integration with the FMPC Emergency Plan.

With the new emergency management document set at the FMPC and the new FMPC-specific emergency management documents for Butler and Hamilton counties, the basis exists for an integrated response to hazardous materials emergencies at the FMPC.

Working with the counties and the Ohio Disaster Services Agency (ODSA), the FMPC is planning a joint exercises, "JOINT RESPONSE 87". This exercise is scheduled for April 25, 1987 and will test both the FMPC response and management capability and the ability of the FMPC and local governments to respond together to a hazardous materials incident at the FMPC.

A series of seven drills and exercises for the EOC staff which include the field, JPIC, and County EOC are scheduled to precede the exercise "JOINT RESPONSE 87". These drills/exercises are scheduled from mid-December through April, 1987. Periodic drills/exercises will be conducted after April, 1987 to assure continued readiness.

4.2.4 Facilities

A new interim Emergency Operations Center (EOC) has been installed in the administration building at the FMPC. This facility will provide an operations area, policy making area, observers,

secretarial and office support area, and private offices with a glass wall to view the operations area are dedicated to the senior policy group (DOE Site Manager, President, WMCO, and several senior staff members) during an emergency. The other two offices will provide space for a public information officer, other emergency management personnel such as security officers, expanded operational or ES&H support staffs.

The new EOC will have a comprehensive communications system of telephones, telephone facsimile equipment and a duplicate of the radio equipment in the Communications Center. The EOC will be able to monitor, significantly augment, or replace the existing FMPC emergency communications control system in the Communications Center.

The EOC will also have several computer support systems to manage the flow of information during an emergency and for the historical record. A HP Vectra (IBM compatible) will be used by the emergency preparedness staff for the maintenance and update of emergency plans and procedures, for normal correspondence, and for use by administrative staff during EOC activation. The emergency preparedness staff secretary will serve as the Administrative Assistant for the EOC staff. Two Toshiba T-3100 lap-top portable PCs are also available to support the emergency preparedness staff during normal operations. During EOC activation these two computers are available for use by the EOC Staff and the EOC Historian. The information on the computers can be electronically modemed to Oak Ridge, Ohio or County EOC Facilities.

Restrooms, a storage area, and a room used to store a copier complete the layout for the FMPC EOC. The operation area will have conference tables, four fotoboards, maps, engineering drawings, and a library of emergency reference materials.

The FMPC will obtain a mobile off-site command post. This command post will be for use in the events of a Site or General Emergency at the FMPC. An off-site mobile command post will be set up to accomodate the EOC Staff or public information staff. This vehicle will duplicate, to the degree possible, the equipment and environment of the FMPC EOC.

The FMPC is obtaining a Radiological Assistance Vehicle as a dedicated vehicle equiped with survey instruments, decontamination equipment, protective clothing, SCBA units and respirators, power supply, portable lighting, and other equipment suitable for monitoring containment and clean-up of radioactive and hazardous material incidents, for on-site and off-site use. Communication equipment will be necessary to interact with off-site groups and the FMPC Communications Center.

4.2.5 Communications

The Emergency Message System is being upgraded. The system that existed in 1986 consisted of hand held receivers located throughout

the site over which emergency information was broadcast. Plant personnel were required to go to a receiver, listen to the message, and then pass it to others.

Problems with this system were: receiver reliability, lack of receivers in buildings, and reliance upon individuals to relay messages. The system is being upgraded to a series of hardwired speakers in each building at the FMPC, with sufficient volume to ensure that everyone will hear the message at their work station.

FMPC is providing the means to warn on-site and off-site personnel in the event of an incident at the FMPC which could affect their health or safety. This Off-Site Emergency Warning System will warn people to take shelter in the event of a hazardous materials incident. The system will also establish radio and dedicated telephone communication with off-site county emergency response centers.

The warning system will have multiple tone module capability of which four distinct tone modules will be used. These tone modules are: national attack, severe weather, FMPC emergency, and test chime. FMPC will only have the ability to activate the last two of these signals. The counties will have the ability to activate all of the signals.

A series of eight new sirens will be installed. Seven of these sirens will be off-site to ensure adequate volume for the warning of all residents within a two mile immediate notification zone around the plant. Tone activated radios will be provided for special occupancy buildings (schools, day care centers, nursing homes, etc.) within a five mile radius of the plant. Advanced communication and radio equipment will be installed to ensure rapid communication between the FMPC, Butler, and Hamilton County. Each county will also have the capability of activating the Emergency Warning System. This warning system, approved by DOE and now being installed, will be tested during the April 25 exercise.

Installation of digital pagers or automatic telephone dialing systems will allow the Communications Center to contact numerous people in a short time in the event of an incident at the FMPC. Contacts which must be made include the DOE/Oak Ridge Operations Center (OROC), EOC Staff members, DOE site management authorities, county officials, community leaders, and plant neighbors.

The dialing equipment will be activated on-site from the Communications Center, and it will have the capability to contact the designated number of people by telephone or pagers. It will be able to: dial a set of programmed telephone numbers and deliver a message in tape recorded or synthesized human-like voice; receive an acknowledgement signal and redial those persons who have not acknowledged the initial call; provide a hard print copy of the numbers dialed and call returns.

4.2.6 Public Information

The FMPC is improving its emergency public information capability and is providing community information on the other enhancements specified in this document.

A Joint Public Information Center (JPIC) has been designated at the Westinghouse Fairfield Training Center. This center will have communications and media briefing equipment, trained personnel, and procedures for operation. The JPIC will be extensively tested during the exercise "JOINT RESPONSE 87".

The FMPC public information staff have initiated a community awareness program to inform FMPC neighbors and community leaders of the new warning system and of the substantial improvements in the FMPC emergency preparedness program. This community awareness program consists of letters mailed to local area residents, television announcements on local stations, and similar radio coverage. A brochure is also under development to be delivered to all residents within the Two-Mile Immediate Notification Zone. This brochure will explain what protective actions to take if the FMPC warning system sounds.

4.3 Applicable Regulations and Current Compliance

The FMPC emergency preparedness program is governed by DOE-HQ Emergency Preparedness Orders, 5500 series, DOE-ORO implementing Emergency Preparedness Orders, 5500 series, by EPA regulations, such as the new Superfund Amendment and Reauthorization Act (SARA), and by provisions of OSHA 1910.1200 Hazard Communication Standard. In addition, FMPC emergency management documents respond to the guidance provided in DOE-ORO emergency management plans and procedures and are coordinated with appropriate Ohio, Butler and Hamilton County emergency plans and procedures.

4.4 Emergency Preparedness Management Plan

The planned improvement projects in the Emergency Preparedness area are discussed below. The breakdown by type of funding and Fiscal Year is shown in Table 4-1.

On-Site Emergency Preparedness

Several projects are planned for development under this title. They are:

- a training program providing a general introduction to emergency preparedness for all FMPC employes, which will be required annual training;
- special training for the Security Group, providing a general plant description, type of chemicals found at the FMPC, potential accidents and the duties of Security during emergencies; and

TABLE 4-1
FUNDING SUMMARY FOR
EMERGENCY PREPAREDNESS
($1,000's)

Funding		Fiscal Years						
Type	Total	1987	1988	1989	1990	1991	1992	OY
GE-CE	$ 52		52					
EH&SI LI	$ 11,472	51	4,565	4,214	2,642			
GE-OP	$ 2,322	247	265	250	380	389	393	398
Totals:	$ 13,846	298	4,882	4,464	3,022	389	393	398

KEY

GE-CE - Capital Equipment From GE Budget

EH&SI LI - Items included in Line Item Project 87-D-159

GE-OP - Operating Funds from GE Budget

OY - Out Year

- emergency drills involving FMPC and Mutual Aid Emergency Groups.

Emergency Operating Procedures

Training for in-plant specific Emergency Operating Procedures will be expanded and improved. Local evacuation drills will be made more detailed and controlled to assure that personnel know and follow correct procedures. Individual plant evacuation training and drills will also be conducted.

Off-Site Emergency Preparedness Training

Off-site training to educate mutual aid and surrounding emergency squads will be conducted annually by an outside hazardous material/safety consultant, beginning in FY-87. Additional informational training will be provided by FMPC staff members.

Emergency Message System Upgrade

The system that existed in early 1986 consisted of a series of hand held receivers, located throughout the site, over which emergency information was broadcast. Plant personnel had to go to a receiver, listen to a message and then pass it along to others.

Problems with this system are: a) receiver reliability, b) lack of receivers in building, and c) reliance upon individuals to relay messages. The proposed upgrade of the system consists of a series of hardwired speakers in each building at the FMPC, with sufficient volume to ensure that everyone will hear the message without leaving their work station. The system which originates at the Communications Center has been partially upgraded with the addition of some of the proposed wall mounted speakers. Additional speakers are needed as well as a backup power supply and supervisory system for the amplifying units.

Emergency Operating Center (EOC)

A new EOC has been proposed to be located in the basement of the ES&H Building addition. The new center will accomodate two or more communications officers and provide easy access to console equipment. Some existing console equipment will be integrated with new technology equipment within the area.

Facilities for management participation in emergency responses will be provided adjacent to the work area. The present EOC does not have this capability. This designated area will be separated from the Communications Center by a soundproof glass partition. It will be furnished with conference tables, white boards, speaker phones, auxiliary phone jacks, electronic area map boards, a computer/word processing work station and an intercom linking it with the Communications Center. This EOC will contain provisions to accomodate the emergency staff for an extended period of time. The entire basement area will be designed with security awareness in

mind. The HVAC system will be capable of purifying make-up air of radionuclides and chemical contaminants.

This new center will meet expanded security requirements for participation in Security Inspection and Evaluation (I&E) tests and improve the FMPC's ability to respond and control emergency situations, including subversive activities, demonstrations, etc.

The existing facility will be used as Security Headquarters and Traffic Control Center.

This program is included in the EH&SI Line Item Project 87-D-159.

Mobile Off-site Command Post

This project will provide a mobile off-site command post for use in the event of a site or general emergency at the FMPC. An off-site mobile command post will be set up to accomodate personnel who are not required on-site to mitigate the ongoing emergency. Personnel may include community affairs and emergency support staff. The command post vehicle will be used to stage incoming personnel and equipment, hold press briefings and serve as an administrative command center.

