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FEED MATERIALS PRODUCTION CENTER ENVIRONMENTAL, SAFETY AND HEALTH MANAGEMENT PLAN SEPTEMBER 1986

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ENVIRONMENTAL, SAFETY AND HEALTH MANAGEMENT PLAN

By
D. J. Loudin

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FEED MATERIALS PRODUCTION CENTER

ENVIRONMENTAL, SAFETY AND HEALTH MANAGEMENT PLAN

By

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FMPC Environmental, Safety and Health Management Plan

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Glossary of 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
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
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
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
KG	Kilogram
LI	Line Item (budget or project)
LLWPS	Low Level Waste Processing and Shipping
LLWPSS	LLWPS System
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
OP	Operating Budget
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
OS	Outside Services, (consultants, computer, etc.)
OSHA	Occupational Safety and Health Act
OSR	Operational Safety Requirements
PCBs	Poly-Chlorinated Biphenyls
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
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.

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FMPC ENVIRONMENTAL, SAFETY

AMD HEALTH MANAGEMENT PLAN REPORT

Executive Summary

Introduction

The Feed Materials Production Center (FMPC) employs a wide variety of chemical and metallurgical processes to produce uranium metal for DOE defense programs at the Washington and South Carolina reactor sites, and DOE facilities elsewhere. In January, 1986, Westinghouse Materials Company of Ohio (WMCO) became site contract operator and is administratively responsible to the DOE Oak Ridge Operations Office.

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 ES&H Management Plan is an important element in achieving that goal.

This Environmental, Safety and Health (ES&H) Management Plan is a vital initial step to bring together all of the ES&H programs as an integrated plan which meets site ES&H concerns, and supports continued operations to fulfill FMPC mission requirements. Many of the management plans in specific areas are still in the formative stage. As detailed specific plans emerge, this overall document will be updated and ultimately become a collection of the individual plans, rather than the current driving/motivating document.

A consolidated report for a facility as large and complex as the FMPC can present a baffling array of seemingly unrelated projects. Figures 1 through 8 represent a condensation of planned improvements through FY-91 in the major areas of Environment, Safety and Health, and Emergency Preparedness. This improvement summary, which clearly illustrates FMPC improvement projects and timing needed to complete them, is intended to aid understanding of details in the body of the report.

ES&H Plan Report

The ES&H Management Plan Report is divided into four major sections:

Section 1.0 Introduction. This explains the FMPC mission and history, describes the site and surrounding area, and details the purpose and organization of the Report.

Section 2.0 Environmental Management. This section describes Air Pollution Control, Water Pollution Control, Solid Waste Management, and the Remedial Action Plan at the FMPC.

Section 3.0 Health and Safety Management. This section describes the Safety Analyses program, Health Physics/Radiation Protection, Nuclear Criticality Prevention, Industrial Hygiene, and Safety/Fire Protection programs.

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Section 4.0 Emergency Preparedness. This section describes the FMPC Emergency Preparedness Plan.

Each section presents concerns for the specified area, the Management Strategy, the Applicable Regulations and Current Compliance situation, and the detailed Plan (improvement projects with the projected costs) proposed for Fiscal Years 1986 through 1991.

The total projected costs by fiscal year are shown in Table 1 (line item projected costs were obtained from April 1986 Conceptual Design Data). Line item spending has been split into those items already identified in the ES&H Improvement Line Item Project and newly identified line item projects.

- The five-year ES&H Management Plan contains 124 improvements projects whose total cost is estimated to be approximately $487.4 million through FY-91.

- The planned expenditures for Environmental Improvements are as follows ($million):

Air Pollution Control	-	62.7
Water Pollution Control	-	129.9
Solid Waste Management	-	56.3
Remedial Action	-	50.8
Total		299.8

- The planned expenditures for Health and Safety Improvements are as follows ($million):

Safety Analyses	-	4.4
Health Physics	-	55.3
Criticality Safety	-	2.2
Industrial Hygiene	-	82.1
Occupational Safety & Fire Protection	-	8.8
Total		152.8

- The planned expenditures for Emergency Preparedness are $34.8 million.

- 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 1986 through 1991.

- 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, an index is forwarded so that the particulars for each project may be easily found.

Revision 2

TABLE 1
ES&H FUNDING SUMMARY FOR FMPC

($ million)

Funding			Fiscal years					
Program	Type	Total	86	87	88	89	90	91
GE	CE	10.71	3.81	3.72	2.67	0.15	0.06	0.30
	GPP	6.70	0.31	2.71	0.90	0.75	1.43	0.60
	ES&H LI	330.39		10.00	54.13	60.87	75.93	129.46
	New LI	55.55	2.37	9.00	10.63	11.20	11.20	11.15
	Total	403.35	6.49	25.43	68.33	72.97	88.62	141.51
GE	OP	29.27	4.34	5.34	4.93	5.32	5.02	4.32
	OS	9.05	1.40	1.83	1.61	1.45	1.40	1.36
	Total	38.32	5.74	7.17	6.54	6.77	6.42	5.68
Program GE -	Total	441.67	12.23	32.60	74.87	79.74	95.04	147.19
AR	CE	0.79	0.18	0.24	0.37			
	GPP	4.77	1.67	2.98	0.12			
	Total	5.56	1.85	3.22	0.49			
AR	OP	40.17	2.82	8.00	6.63	9.84	6.39	6.49
Program AR -	Total	45.73	4.67	11.22	7.12	9.84	6.39	6.49
All Programs-Totals		487.40	16.90	43.82	81.99	89.58	101.43	153.68

LEGEND

CE - Capital Equipment

GPP - General Plant Project

LI - Line Item

OP - Operating Cost

OS - Outside Services

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 ($1000's)	STATUS
1	Replace/Upgrade Dust Collection Systems	CERCLA/CAA	E-Air	2-10	GE	CE	6,580	Started FY 86
						LI	47,479	
2	Onsite Meteorological Tower	CERCLA/CAA	E-Air	2-15	GE	GPP	124	Completed FY 86
						OP	120	
3	In-Vivo Monitoring Equipment & Facility	DOE 5480.1A/OSHA	H&S	3-15	GE	GPP	975	Started FY 86
4	Interim Pit Stabilization	DOE 5820.2/RCRA	E-Waste	2-67	AR	GPP	275	Started FY 86
5	Evacuation Warning Sirens	DOE 5484.1/5500.2/5500.3	H&S	4-6	GE	LI	432	Started FY 86
6	Remedial Investigation/Feasibility Study	CERCLA/NCP	E	2-63	AR	OP	1,430	Started FY 86
7	Improved Stack Samplers/Monitors/Alarms	CERCLA/CAA	E-Air	2-12	GE	CE	1,111	Started FY 86
						OS	1,580	
8	Interim Low-Level Waste Operations	DOE 5820.2/DOT	E-Waste	2-46	AR	OP	9,709	Started FY 86
9	Hand and Foot Monitors	DOE 5480.1A/OSHA	H&S	3-15	GE	CE	90	Started FY 86
10	Waste Inventory Data Base	RCRA	E-Waste	2-47	AR	CE	75	Started FY 86
						OP	450	
11	FMPC Final Safety Analysis Report	DOE 5480.1A	H&S	3-4	GE	OP	4,066	Started FY 86
						OS	308	
12	Locker Room Modifications	DOE 5480.1A/OSHA	H&S	3-14	GE	LI	1,154	Started FY 86
13	Plant-Specific Emergency Operating Proc. - Update	DOE 5484.1/5500.2/5500.3	H&S	4-3	GE	OP	20	Started FY 86
14	Infrared Gas/Vapor Analyzer	DOE 5480.1A/OSHA	H&S	3-35	GE	CE	20	Completed FY 86
15	Training Facility/Visitor Center	DOE 5480.1A/OSHA	H&S	3-17	GE	GPP	1,100	Started Fy 86
						CE	975	
16	Comprehensive Ventilation Survey	DOE 5480.1A/OSHA	H&S	3-36	GE	OP	500	
17	Respirator Washing Facility	DOE 5480.1A/OSHA	H&S	3-34	GE	GPP	100	
18	General Plant Housekeeping Equipment	DOE 5480.1A/OSHA	H&S	3-38	GE	CE	160	
19	Replace Medical Ambulances	DOE 5483.1A/OSHA	H&S	3-45	GE	CE	110	
20	Manhole 175 (River Discharge) Improvements	FWPCA/NPDES	E-Water	2-36	GE	GPP	400	
21	Surface and Groundwater Control Improvements	CERCLA	E-Water	2-66	AR	GPP	1,070	
	0					OP	250	
22	Thorium Removal - Plant 8	DOE 5480.1A	E-Waste	2-68	GE	LI	3,641	
						OP	2,800	
23	Enclose Saws and Lathes	OSHA	H&S	3-14	GE	LI	2,024	
24	Emergency Operating Center	DOE 5484.1/5500.2/5500.3	H&S	4-5	GE	LI	1,700	
25	General Plant Ventilation Upgrade	DOE 5480.1A/OSHA	H&S	3-36	GE	LI	55,000	
26	Hexavalent Chromium Removal	FWPCA/RCRA	E-Water	2-33	GE	GPP	350	
27	K-65 Surface Water Control	DOE 5820.2/FWPCA	E-Water	2-31	GE	GPP	100	
28	Spent Solvent & Oil Disposition	DOE 5820.2/RCRA/TSCA	E-Waste	2-52	AR	OP	1,680	
29	Hydrogen Fluoride Offgas Scrubber	CERCLA/CAA/CWA	E-Air	2-13	GE	CE	150	

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 ($1000's)	STATUS
30	Barium Chloride Passivation/Storage Facility	RCRA	E-Waste	2-51	AR	GPP	350	
						OP	1,343	
31	Plantwide Fire Protection Improvements	DOE 5480.1A/NFPC	H&S	3-43	GE	LI	852	
32	K-65 Residues Disposition	DOE 5820.2/CERCLA	E-Waste	2-67	GE	LI	24,000	
33	PCB Disposition	RCRA	E-Waste	2-52	AR	OP	20	
34	Low-Level Waste Processing & Shipping System	DOE 5820.2/DOT	E-Waste	2-47	GE	LI	17,000	
					AR	OP	12,000	
35	Materials Handling Improvements	DOE 5480.1A/OSHA	H&S	3-13	GE	LI	23,472	
36	Respirator Fit-Testing Facility	DOE 5480.1A/OSHA	H&S	3-34	GE	GPP	150	
37	Solid Waste Incinerator Improvements	CAA	E-Waste	2-53	GE	CE	300	
38	Offsite Groundwater Monitoring System Improvement	FWPCA	E-Water	2-37	GE	OP	120	
39	Fire Alarm System Expansion	DOE 5480.1A/NFPC	H&S	3-44	GE	LI	284	
40	On-Site Emergency Preparedness	DOE 5484.1/5500.2/5500.3	H&S	4-3	GE	OP	60	
41	New Test Wells	FWPCA	E-Water	2-36	GE	GPP	560	
42	Training and Employee Incentive Programs	DOE 5480.1A/5483.1A	H&S	3-45	GE	OP	1,320	
43	Hazardous Chemical Labeling/Tracking System	DOE 5480.1A/OSHA/TSCA	H&S	3-38	GE	CE	50	
44	Leakproof Dikes-Recoat, Maintenance & Expansion	FWPCA	E-Water	2-34	GE	LI	580	
45	Decontamination Building Expansion	OSHA	E-Waste	2-51	GE	LI	4,722	
46	Work Area Continuous Air Monitoring Stations	DOE 5480.1A/OSHA	H&S	3-14	GE	CE	65	
47	Control Storage Pads	FWPCA	E-Water	2-34	GE	LI	2,621	
48	Waste Pit Disposition	CERCLA	E-Waste	2-67	AR	OP	2,500	
49	Uranium Reduction in Offsite Wells	CERCLA/FWPCA/NPDES	E-Water	2-66	GE	LI	7,376	
50	Surface Decontamination & Volume Reduction Equip.	RCRA	E-Waste	2-49	AR	CE	210	
						GPP	750	
51	Receiving and Incoming Material Inspection Area	DOE 5480.1A/OSHA	H&S	3-13	GE	LI	4,091	
52	Plant Evacuation Alarm System	DOE 5480.1A/5483.1A/NFPC	H&S	3-44	GE	LI	512	
53	Asbestos Pipe Insulation Removal	DOE 5480.1A/OSHA	H&S	3-35	GE	GPP	1,500	
54	Trash Monitoring/Segregation Facility	DOE 5820.2	E-Waste	2-50	AR	GPP	740	
						OP	1,000	
						CE	157	
55	Wash Basins in Break Rooms	DOE 5480.1A/OSHA	H&S	3-15	GE	GPP	30	
56	Uranium Removal From Stormwater	FWPCA	E-Water	2-29	GE	LI	1,629	
57	Waste Compactor Facility	DOE 5820.2	E-Waste	2-49	AR	GPP	1,199	
58	Still Bottoms Disposition	DOE 5820.2/RCRA/TSCA	E-Waste	2-52	AR	OP	40	
59	Criticality Detection and Alarm System Upgrade	DOE 5480.1A CHAPTER V	H&S	3-23	GE	CE	300	
60	Smoke Detection System Replacements	NFPC/OSHA	H&S	3-43	GE	LI	72	
61	In-House Hand Dosimetry Capability	DOE 5480.1A/OSHA	H&S	3-15	GE	CE	50	

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 ($1000's)	STATUS
62	Noise Monitoring Instrumentation	DOE 5480.1A/OSHA	H&S	3-37	GE	CE	15	
63	Plant 1 Control Pad and Shelter	FWPCA	E-Water	2-34	GE	LI	27,567	
64	Repair Boiler Plant Insulation	DOE 5480.1A/OSHA	H&S	3-36	GE	OP	90	
65	Operating Costs-Health Physics & Safety Analysis	DOE 5480.1A	H&S	3-16	GE	OP	18,000	
66	Automatic Telephone Dialing System	DOE 5484.1/5500.2/5500.3	H&S	4-7	GE	LI	81	
67	NOx Destructor - Plant 9 Pickling	CERCLA/CAA/CWA	E-Air	2-12	GE	LI	2,690	
68	Emergency Message System Upgrade	DOE 5484.1/5500.2/5500.3	H&S	4-5	GE	CE	130	
69	Storage Building for Analytical Chemicals	DOE 5480.1A/OSHA	H&S	3-36	GE	GPP	80	
70	Convert Dry Cleaning System to New Solvent	DOE 5480.1A/OSHA	H&S	3-34	GE	CE	5	
71	Water Quality Improvement, Recycle and Reuse	FWPCA	E-Water	2-31	GE	LI	76,185	
72	Drum Handling Equipment	OSHA	E-Waste	2-49	AR	CE	100	
73	Health and Safety Building Expansion	DOE 5480.1A/OSHA	H&S	3-35	GE	LI	11,588	
74	Change General Shop Solvent	DOE 5480.1A/OSHA	H&S	3-34	GE	CE	5	
75	Ferrous Metal Scrap Disposition	DOE 5820.2	E-Waste	2-50	AR	OP	3,345	
76	Spectrophotometric Air Monitor for UF6	DOE 5480.1A/OSHA/NESHAP	H&S	3-37	GE	CE	50	
77	Shipping Container Studies	DOE 5480.3	H&S	3-24	GE	OS	250	
						OP	90	
78	Storage Building for Finished U Metal	DOE 5480.4	H&S	3-13	GE	LI	1,401	
79	Convert to Water Based Paints for Drums	DOE 5480.1A/OSHA	H&S	3-32	GE	CE	10	
80	Pilot Plant Sump System Improvements	FWPCA	E-Water	2-29	GE	LI	2,219	
81	Nuclear Criticality Training	DOE 5480.1A CHAPTER V	H&S	3-23	GE	OP	400	
						OS	340	
82	Establish In-House Nuclear Accident Dosimetry	DOE 5480.1A CHAPTER II & V	H&S	3-23	GE	CE	17	Started FY 86
83	North Site Access	DOE 5480.1A/OSHA	H&S	3-13	GE	LI	2,837	
84	Upgrading of Operating Procedures-Air Pol. Control	CERCLA/CAA	E-Air	2-14	GE	OP	60	
85	Existing Landfill Expansion	SWDA	E-Waste	2-53	GE	OP	60	
86	Emergency Response Vehicle	DOE 5480.1A	E-Waste	2-50	AR	CE	250	
87	Respirator Face-Piece Test Fixture	DOE 5480.1A/OSHA	H&S	3-34	GE	CE	20	
88	Administration Building Renovation & Expansion	DOE 5484.1/5500.2/5500.3	H&S	4-8	GE	LI	10,126	
89	Excavation of Uranium Bearing Sediments	DOE 5820.2/CERCLA	E-Waste	2-65	AR	OP	500	
90	Plantwide Lighting Upgrade	DOE 5483.1A/OSHA	H&S	3-40	GE	LI	5,104	
91	2.1% Enriched Metal Transport Safety Studies	DOE 5480.3	H&S	3-24	GE	OS	300	
						OP	90	
92	Pilot Plant Green Salt Pad Enclosure	FWPCA/RCRA	E-Water	2-35	GE	LI	218	
93	Storage, Maint. & Office Building - Boiler Plant	DOE 5483.1A/OSHA/NFPC	H&S	3-40	GE	LI	492	
94	Radiological Assistance Vehicle	DOE 5484.1/5500.2/5500.3	H&S	4-7	GE	CE	75	
95	Modernization of Buildings	DOE 5480.1A/OSHA/NFPC	H&S	3-31	GE	LI	12,750	

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 ($1000's)	STATUS
96	Analytical Facility Upgrade	DOE 5484.1A/5500.2/5500.3	H&S	4-8	GE	LI	15,940	
97	Internal Audit Program-Emergency Preparedness	DOE 5484.1A/5500.2/5500.3	H&S	4-7	GE	OP	50	
98	In-Process Storage Improvements	FWPCA	E-Water	2-30	GE	LI	7,639	
99	Additional Air Monitoring Stations	CERCLA/CAA	E-Air	2-13	GE	LI	118	
						OS	120	
100	Research & Development-Water Pollution Control	FWPCA	E-Water	2-35	GE	LI	1,800	
						OP	240	
						OS	5,590	
101	Nuclear Criticality Calculations	DOE 5480.1A CHAPTER V	H&S	3-21	GE	OS	445	
102	Contaminated Copper Scrap Disposition		E-Waste	2-50	AR	OP		On Hold by DOE
103	Emergency Shelter Upgrade	DOE 5481.1/5500.2/5500.3	H&S	4-6	GE	LI	6,000	
104	Toxic Atmospheric Dispersion Modeling System	CERCLA/CAA/NESHAP	E-Air	2-14	GE	LI	887	
						OP	120	
105	Spent Lime Sludge Drying Beds	FWPCA	E-Waste	2-52	GE	OP	50	
106	Offsite Training - Emergency Preparedness	DOE 5484.1/5500.2/5500.3	H&S	4-5	GE	OS	50	
107	Laundry Detention Sump	FWPCA	E-Water	2-29	GE	GPP	100	
108	Concrete Rubble Decontamination Facility	DOE 5820.2	E-Waste	2-51	AR	GPP	390	
109	Buried Rubble Disposition	DOE 5820.2/CERCLA	E-Waste	2-67	AR	OP	500	
110	Electrostatic Precipitator - Boiler No. 4	CERCLA/CAA/RCRA	E-Air	2-12	GE	GPP	1,000	
111	Abandoned Equipment Removal	DOE 5820.2	E-Waste	2-69	AR	OP	4,800	
112	Plant 1 Storage Towers Removal	DOE 5820.2	E-Waste	2-69	GE	OP	350	
113	Remedial Action Database	CERCLA	E	2-65	AR	OP	600	
114	Laminar Flow Ele. - Wind Tunnel for Air Flow Cal.	DOE 5480.1A	H&S	3-37	GE	CE	25	
115	Flyash Stabilization or Disposition	DOE 5820.2	E	2-68	GE	GPP	750	
116	Mobile Offsite Command Post	DOE 5484.1/5500.2/5500.3	H&S	4-6	GE	GPP	125	
117	Warehouse - Plant 8	FWPCA	E-Water	2-35	GE	LI	1,105	
118	Motor Vehicles and Bulk Transporters	DOT REGS./NRC REGS.	H&S	2-49	GE	CE	345	
119	Computer and Copier for Safety Analysis	DOE 5481.1A/OR5481.1B	H&S	3-4	GE	CE	50	
120	Development Support Pro. - Air Pollution Control	CERCLA/CAA	E-Air	2-13	GE	OP	720	
121	Audit Program-Health Physics & Safety Analysis	DOE 5480.1A	H&S	3-25	GE	OS	8	
122	UF6 Storage Facility - Building 54	FWPCA/RCRA	E-Water	2-35	GE	LI	556	
123	Sewage Treatment Improvements	FWPCA	E-Water	2-34	GE	GPP	300	
124	Car/Truck Wash Sump-Pollutant Removal Equipment	FWPCA	E-Water	2-29	GE	GPP	50	

Figure 1 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Air Pollution Control

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
Radionuclide Emission Control	*Replace/Upgrade Dust Collection Systems	▬	▬	▬	▬	▬	
	Improved Stack Samplers/Monitors/Alarms	▬	▬	▬	▬	▬	▬
NO_x/Criteria Pollutants Emissions	NO_x Destructor - Plant 9 Derby Cleaning - Cancelled 8/86						
	*NO_x Scrubber - Plant 9 Pickling		▬				
	NO_x Destructor - Plant 6 Pickling (Note 1)						
	Nitric Acid Recovery Tower Improvements (Note 2)						
	Electrostatic Precipitator - Boiler No. 4					▬	
Other Air Pollution Control Improvements	Hydrogen Fluoride Offgas Scrubber - Plant 4		▬				
	*Additional Air Monitoring Stations	▬	▬	▬	▬	▬	▬
	Development Support Program	▬	▬	▬	▬	▬	▬
	Upgrading Air Pollution Control Op. Procedures		▬				
	*Toxic Atmospheric Dispersion Modeling System	▬	▬	▬			
	On-site Meterological Tower - (Completion)	▬					

Note: Items with * indicate ES&H Line Item Project

1. Funded by Productivity Retention Program Package II.
2. Funded by Productivity Retention Program Package III.

Figure 2 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Water Pollution Control

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
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 Improvements						■
Counter-measure Facilities	*Warehouse - Plant 8		■	■			
	*UF_6 Storage - Building 54			■			
	*Leakproof Dikes Recoating, Maintenance, and Expansion			■	■		
	*Control Storage Pads		■	■			
	*Plant 1 Control Pad and Shelter				■	■	■
	*Pilot Plant Green Salt Storage Pad Enclosure		■				
	Research and Development	■	■	■	■	■	■
Monitoring of Effluents	Manhole-175 (River Discharge) Improvements				■		
	New Test Wells		■				
	Offsite Groundwater Monitoring Sys. Expansion	■	■	■	■	■	■

Note: Items with * indicate ES&H Line Item Project

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Figure 3 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Solid Waste Management

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
Low-Level Radioactive Waste Management	Interim Low-Level Waste Operations	■	■	■	■		
	Low-Level Waste Processing and Shipping System	■	■	■	■	■	■
	Waste Management Data Base (Ongoing Waste Streams)	■	■	■	■	■	■
	Motor Vehicles and Bulk Transporters	■			■		■
	Drum Handling Equipment		■				
	Surface Decontamination and Volume Reduction Equipment	■	■				
	Waste Compactor Facility	■					
	Trash Monitoring/Segregation Facility		■	■	■	■	■
	Emergency Response Vehicle			■			
	Ferrous Metal Scrap Disposition		■	■			
	*Decontamination Building Expansion		■	■	■		
	Concrete Rubble Decontamination Facility		■	■	■		
	Contaminated Copper Scrap Disposition (Presently on Hold by DOE)						
Hazardous/Mixed Waste Disposition	Barium Chloride Passivation/Storage Facility		■	■	■	■	■
	Spent Solvent & Oil Disposition		■	■	■		
	Still-Bottoms Disposition		■				
	PCB Disposition		■				
Conventional Industrial Waste	Spent Lime Sludge Drying Beds		■	■	■	■	■
	Solid Waste Incinerator Improvements		■	■			
	Existing Land Fill Expansion		■				

Note: Items with * indicate ES&H Line Item Project

Figure 4 FMPC ENVIRONMENTAL MANAGEMENT PLAN

Remedial Action Projects

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
Accumulated Waste Disposition	Waste Pit Disposition		■	■	■	■	■
	Remedial Investigation/Feasibility Study	■	■				
	Excavation of Uranium Bearing Sediments			■			
	Remedial Action Database	■	■	■	■	■	■
	*Uranium Reduction in Off-Site Wells					■	■
	Surface and Ground Water Control Improvements	■	■	■			
	Interim Pit Stabilization			■	■		
	K-65 Residues Disposition				■	■	■
	Buried Rubble Disposition				■		
	Fly Ash Stabilization/Disposition		■				
	*Thorium Removal - Plant 8		■	■	■	■	
Surplus Facilities Management	Abandoned Equipment Removal		■	■	■	■	■
	Plant 1 Storage Towers Removal				■		

Note: Items with * indicate ES&H Line Item Project

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Figure 5 FMPC HEALTH AND SAFETY MANAGEMENT PLAN

Health Physics and Safety Analysis

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
Health Physics Radiation Protection	Operating Costs	■	■	■	■	■	■
	*Storage Building for Finished U Metal		■	■			
	*Material Handling Improvements				■	■	■
	*Receiving and Incoming Materials Inspection Area		■	■			
	*North Site Access		■	■			
	*Locker Room Modifications		■				
	*Enclose Saws and Lathes			■	■		
	Work Area Continuous Air Monitoring Station Equipment	■					
	Wash Basins in Break Rooms	■					
	In-Vivo Monitoring Equipment and Facility	■	■	■			
	Hand and Foot Monitors	■					
	In-house Hand Dosimetry Capability			■			
	Training Facility/Visitor Center	■	■				
Safety Analysis	Purchase Computer and Copier Equipment for Safety Analysis	■		■			
	Complete FMPC Final Safety Analysis Report	■	■	■	■	■	■
Nuclear Criticality Safety	2.1% Enriched Metal Transport Safety Studies	■	■	■			
	Nuclear Criticality Calculations	■	■	■	■	■	■
	Nuclear Criticality Training	■	■	■	■	■	■
	Establish In-House Nuclear Accident Dosimetry	■	■				
	Criticality Detection and Alarm System Upgrade			■	■		
	Shipping Container Studies		■	■			
Administrative	Audit Program	■	■	■	■	■	■

Note: Items with * indicates ES&H Line Item Project

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Figure 6 FMPC HEALTH AND SAFETY MANAGEMENT PLAN

Industrial Hygiene

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
Industrial Hygiene	Modernization of Buildings			■	■	■	■
	Convert to Water-Based Paints for Drum Painting		■				
	Convert Dry Cleaning System to a New Solvent		■				
	Change General Shop Solvent		■				
	Respirator Fit-Testing Facility		■	■			
	Respirator Washing Facility		■	■			
	Respirator Face-Piece Test Fixture		■				
	*Health and Safety Building Expansion		■	■	■		
	Infrared Gas/Vapor Analyzer	■					
	Asbestos Pipe Insulation Removal		■	■	■	■	■
	Repair Boiler Plant Insulation				■	■	■
	Storage Building for Analytical Chemicals	■					
	*General Plant Ventilation Upgrade		■	■	■	■	■
	Laminar Flow Elements - Wind Tunnel for Air Flow Calibration		■				
	Spectrophotometric Air Monitor for UF_6		■				
	Noise Monitoring Instrumentation		■				
	General Plant Housekeeping Equipment		■				
	Hazardous Chemical Labeling/Tracking System		■				
	Comprehensive Ventilation Survey	■	■				

Note: Items with * indicate ES&H Line Item Project

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Figure 7 FMPC HEALTH AND SAFETY MANAGEMENT PLAN

Occupational Safety and Fire Protection

	Planned Improvements	Fiscal Years					
		86	87	88	89	90	91
Occupational Safety	*Plant Wide Lighting Upgrade			▬	▬		
	*Storage, Maintenance and Office Building - Boiler Plant		▬	▬			
Fire Protection	*Smoke Detection Systems Upgrade		▬				
	*Fire Alarm System Expansion		▬	▬			
	*Plant Evacuation Alarm System		▬	▬			
	Replace Medical Ambulances		▬			▬	
	*Plantwide Fire Protection Improvements				▬	▬	
	Training and Employee Incentive Program	▬	▬	▬	▬	▬	▬

Note: Items with * indicate ES&H Line Item Project

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Figure 8 FMPC EMERGENCY PREPAREDNESS PROGRAM

	Planned Improvements	Fiscal Years 86	87	88	89	90	91
Training	On-Site Emergency Preparedness	■	■	■	■	■	■
	Plant Specific Emergency Operating Procedures Update		■				
	Off-Site Training		■				
	Emergency Message System Upgrade	■					
	*Emergency Operating Center		■	■	■		
	*Emergency Shelter Upgrade			■	■	■	■
	Mobile Off-Site Command Post					■	
	*Evacuation Warning Sirens		■				
	*Automatic Telephone Dialing System			■			
	Radiological Assistance Vehicle				■		
	*Administration Building Renovation and Expansion			■			
	*Analytical Facility Upgrade					■	
Administration	Internal Audit Program		■	■	■	■	■

Note: Items with * indicate ES&H Line Item Project

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

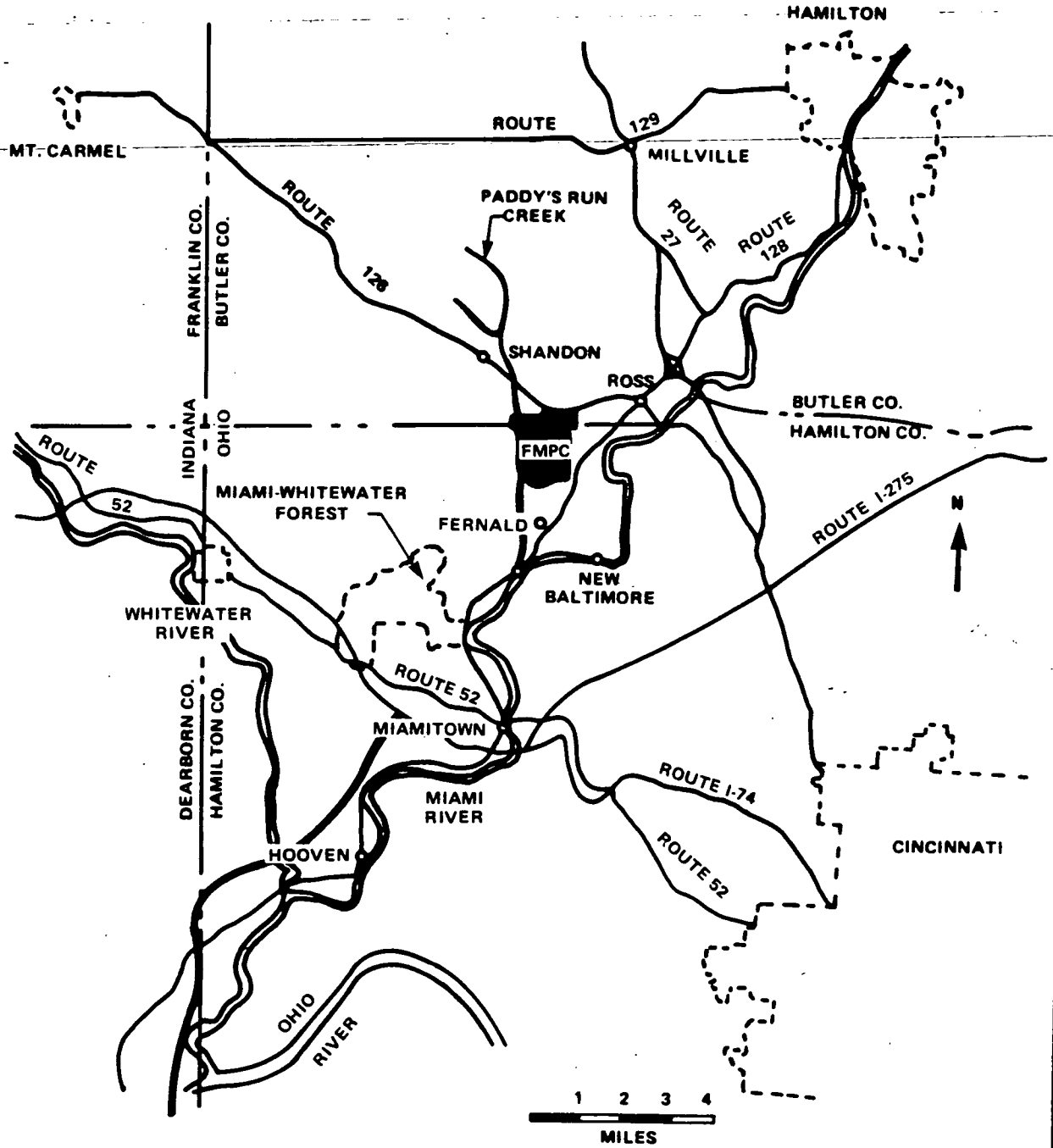


Figure 1-1 Location of Feed Materials Production Center

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

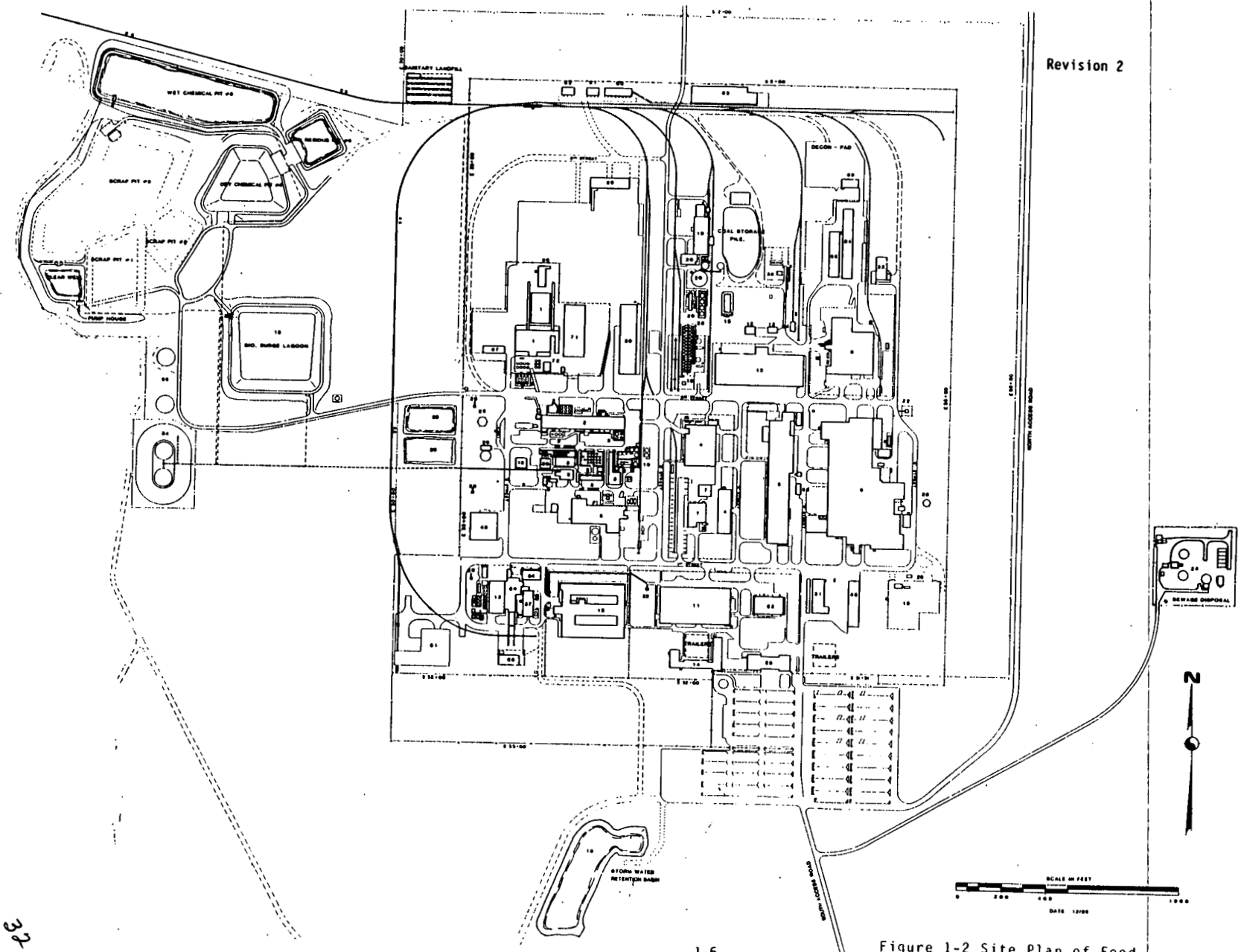
Note[1] Population figures from US Census Bureau, 9/30/82.

increase from 1352 (as of February, 1986) to approximately 1750 by early 1987. In addition, up to 1000 construction and subcontractor personnel are expected on site by 1987 to support various improvement projects. Table 1-2 lists the number of WMCO employes as of July, 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 can be discharged directly into Paddy's Run, a tributary of the Great Miami River, via an outfall ditch.