This vehicle should include cellular phones, radio phones, radio equipment and a power supply unit. It could also be outfitted with laboratory equipment to analyze off-site samples gathered during an emergency.

Emergency Warning System

This project will provide the means to warn on-site and off-site personnel in the event of a catastrophic event at the FMPC. It will also establish primary and secondary means of rapid communication with the off-site emergency response centers.

The system will have multiple tone module capability of which four distinct tone modules will be used at this time. These are: national attack, warning, FMPC disaster and test chime. Voice capability is also possible if desired.

A series of eight sirens will be installed. Seven of these will be off-site to ensure adequate volume for the warning of all residents within a two mile immediate action zone around the FMPC. In building alerting devices will be provided for special occupancy buildings within a five mile planning zone around the FMPC. Advanced communication and radio equipment will also be installed to ensure rapid communication between the FMPC, Bulter County and Hamilton County. Each county will also have the capability of activating the system in the event the FMPC controls are incapacitated.

This system will be tested during an emergency exercise scheduled for late April, 1987.

Automatic Telephone Dialing Systems

Installation of automatic dialing systems will allow the Communications Center to contact numerous people in a short time period in the event of an incident at the FMPC. Contacts which be made include the DOE/ORO Communications Center, Emergency Staff, FMPC Cadre members, DOE site officials, off-site agencies, local community leaders and off-site residents not reached effectively by the warning system.

The dialing equipment will be activated on-site from the new Emergency Operations Center, and it will have the capacity to contact the designated number of people by telephone or pagers. It will be able to: dial a set of programmed telephone numbers and deliver a message in tape recorded or synthesized human-like voice; receive an acknowledgement signal and redial those persons who have not acknowledged the initial call; provide a hard print copy of the numbers dialed and call returns.

This program is included in the EH&SI Line Item Project 87-D-159.

Radiological Assistance Vehicle

This will be a dedicated vehicle equipped with survey instruments, decontamination equipment, protective clothing, SCBA units and respirators, power supply, portable lighting, and other equipment suitable for monitoring containment and clean-up of radioactive and hazardous material incidents, for on-site and off-site use. Communication equipment will be necessary to interact with off-site groups and the FMPC Communications Center.

Internal Audit Program

DOE Order 5480.5 requires an annual internal audit of all the programs involved within the Environmental, Safety and Health domain. Emergency Preparedness is required to have such an audit system in place.

To meet this requirement, the internal audit of the Emergency Preparedness Program will be conducted annually by the site Emergency Planning Review Committee. The Committee will review the plan and prepare a report on its findings, making recommendations as appropriate. An independent audit will be conducted on a two-year basis by an outside consultant; the next one should be performed in FY-87.

Expansion of the Analytical Facility - Building 15

The expansion of the Analytical Facility, Building 15 will consist of adding two more single story above grade wings and a basement level to the south of the existing structure, increasing the present building size by approximately 71,000 square feet. Construction will be of block and concrete similar to the existing building. Age and wear have reduced the original effectiveness and efficiency

of the facility. Requirements for sampling, testing and quality control have increased by nearly 100% in the last two years and the staff will be increased by 30 to 50% to meet these needs. In addition to providing the new laboratory wings, the existing laboratory space in the north and center wings of the existing building will be relocated into the new addition and be updated to provide more efficient laboratory facilities. The existing fume hoods and HVAC will be upgraded to current standards and operation. The expansion will provide adequate space to house a new vacuum coating lab, stock room, sample labs, office space, conference rooms and an audio/visual lab. The basement level of the new addition will house a conference area which will also serve as an Emergency Personnel Shelter.

This program is included in the EH&SI Line Item Project 87-D-159.

5.0 REFERENCES

1. Westinghouse Materials Company of Ohio, 1993 Long-Range Plan for Fiscal Years 1990-1993, Package II, January, 1987.

2. D. J. Loudin, FMPC Five Year Environmental, Safety and Health Plan, Westinghouse Materials Company of Ohio, FMPC-2048, September, 1986.

3. Westinghouse Materials Company of Ohio, Fiscal Year 1989 Budget Capital Programs, Feed Materials Production Center, January 19, 1987.

4. Westinghouse Materials Company of Ohio, Fiscal Year 1989 Budget Operating Programs, Feed Materials Production Center, Schedule 1-B-24, January 19, 1987.

5. R. E. Watts et al, FMPC Waste Management Plan, Westinghouse Materials Company of Ohio, FMPC-2040, December 31, 1986.

6. Lockwood Greene Engineers, Inc., Environmental, Safety and Health Conceptual Design Report, Revision 1, Volume 1, dated October 21, 1986.

7. Westinghouse Materials Company of Ohio, Fiscal Year 1989 Budget, Defense Waste and Transportation Management, Feed Materials Production Center, March 4, 1987.

8. S. J. Wentzel, FMPC Emergency Plan, Westinghouse Materials Company of Ohio, Report NLCO-1129, Revision 5, January 1, 1986.

APPENDIX

APPENDIX A

ited States Government — Department of Energy

Memorandum

DATE: March 31, 1986

LY TO N OF: EH-1

JECT: Department of Energy Interim Policy on State Regulation of "Mixed Waste" and Its Implementation

TO: Secretarial Officers
Operations Office Managers

The purpose of this memorandum is to explain the Department of Energy's (DOE) interim policy on state regulation of mixed waste 1/ under the Resource Conservation and Recovery Act (RCRA) pending the Environmental Protection Agency (EPA) authorization of State programs.

I. DOE's Policy

The question of the application of RCRA to DOE in general was resolved in 1984 by the United States District Court for the Eastern District of Tennessee in deciding the case of LEAF v. Hodel. While, as discussed below, the application of RCRA to DOE mixed waste may require special regulatory requirements, DOE is of the view that mixed waste is also subject to RCRA regulation.

RCRA places a high priority on the development of state regulation of hazardous waste. One of the statute's stated objectives is for all of the states to obtain full authorization of their programs (42 U.S.C. 6902(a)(1)). With respect to federal facilities, RCRA requires compliance with all state and local requirements (42 U.S.C. 6961) to the same extent as any other "person."

As set forth in the Secretary's policy statement of January 8, 1986, it is the policy of the Department to conduct its operations "in compliance with the letter and the spirit of applicable environmental statutes, regulations and standards."

Accordingly, consistent with Congressional intent and the Department's own environmental policy, DOE will move forward to promote and encourage state participation in the

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1/ The Department's current operative definition of "mixed waste" is waste, other than "source, special nuclear, and byproduct material," that would be subject to RCRA for the non-radioactive hazardous waste components and subject to AEA for the radioactive components. This definition is currently undergoing review in connection with the recently initiated policy review of DOE's proposed definition of byproduct material.

regulation of mixed waste at DOE facilities, and it will cooperate with and assist the states and the EPA as necessary to achieve a smooth transition of regulatory authority when the mechanism for a transfer is in place. Morever, these actions are consistent with the Department's desire to promote positive relationships with states that are host to its operations.

II. Implementation of the Policy

DOE's approach to state participation in the regulation of DOE mixed waste is intended to be compatible with EPA's RCRA program authorization process. EPA has yet to authorize any state to conduct a RCRA program for the regulation of mixed wastes. The EPA has stated that such authorization has been withheld pending the completion of its rulemaking designed to implement RCRA at DOE's AEA facilities. The EPA rule will establish procedures to address and resolve those situations where requirements of RCRA pertinent to mixed waste may be inconsistent with the requirements of the AEA.

As a preliminary matter, DOE will continue to explore with EPA the question of whether the completion of its rulemaking is a necessary precondition to the authorization of states to regulate mixed wastes under their RCRA programs. 2/ Should EPA determine that completion of its rulemaking is not a necessary precondition, and DOE agrees that its AEA obligations are adequately protected, DOE will encourage EPA to proceed to issue the authorizations necessary to permit the authorized states to regulate mixed waste under their RCRA programs. Should EPA determine that the completion of the rulemaking is a necessary precondition, DOE commits to work with EPA to expedite the EPA rulemaking.

2/ RCRA provides (42 U.S.C. 6905) that it does not apply to, nor permit the states to regulate, activities or substances that are subject to the AEA "except to the extent that such application (or regulation) is not inconsistent with the requirements" of the AEA. The EPA rulemaking would establish procedures for implementing this statutory provision. The need for the completion of this rulemaking prior to state authorization to regulate mixed waste would presumably be determined, at least in part, by the extent and frequency of situations where the two statutory provisions might be "inconsistent," and further, by the extent to which inconsistences could be treated on a case-by-case basis.

In either event, where EPA has granted interim or final authorization to a state under RCRA to regulate hazardous waste, DOE will proceed to establish a system for DOE compliance with state regulation of mixed waste on the basis that state authorization to regulate mixed waste is forthcoming. 3/

Accordingly, DOE will work with the states and EPA regional offices to develop the organizational and personnel structure and the practices and procedures for state regulation of DOE mixed waste. This will involve, among other things, providing appropriate security clearances for state regulatory authority representatives; appointing liaison persons in the involved state, DOE, and EPA organizational elements; providing review and familiarization programs for appropriate state personnel to acquaint them with DOE mixed wastes; giving the states, for their review, the RCRA Part B permit applications for mixed waste that are submitted to EPA; and working with the states to resolve state regulatory concerns as to the adequacy of the permit applications in light of state requirements. Until formal procedures are developed pursuant to rulemaking or such rulemaking is deemed not a prerequisite, in order to resolve apparent inconsistencies between state requirements, RCRA requirements, and AEA requirements identified in this process, we will consult with EPA and the states.

III. Other Considerations

There is an additional potential source of state regulation of DOE mixed waste. It is argued by some that states with laws covering hazardous waste may apply them to federal facilities outside of an EPA authorized RCRA program. This argument results from a literal reading of RCRA Section 6001 (42 U.S.C. 6961), which states that federal facilities must comply with all state requirements, both substantive and procedural. By way of example, a state could require DOE to submit its mixed waste to the state's permitting requirements covering hazardous waste, even though EPA has not authorized

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3/ To be granted authorization under RCRA to administer mixed waste regulations, a state must demonstrate that its program is "equivalent to" and "consistent with" the federal and other state programs (42 U.S.C. 6926).

the state to regulate mixed waste as a part of the RCRA program approval process. In this instance, regulation of mixed waste by the state would, therefore, not be carried out pursuant to RCRA as a part of an EPA approved program. Instead, it would be done pursuant to state law.