Wind directions and speeds are observed at the Dayton airport as indicated in Figure 1-5. Prevailing winds are out of the southwest approximately 34 percent of the time, mostly during the warm-weather months. During the winter months the prevailing winds are northerly. Weather data is presently being observed and collected by the new FMPC meteorological tower, giving a more precise picture of actual site meteorology.



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
36	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 I 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[illegible])

Figure 1-2 Site Plan of Feed Materials Production Center

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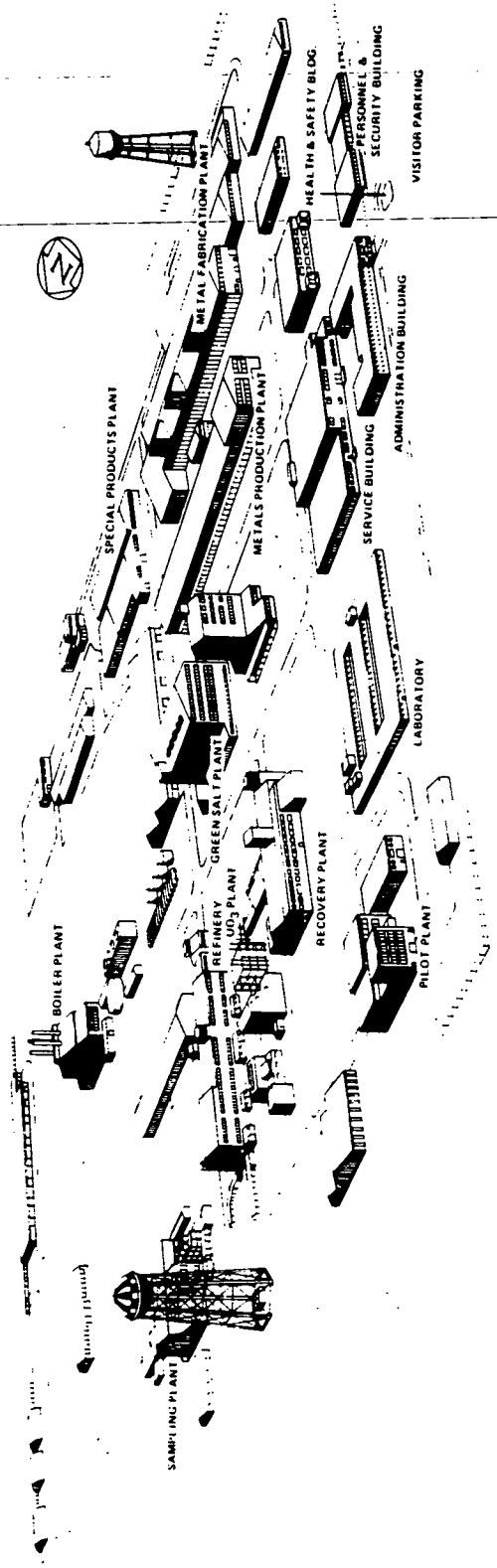


Figure 1-3. Layout of Production Facilities and Support Buildings

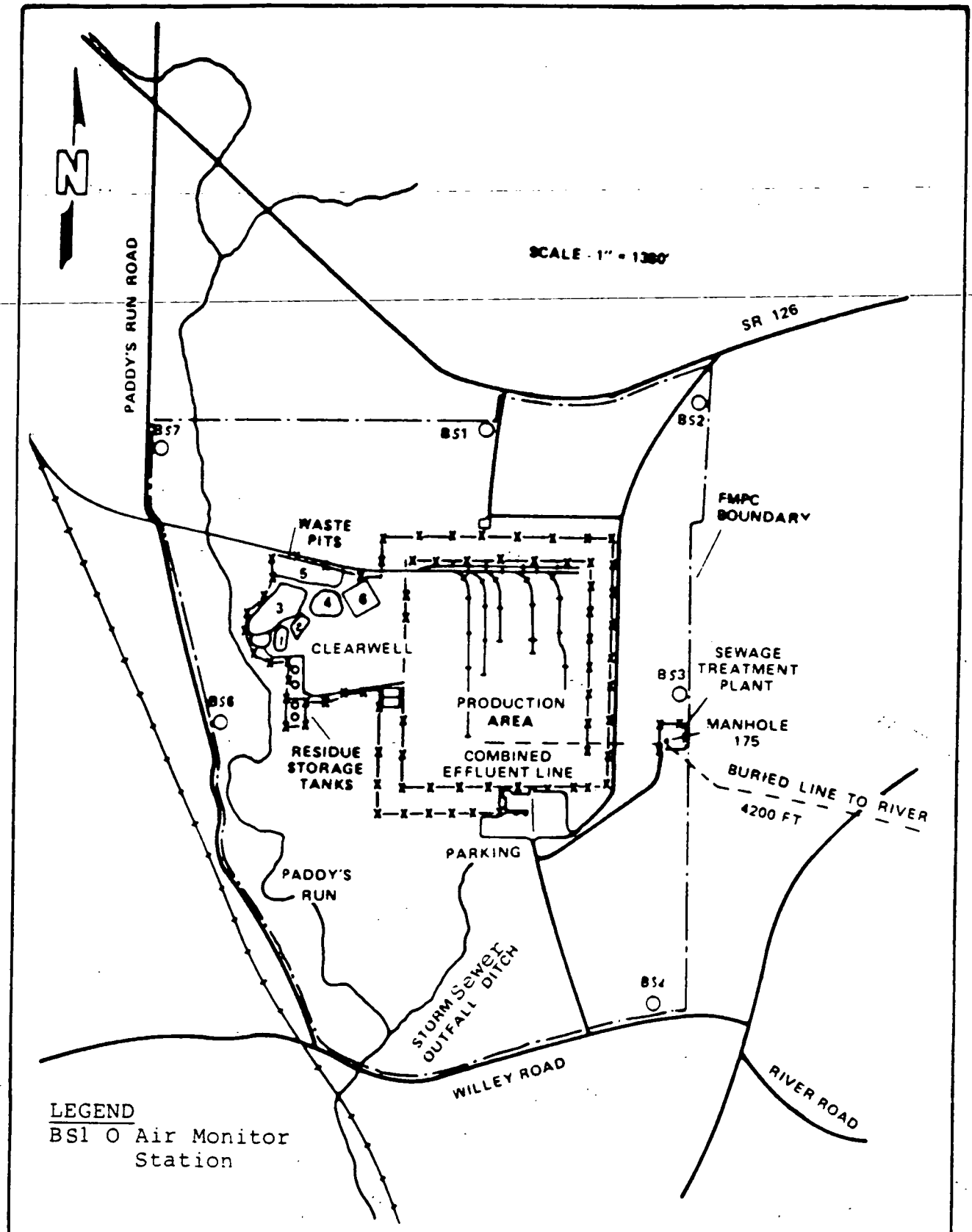


Figure 1-4 FMPC Environmental Features

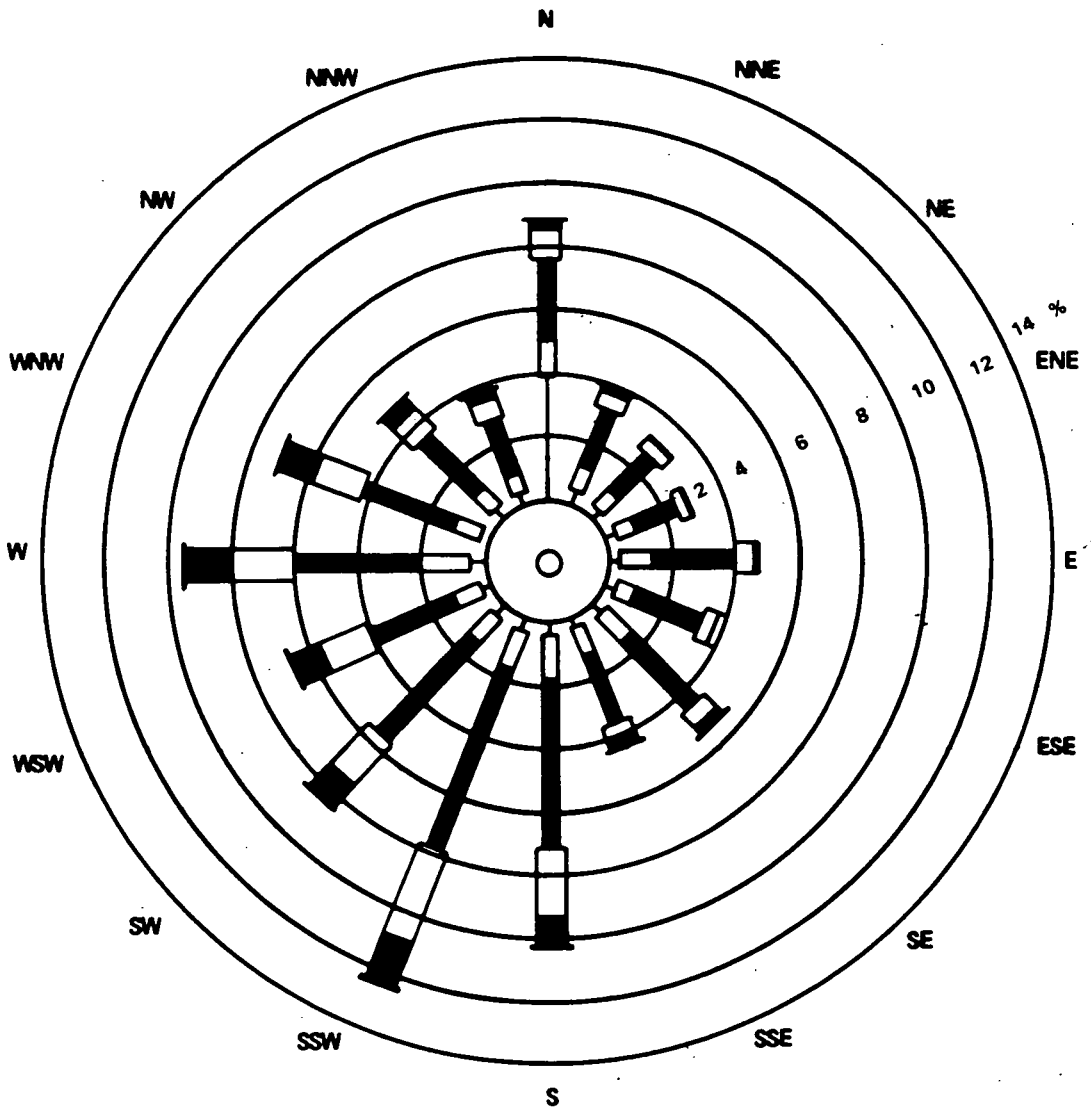


Figure 1-5 Wind Direction and Speed Occurrences Wind Rose for Dayton (1973-1977)

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:

(1) Characterizing the FMPC in terms of what potential threats to the environment, safety and health exist at the site.

(2) Formulating strategies and programs to maintain the highest standards of operation relative to the environment, safety and health, both on and off site.

(3) Reviewing applicable regulations and standards, and assuring present and future compliance.

(4) Presenting the estimated operating costs and capital expenditures (through FY-91) necessary for ES&H improvement projects at the FMPC.

Although the costs listed in the various areas have been made consistent with existing budgeting documents, the ES&H Management Plan is not intended to be a budgeting and planning document per se. Rather, it represents, in its present form, a compendium of improvement projects in the ES&H area with estimates of the associated costs for each. However, the sum of those estimated costs will not equal the total ES&H budget for a given period of time for two reasons:

(1) Since only improvements are covered, there are significant amounts of manpower and costs associated with routine operations not included. For example, the medical staff in the ES&H Department isn't mentioned at all.

(2) Many of the improvements involve efforts that cross organizational lines, so that, although the total man-hours of effort may be estimated fairly well, it is difficult, to predict exactly how much of the effort will ultimately come from each involved organization.

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:

(1) Characterization of specific concerns in the area;

(2) Strategy for managing the area;

(3) Applicable regulations and status of compliance, and

(4) Plan details (including estimated operating costs and capital expenditures).

Thus, each section of this report is arranged in the same way to aid the reader in understanding each part of this large and complex subject.

AIR POLLUTION
CONTROL

2.0 Environmental Management Plan

2.1 Introduction

Environmental protection at and around the FMPC requires an integrated approach that crosses organizational lines. Every site 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.

Environmental Review Program

All construction projects are reviewed by the FMPC Environment, Safety & Health and Waste Management Departments together with the DOE. 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 enables 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 the timely preparation of permit 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 review of the project with the provisions of the National Environmental Policy Act (NEPA). NEPA requires all major federal actions to be performed in an environmentally sound and acceptable manner. NEPA mandates an evaluation of all potential impacts on the environment and an identification of alternatives to eliminate or mitigate them." The FMPC role in national defense demands thorough and early participation by environmental management to enable DOE to review construction projects and operations to fulfill their missions on schedule and in compliance with NEPA.

Environmental Management Program Control

An integrated FMPC Environmental Project Schedule will be developed in FY-86. Our 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 each program's objectives.

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-86.

Environmental Database Management

An environmental management program plan will be developed in FY-86 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 all changes in the project description or funding are reflected in the database.

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 milestones, 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 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 ensure continued regulatory compliance. The program's objective is to effectively reduce air pollutant discharges from plant emission points in order to reduce worker and public exposure and minimize associated environmental impacts 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. Critical dust collector samplers (those collector samplers deemed to handle approximately 90 percent of the emissions) are inspected twice weekly. Upon removal, all filter papers are analyzed to determine both particulate and radionuclide emission levels.

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

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

using a sampler rotometer, and the calibration of sampler rotometer is checked weekly. Plant personnel check rotometer settings hourly to ensure that the 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. Seven boundary 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 control program that ensures

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. Upgrades 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.

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 dose equivalent rate no greater than 25 mrem/yr whole body and 75 mrem/yr 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/yr effective dose equivalent and a noncontinuous exposure of more than 500 mrem/yr 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.

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:

(1) Airborne Radionuclide Emission Control Improvements

(2) Reduction of NO_x and Other Criteria Pollutants

(3) Other Air Pollution Improvements

The planned improvement projects in these three areas, and estimated costs of each, are discussed below. These estimates may not accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned Air Pollution Control improvements through FY-91 is $62.735 million. The breakdown of this total by type of Funding and Fiscal Year is shown in Table 2-2.

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-86 through 91, with a total expected cost of $56.75 million. Specific projects are briefly discussed as follows:

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 funding of $6.58 million for FY-86 through FY-88. Dust equipment to be replaced under the ES&H Improvement Line-Item project requires funding of $47.479 million between FY-87 and FY-90.

TABLE 2-2

FUNDING SUMMARY FOR AIR POLLUTION CONTROL

($1,000'S)

FUNDING		FISCAL YEARS					
Type	Total	1986	1987	1988	1989	1990	1991
GE-CE	7,841	3,461	2,200	2,180			
GE-GPP	1,000					1,000	
ES&H LI	51,174		4,476	15,619	22,000	9,079	
GE-OP	1,020	180	280	140	140	140	140
OS	1,700	190	324	304	294	294	294
Totals:	62,735	3.831	7,280	18,243	22,434	10,513	434

KEY

GE-CE - Capital Equipment From GE Budget

GE-GPP - General Plant Projects From GE Budget

ES&H LI - Items Included in the ES&H Line Item Project

New LI - New Line Item

GE-OP - Operating Funds from GE Budget

OS - Outside Services, Consultants, etc.

Improved 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. Capital Equipment funding of $1.111 million is required in FY-86 to complete this project. Stack compliance testing and in-stack sampling will require $1.58 million of outside services during the period through FY-91.

2.2.4.2 Reduction of No_x and Other Criteria Pollutants

Extensive facilities improvements for criteria pollution control are planned at the FMPC. Improvements are anticipated to cost $3.69 million for two criteria pollutant emission control projects during the five-year improvement period. Specific projects are briefly described in the following subsections.

NO_x Destructors - Plant 6 Pickling

Scrap and core pickling operations in Plant 6 discharge visible NO_x emissions to the atmosphere. New NO_x destructors will be installed on existing pickling equipment to reduce emissions to a clear-stack condition.

NO_x Scrubber - Plant 9 Pickling

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.

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. In order 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.

Nitric Acid Recovery Tower Improvements

The existing Nitric Acid Recovery Tower removes NO_x and nitric acid fumes from the offgases of Plants 2/3. Revisions to the Nitric Acid Recovery Tower are necessary to improve equipment performance in order to further reduce NO_x emissions.

2.2.4.3 Other Air Pollution Control Improvements

Six other projects planned to improve air pollution control will total $2.295 million, including projects funded by operating funds (OP). These six projects are discussed briefly as follows:

Hydrogen Fluoride Offgas Scrubber Improvements

Due to the deteriorating condition of the HF Recovery system in Plant 4, scrubber system improvements are necessary to the continued operation of the facility.

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 seven air monitoring stations at various locations around the perimeter of FMPC. Additional Monitor Stations are needed to more adequately assess the airborne environmental impact of FMPC operations. In addition to $118,000 in ES&H Line-Item Funding, outside services (independent agency monitoring) for the off-site air samplers will require $120,000 over the planning period.

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.

Establishment of On-site Meteorological Capabilities

Utilizing FY-85 GPP funding of $124,000, a project has been initiated to provide on-site meteorological capabilities. Site specific meteorological data is necessary for emergency preparedness, dispersion modeling and environmental impacts analysis. A meteorological database will be established to help statistically define trends on weather to support ongoing site programs and in satisfying air-pollution control compliance modeling requirements.

WATER POLLUTION
CONTROL

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 the 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 and then 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 chromium, uranium, nickel, iron, 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, various oxygen demand compounds, and uranium.

Surface water runoff generated from precipitation falling on the production area is currently being collected and subsequently discharged to either the Great Miami River or Paddy's Run (via the storm sewer outfall ditch), depending on the amount of stormwater collected. A portion of stormwater runoff originating in the waste pit area flows directly to Paddy's Run. Pollutants of primary concern are suspended solids, oil and grease, and uranium.

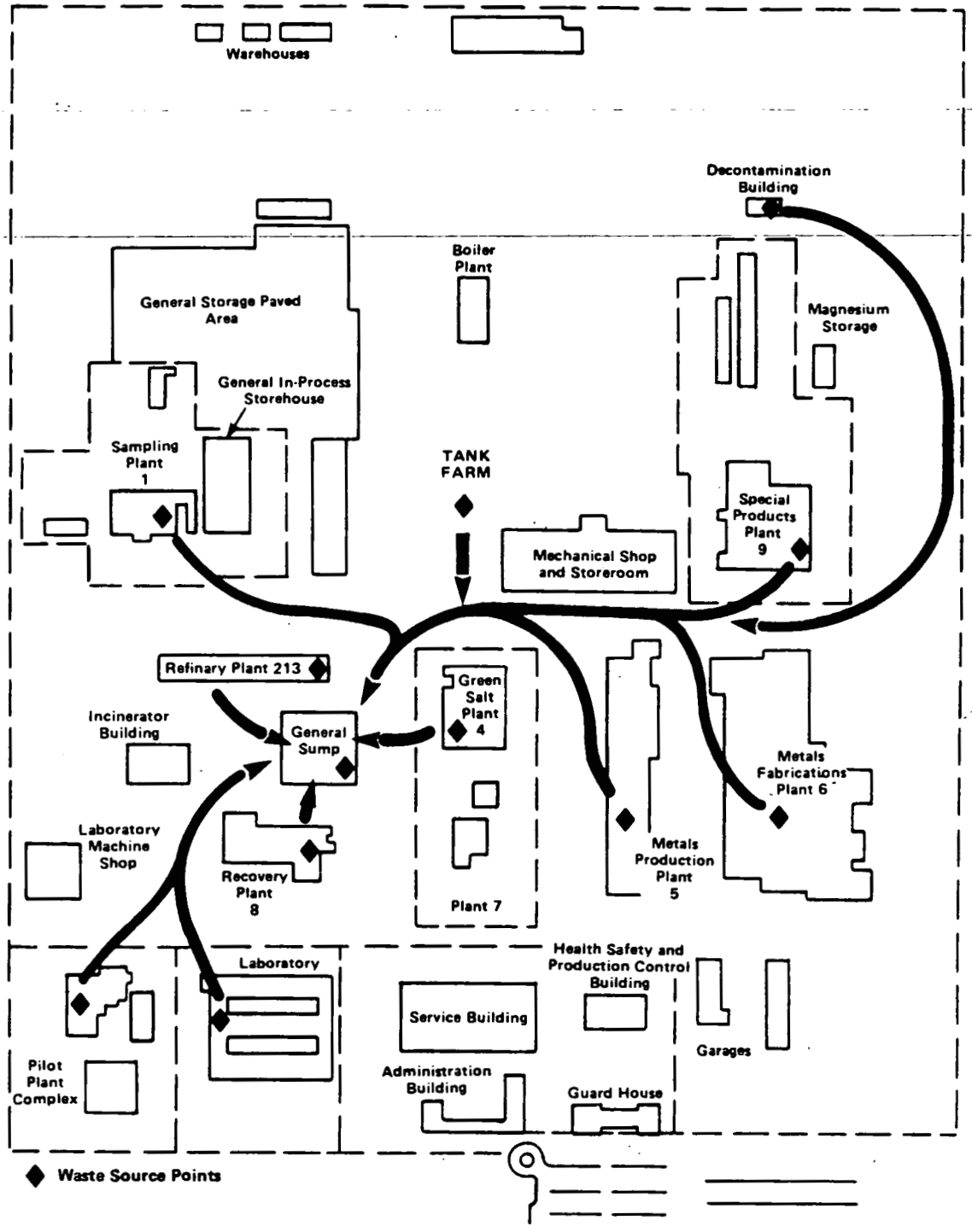


Figure 2-1 Sources of Production Wastes Collected & Treated in the General Sump

2.3.2 Water Pollution Control Strategy

2.3.2.1 Current System

Liquid wastes are generated to some degree in 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 that require sump equipment have plant sumps for the collection and initial treatment of process wastewater. Greater than 99 percent of the contained uranium is removed by precipitation and sedimentation in 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. Filtrate is returned to the General Sump and finally discharged with other clarified effluents to the Great Miami River via Manhole-175. Other 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 on results of a Storm Sewer Evaluation Survey, modifications and rehabilitation to 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, the stormwater control and recovery measures required for accidental spills can be achieved through existing diversion capabilities. Stormwater may be routed to the General Sump for storage and treatment for removal of uranium until the source of contamination has been determined and appropriate corrective actions taken.

Monitoring the FMPC liquid waste streams consists of daily grab and composite sampling along with flow metering at various locations such as the General Sump, Storm Sewer Lift Station, Storm Sewer Outfall, 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, 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 per month are performed on water samples taken solely for NPDES reporting purposes.

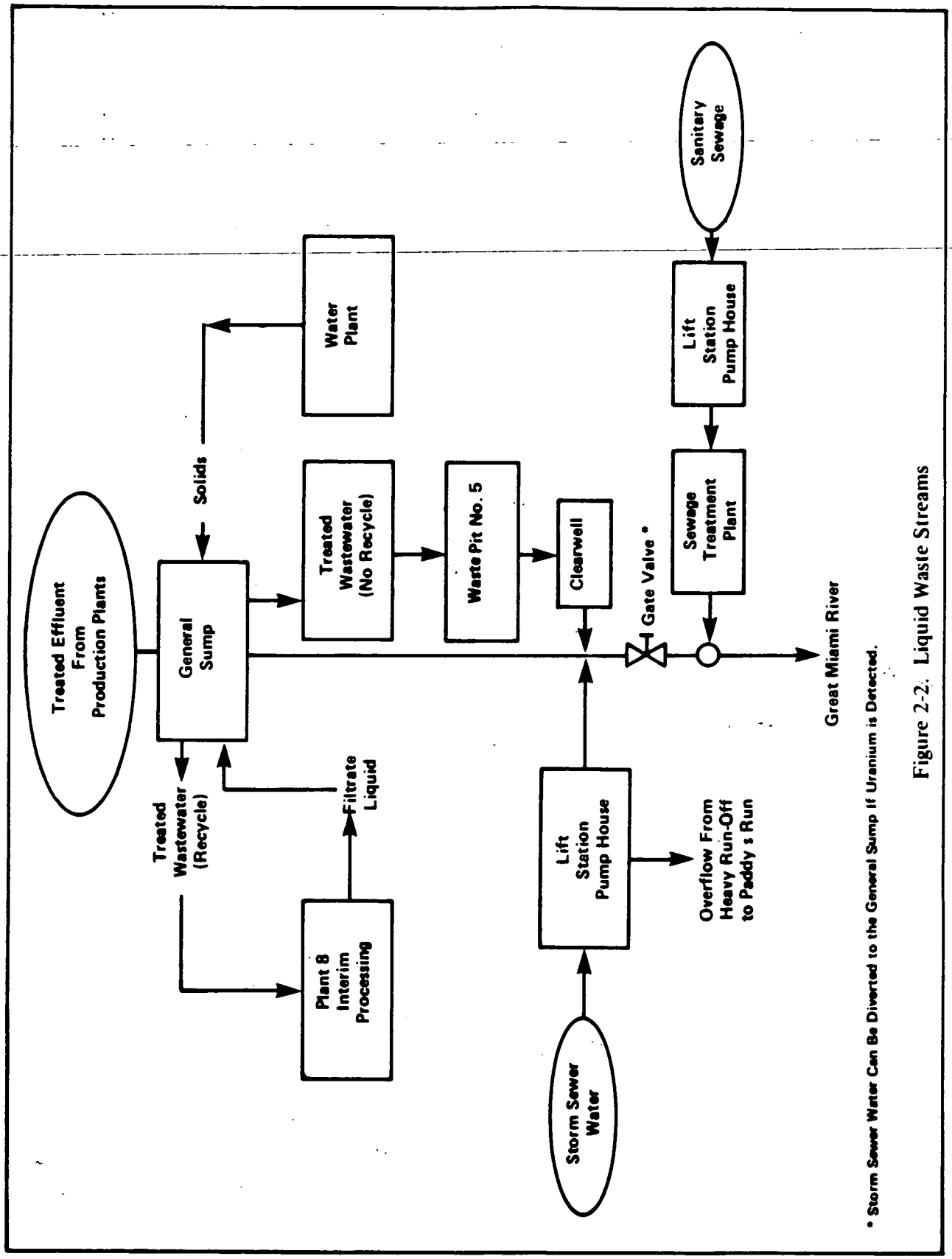


Figure 2-2. Liquid Waste Streams

Groundwater is currently collected monthly from approximately twenty-five off-site wells and analyzed for uranium content.

Monthly samples are also collected from on-site wells and analyzed for uranium and various water quality parameters. All on-site and several off-site wells are presently being sampled as per RCRA protocol and analyzed quarterly for over a hundred 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 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.