While this issue is currently in litigation, the Department is working with EPA to promptly resolve this issue. Should the culmination of this process result in the affirmation of the view contrary to DOE's current view, then state statutes and regulations would be applicable to DOE without EPA authorization. In that event, the procedures outlined above (Section II) for putting in place a system of state regulation of DOE mixed waste would nevertheless remain valid, except that the underlying state regulatory requirements would be legally enforceable and we would be required to submit to their permitting.

Any questions concerning the application of this interim policy may be directed to John Barker, Office Environmental Audit and Compliance, EH-24 on (FTS)252-5680.

Mary L. Walker
Assistant Secretary
Environment, Safety and Health

APPENDIX B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

UNITED STATES DEPARTMENT OF ENERGY	)	
	)	
AND	)	FEDERAL FACILITY COMPLIANCE AGREEMENT
	)	
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	)	Docket No. _____

The United States Environmental Protection Agency (U.S. EPA) and the United States Department of Energy (U.S. DOE) are the parties to this agreement which is entered into pursuant to Executive Order 12088, October 13, 1978 (43 F.R. 47707). This Agreement pertains to U.S. DOE's Feed Material Production Center (FMPC) in Fernald, Ohio. The Office of Management and Budget (OMB) and the United States Department of Justice (DOJ) will take cognizance of this agreement pursuant to their respective duties to ensure compliance with the environmental laws under Executive Order 12088 and the particular statutes addressed herein.

SCOPE

1. This agreement is entered into by the parties to ensure compliance by U.S. DOE, Oak Ridge Operations, Oak Ridge, Tennessee, with existing environmental statutes, and implementing regulations, including the Clean Air Act (CAA), as amended 42 U.S.C. 7401 et seq., the Resource Conservation and Recovery Act (RCRA), as amended, 42

U.S.C. 6901 et seq, and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq., at FMPC. The Agreement is further intended to ensure that the environmental impacts associated with past and present activities at the FMPC are thoroughly and adequately investigated, and appropriate remedial response action taken, as contemplated by the Comprehensive Environmental Response, Compensation & Liability Act, of 1980, and regulations promulgated thereunder. The Agreement does not address compliance, or the lack thereof, by U.S. DOE's FMPC with the Clean Water Act, 33 U.S.C. 1251 et seq.

2. This Agreement shall apply to U.S. DOE, its officers, successors in office, agents, employees, contractors, and subsequent owners and all operators of FMPC in Fernald, Ohio. U.S. DOE agrees to give notice of this compliance agreement to any subsequent owner and/or operator prior to the transfer of ownership or the obligation of a new contractor/operator and shall simultaneously notify U.S. EPA of any such change or transfer.

AUTHORITIES

The duties of U.S. DOE to operate its facilities in compliance with enacted environmental statutes are prescribed in Section 118 of the Clean Air Act, 42 U.S.C. 7417; Section 6001 of RCRA, 42 U.S.C. 6961, and Section 107(g) of CERCLA, 42 U.S.C. 9607(g). Executive Order 12088 was promulgated to ensure federal compliance

with applicable pollution control standards. This agreement contains a "plan" as described in Section 1-601 of Executive Order 12088 to enable U.S. DOE to achieve and maintain compliance with applicable environmental standards. This Agreement is further entered into pursuant to U.S. EPA's responsibilities under Executive Order 12316 and U.S. DOE's authority under the Atomic Energy Act, as amended, 42 U.S.C. 2011, et seq. The parties agree to meet their responsibilities under the authorities recited herein.

FINDINGS OF FACT

1. FMPC is an industrial facility owned by the U.S. Government and operated for the U.S. DOE under a management contract with Westinghouse Materials Co. of Ohio (WMCO). The facility commenced operations in 1952. Between the years 1952 and 1986, FMPC was operated by National Lead of Ohio, Inc. (NLO), under contract with U.S. DOE. The facility is located approximately twenty miles northwest of downtown Cincinnati, Ohio. FMPC operations cover approximately 136 acres in the center of a 1050 acres site. Several rural communities lie within a one to three mile radius of the plant.

2. The primary function of the FMPC is the production of metallic uranium fuel elements and target cores and other uranium products for use in production reactors operated for the U.S. DOE. In prior years, small amounts of thorium were also processed. As a result of these processes the plant has generated both radioactive and non-radioactive hazardous waste. The principal

radionuclides present in waste materials handled at FMPC include Uranium-238 (U-238), U-235, and thorium-232 (Th-232) with their respective decay chains. Plutonium and fission products may also be present in the wastes. The principal non-radioactive hazardous wastes known to be generated at the FMPC are halogenated solvents, primarily 1,1,1-trichloroethane. The facility also stores radioactively contaminated polychlorinated biphenyls (PCBs). Detailed chemical and radiological analyses are necessary at the facility to determine the nature and extent of wastes generated, handled, treated, stored and disposed of at the FMPC.

3. Waste storage and disposal areas at FMPC include six on-site waste pits and lagoons containing both radioactive and nonradioactive hazardous substances; two silos containing approximately 1700 curies of radium and other radioactive waste ("K-65 silos"); metal structures and other containers containing a total of approximately 1,100 metric tons of thorium; and a 10,000 gallons hazardous waste container storage area. The 61 drums of radioactively contaminated PCBs in the container storage area presently satisfy the requirements of the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601 et seq.

4. Plants 1 through 6; 8, 9 and the Pilot Plant at FMPC contain emission points subject to Ohio Pollution Control Regulations AP-3-07 (recodified Ohio Administrative Code (OAC) 3745-17-07), AP-3-11 (recodified OAC 3745-17-10) and AP-3-12 (recodified OAC-3745-17-11) concerning the limitations of visible and particulate emissions. These provisions are part of the

applicable State Implementation Plan (SIP), approved by U.S. EPA on April 15, 1974. The regulations are enforceable by both the State of Ohio and the Federal government.

5. Airborne uranium, radon gas and radon decay product releases at FMPC have resulted from plant operations. Radioactive dust generated by manufacturing processes at FMPC are captured by bag-type dust collectors. Operations, including collector failures, have resulted in estimated releases of approximately 215,000 pounds of uranium to the air. Radium-bearing wastes are stored in two silos that are structurally unsound and are leaking radon and radon decay products to the environment. Up to 500 metric tons of thorium compounds are stored in a metal structure that is currently structurally unsound. Failure of the structure would release radioactive thorium compounds into the environment at levels that could be harmful to the surrounding communities.

6. Liquid effluent from the uranium metal production processes is generated and sent to the general sump for treatment prior to release to the Great Miami River. Untreated stormwater run-off from the process areas is routinely discharged to the Great Miami River and the overflow is periodically discharged to Paddy's Run Creek. Paddy's Run Creek is a small receiving stream upgradient to underground drinking water sources. Available evidence indicates that discharges to Paddy's Run Creek have contributed to the contamination of underground water supplies.

7. In December, 1981, elevated radioactivity was detected in three private wells located downgradient from FMPC. In February, 1982, following confirmation of preliminary sample results, the Ohio Department of Health and the landowners were notified of the elevated readings. This information was released to the general public in a FMPC Environmental Monitoring Annual Report in 1983.

8. As a result of the aforementioned releases, the Regional Administrator of U.S. EPA, Region V, has determined that releases and threatened releases of hazardous substances including radioactive materials, may present an imminent and substantial endangerment to the public health, welfare and the environment, requiring remedial response activities. U.S. DOE neither admits nor denies this determination; however, it does commit to undertaking the Work outlined in this Agreement without contest.

9. On March 9, 1985, U.S. EPA issued a Notice of Noncompliance letter to U.S. DOE identifying the Agency's major concerns over the environmental impacts associated with FMPC's past and present operations. U.S. DOE responded to this letter on June 14, 1985.

10. Between April, 1985, and July, 1986, conferences were held between the U.S. DOE and U.S. EPA representatives to discuss the violations and adverse environmental impacts and steps U.S. DOE proposed to take to achieve and maintain compliance.

COMMITMENT OF THE PARTIES

1. U.S. DOE and U.S. EPA hereby agree that U.S. DOE shall conduct a Remedial Investigation/ Feasibility Study and implement Initial Remedial Measures, in accordance with guidelines under CERCLA, to determine the nature and extent of contamination both on and off the FMPC site. The investigation shall be consistent with applicable EPA guidance documents.

2. It is further agreed that U.S. DOE shall undertake the activities described below, within the stated time frames, to bring FMPC into compliance with, and maintain compliance with, the Clean Air Act and RCRA.

COMPLIANCE PLAN

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT

1. Initial Remedial Measures

Pursuant to Section 106 of CERCLA, 42 U.S.C. 9606, and 40 CFR 300.68, U.S. DOE shall undertake the following initial remedial measures to limit the exposure or threat of exposure of radioactive emissions, including radon gas and radon decay products, to the public health and the environment:

A. U.S. DOE shall develop effective operation and maintenance procedures and work practices to control radioactive emissions, including radon gas and radon decay products, from production

materials and onsite wastes to maintain all exposures As Low As Reasonably Achievable (ALARA). Within sixty (60) days of the effective date of this agreement, U.S. DOE shall implement effective operation and maintenance procedures and work practices for the control of radioactive emissions, including radon gas and radon decay product emissions. Progress reports shall be provided to U.S. EPA quarterly.

B. Within thirty (30) days of the effective date of this Compliance Agreement, U.S. DOE shall develop and provide U.S. EPA with a plan and implementation schedule for the following initial remedial measures: 1) interim control of radioactive emissions, including radon gas and radon decay product emissions from the K-65 silos and thorium compounds storage structures; 2) interim controls to ensure the structural integrity of the two K-65 silos, and the thorium compounds storage structures; 3) a radon and radon decay product monitoring program for the fence line and off-site environs; and 4) measures to be undertaken in the event of unplanned releases from the K-65 silos and thorium compounds storage structures to the environment.

C. U.S. DOE shall implement the plan for interim controls described in subparagraph B above, upon approval of the plan by U.S. EPA in accordance with the approved implementation schedule. The interim controls shall be maintained until such time as a long-term plan for the radium-bearing wastes and thorium compounds

is developed, approved and implemented pursuant to the Remedial Investigation/Feasibility Study process discussed below.