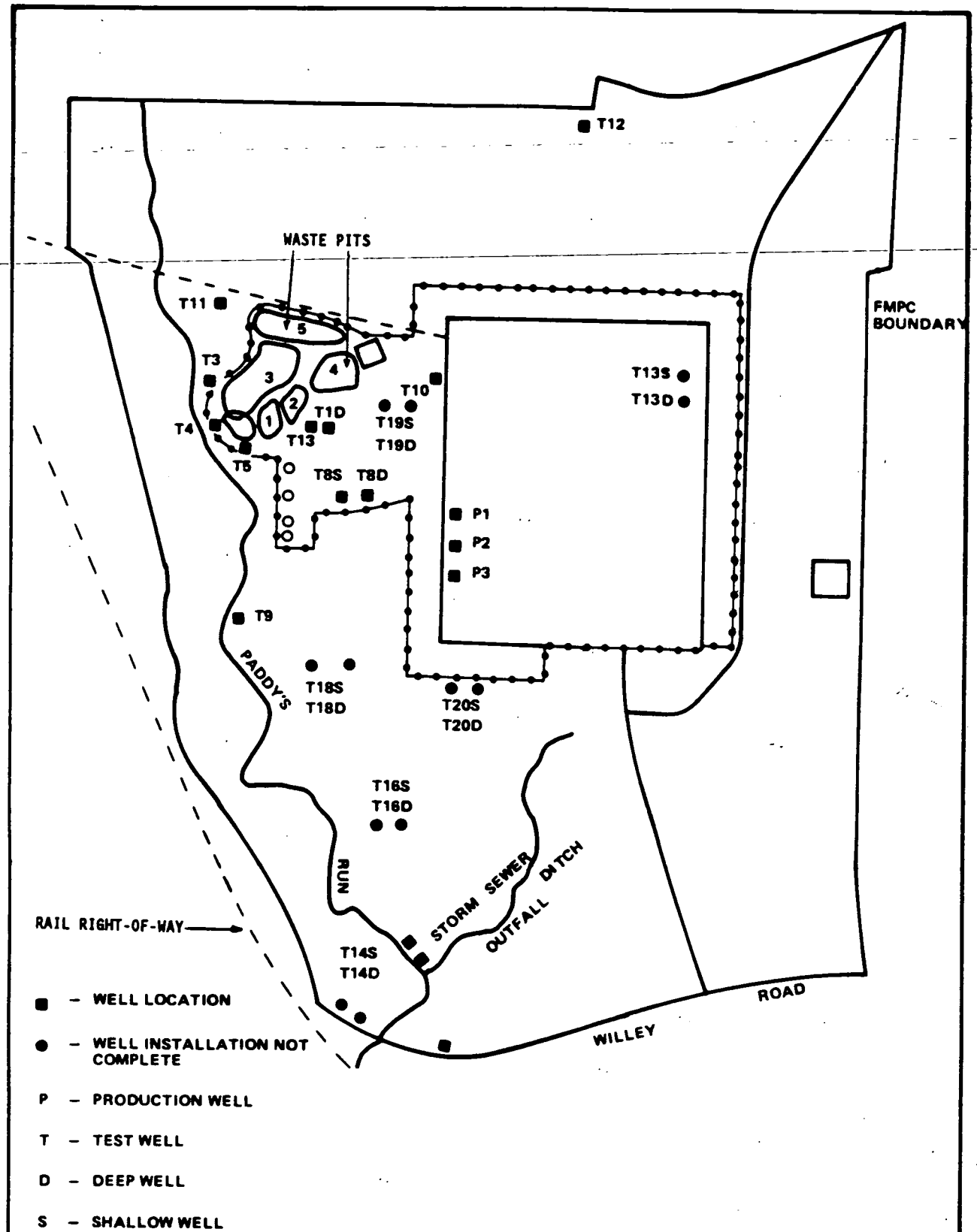


Figure 2-3 Water Sources and Sampling Points

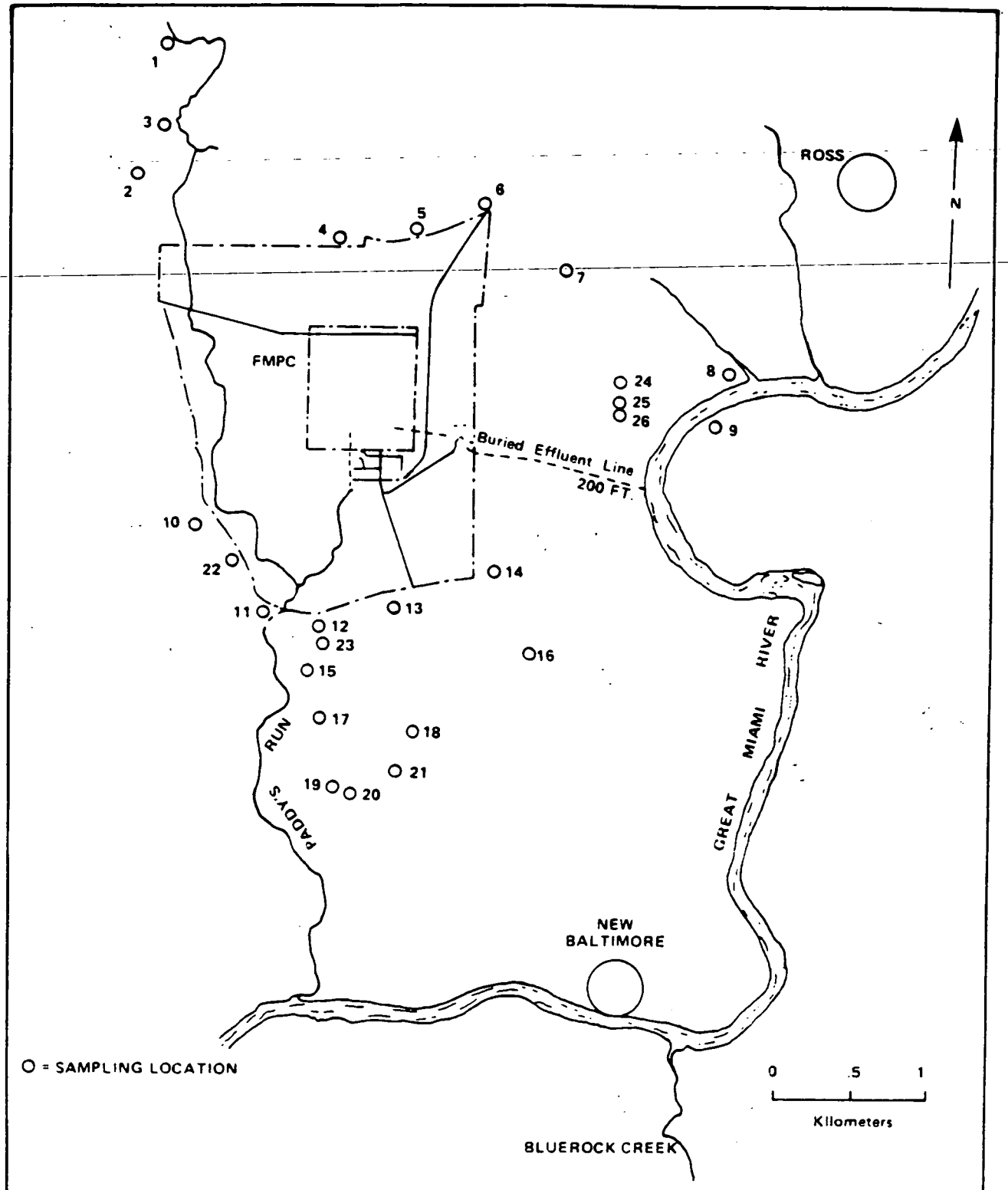


Figure 2-4 Offsite Monitoring Well Locations

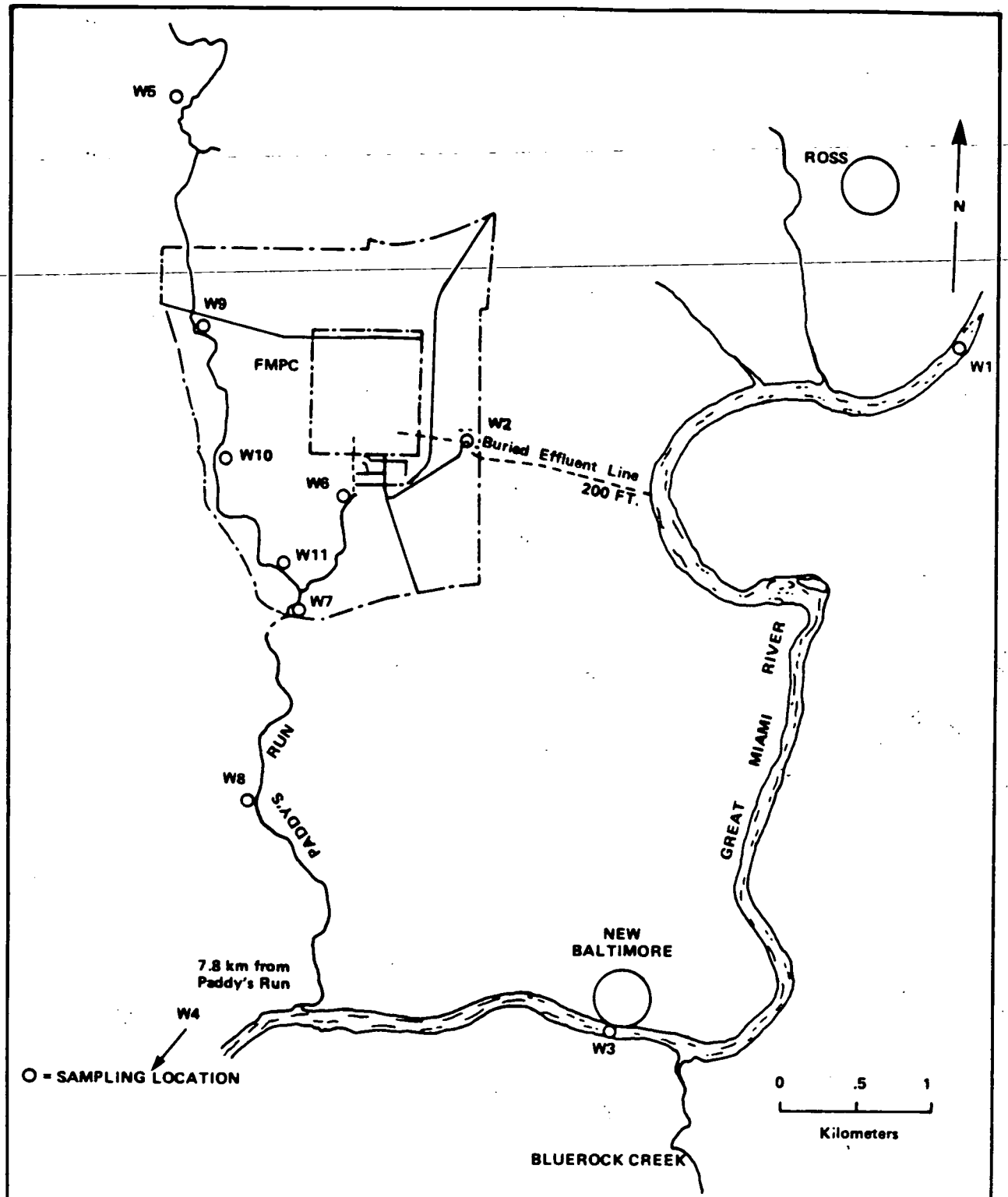


Figure 2-5. Surface Water Sampling Locations

2.3.2.2 Proposed System

New water pollution control facilities are scheduled to become operational in FY-86. As indicated in Figure 2-6, the principal components of this new system will be the biodenitrification treatment process and the stormwater retention facility. The biodenitrification process is denitrification of FMPC effluent using 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. Presently, the coal storage runoff system and ultraviolet disinfection unit are in operation.

Other proposed improvements are to include containment facilities for stored uranium materials, in order 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 any discharges to Paddy's Run. The completion of the current Water Pollution Control project would assuredly lessen the effects of FMPC operations on the local environment.

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 any future remedial actions.

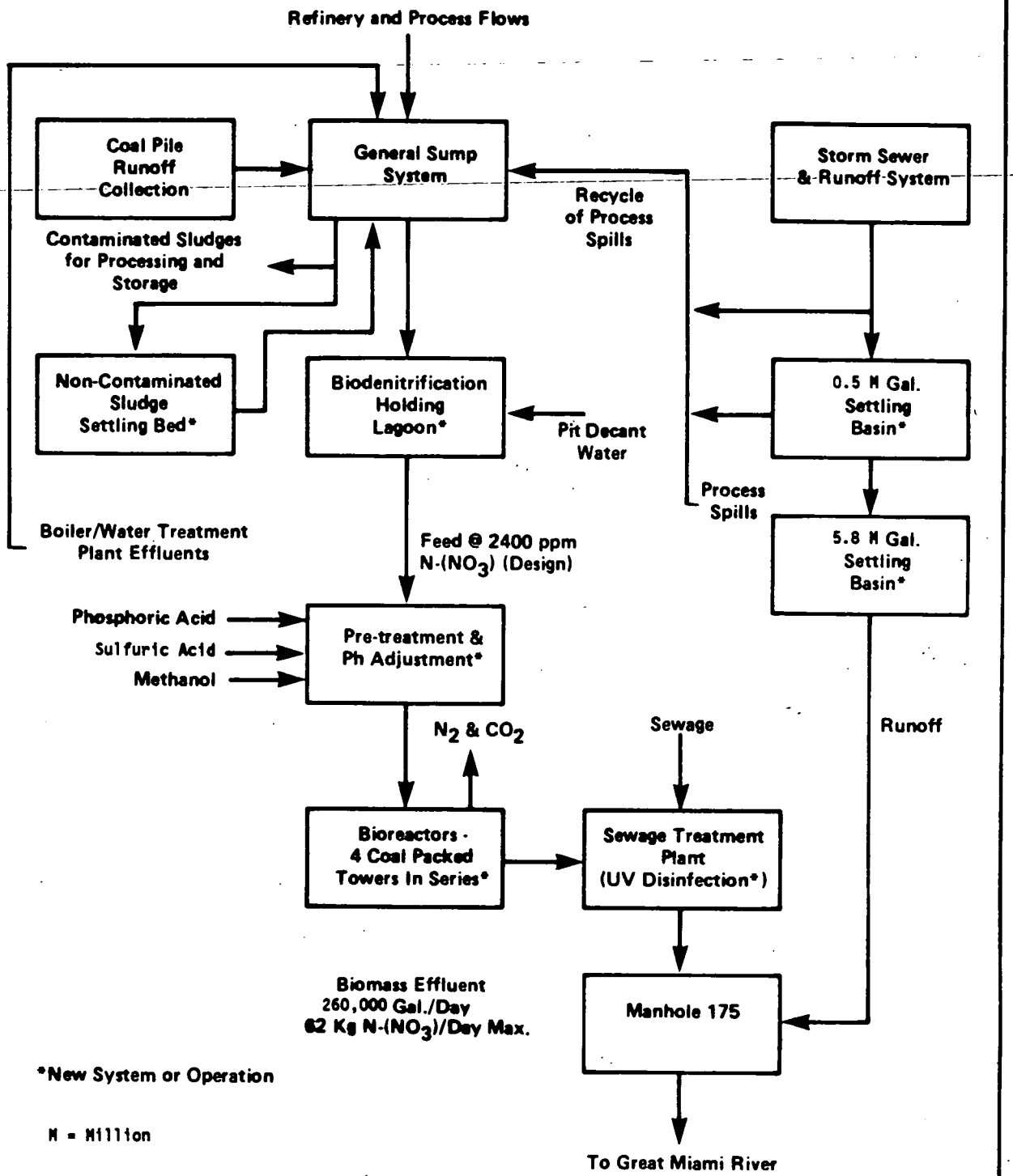


Figure 2-6. FMPC - Integrated Water Pollution Control System

In order 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 will be performed quarterly for FY-86 and annually thereafter. Surface water samples will be taken from an increased number of Paddy's Run sampling locations to more adequately characterize the 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 properly address the compliance requirements of all applicable Federal, State, and Local environmental regulations.

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 RCRA pit 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 being sampled and analyzed per RCRA requirements (quarterly for FY-86, and annually in subsequent years).

2.3.4 Water Pollution Control Management Plan

The projects for water pollution control planned for the period through FY-91 are described below under five subcategories:

(1) Collection and Pretreatment

(2) Primary Treatment

(3) Countermeasure Facilities

(4) Research and Development

(5) Monitoring

The planned improvement projects in these categories, and estimated cost of each are discussed in the following paragraphs. These estimates may not accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned Water Pollution Control improvements through FY-91 is $129.929 million. The breakdown of this total by type of funding and Fiscal Year is shown in Table 2-3.

TABLE 2-3
FUNDING SUMMARY FOR
WATER POLLUTION CONTROL
($1,000'S)

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
GE-GPP	1,860		660	450	450		300
ES&H LI	120,319		1,518	5,551	3,230	29,800	80,220
New LI	1,800			1,800			
GE-OP	360	20	20	80	80	80	80
OS	5,590	932	932	932	932	931	931
Totals	129,929	952	3,130	8,813	4,692	30,811	81,531

KEY

GE-GPP	General Plant Project From GE Budget
ES&H LI	Items Included in the ES&H LI Project
New LI	New Line Item
GE-OP	Operating Funds from GE Budget
OS	Outside Services, Consultants, etc.

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.

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

Upon completion of the stormwater retention basin in the 3rd Quarter of FY-86, surface runoff from the production area will be 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. Completion of the lined stormwater retention basin now under construction will eliminate, except for extreme

rainfall conditions, runoff water entering into the Storm Sewer Outfall Ditch and Paddy's Run.

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 expected to cost $1.629 million.

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

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. Activities are projected to cost $100,000. Studies must be completed in order to fund this project no later than FY-88.

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". The program consists of four subsections described below.

Wastewater Treatment Improvements

The planned improvements to the wastewater system include:

1. 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

2. 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:

1. 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.

2. Channeling flow within the pit to accommodate liquid removal to the extent possible

3. 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. This system is temporary and will be sized for 300 gpm to accommodate peak anticipated flow during the pit shutdown period.

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 exisiting 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:

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

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

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

4. Piping and valving required to re-introduce recovered water from the water reuse tank to the Water Treatment Plant for introduction into the sanitary water and process water headers

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

6. 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 only by evaporation (natural means or through installed units), or in slurries shipped for proper disposal.

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.

Sewage Treatment Improvements

Due to expected increases in plant sewage volume, studies directed toward improving the treatment of liquid effluents will be conducted in FY-89. Funding of $300,000 is anticipated for FY-91, to improve the overall quality of effluent.

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.

Control Storage Pads

Many intermediate low-level radioactive materials are drummed and stored on outdoor concrete pads before being processed. The rainwater and wash water that flow from these pads needs to be contained and treated before being discharged to Manhole-175. Many storage pads at the FMPC were "not designed as controlled storage pads." The advantage of a covered pad is that the rainwater can be diverted from the storage pad, resulting in less water needing treatment in the General Sump.

Control storage pads are required west of Plant 8 (12,000 sq. ft.); north of Plant 9 (5,000 sq. ft.); and east of Plant 8 (26,000 sq. ft.).

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 350,000 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.

Warehouse - Plant 8

Storage space is required for Purex UO_3 received from Richland. A warehouse approximately 12,000 sq. ft. is needed to prevent drum deterioration 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.

Pilot Plant Green Salt Storage Pad Enclosure

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 fully enclose the storage area. Interior lights will be provided by metal halide or high pressure sodium vapor lamps. Exterior lights will be installed on all four building sides and over each personnel door, and an emergency lighting system will be included in the building. Fire protection will include an alarm, dry sprinkler system and portable fire extinguishers. Ventilation will be provided through louvers over each door and at each gable, and a ventilation fan will be installed at one of the gable louvers.

UF_6 Storage - Building 54

A prefabricated metal building 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, all-weather enclosure for handling the UF_6 cylinders. This improvement will also enhance water-pollution control by containing any accidental material spills.

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. Approximately $1.8 million will be required for lab facilities and equipment to support research and development efforts. Operating Funding Support of about $240,000 will be required. Outside services (analytical, consulting, etc.) will total $5.59 million.

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 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.

SOLID WASTE
MANAGEMENT

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.

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
- Thorium ore and metal
- Items contaminated with the above (tools, gloves, shoe covers, building materials, etc.)
- Sanitary sewage

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)

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 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 lists, non-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) Rule which is 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:

1) Low-Level Radioactive Waste Management

2) Radioactive/Hazardous Mixed Waste Management

3) 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. The two new key facilities are the Low-Level Waste Processing and Shipping (LLWPS) system and the new incinerator. Both are described in more detail below. Prior to the completion of the 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, and estimated cost of each, are also discussed. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned Solid Waste Management improvements through FY-91 is $56.285 million. The breakdown by type of funding and Fiscal Year is shown in Table 2-6.

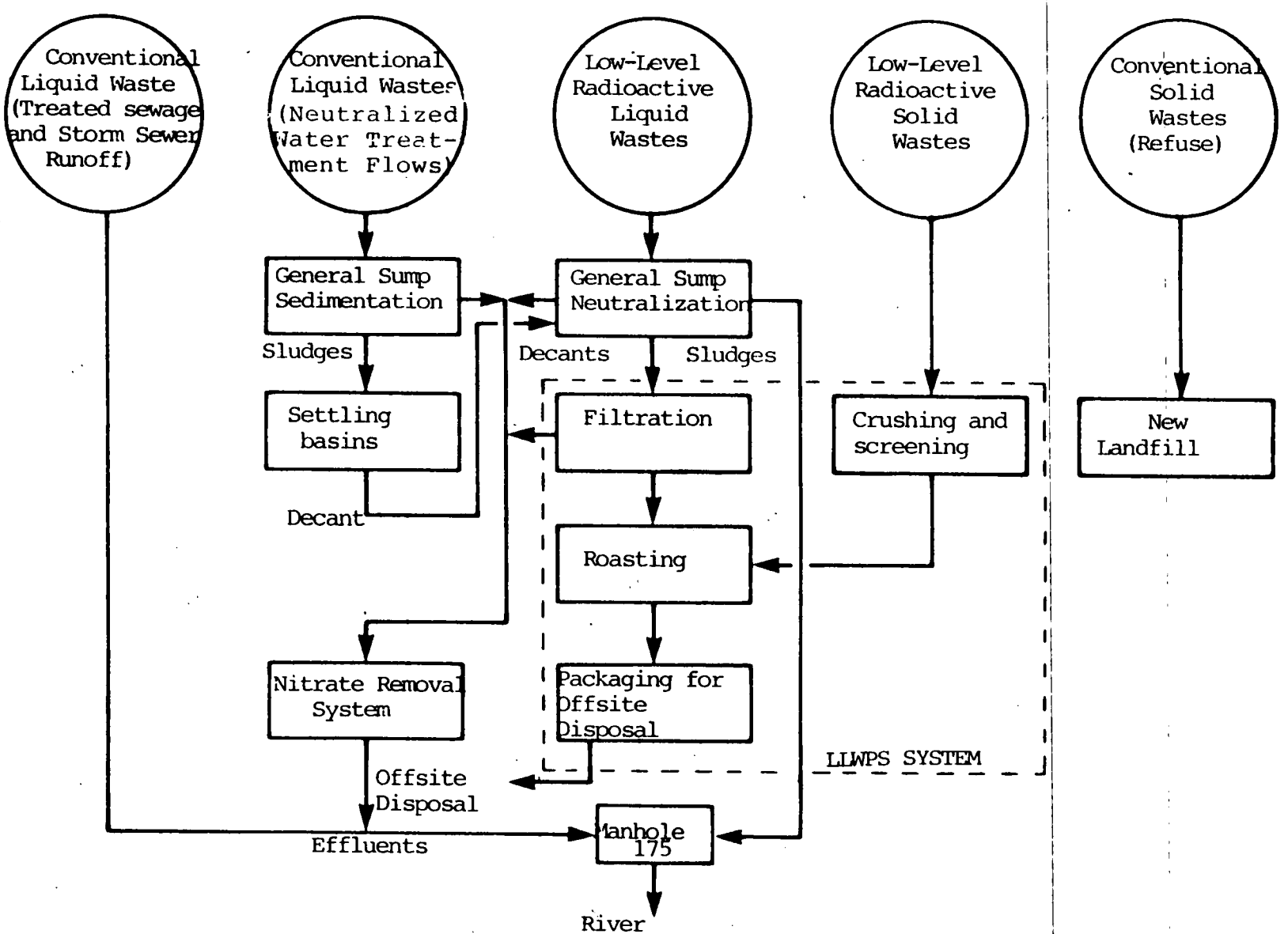


Figure 2-7 FUTURE FMPC WASTE MANAGEMENT (1988)

TABLE 2-6

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

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
AR-CE	792	185	240	367			
GE-CE	645	15	150	150	30		300
AR-GPP	3,429	1,399	2,030				
New LI	17,000	2,372	9,000	5,628			
ES&H LI	4,722		100	4,622			
AR-OP	29,587	2,284	5,253	4,525	7,775	4,825	4,925
GE-OP	110		70	10	10	10	10
Totals	56,285	6,255	16,843	15,302	7,815	4,835	5,235

KEY

AR-CE	Capital Equipment From AR Budget
GE-CE	Capital Equipment From GE Budget
AR-GPP	General Plant Projects From AR Budget
New LI	New Line Item
ES&H LI	Items Included in the ES&H Line Item Project
AR-OP	Operating funds from AR Budget
GE-OP	Operating funds from GE Budget

2.4.4.1 Low-Level Radioactive Waste Management Program

Interim Low-Level Waste Operations

Prior to completing the LLWPS System in FY-88, existing facilities will be used to process wet-waste streams into a form suitable for shipment to an off-site disposal facility. Total funding of $9.709 million will be required for maintenance, operations, packaging, shipping and disposal of the waste materials through FY-89. The currently generated low-level waste shipments will be back-charged to the generator out of GE budgets beginning in FY-88. The remedial (previously generated) wastes will be budgeted from the AR funds.