D. The State of Ohio shall be given an opportunity to review and comment upon reports developed by U.S. DOE under this subsection.

2. Remedial Investigation/ Feasibility Study

Pursuant to Section 106 of CERCLA, 42 U.S.C. 9606, which addresses imminent and substantial endangerment to public health or welfare or the environment, and the regulations promulgated thereunder, U.S. DOE shall conduct a Remedial Investigation and Feasibility Study (RI/FS).

A. All RI/FS work shall be conducted in conformance with U.S. EPA "Guidance on Remedial Investigations under CERCLA", dated May, 1985, and the U.S. EPA "Guidance on Feasibility Studies under CERCLA", dated April, 1985, and shall be consistent with the guidelines and criteria and considerations set forth in the National Contingency Plan, 40 CFR Part 300, as amended.

B. Attachment I to this Agreement provides a Scope of Work (SOW) for the completion of the RI and FS. The SOW is incorporated into and made a part of this Agreement.

C. Within forty-five (45) days of the effective date of this Compliance Agreement, U.S. DOE will provide analytical results for

laboratory certification as required by SOW Task 7b. In the event of any disapproval of certification by U.S. EPA, U.S. EPA may require that U.S. DOE either select another laboratory for laboratory certification, or allow the original test company to analyze a second round of blanks. Ten (10) days will be allowed for the analysis of a second round of test blanks by either the new or original laboratory.

D. Within ninety (90) calendar days of the effective date of this Agreement, U.S. DOE shall submit to U.S. EPA a work plan for a complete Remedial Investigation and Feasibility Study (RI/FS Work Plan) to determine the nature and extent of any release or threatened release of hazardous chemical and/or radiological substances pollutants or contaminants into the environment at or from FMPC. The RI/FS Work Plan shall be based upon the SOW provided in Attachment I and developed in accordance with the U.S. EPA RI/FS guidance documents which have been provided to U.S. DOE.

E. After receipt of the RI/FS Work Plan, U.S. EPA shall evaluate it and specify in writing to U.S. DOE both deficiencies and any U.S. EPA recommended modifications. Within forty-five (45) calendar days of the receipt of U.S. EPA notification of a RI/FS Work Plan disapproval, U.S. DOE shall amend and submit a revised plan to U.S. EPA. In the event subsequent disapproval

of the RI/FS Work Plan cannot be resolved by informal means, the dispute resolution process described in the Agreement shall be used.

F. U.S. DOE shall implement the tasks detailed in the RI/FS Work Plan as approved by U.S. EPA. The fully approved RI/FS Work Plan shall be incorporated into and made a part of this Compliance Agreement, and shall be included as Attachment II. The tasks in the RI/FS Work Plan shall be conducted in accordance with the standards, specifications, and schedules contained in the approved RI/FS Work Plan.

G. U.S. DOE shall prepare draft and final RI and FS reports as provided in the attached SOW in accordance with the approved time schedule.

H. The final RI and FS studies, including recommended remedial alternatives, shall be made available to the public for review and comment for a twenty-one (21) day public comment period. After public comment, U.S. EPA shall prepare a Record of Decision (ROD) incorporating comments received during the public comment period, and identifying the selected remedial alternative. U.S. DOE shall implement the remedial action alternatives identified in the ROD. This work shall be conducted in accordance with applicable U.S. EPA guidance documents and the standards, specifications and implementation schedules specified by U.S. EPA.

I. The State of Ohio shall be given an opportunity to review and comment upon reports developed by U.S. DOE pursuant to the Remedial Investigation/Feasibility Study process, and shall be consulted during the selection of remedial alternatives to be carried out at FMPC.

J. Upon completion of the work described in subparagraph H. above, U.S. DOE shall provide U.S. EPA with written notification of its completion. U.S. EPA shall evaluate the remedial action taken by U.S. DOE and notify U.S. DOE in writing of the adequacy of the required cleanup. If the actions taken are inadequate, U.S. EPA shall specify, in writing, both deficiencies and the steps necessary to complete the remedial action. Within forty-five (45) calendar days of receipt of U.S. EPA notification, U.S. DOE shall implement the necessary remedial action. Any disputes that cannot be resolved by informal process will be handled according to the dispute resolution process contained in this Agreement.

K. U.S. EPA and U.S. DOE agree that actions undertaken by U.S. DOE pursuant to this section of the Agreement, establish a course of action, which, based on present information, is reasonable and necessary and consistent with the National Contingency Plan.

L. To the extent the RI/FS is conducted consistent with the provisions of this Agreement, following the completion of the RI/FS and upon written request by U.S. DOE, U.S. EPA will respond

in writing within ninety (90) days of the request, that in the opinion of U.S. EPA, the Work was performed consistent with the National Contingency Plan and any cleanup remedy selected by U.S. EPA is the most appropriate remedy to protect the public health, safety and the environment consistent with the National Contingency Plan.

3. Reports and Recordkeeping

A. All submittals made to U.S. EPA and RI/FS work performed by U.S. DOE are subject to the review, modification and approval of U.S. EPA. U.S. EPA retains the right to amend reports, perform additional work, and to conduct the RI/FS if U.S. EPA decides any of the above are necessary.

B. U.S. DOE shall provide monthly written progress reports to U.S. EPA as described in Scope of Work (SOW) Task 7.

C. In addition to the monthly progress reports, U.S. DOE shall submit the plans and reports to U.S. EPA as required in the SOW, in accordance with the schedule contained in the approved RI/FS Work Plan.

D. Within thirty (30) days of receipt of any written notice of disapproval from U.S. EPA of such plans or reports, U.S. DOE shall submit a revised plan or report to U.S. EPA incorporating the required modifications or additions.

E. Documents and other notices required to be submitted pursuant to this Agreement, shall be sent by certified mail to the following addresses, or to such other addresses as U.S. DOE or U.S. EPA may hereafter designate in writing:

1. Documents to be submitted to U.S. EPA should be sent to:

   United States Environmental Protection Agency
   Region V
   Hazardous Waste Enforcement Branch, 5HE-12
   230 South Dearborn Street
   Chicago, Illinois 60604
   Attention: RCRA Enforcement Section

2. Documents to be submitted to U.S. DOE should be sent to:

   U.S. Department of Energy
   Oak Ridge Operations
   Environmental Protection Division
   P.O. Box E
   Oak Ridge, Tennessee 37830

4. Designated Project Coordinators

A. The designated Project Coordinators for CERCLA activities are:

James A. Reafsnyder U.S. DOE	Stephen Clough U.S. EPA

B. To the maximum extent possible, communications between U.S. DOE and U.S. EPA and all documents, including reports, agreements, and other correspondence, concerning the activities performed pursuant to the terms and conditions of this section of the Agreement, shall be directed through the Project Coordinators.

C. U.S. EPA and U.S. DOE have the right to change their respective Project Coordinators. Such a change shall be accomplished by notifying the other party in writing.

CLEAN AIR ACT

A. U.S. DOE shall comply with the radionuclides emission standard promulgated at 40 CFR 61.92. Airborne concentrations of radionuclides shall not exceed those amounts that cause a whole body dose equivalent of 25 millirem (mrem) per year and 75 mrem per year to the critical organ of any member of the public.

B. To ensure compliance with emission standards promulgated at 40 CFR Part 61, U.S. DOE shall establish monitors, install emission controls and develop administrative controls to ensure (1) their proper operation and (2) correct collection and analytical methodology. Within thirty (30) days of the effective date of this Agreement, the following work shall be completed with progress reports quarterly:

1. Install real-time alarm monitors to monitor radionuclides on all major emission points.

2. Establish and implement administrative controls for real-time alarm monitors to ensure that any unplanned release will be detected immediately and dealt with in 24 hours.

3. Establish and implement air sample collection and analysis procedures along with a quality assurance plan to monitor radionuclides on all emission points with a potential for release of radionuclides to the air.

4. Establish a schedule for installation of emission controls and annual progress reports on the replacement of control devices.

C. U.S. DOE shall comply with the reporting provisions contained at 40 CFR 61.94(c).

D. Commencing in 1986, and each year thereafter, U.S. DOE shall provide U.S. EPA with (1) a yearly particulate matter stack-testing schedule for that year of all air pollution control devices using U.S. EPA method 5 procedures and (2) the stack test results forty-five (45) days after testing is completed. Stack test results shall report the actual quantities of emissions. The results shall be included in the quarterly reports required by Subparagraph E. Particulate catch shall also be analyzed for radionuclides and isotopic concentrations reported. U.S. DOE shall provide U.S. EPA with twenty (20) days advance notice of any change in the stack-testing schedule.

E. U.S. DOE shall maintain records of monthly particulate matter emissions and shall provide U.S. EPA with quarterly reports of such emissions.

F. Within sixty (60) days of the effective date of this Compliance Agreement, U.S. DOE shall provide U.S. EPA with a list of all environmental air monitoring equipment, including their location, and the operation and maintenance (O&M) program designed to maintain the monitors at peak efficiency.

G. Within ninety (90) days of the effective date of this Compliance Agreement, U.S. DOE shall develop and provide U.S. EPA with an O&M program for air pollution control devices.

H. Reports required to be submitted to U.S. EPA as a requirement of NESHAPS shall be sent to U.S. EPA, Assistant Administrator for Air and Radiation (ANR-443), 401 M Street, S.W., Washington, D.C. 20460. Copies of the reports shall also be sent to U.S. EPA, Region V.

RESOURCE CONSERVATION AND RECOVERY ACT

A. Within thirty (30) days of the effective date of this Compliance Agreement, U.S. DOE shall achieve compliance with interim status regulations at all areas subject to control under RCRA. For purposes of this Agreement, the "mixed wastes" located at FMPC are subject to RCRA regulation. For purposes of this Agreement, at FMPC, the term "mixed wastes" shall apply to hazardous waste that is mixed with source, special nuclear and byproduct material. Pursuant to the RCRA interim status regulations, U.S. DOE shall:

1. Conduct a hazardous waste determination on all

waste streams generated at the facility that were previously untested, pursuant to 40 CFR 262.11.

2. Commence a hazardous waste analysis program to determine the physical and chemical characteristics of the materials in the landfill and going to the incinerator at the FMPC in accordance with the RCRA regulations, 40 CFR 265.13. The radiological characteristics of the materials shall also be determined and results submitted to U.S. EPA.

3. Update the operating records to include: the description and quantity of waste stored onsite, a map showing the location and quantity of waste disposed of onsite, the EPA Hazardous Waste Code and physical state of all waste treated, stored or disposed of, and a description of the method(s) used to treat, store, or dispose of any hazardous waste pursuant to 40 CFR 265.73 and 265.309.

4. Include the printed full name and signature of the person receiving hazardous waste and the date it is received on the manifests pursuant to 40 CFR 265.71.

5. Update the facility closure plan to reflect the year the facility expects to begin closure pursuant to 40 CFR 265.112.

6. Collect run-off from the active portions of the landfill as required by 40 CFR 265.302(b);

7. Prepare and maintain onsite a written outline for a groundwater quality assessment program pursuant to 40 CFR 265.93(a).

B. Within ninety (90) days of the effective date of this Compliance Agreement, U.S. DOE shall submit to U.S. EPA for approval a detailed groundwater monitoring plan for the landfill (waste pit #4) pursuant to 40 CFR 265.90 and 265.91. This plan may be combined with the CERCLA groundwater monitoring plan described in the Remedial Investigation Study (CERCLA, Section 2). In addition to the requirements of CERCLA, Section 2., the RCRA groundwater monitoring plan should provide the following information:

1. A determination of groundwater flow at the RCRA regulated units, that specifies both horizontal and vertical components. A potentiometric map should display groundwater flow in this area.

2. A detailed map providing the location of all RCRA monitoring wells. This map should also designate the location of cross sections constructed from well information.

3. The specifications for the design and construction of all RCRA wells to be included in the monitoring system. This description should include well depth, screen length, casing materials, etc.

4. A list of the parameters to be monitored. If the waste inventory of all the pits and impoundments is not completed,

all Appendix VIII constituents should be monitored. U.S. DOE may petition U.S. EPA to delete a constituent if documentation can be provided to U.S. EPA indicating that a specific waste was not handled in the past. This list of parameters should include radionuclides.

5. A sampling and analysis plan that meets the requirements of 40 CFR § 265.92.

C. Within sixty (60) days of completion of the Waste Characterization Study at the waste pit area, DOE shall:

1. Develop a closure plan for the landfill pursuant to 40 CFR 265.112.

2. Develop a post-closure plan for the landfill pursuant to 40 CFR 265.118.

RADIATION DISCHARGE INFORMATION

A. Within thirty (30) days of the effective date of this Agreement, U.S. DOE shall provide U.S. EPA with its existing comprehensive offsite environmental monitoring program and an associated quality assurance plan for FMPC, and any revisions to the plan, for review and comment. At a minimum, the environmental monitoring program shall include the maintaining of liquid discharge monitors and administrative controls to ensure (1) their proper operation and (2) correct collection and analytical methodology. The following work shall be continued:

1. Maintain continuous liquid discharge sample collectors

at all discharge points, monitor and report results quarterly to U.S. EPA, Ohio EPA, and Ohio Department of Public Health.

2. Maintain administrative controls for liquid discharges sufficient to identify and deal with any unplanned release within 24 hours.

3. Maintain sample collection analysis procedures along with a quality assurance plan for liquid samples.

B. For the purposes of this Compliance Agreement, data reported to the U.S. EPA shall be radionuclide specific except for uranium which may be reported as total uranium.

FUNDING

U.S. DOE's performance of the commitments under this Agreement are subject to the availability of appropriated funds for such purposes. If appropriated funds are not available to fulfill requirements of the Agreement U.S. EPA reserves the right to initiate such action as it deems appropriate to the extent permitted by law.

REPORTING REQUIREMENTS

A. Unless otherwise specified, U.S. DOE shall submit required documents, notices and reports to the following address:

Chief, Environmental Review Branch
U.S. Environmental Protection Agency
John C. Kluczynski Federal Building, 5ME-16
230 South Dearborn Street
Chicago, Illinois 60604

B. Monthly progress reports identifying steps taken toward achieving compliance with the requirements contained herein shall be submitted to U.S. EPA. Monthly reports shall be submitted by the twentieth (20) day following the end of each month.

C. U.S. EPA may need varying amounts of time to comment on the various documents required to be submitted by U.S. DOE to U.S. EPA for review and comment or approval. U.S. EPA will respond within thirty (30) days of receipt of submittals unless more time is required.

DISPUTE RESOLUTION

Failure to comply with the terms of this Compliance Agreement shall be considered a violation and shall result in the initiation of the conflict resolution procedures of Section 1-602 of Executive Order No. 12088. Unless U.S. DOE demonstrates that such failure to comply was justified and a new schedule is agreed upon, the Regional Administrator will refer the matter to the U.S. EPA, Office of External Affairs (OEA) for resolution of the dispute with U.S. DOE's Headquarter Office. In the event that a resolution is not reached between OEA and the parent Agency of the non-complying facility, the Administrator of U.S. EPA will request the Director of the Office of Management and Budget to resolve the conflict pursuant to Section 1-602 of Executive Order 12088. As provided in Section 1-604 of Executive Order No. 12088, such conflict resolution procedures are in addition to, not in

lieu of, other procedures, including sanctions, for the enforcement of applicable pollution control standards.

OTHER APPLICABLE LAWS AND REGULATIONS

All actions required to be taken by U.S. DOE pursuant to this Agreement shall be undertaken in accordance with the requirements of all other applicable local, state, and Federal laws and regulations unless an exception from such requirement is specifically provided in this Agreement.

RESERVATION OF RIGHTS

U.S. DOE neither admits nor denies any findings of fact or conclusions of law contained in this Compliance Agreement. Nothing herein is intended to affect the rights or liabilities of nonparties to this Agreement.

EFFECTIVE DATE AND SUBSEQUENT MODIFICATIONS

1. The effective date of this Agreement shall be the date on which it is signed by U.S. EPA.

2. Modifications to this Agreement may be requested by U.S. EPA or U.S. DOE. All such modifications shall be by mutual agreement of U.S. EPA and U.S. DOE. Such amendments shall be in writing and shall have as the effective date, that date on which such amendments are signed by U.S. EPA, and shall become an integral part of this Compliance Agreement.

3. Any reports, plans, specifications, schedules, and attachments required by this Agreement are, upon approval by U.S. EPA, incorporated into this Agreement.

4. No informal advice, guidance, suggestions, or comments by U.S. EPA regarding reports, plans, specifications, schedules, and any other writing submitted by the U.S. DOE will be construed as relieving U.S. DOE of its obligation to obtain such formal approval as may be required by this Agreement.

5. Upon demonstration of compliance by U.S. DOE with this Agreement, there will be a continuing obligation to comply with applicable permit and other requirements under the relevant statutes.

IT IS SO AGREED:

By: _____ July 19, 1986
U.S. Department of Energy DATE:

By: _____ July 18th, 198
U.S. Environmental Protection Agency DATE:

ATTACHMENT I

SCOPE OF WORK FOR A REMEDIAL INVESTIGATION 6/30/86

AT FEED MATERIALS PRODUCTION CENTER

PURPOSE

The purpose of this Remedial Investigation is to determine the nature and extent of any release, or threat thereof, of hazardous or radioactive substances, pollutants, or contaminants at or from the Feed Materials Production Center, and to gather all necessary data to support the Feasibility Study. The Contractor will furnish all personnel, materials, and services necessary for, or incidental to, performing the Remedial Investigation at Feed Materials Production Center.

DEFINITIONS

a. Facility - refers to the Feed Materials Production Center (FMPC).

b. Site - refers to FMPC and all areas where hazardous or radioactive substances, pollutants, or contaminants have been deposited, stored, disposed of, or placed or otherwise come to be located.

c. Waste Management Area - refers to any continguous land structures, other appurtenances and improvement on the land used for storage, treatment, disposal, collection, radioactive source separation, transfer, processing, resource recovery, incineration, or conservation of any chemical or radioactive material. It includes any unit at the FMPC facility from which contaminants might migrate, irrespective of whether the units were intended for the management of radioactive and/or hazardous waste.

d. Production Area - refers to any device that yields a radioactive or hazardous substance.

SCOPE

The Remedial Investigation shall consist of eight tasks:

Task 1 - Description of Current Situation
Task 2 - Work Plan Requirements
Task 3 - Site Investigation
Task 4 - Site Investigation Analysis
Task 5 - Laboratory and Bench-Scale Studies
Task 6 - Reports
Task 7 - Additional Requirements
Task 8 - Community Relations Support

TASK 1 - DESCRIPTION OF CURRENT SITUATION

The Contractor will outline the purpose for the Remedial Investigation and describe the background information pertinent to the Facility and its problems.

The data gathered during any previous investigations or inspections and other relevant data should be used.

a. Site Background

The Contractor will prepare a summary of the regional location, pertinent area boundary features, general site physiography, hydrogeology, and historical use of the Facility for the treatment, storage and disposal of both hazardous and radioactive materials.

This summary shall at a minimum include:

1. Maps depicting the following:

   A. The general geographic location;

   B. All existing and former Waste Management and Production Areas.

   C. Feed Materials Production Center property lines and any adjacent property lines with the owners of all adjacent property clearly indicated; and

   D. All known past and present product and waste underground tanks or lines.

2. Details on past product and waste spills including date, volume, nature, location, and cleanup activities.

3. A description of current operations at each Waste Management and Production Area including a history of the unit's function and all of the wastes processed or disposed at the unit. Include the waste constituents processed or disposed, the time frames of operation, and quantities handled during those time frames.

4. A description of each Waste Management and Production Unit including engineering drawings, foundation materials of construction, dimensions, capacity and ancillary systems: include location, design, construction, and descriptions of all groundwater monitoring systems. If the Waste Management or Production Area is not in use, describe the methods utilized to close the facility and all construction related to closure.

b. Nature and Extent of Problem.

Prepare a summary of the actual and potential off-facility and on-facility health and environmental effects. This summary shall include: the types, physical states, and amounts of hazardous wastes/hazardous substances and radioactive materials; the existence and condition of drums, tanks, landfills, surface ponding, and other containers; affected media and pathways of exposure; and contaminated releases such as air releases, leachate, and runoff. Include discussion of the population in the area potentially affected by release of contaminants from the Facility.