Low-Level Waste Processing and Shipping System

The LLWPS system has been approved as a FY-86 line-item project and will convert all sludges and dry solids to a uniform dry solid suitable for packaging for off-site disposal. The system consists of the following major components:

1) Size reduction equipment (crusher/shredder)

2) Rotary kiln

3) Box furnace

4) Blending and sampling equipment

5) Drum handling equipment

The treatment paths for the various waste types are outlined in Figure 2-8. Depleted slag and various dry scraps will be crushed and screened to the proper form for disposal. Neutralized raffinate and slag leach filter cakes will be fed to a new rotary kiln to dry the material for disposal. A scrubber, NO_x destructor and dust collectors will control atmospheric emissions from the kiln. Project No. 87-D-174 will cover the construction of the LLWPS system. Operating costs, including operation and management of equipment, fuel, shipping, and disposal costs, are expected to total $12 million in the period FY-89 through FY-91

Waste Inventory Database

A dedicated microcomputer with associated software is necessary as a comprehensive waste-management tool. The microcomputer will enable the establishment of a waste management database capable of tracking current inventories and shipments of waste materials. Also, it will provide a system where existing waste streams can be modeled and option studies performed to help optimize the waste-management system. The system must be compatible with existing DOE waste-management computer systems for effective overall coordination of DOE generated waste materials. In conjunction with the computer system, a bar code labeling/reading system is required to track waste shipments off site. Capital Equipment funding of $75,000 will be needed in FY-86. Operating costs are estimated at $75,000 per year over the period, for a total operating cost of $450,000.

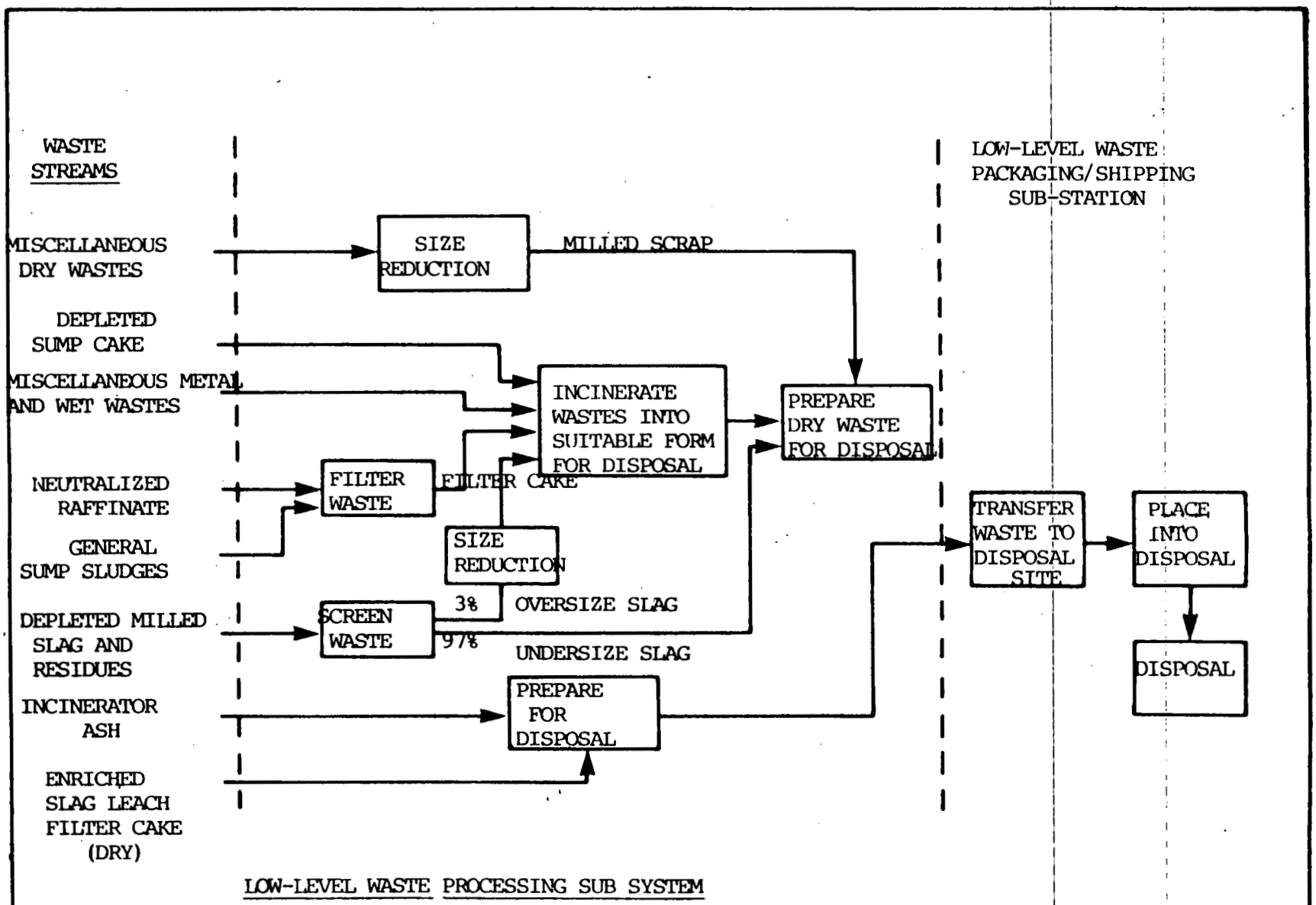


Figure 2-8 Functional Flow Sheet For FMPC Low-Level Waste Processing And Shipping System

Motor Vehicles and Bulk Transporters

Because of the increased waste management activities currently underway and projected for the FMPC, a van and a panel truck will be required to haul necessary processing and monitoring equipment. Funding of $15,000 will be required in FY-86 for the van. Funding of $30,000 will be required in FY-89 for the panel truck. Replacement of existing vehicles used for bulk transport of low-level waste materials will be required in FY-91 at a cost of $300,000.

Drum Handling Equipment

With the increased number of drums containing low-level wastes for off-site disposal, drum handling equipment is necessary to manage the inventory and have capability to package drums into overpack containers. Equipment needed includes: forklift trucks, towmotors and drum rotator trucks.

Equipment for Volume Reduction and Surface Decontamination

The many current and planned construction/demolition projects at the FMPC will generate substantial quantities of rubble. Methods will be investigated and procedures implemented, where applicable, for waste segregation, decontamination and volume reduction. This will minimize low-level radioactive waste generation. Total funding of $210,000 (Capital Equipment) will be required, $110,000 in FY-86 and $100,000 in FY-87, for surface decontamination equipment. An interim storage pad for rubble in bulk quantities will require GPP funding of $200,000 in FY-86. Facilities are also planned for size reduction, packaging, and shipping contaminated rubble, which will require GPP funding of $550,000 in FY-87.

Waste Compactor Facility

Facilities, including a large compactor, will be provided for size reduction, separation, and/or compaction of non-process wastes (i.e., contaminated paper, trash, glass, wooden pallets, asbestos, and oil) for which handling facilities are not currently available. A new building (approximately 24′ x 40′) will be required to house the facilities.

Trash Monitoring/Segregation Facility

The increasing costs and personnel exposures associated with the disposition of low-level waste materials require improvement in the ability to quickly and non-destructively characterize the contents of waste packages. A trash monitoring and segregation facility is planned and will require GPP funding of $740,000 in FY-87. The facility will use real time radiography to provide non-destructive assay of the contents of waste packages. Operating funds of $1.0 million will be required for training and utilization of the facility through FY-91.

Emergency Response Vehicle

A large vacuum truck for use as an emergency response vehicle is necessary to provide emergency clean-up capabilities for potential spills during on-site processing/handling and off-site transport of low-level radioactive wastes. This truck would be equipped with survey instruments, monitors and spill containment equipment.

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 5,000 tons. Total operating funding of $2.745 million will be required in FY-87 through FY-88 for segregation, sorting and disposition of contaminated ferrous-scrap metal. Approximately $200,000 annually will be required for disposition of expected scrap generation from future renovation activities beginning in FY-89.

An extension of the existing pad at the Decontamination Building will be built to facilitate segregation of the existing scrap-metal pile. The new extension will be located in the area north of the existing pad. The new pad will be provided as part of the sub-contract for segregation of the scrap-metal pile.

Contaminated Scrap Copper Management

The FMPC has a substantial inventory of contaminated copper scrap. WMCO has initiated a program to shred the contaminated copper scrap for eventual sale or transfer to a permanent disposal facility. Shredding and storing of contaminated copper scrap began in FY-85.

Concrete Rubble Decontamination Facility

Equipment will be procured for the removal of surface contamination from concrete walls, floors, and pads to reduce the volume of waste generated as a result of construction/demolition activities.

Expansion of Decontamination Building

Expansion of the existing decontamination building and renovation of current facilities are required to accommodate an increasing quantity of FMPC waste that must be decontaminated prior to off-site disposal. Contaminated materials occupy valuable pad storage space and contribute to ground and liquid effluent contamination. A 5,000 square feet addition is required,with doors large enough to permit entry of semi-truck trailers. The addition will include clean-up areas for asbestos removal and metal sandblasting, together with a suitable crane for handling items to be decontaminated. Renovation of facilities will include enlargement of caustic wash and rinse tanks for furnace pots, expansion of emergency eyewash and shower facilities, improvement of sanitary facilities to accommodate female employes, and modification of the sump system to permit more efficient sludge separation.

2.4.4.2 Radioactive/Hazardous, Mixed Waste Management Program

There are four projects planned for this program:

Facility for Passivation/Storage of RMI-Generated $BaCl_2$ Waste

Approximately 36,000 pounds of spent salt sludges are received annually from the RMI extrusion operation (FMPC is currently permitted at 50,000 pounds annually). The salt sludges are composed of approximately 55 percent barium chloride, a hazardous waste requiring disposal in a licensed hazardous waste disposal facility. Since neither the FMPC waste-storage pits nor the DOE low-level waste disposal site are hazardous waste disposal sites, a facility must be provided for the treatment and/or storage of the salt sludge wastes. Passivation, or treatment of the salt-sludge to remove or stabilize the hazardous component, will render the waste suitable for management as a low-level radioactive waste. Funding of $350,000 will be required for facilities in FY-87. Operating costs of $1.343 million for storage/treatment of the salt sludges will begin in FY-87.

Spent Solvent and 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 1,500 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 currently under construction at the Oak Ridge Gaseous Diffusion Plant.

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 DOE toxic waste incinerator beginning in FY-87. 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. Operating Funds of $40,000 for FY-87 are required for this effort.

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 eventual destruction in the DOE toxic waste incinerator.

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. New spent lime sludge drying beds were constructed during FY-85, and will become operational in FY-87. Annual operating costs are estimated to be $10,000.

Improve Solid Waste Incineration

The existing solid waste incinerator will be improved by providing a particulate collection system. Funding of $300,000 will be needed, beginning in FY-87, to retrofit the system.

Expand Existing Landfill

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

REMEDIAL ACTION

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 decontamination of facilities removed from service, abandoned-in-place or put in standby status.

2.5.1 Remedial Action Concerns at the FMPC

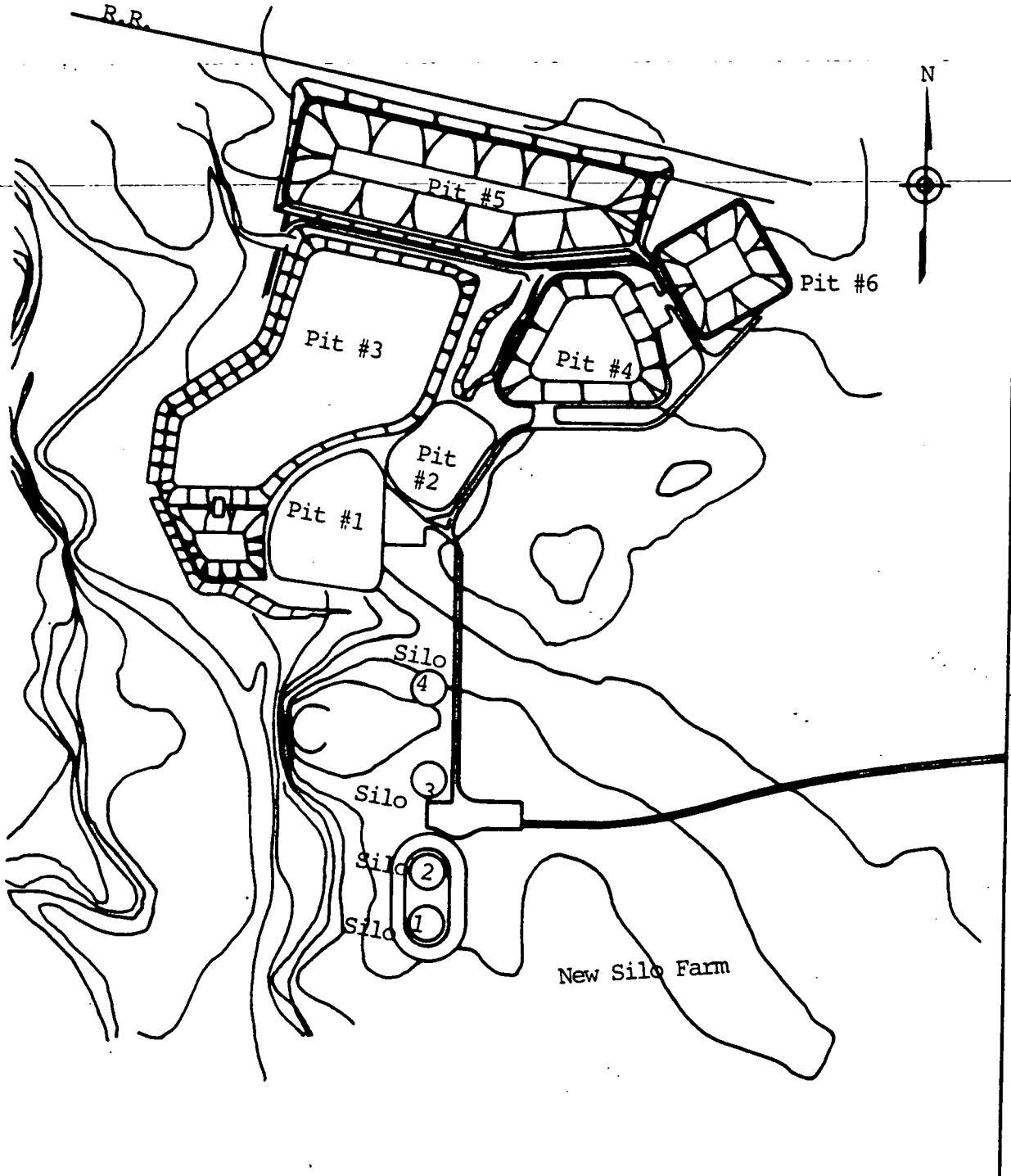
In the past, the FMPC's low-level radioactive waste was discarded to surface impoundments and silos. Although this practice has been discontinued as a potential source of environmental contamination, a large inventory of accumulated waste is currently on site. Because of their design, the nature of the wastes contained, and their location over an extensive aquifer, these impoundments 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 2-9); two concrete silos (the "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, an intermittent tributary of the Great Miami River, 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

There are six waste pits at the FMPC (See Figures 1-2 and 2-9). They are identified by numbers based on the chronological sequence of their construction. Pits 1 and 2 are essentially "inground" facilities which were used for mixed dry solid waste disposal. They were constructed in 1952 and 1957, respectively, by digging large basins into



Pits 1, 2, and 3 are retired and Covered.

Figure 2-9 FMPC Solid Waste Storage Facility Layout

TABLE 2-7

WASTE STORAGE FACILITY STATUS

Structure	Type	Volume (Million ft^3)	Status	Contents
Pit 1	Dry	1.08	Retired	U-Bearing Wet & Dry Solids
Pit 2	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	Being Retired	Slags, Abrasives, Metals, Dry
Pit 5[2]	Wet	3.10	Removed from Sedimentation Service	U-Bearing Wet Sludges
Pit 6[2]	Dry	0.375	65% Full; Remove from Active Use	Slags, Misc. Materials, U-Bearing Wet & Dry Solids
Silo 1	Dry	0.134	Full	High Radium Tailings, Dry
Silo 2	Dry	0.134	Full	High Radium Tailings, Dry
Silo 3	Dry	0.134	Full	Low Radium Metal Oxides, Dry
Silo 4	Dry	0.134	Empty	

Note[1] Clay-lined
Note[2] Rubberlined

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

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 fill and graded to provide surface drainage.

Pits 3 and 5 were used for disposal of wet chemicals. 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 so 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. 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. 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 in the Great Miami River.

Pit 5 was also a settling basin constructed in 1968 to replace Pit 3. It was constructed by cut and fill using the excavated material to build a dike approximately 10 feet above the 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 on the pit bottom. The clarified effluent flowed by gravity through an effluent control tower to the clearwell where it was discharged to the Great Miami River. Since 1983, solids in the waste streams have been removed by filtration and then pumped to Pit 5. The clear effluent flows across the pit prior to discharge.

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 hazardous waste which is now mixed with 143 million pounds of low-level radioactive waste. Pit 4 currently is inactive, but does receive materials restricted to radioactively contaminated construction rubble, asbestos, and graphite.

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. Although Pit 6 is not yet full, as of March, 1985, it no longer received waste.

Because the groundwater is contaminated with uranium in the waste storage facility area, use of all waste pits has been discontinued.

Almost all the pits have an impermeable clay or rubber lining which produces a "bathtub" effect -- an impermeable bottom which retains water, and a permeable topsoil cover permitting water to enter. Water, therefore, can accumulate in the pits, reaching a high level until it spills over. Since this spilled water remained in the pits for some time, it is likely to contain traces of radioactive materials. Because of the bathtub effect, the waste in the pits is not dry.

Characterization of the wastes placed in these pits was 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 and encased by an earthen embankment. 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 Ra-226. Pitchblende-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 the K-65 silos may not be structurally sound. Radon flux measurements from the silos are being monitored by the Oak Ridge

National Laboratory and Mound Laboratory 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 personnel. It is DOE and WMCO policy that exposures to employees 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 Waste Site Remedial Investigation to be conducted in FY-86. The Surplus Facilities Management Strategy is to be developed by the fourth quarter of FY-86.

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.

Because of the above-background concentrations of uranium in off-site wells, it is suspected that waste-pit migration may have occurred. Studies are in progress to characterize groundwater around the waste-storage pits and determine options for remedial action, if required.