Describe any reports of human or animal illness that may be related to the Facility. Emphasis should be placed upon describing the threat or potential threat to public health and the environment.

c. History of Response Actions.

Prepare a summary of any previous response actions conducted by either local, State, Federal, or private parties, including inspections and other technical reports, and their results. A list of reference documents and their location should be included. The scope of the remedial investigation should be developed to address the problems and questions that have resulted from previous work at the site.

d. Site Visit.

Conduct an initial site visit to become familiar with site topography, access routes, and proximity of receptors to possible contamination and collect data for preparation of the site safety plan. The visit should be used to verify the site information developed in this Task.

e. Define Boundary Conditions.

Establish site boundary conditions to delineate the area of remedial investigation. The boundary conditions shall be set so that subsequent investigations will cover the contaminated media in sufficient detail to support the following activities, e.g. feasibility study. Boundary conditions will also be used to identify boundaries for site access control and site security. Site boundaries shall encompass all areas of contamination (i.e. groundwater, soil), both on and off FMPC.

TASK 2 - WORK PLAN REQUIREMENTS

The consultant shall conduct preliminary work necessary to scope and conduct the site remedial investigation and feasibility study. This shall include the development and submittal of a detailed work plan to U.S. EPA for review and approval outlining data needs for characterizing the site and for support of the feasibility study. The work plan shall include an outline of proposed investigation activities, a time schedule for accomplishing the tasks identified in the SOW, and personnel and equipment requirements. The work plan shall also include a sampling plan indicating rationales for sampling activities, location, quantity, and frequency of sampling, sampling and analysis methods, constituents for analysis, and quality assurance procedures. In addition to these general sampling plan elements, other requirements will be identified in the following subtasks as they apply:

a. Sampling Plans.

The Contractor will prepare detailed Sampling Plans to address each of the Site Investigation activities.

1. The objective of the Sampling Plan is to:

A. Provide specific guidance for all field work;

B. Provide a mechanism for planning and approving site activities;

C. Provide a basis for estimating costs of field efforts;

D. Ensure that sampling activities are limited to those that are necessary and sufficient; and

E. Provide a common point of reference for all parties to ensure comparability and compatibility between all activities performed at the site.

2. A Sampling Plan should discuss the following items:

A. Investigation objectives;

B. Parameters of interest;

C. Number of each sample type for each matrix;

D. Locations of samples;

E. Justification for sample type and location;

F. Collection methods;

G. Sample number and frequency;

H. Analytical procedures (refer to Quality Assurance Project Plan);

I. Operational plan and schedule;

J. Differentiation between samples that will be analyzed in the field (on-site) and those that will be sent to a laboratory;

K. Sampling Logistics Plan including:

(1) Identification of team members;

(2) Documentation procedures;

(3) Field equipment listing;

(4) Sampling order; and

(5) Decontamination procedures.

L. Monitor well and piezometer construction materials and techniques; and

M. Quality control to assure samples are not contaminated as specified in Subpart d below.

b. Health and Safety Plan.

The Contractor will prepare a site Health and Safety Plan.

1. Major elements of the Health and Safety Plan will include:

   A. Site description including availability of resources such as roads, water supply, electricity and telephone service;

   B. Hazard evaluation;

   C. Monitoring requirements;

   D. Levels of protection;

   E. Work limitations;

   F. Authorized personnel;

   G. Decontamination; and

   H. Emergency information.

2. The Site Health and Safety Plan must be consistent with:

   A. Interim Standard Operating Safety Procedures;

   B. Section III(C)(6) of CERCLA;

   C. EPA Order 1440.1 - Respiratory Protection;

   D. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

   E. EPA Occupational Health and Safety Manual;

   F. EPA Interim Standard Operating Safety Guide (September, 1982);

   G. OSHA regulations in 29 CFR 1910 - 1926;

   H. Other EPA guidance as provided; and

   I. Site conditions.

c. Chain of Custody. Any field sampling collection and analyses conducted shall be documented in accordance with chain-of-custody procedures as provided by U.S. EPA. The Contractor shall prepare and submit as part of the work plan a description of the chain-of-custody procedures to be used.

d. Quality Assurance Project Plan. The Contractor will prepare a Quality Assurance Project Plan (QAPP). The QAPP will be prepared in accordance with "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" (QAMS-005/80, U.S. EPA, December, 1980), and the requirements of U.S. EPA's Contract Laboratory Program. The QAPP should be prepared as soon as possible to allow adequate time for possible review and revision.

1. The goals of the QAPP are:

   A. To ensure that the procedures used will not detract from the quality of results; and

   B. To ensure that all activities, findings and results follow an approved plan and are documented.

2. Specifically, the QAPP must address the following items and issues:

   A. Title page with provision for approval signatures;

   B. Table of contents;

   C. Project description;

   D. Project organization and responsibility;

   E. QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness, detection limits, and comparability;

   F. Sampling procedures;

   G. Sample custody;

   H. Calibration procedures and frequency;

   I. Analytical procedures;

   J. Data reduction, validation and reporting;

   K. Internal quality control checks and frequency;

   L. Performance and systems audits and frequency;

   M. Preventative maintenance procedures and schedules;

   N. Specific routine procedures to be used to assess data precision;

   O. Remedial action;

   P. Quality assurance reports; and

   Q. Turnaround time.

d. Permitting Requirements Plan.

The Contractor will prepare a plan addressing the procedures to be employed if tasks required in the RI will require permitting action by any governmental authority.

e. Pre-Investigation Evaluation.

Prior to starting any remedial investigations, the Contractor shall assess the site conditions to identify potential remedial technologies applicable to the site and associated data needed to evaluate alternatives based on these technologies for feasibility studies. A report shall be prepared for U.S. EPA review identifying broad categories of remedial technologies that may be applicable to the site and data needs.

TASK 3 - SITE INVESTIGATION

The Contractor will conduct those investigations necessary to characterize the site and its actual or potential hazard to human health and environment. The investigations should result in data of adequate technical content to support the development and evaluation of remedial alternatives during the Feasibility Study. Investigation activities will focus on problem definition and data to support the screening of remedial technologies, alternative development and screening, and detailed evaluation of alternatives.

The site investigation activities will follow the plans set forth in Task 2. All sample analyses will be conducted at laboratories following EPA protocols or their equivalents. Strict chain-of-custody procedures will be followed and all samples will be located on a site map.

a. Hazardous Analyses Program

A sampling and analysis program to characterize the radiological, physical, and chemical characteristics of all materials of interest at the Facility will be completed. The materials of interest will at a minimum include:

1. Materials (waste and product) stored above or below ground in tanks, containers, lagoons, piles or other structures;

2. Materials generated at the Facility and disposed of off-site;

3. Materials treated or disposed of on the facility; and

4. All materials emitted, discharged, released or potentially released into the environment.

b. Hydrogeologic Investigation

The Contractor shall conduct a program to evaluate hydrogeologic conditions at the site. This program shall provide the following information:

1. A description of the regional geologic and hydrogeologic characteristics in the vicinity, including:

   A. regional stratigraphy: description of strata including strike and dip, identification of stratigraphic contacts, petrographic analysis;

   B. structural geology: description of local and regional structural features (e.g., folding, faulting, tilting, jointing, etc.);

   C. depositional history;

   D. regional groundwater flow patterns; and

   E. identification and characterization of areas of recharge and discharge.

2. An analysis of any topographic features that might influence the groundwater flow system (Note that stereoscopic analysis of aerial photographs should aid in this analysis).

3. A classification and description of the hydrogeologic properties of all the hydrogeologic units found at the site based on continuous bore hole samples (i.e., the aquifers and any intervening saturated and unsaturated units), including:

   A. hydraulic conductivity and effective porosity based upon laboratory and field data;

   B. lithology, grain size, sorting, degree of cementation;

   C. an interpretation of hydraulic interconnections between saturated zones; and

   D. the soil's attenuation capacity and mechanisms.

4. Using a topographic map or aerial photograph as a base, submit maps of structural geology and at least four hydrogeologic cross sections showing the extent (depth, thickness, lateral extent) of all hydrogeologic units within the scope of the RI, identifying:

   A. sand and gravel deposits in unconsolidated deposits;

   B. zones of fracturing or channeling in consolidated or unconsolidated deposits;

   C. zones of higher permeability or lower permeability that might direct or restrict the flow of contaminants;

   D. perched aquifers;

E. the uppermost aquifer (includes all water-bearing zones above the first confining layer that may serve as a pathway for contaminant migration including perched zones of saturation); and

F. zones of contaminated leaching, accumulation, and unaffected horizons for those contaminants whose movement is controlled by mechanisms of adsorption and/or mechanical filtering. These profiles should be based on continuous bore hole sampling and representative analysis.

5. A description of water level or fluid pressure monitoring including:

   A. water-level contour and/or potentiometric maps;

   B. hydrologic cross sections showing vertical gradients;

   C. an interpretation of the flow system, including the vertical and horizontal components of flow; and

   D. an interpretation of any change in hydraulic gradients due, for instance, to tidal or seasonal influences.

6. An interpretation of man-made influences that may affect the hydrogeology of the site, identifying:

   A. local water-supply and production wells with an approximate schedule of pumping; and

   B. man-made hydraulic structures (pipelines, french drains, ditches).

7. Preparation of chemical and radiological concentration isopleth maps which extend off the FMPC as necessary to identify areas of contaminant transport. The map should reflect discrete depth intervals.

c. <u>Groundwater Quality Investigation</u>

The Contractor shall conduct a Groundwater Quality Investigation to characterize any plumes of contamination at the site utilizing monitor wells constructed of teflon or stainless steel 316. This investigation shall at a minimum provide the following information:

1. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility;

2. The horizontal and vertical direction of contamination movement;

3. The current speed of contaminant movement;

4. The maximum concentration of Contract Laboratory Program List (CLP) constituents and radiological contaminants in the plume(s);