An effective remedial-action plan must take into account all of the pathways involved in the transport of contaminants through the environment and to receptors. Remedial actions may be taken on several levels: direct treatment or removal of the land-disposed wastes; prevention of waste migration from the site; and cleanup of affected media. DOE is considering a wide range of remedial action alternatives and will select a preferred alternative only after completion of the ongoing characterization studies and appropriate public input.

Process for Selection of Remedial Actions

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. At that point, detailed information must be used to further determine the technical and economic feasibility of potential alternatives. Accordingly, the remedial action selection 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.

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.

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.

Sediments

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.

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.

2.5.4 Remedial Action Plan

The planned improvement projects in the two Remedial Action subprograms, and estimated cost of each, are discussed below. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned Remedial Action through Fiscal Year 1991 is $50.842 million. The breakdown by type of funding and Fiscal Year is shown in Table 2-9.

2.5.4.1 Waste Storage Area Management Plan

Remedial Investigation/Feasibility Study

Total estimated cost: $1,430,000 - FY-86 through 87 (AR-OP)

A Remedial Investigation/Feasibility Study (RI/FS) has been initiated. It is structured after a Remedial Investigation/Study (RI/FS) as outlined in RI/FS guidance documents by both the U.S. EPA and Ohio EPA.

The Remedial Investigation shall consist 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

TABLE 2-9
FUNDING SUMMARY FOR
REMEDIAL ACTION
($1,000'S)

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
GE-GPP	750		750				
AR-GPP	1,345	270	950	125			
ES&H LI	11,017			1,500	1,700	1,441	6,376
NEW LI	24,000				8,000	8,000	8,000
AR-OP	10,580	540	2,750	2,110	2,060	1,560	1,560
GE-OP	3,150		700	700	1,050	700	
Totals	50,842	810	5,150	4,435	12,810	11,701	15,936

KEY

GE-GPP	General Plant Projects From GE Budget
AR-GPP	General Plant Projects From AR Budget
New LI	New Line Item
ES&H LI	Items Included in the ES&H LI Project
AR-OP	Operating funds from AR Budgets
GE-OP	Operating funds from GE Budgets

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

The RI/FS will be subcontracted at an estimated cost of $1,430,000 from operating funds.

Excavation of Uranium-Bearing Sediment

A close-spaced survey and sampling program of both the Storm Sewer Outfall Ditch and Paddy's Run will be used to identify zones of sediments which may be acting as intermediate uranium sources for the groundwater. If such zones of sediment are found, they should be excavated for subsequent disposal. Estimated costs are as high as $500,000, depending on the extent of excavation.

Remedial Action Database

A program will be initiated to perform a radiologicalcharacterization of the FMPC facility and adjoining areas, if needed. A database will be will be established to document the extent of contamination to aid development of acomprehensive 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 of approximately $100,000 per year will be required for characterization studies and establishment of the data base.

Reduce Uranium in Three 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. By regrading this area, surface water runoff will be diverted south to the Stormwater Basin, thus minimizing the flow of runoff west to Paddy's Run.

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.

Surface Water and Groundwater Controls

Diversion of stormwater from the waste-pit storage area is needed to reduce the amount of runoff entering Paddy's Run. Regrading of the ground surface and diversion of runoff flows to the clearwell or another suitable retention basin is planned, at an estimated cost of $1.07 million.

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 at an estimated operating cost of $200,000. Routine maintenance and resurfacing of the pit access roadways will be required during this same period with a funding requirement of $50,000 in FY-88.

Interim Pit Stabilization

Currently, Pits 4, 5 and 6 are open surface pits that are inactive and no longer receive wastes, with the exception of filtered effluent from Plant 8. As part of the RI/FS, an engineering option study will be conducted to determine the most effective method of pit closure to minimize possible migration to adjoining areas or the underlying aquifer. This interim pit stabilization will cost $275,000 beginning in FY-88.

Waste Pit Disposition

Planning must be initiated to stabilize the pits or remove and process the stored waste inventories for final disposal. The Remedial Investigation/Feasibility Study will identify effective alternatives for material retrieval and disposition. Annual costs of $500,000 will be incurred during the five year planning period for NEPA documentation and conceptual design engineering. Major line-item capital expenditures estimated to be $66 million are anticipated beyond FY-92, for construction of required facilities. Annual operating costs of $16 million will be incurred beyond the five year improvement planning period during the estimated twelve year period of operation. Thus, the final disposition of the waste pits will require an estimated total funding of $192 million from FY-92 through FY-2004.

K-65 Residues Disposition

Radium-bearing residues are currently maintained in two concrete silos. Because of concerns over potential migration of these residues into the underlying aquifer, an engineering option study will be initiated as part of the RI/FS to define effective alternatives for processing the K-65 material for permanent disposal. Expenditures of $24 million are anticipated for facilities and operations to achieve permanent disposal of K-65 residues in the period FY-89 through FY-91.

Buried Rubble Disposition

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, but are estimated to be $500,000.

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 at an estimated cost of $750,000.

Thorium Removal - Plant 8

The on-site thorium inventory consists of approximately 3.95 million pounds of material containing various concentrations of thorium. Approximately 3.3 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. This effort will require an estimated $700,000 operating cost per year from FY-87 through FY-90.

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: (1) upgrading existing facilities without relocating the thorium; (2) repackaging by using existing material handling equipment (if operable), or (3) designing new systems to remove the residues to appropriate containers for interim on-site storage. The third option appears to be preferred, based on preliminary thinking. The design and procurement of a thorium loading system is included in the ES&H Line Item Project. The conceptual design involves a remotely controlled robotic device to effect removal from the silos, using a wire grinding wheel to break up the material, and a vacuum system to remove it. This project is estimated to require $3.641 million from FY-88 through FY-90.

Thorium residues will be dispositioned as outlined if and when it is classified as waste.

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 contaminated 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. Two projects planned during the five year planning period follow.

Removal of Abandoned Equipment

Abandoned waste management 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. Dismantling and removing the sewage treatment plant incinerator will be included in this plantwide project.

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. 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 Plant 1 storage towers also will eliminate the potential damage to the nearby enriched uranyl nitrate solution storage tanks.

SAFETY ANALYSIS
AND REVIEW

3.0 Safety and Health Management Plan

Introduction

Safety and Health programs for the FMPC cover four areas: (1) Health Physics/Radiation Protection; (2) Nuclear Criticality Safety; (3) Industrial Hygiene and (4) Occupational Safety/Fire Protection. The five year plan for each of these areas is discussed in Sections 3.2 through 3.5. 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 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 by the course of everyday living by the vast majority of the public.

Safety analysis at the FMPC is divided into two categories: existing plant safety analyses, and new project safety analyses. The existing plant category covers all existing facilities/systems. The new project category includes line-item projects and capital improvements to the existing plant. Safety Analysis Reports (SARs) have been prepared for several FMPC facilities since 1979, when safety analyses of FMPC facilities first began. Safety assessments and SARs are also underway for engineering projects.

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 Division, and the Environment, Safety and Health (ES&H) Department. Project engineers in the Technical Services and Waste Management Departments of the Technical Division prepare project Safety Assessments and 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:

a. Assists Project Engineers in preparing Safety Assessments

b. Reviews Project Safety Assessments to ensure compliance with current directives

c. Prepares the Accident Analysis portion of project PSARs and FSARs

d. Prepares all Safety Studies for existing plant facilities and systems

e. 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

WMCO plans to establish an Independent Safety Review Committee. 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.

The Independent Safety Review Committee is scheduled to be chartered in FY-86. The Management Plan and Procedure for this committee are both in the draft stage and currently being reviewed.

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. A management plan defining the purpose and goals of the Configuration Control Program is being drafted, to be followed by a configuration control procedure listing the responsibilities of each group in implementing the program.

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 head of the Nuclear Safety department, 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 is scheduled to be in place in late FY-86, with the initial audit scheduled during the first quarter of FY-87.

3.1.3 Applicable Regulations and Status Compliance

The overall Safety Analysis and Review Program is governed by DOE Order 5480.1A. Chapter V and DOE Order 5481.1A as supplemented by DOE-ORO Order OR5481.1B.

3.1.3.1 DOE ORDER 5480.1A

DOE Order 5480.1A requires a program that includes:

a. 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.)

b. 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.)

c. 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)

d. 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.)

e. 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.)

f. 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 5481.1A as Supplemented by OR5481.1B

DOE Order 5481.1A 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 of $15,000 in FY-86 for copier equipment and $35,000 in FY-88 for computer equipment are anticipated to support the program. The remaining funds through FY-91 will be $4.066 million operating funds for the FMPC staff personnel

and $308,000 outside contractor assistance, which may be required for some of the accident analyses. The total funding through FY-91 is summarized in Table 3-1.

TABLE 3-1
FUNDING SUMMARY FOR
SAFETY ANALYSIS AND REVIEW PROGRAM

FUNDING		FISCAL YEARS					
Type	Total	1986	1987	1988	1989	1990	1991
GE-CE	50	15		35			
GE-OP	4,066	635	694	685	684	684	684
OS	308	58	50	50	50	50	50
TOTAL	4,424	708	744	770	734	734	734

KEY

GE-CE - Capital Equipment From GE Budget

GE-OP - Operating Funds From GE Budget

OS - Outside Services, Consultants, etc.

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:

(a) 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.

(b) Minimize traffic between areas in different categories, especially between Categories I and III

(c) Require protective clothing in Category III areas, and perhaps in Category II areas, while forbidding it in Category I areas

(d) 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

(e) 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 employees and radiation sources; decreasing the time that employees 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 Line Item for ES&H Improvements 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 both alpha and 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

In order to control external radiation exposures, it is necessary to evaluate actual employee exposures. This is accomplished by providing employees with thermoluminescent dosimeters (TLD's) capable of measuring both penetrating and non-penetrating radiation. In addition, employees 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 it may become necessary to place dosimeters on the hands of some employees in order to accurately determine hand doses.

All employees are monitored for external radiation by dosimeters contained in their security badges. The Panasonic dosimetry system monitors both penetrating and non-penetrating radiation. The DOE Laboratory Accreditation Program (DOELAP) establishes performance criteria for dosimetry processors at DOE facilities. In a pilot testing study performed in 1985, the FMPC passed the tests in all

applicable radiation categories and was the only participating processor to pass more than 50 percent of the DOELAP categories.

Dosimeters are changed monthly and employes whose doses are approaching quarterly or annual limits are restricted to jobs having relatively low exposures for the remainder of the pertinent period. Employees who potentially receive hand and/or forearm doses that are substantially higher than their whole body dose also wear wrist dosimeters that utilize TLD's. In this manner, forearm doses are measured directly and hand doses are estimated. Wrist dosimeters are changed monthly. Restrictions are placed on work assignments of individuals whose doses approach quarterly or annual limits.

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 supporting activities address the three objectives previously described.

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 an audit trail 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 employees 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 is being 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:

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

In addition to keeping employee radiation doses below specified numerical limits, it is a requirement to maintain doses as low as reasonably achievable (ALARA). The FMPC has been very successful in keeping doses below the limits, but there are areas where further

improvements in radiation protection practices can be made to improve the ALARA performance.

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) could result in reductions in statutory exposure limits. If that occurs, a careful examination of FMPC operations will be required in order to determine what must be done in order to keep exposures within the new limits. The recommendations that are apt to have the greatest impact on FMPC operations 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/yr. to 50 Rem/yr.; 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, and estimated cost of each, are discussed below. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned improvements in Health Physics/Radiological Protection through Fiscal year 1991 is $55.289 million. The breakdown by type of funding and Fiscal year is shown in Table 3-2.

TABLE 3-2
FUNDING SUMMARY FOR
HEALTH PHYSICS/RADIOLOGICAL PROTECTION
($1,000's)

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
GE-CE	1,180	155	975	50			
GE-GPP	1,130	230	900				
ES&H LI	34,979		2,974	7,509	4,524	12,000	7,972
GE-OP	18,000	3,000	3,000	3,000	3,000	3,000	3,000
Totals	55,289	3,385	7,849	10,559	7,524	15,000	10,972

KEY

GE-CE - Capital Equipment From GE Budget

GE-GPP - General Plant Projects From GE Budget

ES&H LI - Items included in the ES&H Line Item Project

GE-OP - Operating Funds From GE Budget

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 15,000 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.

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 employee exposures and personal contamination as well as reduce the opportunities for injury.

Receiving and Incoming Materials Inspection Area

A new Receiving/Shipping facility has been proposed for construction at the outer fence line. It will contain 12,000 square feet of Receiving and Inspection area and 1,000 square feet of office area. Incoming and outgoing shipments of non-radioactive materials will be handled through this facility. At present, the FMPC Receiving facility is at a location requiring all delivery trucks to enter the process area.

North Site Access

In conjunction with the new Receiving/Shipping facility, a new access road will be constructed along the existing north access road and east-west guard road for use by delivery trucks. The existing road to the North Access Gate (and from there to the existing Receiving facility) is not suitable for truck traffic. The new road is required to provide access to the Receiving facility without entering the process area. It will be necessary to provide a new security station at the North Access Gate and a parking lot for 100 cars for personnel working in that area.

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 mens' 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 a new elevator and new fencing in critical areas to help maintain the separation between process and non-process areas.

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.

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.

Work Area Air Monitoring Stations

Continuous air sampling will permit constant evaluation of airborne uranium levels in work areas. This information can determine where respiratory protection is required; compare relative uranium inhalation potential at different jobs; determine if airborne levels at a given station are changing with time; help identify sources of airborne contamination; and identify when upset conditions occur. Timely information about airborne contamination levels will allow prompt responses for reducing operator exposures.

Continuous air samplers will be installed at approximately fifty locations in the process area where airborne uranium levels are potentially significant. Filters will be changed each day or each shift in order to give a timely indication of airborne uranium levels.

Installation of Wash Basins at Process Area Break Rooms

Wash basins will be installed at entrances to break rooms and near smoking areas in the process area. Break rooms and smoking areas are provided for employes within the process area. Employes are to wash their hands and monitor them for contamination before entering those areas. Installation of wash basins will enhance compliance with that requirement.

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. The facility is scheduled for completion in Fiscal year 1988.

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.

Hand and Foot Monitors

Eight monitors, consisting of gas-flow proportional radiation detectors configured specifically for monitoring hands and feet of personnel, have been purchased for installation at points of egress from the process area. Hand and foot monitors are a quick and efficient method of monitoring for contamination. Monitoring employes when they leave the process area will ensure that radioactive materials are not being inadvertently tracked into administrative areas, and also will allow change rooms to be monitored.

In-House Hand Dosimetry System

TLD's, a reader, and ring badges may be procured and hand dosimetry done in-house as an alternative to obtaining commercial dosimetry services. Performing hand dosimetry in-house may prove cost effective and provide quicker results and improved calibration because of knowledge of workplace radiation fields.

At present, hand exposures are estimated from the readings of TLD's worn at employes' wrists. This estimate is based on limited data. A study was performed in July, 1985 in which a large number of production employes wore ring dosimeters in addition to wrist dosimeters. Results of the study indicate that the current method for estimating hand exposures requires revision.

Operating Costs

The Health Physics Staff to support the ES&H improvements and the ongoing Health Physics Programs consists of four managers, 12 professionals, three secretaries and 38 technicians, resulting in estimated operating costs of $3.0 million per year over the planning period through Fiscal year 1991.

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

Training Facility/Visitor Issue Center

A training facility and visitor issue center is needed to prepare and give training programs for all FMPC personnel. The building would also be used to provide facilities for visitor clothing and clean-up. The visitor center portion would contain safety and/or protective equipment required for entry into the process area. Turnstiles would be used to ensure correct separation from clean-side and process-side of the building.

NUCLEAR
CRITICALITY SAFETY

3.3 Nuclear Criticality and Packaging and Transportation Safety Plan

3.3.1 Criticality and Packaging and Transportation 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.

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 Safety concern is the transportation of fissile and radioactive materials in-plant and to other DOE sites. The Nuclear Safety Group provides advice on non-routine fissile shipments, coordinates the design of fissile shipments, and shipping containers, and serves as a point of contact with DOE on fissile material transportation matters.

3.3.2 Strategy for Nuclear Criticality Safety

As the primary means of criticality control, the Nuclear 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 Order 5480.1A, Chapters III and V. 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 complete compliance with this section of the Order, new analyses must be performed in support of the 2.1% metal program and possibly to support the replacement of wooden shipping containers with metal containers. Details on these two projects are given in Section 3.3.4.

DOE Order 5480.1A Chapter V

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 complete 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 complete 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.

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 complete 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-86. 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, and estimated cost of each, are discussed below. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned projects in Nuclear Criticality through FY-91 is $2.24 million. 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 system of having ORNL set up the problem under purchase agreements.

The estimated cost for these calculations will be approximately $445,000 for outside services.

TABLE 3-3
FUNDING SUMMARY FOR
NUCLEAR CRITICALITY SAFETY
($1,000'S)

Funding Type	Total	Fiscal Years 1986	1987	1988	1989	1990	1991
GE-CE	317	14	3	250	50		
GE-OP	520	22	67	72	87	137	135
OS	1,403	221	471	326	176	127	82
Totals	2,240	257	541	648	313	264	217

KEY

GE-CE - Capital Equipment From Budget

GE-OP - Operating Funds from GE Budget

OS - Outside Services

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-90. It is estimated that operating funds of $340,000 and outside services of $400,000 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.

This project will be handled in two phases. First, new NAD's will be installed in all buildings which process or store uranium. Second, a sodium-iodide (NaI) well detector with shielding and a multichannel analyzer will be purchased. Appropriate software will also be purchased 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,

no additional RDA units are available for installation into new facilities which are presently being planned or built.

Purchasing and testing 20 additional RDA units (2 gamma detectors per unit) will give the FMPC the flexibility of meeting ANSI Standard 8.3 ("Criticality Accident Alarm System"). Nine of these units would be installed immediately in existing buildings and tied into the units already in place. An additional eight units would be reserved for installation in new facilities as they are built. All eight units would probably be installed within three to four years. The remaining three units would be kept as spares to replace faulty units as quickly as possible.

The estimated cost of $300,000 takes into account purchasing the detectors, 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.

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. Shipping container design must begin in FY-86, with testing, licensing and construction in FY-87, if shipments are to begin in FY-88. Outside services (computer) of $300,000 and operating costs of $90,000 will be required for the studies.