5. An evaluation of factors influencing the plume movement;

6. An extrapolation of future contaminant movement; and

7. Identification of the source(s) of groundwater contamination.

d. Soils and Sediments Investigation

The Contractor shall conduct a program to determine the location and extent of contamination of surface and subsurface soils. This process may overlap with certain aspects of the hydrogeologic study (e.g., characteristics of soil strata are relevant to both the transport of contaminants by groundwater and to the location of contaminants in the soil; cores from groundwater monitoring wells may serve as soil samples). A survey of existing data on soils and sediments may be useful. The horizontal and vertical extent of contaminated soils and sediments should be determined. Information on local background levels, degree of hazard, location of samples, techniques utilized, and methods of analysis should be included. The investigation should identify the locations and probable quantities of subsurface wastes, such as buried drums, old spill areas, inactive surface impoundments or landfills. Geophysical methods may be used to supplement sampling results. This investigation should include a study of soil contamination off the FMPC from both airborne and surface water releases.

e. Surface Water Investigation

Conduct a program to determine the extent of contamination of surface water. This process may overlap with the soils and sediments investigation; data from river sediments sampled may be relevant to surface water quality. A survey of existing data on surface water flow quantity and quality may be a useful first step, particularly information on local background levels, location and frequency of samples, sampling techniques, and method of analysis. This program shall also evaluate the impacts of the contaminants on the floral and faunal communities in the surface water, sediments, and any adjacent wetlands. This investigation should include:

1. Retrospectively computing doses to the population along the Great Miami River and Paddy's Run Creek from discharges to surface water for each each year of plant operation. Report for each year, doses to maximally exposed individuals and, for the Great Miami River, to the nearest population center downstream, New Baltimore. Report the integral population dose from the Great Miami River discharge point to the nearest population center downstream for each year; and

2. Performance of radiological analyses on the sediments in the Great Miami River from each discharge point downstream 2 kilometers. Radiological analyses on soils from the banks shall be made. Radionuclides shall be identified isotropically and compared to measured background concentrations.

f. Air Investigation

Conduct a program to determine the extent of atmospheric contamination. The program should address the tendency of substances (identified through the Hazardous Analyses Program, Task 3.a) to enter the atmosphere, local wind patterns, and the degree of hazard. This investigation should include a detailed and comprehensive study of radiological impacts associated with past operations and should include:

1. Retropectively computing inhalation doses to the offsite population within 2, 5, 10, and 50 mile radii of the FMPC due to airborne releases for each year of plant operation. Report doses to the population in each ring and doses to maximally exposed individuals for each year.

2. Retrospectively computing the deposition of radioactive materials in areas within 2 and 5 mile radii of the FMPC due to airborne releases for each year of plant operation and give the integral deposition for each year. Report deposition and compute resulting whole body and organ doses. Verify the computations through direct measurement of soils and sediments performed in Subpart e.

g. Off-Facility Water Supply Investigation

Conduct a program consisting of regular sampling and analysis of off-facility downgradient private water supply wells and downwind cistern supplies for any contaminants having the potential for movement off of the FMPC. The program should identify the contaminants of concern and include proposed criteria for comparison of results.

TASK 4 - SITE INVESTIGATION ANALYSIS

The Contractor will prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality (e.g., QA/QC procedures have been followed) and quantity to support the Feasibility Study.

a. Data Analysis

The Contractor will analyze all site investigation data and develop a summary of the type and extent of contamination at the site. The summary will describe the extent of contamination (qualitative/quantative) in relation to background levels indicative for the area.

b. Exposure (Risk) Assessment

For the detailed listing of radionuclides, and inorganic and organic constituents determined to be present during the Site Investigation (Task 3), the Contractor shall evaluate the risk to life forms encountering these contaminants. The following items will be discussed for each contaminant:

1. Environmental Fate and Transport:

   A. physical, chemical, and radiological properties;

   B. chemical transformations; and

   C. fate and transport.

2. Toxicological Properties:

   A. metabolism;

   B. acute toxicity;

   C. subacute and chronic toxicity;

   D. carcinogenicity;

   E. mutagenicity;

   F. teratogenicity/reproductive effects;

   G. other health effects;

   H. epidemiological evidence; and

   I. aquatic species toxicity, environmental improvement.

3. Risk Assessment and Impact Evaluation:

   A. carcinogenic risk;

   B. probability of noncarcinogenic human health effects;

   C. nonhuman species risk assessment; and

   D. conclusions.

4. Demographic Profile of Population at Risk:

   The analysis should discuss the degree to which either on-facility control or off-facility measures are required to significantly mitigate the threat to public health, welfare or the environment. If the results of the investigation indicate that no threat or potential threat exists, a recommendation to stop the remedial response should be made.

c. Application to Preliminary Technologies

The Contractor will analyze the results of the site investigations in relation to the potential remedial technologies applicable to the site. Data supporting or rejecting types of corrective action technologies, compatibility of wastes and construction materials, and other conclusions should be presented.

d. Groundwater Protection Standards

The Contractor shall develop Groundwater Protection Standards for all of the CLP constituents found in the groundwater during the Site Investigation (Task 3).

1. The Groundwater Protection Standards shall consist of:

   A. for any constituents listed in Table 1 of 40 CFR 264.94, the respective value given in that table if the background level of that constituent is below the value given in Table 1; or

   B. the background level of that constituent in the groundwater; or

   C. a U.S. EPA aproved Alternate Concentration Limit.

2. Alternate Concentration Limits (ACL's) may be developed by the Contractor and submitted to the U.S. EPA for approval. For any proposed ACL's the Contractor shall include a justification based upon the criteria set forth in 40 CFR 264.94(b).

3. Within forty-five (45) days of receipt of any proposed ACL's, the U.S. EPA shall notify the United States Department of Energy (U.S. DOE) in writing of approval, disapproval or modifications. The U.S. EPA shall specify in writing the reason(s) for any disapproval or modification.

4. Within twenty (20) days of receipt of the U.S. EPA's notification of disapproval of any proposed ACL, the U.S. DOE shall amend and submit to the U.S. EPA revised ACL's.

TASK 5 - LABORATORY AND BENCH-SCALE STUDIES

The Contractor shall conduct laboratory and/or bench scale studies to determine the applicability of remedial technologies to site conditions and problems. Analyze the technologies, based on literature review, vendor contracts, and past experience to determine the testing requirements.

A testing plan identifying the type(s) and goal(s) of the study(ies), the level of effort needed, and data management and interpretation guidelines shall be developed and submitted to U.S. EPA for review and approval.

Upon completion of the testing, evaluate the testing results to assess the technologies with respect to the site-specific questions identified in the test plan. Scale up those technologies selected based on testing results.

Prepare a report summarizing the testing program and its results, both positive and negative.

TASK 6 - REPORTS

The Contractor shall prepare a Remedial Investigation Report to present Tasks 1-7. The Remedial Investigation Report will be developed in draft form for U.S. EPA review and approval. A public meeting may be held to discuss the Draft. The Remedial Investigation will be developed in final format incorporating all comments received on the Draft Remedial Investigation Report.

Five (5) copies of both the Draft and Final Remedial Investigation Reports will be provided by the Contractor to U.S EPA.

TASK 7 - ADDITIONAL REQUIREMENTS

a. Reporting Requirements.

Monthly Technical Progress Reports developed by the Contractor should be submitted to U.S. EPA. For each on-going work assignment, the Contractor shall submit progress reports with the following elements:

1. Identification of site and activity.
2. Status of work at the site and progress toward achieving compliance with the Agreement.
3. Percentage of completion.
4. Difficulties encountered during the reporting period.
5. Actions being taken to rectify problems.
6. Changes in personnel.
7. All results of sampling tests and all other data received by U,S. DOE.
8. A summary of all plans and proceudres completed during the past month as well as any activities scheduled for the next month.

The monthly progress report will list target and actual completion dates for each activity including project completion and provide an explanation of any deviation from the milestones in the work plan schedule.

b. Laboratory Certification

In addition to QAPP development, the Contractor will be required to pass a laboratory performance audit prior to performing any task after Task 1 if a certified CLP laboratory is not used. The audit will include analysis of the following performance evaluation samples.

Sample Type	Performance Evaluation Sample	# of Samples	U.S. EPA Analysis Procedure
Organic	Base/Neutrals	2	625
Organic	Acids	1	625
Organic	PCB's	2	608 or 625
Organic	Aromatic Purgeables*	1	602
Organic	Halogenated Purgeables*	1	601
Organic	GC/MS Purgeables	1	624

*Methods 601 and 602 are not essential if Contractor proposed analyzing all purgeables by GC/MS (method 624).

Sample Type	Performance Evaluation Sample	# of Samples	U.S. EPA Analysis Procedure
Inorganic	Metals	1	
Inorganic	Minerals	1	
Inorganic	Nutrients	2	
Inorganic	CN	1	
Inorganic	COD/BOD	1	

The Contractor is expected to qualify as well as quantify the parameters of interest. The results shall include all supporting data as required for a QAPP as specified by U.S. EPA and described when samples are forwarded to the laboratory.

An on-site laboratory visit will be performed by an U.S. EPA Quality Assurance Officer to verify compliance with required analysis procedures.

TASK 8 - COMMUNITY RELATIONS SUPPORT

The U.S. DOE will act as lead agent for the implementation of community relations activities. The Contractor will provide support to U.S. DOE staff as required for community relations activities. Community relations activities performed by the U.S. DOE will be consistent with:

a. Superfund community relations policy, as stated in "Guidance for Implementing the Superfund Program", and

b. "Community Relations in Superfund-a-Handbook".

SCOPE OF WORK FOR A FEASIBILITY STUDY

FEED MATERIALS PRODUCTION CENTER

PURPOSE

The purpose of this Feasibility Study is to develop and evaluate remedial action alternatives and to recommend the remedial action(s) to be taken to protect the public health, or welfare, or the environment from releases, or threatened releases of hazardous or radioactive substances, pollutants or contaminants at or from the Feed Materials Production Center. The Contractor will furnish the necessary personnel, materials, and services necessary to prepare the remedial action feasibility study, except as otherwise specified.

DEFINITIONS

a. Facility - refers to the Feed Materials Production Center (FMPC).

b. Site - refers to FMPC and all areas where hazardous or radioactive substances, pollutants, or contaminants have been deposited, stored, disposed of, or placed or otherwise come to be located.

SCOPE

The Feasibility Study consists of nine tasks:

Task 9 - Description of Current Situation
Task 10 - Work Plan
Task 11 - Development of Alternatives
Task 12 - Initial Screening of Alternatives
Task 13 - Detailed Analysis of Alternatives
Task 14 - Evaluation and Selection of Preferred Alternative
Task 15 - Draft Feasibility Study Report
Task 16 Final Feasibility Study Report
Task 17 - Additional Requirements

TASK 9 - DESCRIPTION OF CURRENT SITUATION

Information on the site's background, the nature and extent of the problem, and the previous response activities presented in Task 1 of the Remedial Investigation may be incorporated by reference. Any changes to the original project scope described in the Task 1 description should be discussed and justified based on the results of the remedial investigation.

Following the summary of the current situation, a site-specific statement of the purpose for the response, based on the results of the Remedial Investigation, should be presented. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by remedial alternatives.

TASK 10 - WORK PLAN

A work plan that includes a technical approach, personnel requirements, and schedules shall be submitted to the U.S. EPA for review and approval for the proposed feasibility study.

TASK 11 - DEVELOPMENT OF ALTERNATIVES

Based on the results of the Remedial Investigation, the Contractor will develop a limited number of alternatives for source control, off-facility remedial action or on-facility remedial action, based on the objectives established for the remedial action and the scoping decision.

a. Establishment of Remedial Response Objectives.

The Contractor in conjunction with the U.S. EPA will establish site-specific objectives for the remedial action. These objectives shall be based on public health and environmental concerns, scoping decisions, information gathered during the Remedial Investigation, EPA interim guidance, and the requirements of any other applicable Federal statutes including 40 CFR 300.68. At a minimum, all remedial actions concerning groundwater must be consistent with, and as stringent as, those required under 40 CFR 264.100.

b. Identification of Remedial Technologies.

Based on the remedial response objectives established above and the statement of purpose identified in Task 9 identify appropriate remedial technologies as a basis for the development of remedial alternatives. These technologies shall be identified on a media-specific basis, although consideration should be given to the interrelationship of the media. The technologies should be able to meet the response objectives. The list of potential remedial technologies developed in Tasks 2e and Task 4c shall be considered a master list of applicable technologies and shall be screened based on site conditions, waste characteristics, and technical requirements, to eliminate or modify those technologies that may prove extremely difficult to implement, will require unreasonable time periods to implement, or will rely on insufficiently developed technology.

c. Identification of Remedial Alternatives.

The Contractor will develop appropriate remedial technologies, response objectives, and other appropriate considerations into a comprehensive, site-specific approach. Alternatives developed should include the following (as appropriate):

- Alternatives for treatment or disposal off the FMPC as appropriate
- Alternatives which attain applicable and/or relevant Federal public health or environmental standards

- Alternatives which exceed applicable and/or relevant public health or environmental standards.

- No action

There may be overlap among the alternatives developed. Further, alternatives outside of these categories may also be developed. The alternatives shall be developed in close consultation with the U.S. EPA. Document the rationale for excluding any technologies in Task 2e in the development of alternatives.

TASK 12: INITIAL SCREENING OF ALTERNATIVES

The alternatives developed in Task 11 will be screened by the Contractor and U.S. EPA to eliminate alternatives that are clearly not feasible or appropriate prior to undertaking detailed evaluations of the remaining alternatives.

a. Considerations to be Used in Initial Screening.

Three broad considerations must be used as a basis for the initial screening: cost, effects of the alternative, and acceptable engineering practices. More specifically, the following factors must be considered:

1. Cost. An alternative whose cost far exceeds that of other alternatives may be eliminated from recommendation. Total cost will include the cost of implementing the alternative and the cost of operation and manintenance.

   The cost screening will be conducted only after the environmental and public health screenings have been performed.

2. Environmental effects. Alternatives posing significant adverse environmental effects will be eliminated. Significant adverse environmental effects shall include but not limited to failure to meet the Groundwater Protection Standards both on and off the FMPC.

3. Environmental protection. Only those alternatives that satisfy the remedial action objectives and contribute substantially to the protection of public health, welfare, or the environment shall be considered further. Source control alternatives shall achieve adequate control of source materials. On and off-facility alternatives shall minimize or mitigate the threat of harm to public health, welfare, or the environment.

4. Implementability and reliability. Alternatives that may prove extremely difficult to implement, will not achieve the remedial action objectives in a reasonable time period, or rely on unproven technology, will be eliminated.

TASK 13 - DETAILED ANALYSIS OF ALTERNATIVES

The Contractor will evaluate the alternatives that pass through the Initial Screening in Task 12. Alternative evaluation will be preceded by detailed development of the remaining alternatives.

a. Technical Analysis

The Technical Analysis will at a minimum:

1. Describe appropriate treatment, storage, and disposal technologies;

2. Discuss how the alternative does (or does not) comply with specific requirements of other environmental programs. When an alternative does not comply, discuss how the alternative prevents or minimizes the migration of wastes and public health or environmental impacts and describe special design needs that could be implemented to achieve compliance;

3. Outline operation, maintenance, and monitoring requirements of the remedy;

4. Identify and review potential off the FMPC facilities to ensure compliance with applicable RCRA and other EPA environmental program requirements, both current and proposed. Potential disposal facilities should be evaluated to determine whether off the FMPC management of site wastes could result in a potential for a future release from the disposal facility;

5. Identify temporary storage requirements, off the FMPC disposal needs, and transportation plans;

6. Describe whether the alternative results in permanent treatment or destruction of the wastes, and, if not, the potential for future release to the environment;

. Outline safety requirements for remedial implementation (including both on-facility and off-facility health and safety considerations);

8. Describe how the alternative could be phased into individual operable units. The description should include a discussion of how various operable units of the total remedy could be implemented individually or in groups, resulting in significant improvement to the environment or savings in cost;

9. Describe how the alternative could be segmented into areas to allow implementation in differing phases; and

10. Describe the special engineering requirements of the remedy or site preparation considerations.

b. Environmental Assessment

The Contractor will perform an Environmental Assessment (EA) for each alternative. The EA should focus on the site problems and pathways of contamination actually addressed by each alternative. The EA for each alternative will include, at a minimum, an evaluation of beneficial effects of the response, adverse effects of the response, and an analysis of measures to mitigate adverse effects. The no-action alternative will be fully evaluated to describe the current site situation and anticipated environmental conditions if no actions are taken. The no-action alternative will serve as the baseline for the analysis.

c. Public Health Analysis

Each alternative will be assessed in terms of the extent to which it mitigates long-term exposure to any residual contamination and protects public health both during and after completion of the remedial action. The assessment will describe the levels and characterizations of contaminants on-site, potential exposure routes, and potentially affected population. The effect of "no-action" should be described in terms of short-term effects (e.g., lagoon failure), long-term exposure to hazardous substances, and resulting public health impacts. Each remedial alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. The relative reduction in public health impacts for each alternative will be compared to the no-action level. For management of migration measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelines acceptable to EPA. For source control measures or when the criteria, standards, or guidelines are not available, the comparison should be based on the relative effectiveness of technologies. The no-action alternative will serve as the baseline for the analysis.

d. Institutional Analysis

Each alternative will be evaluated based on relevant institutional needs. Specifically, regulatory requirements, permits, community relations, and participatory agency coordination will be assessed.

e. Cost Analysis

Evaluate the cost of each remedial action alternative (and for each phase or segment of the alternative). The cost will be presented as a present worth cost and will include the total cost of implementing the alternative and the annual operating and maintenance costs. Both monetary costs and associated non-monetary costs will be included. A distribution of costs over time will be provided.

TASK 14 - EVALUATION AND SELECTION OF PREFERRED ALTERNATIVE

The U.S. EPA shall review the results of the detailed analysis of alternatives prepared under Task 13 and select the preferred alternative. The lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment will be considered the preferred alternative.

The following considerations shall be used as the basis for selecting the cost-effective alternative:

a. Reliability. Alternatives that minimize or eliminate the potential for release of hazardous substances into the environment will be considered more reliable than other alternatives. For example, recycling of wastes and off-site incineration would be considered more reliable than land disposal. Institutional concerns such as management requirements can also be considered as reliability factors.

b. Implementability. The requirements for implementing the alternatives will be considered, including phasing alternatives into operable units and segmenting alternatives into project areas on the site. The requirements for permits, zoning restrictions, rights of way and public acceptance are also examples of factors to be considered.

c. Effects of the Alternative. The altenative posing the greatest improvement to (and least negative impact on) public health, welfare, and environment will be favored.

d. Safety Requirements. The alternatives with the lowest adverse safety impacts and associated costs will be favored.

e. Present Worth of Total Cost. The net present value of capital and operation and maintenance cost of the proposed alternative must be presented.

TASK 15 - DRAFT FEASIBILITY STUDY REPORT

The Contractor will prepare and submit to U.S. EPA, a Draft Feasibility Study Report presenting the results of Tasks 9 through 14 and recommending a remedial action alternative. Five (5) copies of the preliminary report will be provided by the Contractor.

TASK 16 - FINAL FEASIBILITY STUDY REPORT

The Contractor will prepare a Final Feasibility Study Report for submission to U.S. EPA, taking into account comments received from the Agency and the State of Ohio. Five (5) copies will be provided by the Contractor.

TASK 17 - ADDITIONAL REQUIREMENTS

Reporting and Community Relations Support requirements, as described in Task 8 of the Remedial Investigation scope of work, will be required for the Feasibility Study as well. The Feasibility Study Reports will address the need and the applicability of long term monitoring at the facility.

APPENDIX C

CRITICAL DUST COLLECTORS

Dust Collector Number	Rank	Notes
G4-2	1	
G5-261	2	
G4-14	3	1
G9N1-1039	4	
G5-249	5	2
G5-250	5	2
G5-251	5	2
G5-253	5	2
G43-27	6	
G4-12	7	
G-1	8	2
G-2	8	2
G5-260	9	
G8-035	10	3
G4-5	11	3
G5-259	12	4
G5-258	13	4

The above ranking is based on uranium discharges from 1980 through 1987, enrichment of material collected by the dust collector and projected utilization in the short term (5 years).

Notes:

1. The process this collector ventilates is scheduled to go off line in 1987. The collector will not be needed again until 1990.

2. These collectors ventilate the same processes and cannot realistically be rated one more critical than the other.

3. These collectors were not previously rated critical but should be considered critical.

4. These collectors are not allowed to be operated, although they are operational. Present projected production demands do not require the use of these collectors. Should the need arise these collectors would have to be rated much higher on the priority list.