Wooden-Family Shipping Containers Study

Presently, all of the FMPC wooden-box family shipping containers are approved for use by the DOE. Current NRC guidelines require all surfaces of shipping containers to be capable of easy decontamination. It is anticipated that the FMPC wooden shipping container design will be required to meet the NRC guidelines in the near future. To determine if a method can be developed to adapt the current wooden-box design to meet the requirements for surface decontamination, a study costing $50,000 in outside services in FY-87 is necessary. It will evaluate paints and coatings, or a sheet metal skin, to retrofit the current wood box design. Additional outside services of $200,000 will be required to implement study results in FY-87 and 88. The operating costs for the period are estimated to be $90,000.

Audit Program

A two-step audit system is proposed to begin in FY-86. In the first phase, the Nuclear Safety Department will conduct an in-depth audit of each of the production and laboratory operations with respect to their criticality safety practices and availability of nuclear safety limits to workers in these areas. Each audit will be followed by a brief report.

The second phase is the management review of the Criticality Safety Section of the Regulatory Compliance Section. An outside auditor will be brought in, either from the University of Cincinnati or another DOE site to review the criticality safety program.

The estimated costs of these annual audits would be $1,400 per year of outside services (independent auditors).

INDUSTRIAL HYGIENE

3.4 FMPC Industrial Hygiene Program

3.4.1 Industrial Hygiene Concerns at the FMPC

Industrial hygiene is concerned with the potential exposure of employes to hazardous substances that are either not radioactive (e.g., toxic chemicals such as hydroflouric acid) or for which radioactivity is of secondary importance to their toxicity (e.g., uranium hexafluoride). The hazardous substances of concern at the FMPC fall into three categories; airborne particulates, hazardous chemicals, and solvents. A fourth category, other industrial hazards, includes physical hazards such as noise and nonionizing radiation (eg. microwaves). Table 3-4 summarizes the major industrial hygiene concerns.

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 employee health.

3.4.2 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 employee exposures; makes recommendations for control; and 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

TABLE 3-4

MAJOR INDUSTRIAL HYGIENE CONCERNS AT THE FMPC

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

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 requests for investigation and assistance from supervisory peronnel, 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.

Communication strategy includes assisting the first-line supervisor in developing appropriate employee 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 employees, 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, nonionizing radiation, laser safety and biological risks.

Air Sampling

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

- Employee exposures to potential health risks
- Magnitude of employee exposure at the start-up of a new process or a change in a process or material used
- Justification of employee complaints or grievances concerning an alleged health risk
- Performance of engineering control measures

- Chemical and/or physical characteristics of gaseous and airborne emissions for 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 will be 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.

Hearing Conservation

A Hearing Conservation Program has been established as a positive measure to protect the hearing acuity of employees 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 employee exposed to noise levels at a Time-Weighted Average (TWA) of 85 dBA (slow) or more will be included in the program.

This program is designed and will be 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 is being 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, including new practices. The standard requires that a list of all chemicals in use at the site, Material Safety Data Sheet files, and employee 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; to measure air velocity at ventilation enclosure or hood openings; and to inspect the change stack sampler filters collected in the ventilation stack downstream of the air cleaning devices and prior to discharge.

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.

3.4.3 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 incuding OSHA standards, 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:

(1) Identification of health hazards
(2) Hazard evaluation
(3) Control measures
(4) Periodic review
(5) Employee education
(6) 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.

3.4.4 Industrial Hygiene Program

The planned improvement projects in the Industrial Hygiene area, and estimated cost of each, are discussed below. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting, the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned projects in Industrial Hygiene through Fiscal Year 1991 is $82.118 million. The breakdown by type of funding and Fiscal Year is shown in Table 3-5.

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. This eight year modernization program will cost $25.5 million beginning in FY-88. Thus, the estimated cost through FY-91 is $12.75 million.

Conversion from Oil-Base Paints for Drum Painting

The existing drum reconditioning operations coat the FMPC's cleaned and reshaped drums with oil-base paint. Workplace concentrations of paint solvent are minimized by the use of paint spray booth ventilation through a water curtain. In order to reduce firehazards associated with volatile organics, the drum reconditioning operation will be converted from oil-base to water-base paints in FY-87, at a cost of $10,000 from miscellaneous capital. This replacement of solvent with water as a paint thinner will also eliminate a potential worker exposure to solvents.

TABLE 3-5
FUNDING SUMMARY FOR
INDUSTRIAL HYGIENE
($1,000'S)

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
GE-CE	360	20	340				
GE-GPP	1,830	80	400	450	300	300	300
New LI	12,750			3,200	3,200	3,200	3,150
ES&H LI	66,588		100	8,588	19,586	11,458	26,856
GE-OP	590	250	250		30	30	30
Totals	82,118	350	1,090	12,238	23,116	14,988	30,336

KEY

GE - CE - Capital Equipment From GE Budget

GE - GPP - General Plant Project From GE Budget

New LI - New Line Item

ES&H LI - Items Included in the ES&H Line Item Project

GE - OP - Operating Funds From GE Budget

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 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.

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.

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.

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.

Infrared Gas/Vapor Analyzer

The capabilities of the Industrial Hygiene Chemical Exposure Control Program will be expanded by procuring a portable infrared gas/vapor analyzer. This equipment will facilitate compliance with program requirements by permitting real-time monitoring of workplace levels of numerous chemicals in air. It will allow for screening of jobs to determine those requiring additional sample collection, and for detailed evaluation of constituent levels at work areas. Constituents such as SO_2, HF, NO, NO_2, CO, CO_2, NH_3, perchloroethylene, 1, 1, 1 - trichoroethane, xylenes, etc. will be measurable over a wide range of concentrations. All operations are controlled by a built-in microprocessor to reduce operator error. This instrument will increase the accuracy range and capabilities of current industrial hygiene monitoring techniques.

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. This long-term project is expected to cost $300,000 annually beginning in FY-87.

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.

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 ES&H Line Item Projects. 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 ES&H Line Item Project 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 ES&H 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.

This portion of the ES&H line item is estimated to require $55 million of the total of $108.479 million for this ES&H line item.

Laminar Flow Elements and 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 laminar flow elements and a wind tunnel for these calibrations will improve the volume flowrate and air speed measurements used in industrial hygiene. These are secondary calibration standards for volumetric air flow rate. They 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 of $50,000 will be required in FY-87 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 routine area monitoring or for monitoring during maintenance work.

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.

General Plant Housekeeping

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.

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.

SAFETY &
FIRE PROTECTION

3.5 Occupational Safety & Fire Protection Plan

3.5.1 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-86 through FY-91.

3.5.2 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-86 through FY-91 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 and associated costs are described in Section 3.5.4.

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.

3.5.3 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 OR5484.1. 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 insurance

underwriting to the best protected class of industrial risk. The objectives are four-fold:

1) No threat to the public from fire

2) No undue hazards to employes from fire

3) No unacceptable delays of vital DOE programs as a result of fire

4) 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.

3.5.4 Safety and Fire Protection Program

The planned improvement projects in the occupational safety and fire protection area, and estimated cost of each, are discussed below. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned projects in Occupational Safety/Fire Protection through Fiscal Year 1991 is $8.746 million. 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.

Storage, Maintenance and Office Bldg. - Boiler Plant

A 2,400 square foot metal building will be constructed near the Boiler Plant and Water 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 work areas and aisleways contain hoses, fittings, portable pumps and other

equipment essential to the Plant 5 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."

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

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
GE - CE	110		55			55	
ES&H LI	7,316		300	3,060	3,204	752	
GE - OP	1,320	220	220	220	220	220	220
Totals	8,746	220	575	3,280	3,424	1,027	220

KEY

GE - CE - Capital Equipment From GE Budget

ES&H LI - Items Included in the ES&H Line Item Project

GE - OP - Operating Funds From GE Budget

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 new 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 systems are totally supervised to promptly detect tampering, loss of power or other trouble with the equipment.

Plantwide Fire Protection Improvements

This project consists of the following fire protection improvements planned for Fiscal year 1989 as part of the ES&H Line Item Project.

(1) 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.

(2) 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 receive a dry pipe sprinkler system designed and installed for ordinary hazard (Group 1). This occupancy modified sprinkler system will protect the entire building in case of a fire originating in the wood frame offices being installed next to the Administration Building, or from a fire originating inside the Administration Building. The sprinkler system will also provide better protection for personnel and files in the Administration Building.

(3) 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 in Building 65 is necessary due to the deteriorated condition of the existing system. Upgrading this system will also ease the shortage of combustible storage space.

(4) General Site

Fire protection systems for all site buildings not previously mentioned will be upgraded. Upgrading includes adding fire hoses, validating fire extinguishers and inspecting and adding to some existing sprinkler systems. Upgrading the various building systems will enhance the entire site fire protection system.

(5) Fire Department Tanker

A new 3500 gallon water tank, mounted on a dual wheel trailer, complete with hose, valves, pump and all other equipment necessary to make the new water tank conform to National Fire Protection Code (1985) Volume 6, Section 1901, will be provided.

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.

Plant Evacuation Alarm System

WMCO's objective is to provide a uniform evacuation alarm that complies with both regulatory requirements and NFPA standards in every major building, to warn occupants of a life threatening condition requiring evacuation.

The present building evacuation alarm systems in the Production plants are in need of upgrading to assure they meet National Fire Code or regulatory requirements. Major nonproduction buildings must be equipped with evacuation alarms to warn occupants of an emergency in the building.

The present mechanical evacuation alarms will be replaced with new electronic systems employing the National Evacuation Signal. Similar systems will be installed in the Administration Building, Laboratory Building, Health and Safety/Production Building and Service Building. All units will meet the requirements of the current National Fire Codes and regulatory requirements. In addition, they will have the capability of voice transmission and local or remote operation from the Communication Center through radio equipment.

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 and are in excellent operating condition. However, they will be replaced at a total estimated cost of $110,000 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. The first ambulance will be replaced during FY-87, and the second during FY-90.

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-86.

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.

The operating cost is estimated to be approximately $220,000 per year for these training programs.

EMERGENCY
PREPAREDNESS

4.0 Emergency Preparedness Program

4.1 Introduction

The Emergency Preparedness Program at the FMPC involves the set of policies, procedures and guidelines which govern the actions and responsibilities of individuals during an emergency. An emergency could occur within or beyond the site boundaries. The Emergency Preparedness Program is dedicated to personnel safety, environmental impact and equipment protection. Its secondary purpose is to maintain or resume essential FMPC operations under condition of natural, civil or national emergency.

The effectiveness of the FMPC Emergency Preparedness Program depends on the following:

a) normal procedures and plans
b) clearly defined responsibilities
c) the availability of necessary equipment, resources and facilities
d) trained personnel
e) rapid response

The FMPC Emergency Plan, which is the governing document for the Emergency Preparedness Program, defines management and individual responsibilities for emergency operations and planning. It also establishes the ground work for periodic reviews and audits to ensure the compliance of the plans with applicable DOE orders, Nuclear Regulatory (NUREG) and Federal Emergency Management Agency (FEMA) guidelines, and WMCO management guidelines.

4.2 Emergency Preparedness Strategy

Responsibility for Emergency Preparedness rests with the Emergency Preparedness sub-section of the Environment, Safety and Health Group. To enhance the effectiveness of the FMPC Emergency Preparedness Program, several areas have been defined. These are on-and off-site planning, training, evaluation, and documentation. Presently, strategies are being developed to improve equipment and procedures, and to assure that administrative responsibilities have been properly assigned.

The needs and direction which this program take will demand developing a cohesive, well equipped staff to meet present and future requirements. Historically, the emergency preparedness, planning, and response activities have been accomplished by a joint effort of several different groups. Recent restructuring has brought Emergency Planning and Emergency Response under one Section manager. Security and Communications still remain outside of the group.

The FMPC Emergency Plan is now being rewritten and restructured. This document will contain two sections, the Plan and the Procedures. The current Plan was revised in January, 1986 to

reflect current management philosophy on organizational structure. The two-section concept will make the Plan available for general and public use while the Procedures will give stand-alone specific information and instructions for various types of emergencies. The Procedure section will be for on-site use only. The entire document will be developed using the following: a) current DOE philosophy requiring that site specific plans be developed, b) DOE Orders, c) NRC Regulations and FEMA Guidelines, and d) management philosophy on organizational structure.

Off-site evacuation plans have been initiated by both Butler and Hamilton Counties. In order for these plans to be workable and compatible with the FMPC Plan, a higher degree of interface between all parties must be developed. A means of emergency notification to Butler and Hamilton Counties for residents near the FMPC needs to be designed and put into operation.

Training programs in general emergency preparedness must be prepared and presented to on-and off-site groups. Additional specific training programs for the emergency staff, brigade, and security forces must also be developed and presented.

The present FMPC Emergency Operating Center cannot be expanded and has inadequate space for personnel and current technology equipment. A new facility is required to provide ample seating and working areas for the emergency staff, and new technology equipment.

The FMPC presently has no dedicated equipped vehicle to respond to radiological or chemical incidents for monitoring, sampling and containment/cleanup assignments. In order to provide immediate response capabilities for both on-site and off-site incidents, a vehicle for this purpose will have to be designed, equipped, and placed in service. This will demonstrate to the community our interest and ability to control such incidents.

The FMPC presently has no mobile off-site command post or administrative center. In the event of an incident that incapacitated the on-site command center, another dedicated vehicle would be necessary to supply a source of communications, provide administrative work areas, and act as a staging/briefing post. To accomplish this, such a vehicle will have to be designed, equipped and put into service.

There are presently two designated emergency shelter areas at the FMPC. Neither area is equipped as a shelter or has adequate capacity to shelter all employes assigned to a shift. In order to correct this, existing shelters must be remodeled and new ones constructed.

4.3 Applicable Regulations and Current Compliance

The FMPC Emergency Preparedness Program is governed by the following DOE Orders: a) 5500.2, b) 5500.3, c)5500.4.

Additionally, since the DOE has directed that each facility develop a plan on a site specific basis, NRC Regulations and FEMA Guidelines are used as supplemental references.

The stated purpose of DOE Orders 5500.2 & 5500.3 is to provide coordination and direction of planning, preparedness and response to operational emergencies in which there is a potential for personal injury, destruction of property, theft or release of toxic, radioactive or other hazardous material. This is done by developing site specific emergency plans and procedures to deal with such incidents, whether they be on or off-site. Emergency planning, preparedness, response, and recovery capabilities must be capable of minimizing the consequences of such emergencies to people, property, and the environment.

Although the FMPC has been in substantial compliance with these orders, implementation of the stated projects is necessary to maintain and increase the degree of compliance. The ultimate goal will always be 100% compliance.

4.4 Emergency Preparedness Management Plan

The planned improvement projects in the Emergency Preparedness area, and estimated cost of each, are discussed below. These rough estimates are not intended to accurately reflect current detailed budgets. For an accurate accounting the reader is directed to the appropriate budget documents. Given this reservation, the total estimated funding to accomplish planned projects in Emergency Preparedness through Fiscal Year 1991 is $34.789 million. 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) a training program providing a general introduction to emergency preparedness for all FMPC employes, which will be required annual training; b) 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 c) emergency drills involving FMPC and Mutual Aid Emergency Groups. Operating funds are estimated at $10,000 per year for these training programs.

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. Plant evacuation training and drills will also

be conducted. This effort will require an estimated $20,000 in Fiscal year 1987.

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

Funding		Fiscal Years					
Type	Total	1986	1987	1988	1989	1990	1991
GE - CE	205	130			75		
GE - GPP	125					125	
ES&H LI	34,279		532	7,681	6,626	11,400	8,040
GE-OP	130	10	40	20	20	20	20
OS	50		50				
Totals	34,789	140	622	7,701	6,721	11,545	8,060

KEY

GE - CE - Capital Equipment From GE Budget

GE - GPP - General Plant Projects From GE Budget

ES&H LI - Items included in ES&H Line Item Project

GE - OP - Operating Funds from GE Budget

OS - Outside Services

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.

Emergency Message System Upgrade

The current system at the FMPC consists of a series of receivers, located throughout the site, which transmit information concerning the emergency. Plant personnel must 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 upgraded system consists of a series of hardwired speakers in every building at the FMPC, with sufficient volume to ensure that everyone will hear the message without leaving their work station. The system will originate at the Communications Center and have capability to address one building, a series of buildings or the entire site.

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 radionucli 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.

Emergency Shelter Upgrade

The plant areas currently designated as emergency shelters cannot accommodate more than 10% of the total persons on site in the event of an emergency during the day shift. Additional emergency shelter space needed to provide adequate room will be accomplished as part of the ES&H Line Item project titled "General Plant Ventilation Upgrade and Improvements." The additional emergency shelter space will be provided by incorporating basements in the three new filter buildings, 5-B-88, 6-A-88, and 8-A-88. Locating shelters in these basements is practical because the filter buildings will be located at areas of dense plant population. The cost of incorporating basements and equipping them for emergency shelter use is estimated to be $6.0 million. This project is included in the ES&H Line Item project titled "General Plant Ventilation Upgrades."

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.

Evacuation Warning Sirens

This project will provide the means to warn on-site personnel who are outside of buildings, and provide the means of giving instructions to on-site personnel in the event of an emergency.

The system will have the capability of three distinct tones: a) evacuation, b) shelter, and c) test. It will be equipped with voice capabilities originating from the Communications Center.

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 must be made include the DOE/ORO Communmications Center, Emergency Staff, FMPC Cadre members, DOE site officials, off-site agencies, local community leaders and off-site residents not reached effectively by sirens.

The dialing equipment will be activated on-site from the Communications 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.

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 5480.1A, Chapter V, 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. These audit programs are estimated to require operating funds of $10,000 annually for the FY-87 through 91 period.

Administration Building Renovation and Expansion

A 12,600 square foot building addition will link the existing Administration Building with the existing Personnel Building. It will also provide the non-contaminated area of the plant with an emergency shelter. The existing Administration Building will be refurbished and modernized.

The emergency shelter, in the basement of the new addition, will accommodate the anticipated population of the administrative area.

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 and an exterior insulating finish system will be applied to both the existing and new parts of the building, for a more modern and unified appearance. The exterior finish will be coordinated with the exterior finish of the Health and Safety Building and the Administration Building. 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.

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).

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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