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NATIONAL LEAD COMPANY OF OHIO, INC., FEED MATERIALS PRODUCTION CENTER RADIOACTIVE WASTE MANAGEMENT PLAN - (USED AS REFERENCE IN OU1 & OU5 RI REPORTS)

00/00/85

FMPC-2040/NLCO-1100
WMCO (NLCO)
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REPORT

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FMPC - 2040
(special)
UC-70
[Revision to NLCO-1100 (Rev. 6)]

FEED MATERIALS PRODUCTION CENTER

RADIOACTIVE WASTE MANAGEMENT PLAN

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This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September, 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

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Prepared for:
U. S. Department of Energy
Weapons Division of Oak Ridge Operations
Contract No. DE-AC05-86OR21600

Approved:

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The development of the FMPC Radioactive Waste Management Plan for 1986 could not have been done without the efforts of the many project managers of the FMPC Waste Management Department. Particular thanks is extended to the authors and coordinators of previously prepared FMPC documents, which served as valuable base material for this Report. Of special importance to the development of this Document was information taken from the Preliminary FMPC Environmental, Safety and Health Management Plant (NLCO 2037 Special UC-11, November, 1985), and the RCRA Part B Application.

Because this Radioactive Waste Management Plan was prepared during the contractor transition period, it is structured to the organization of NLO, Inc. Extensive revisions are anticipated as WMCO defines the long-term objectives during the nine-month transition period ending September 30, 1986.

FMPC RADIOACTIVE WASTE MANAGEMENT PLAN

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FMPC WASTE MANAGEMENT PLAN

Table of Contents

Page

Executive Overview

1.0 Introduction 1

1.1 FMPC Background 1
1.2 Site 1
1.3 Purpose of Report 3
1.4 Environmental Regulatory Requirements 3
1.5 Responsible DOE Area Office 6
1.6 Program Administration 6
1.7 Responsible DOE Staff Members 6
1.8 Funding of Waste Management Activities 6

2.0 Description of Waste and Waste Generating Processes 12

2.1 Waste Process Flow Charts 12
2.2 Waste Characterization 12

3.0 Waste Management Strategy 20

3.1 Identification and Location of Waste Management Facilities . . 20
3.2 Description of Waste Treatment Facilities 20
3.3 Waste Management Strategies 26

3.3.1 Low-Level Radioactive Wastes 26
3.3.2 Low-Level Radioactive/Hazardous Mixed Wastes 31
3.3.3 Low-Level Radioactive/Toxic Mixed Wastes 34
3.3.4 Conventional Industrial Wastes 34

4.0 Waste Storage Facilities 34

4.1 Low-Level Radioactive Wastes 37
4.2 Low-Level Radioactive/Hazardous Mixed Wastes 39
4.3 Low-Level Radioactive/Toxic Mixed Wastes 40
4.4 High-Level Radioactive Wastes 40

5.0 Schedules and Major Milestones for Waste Management Activities . . 40

5.1 Management of Liquid Wastes 40
5.2 Management of Solid Wastes 50
5.3 Management of Airborne Radioactive Waste. 57

6.0 Environmental Monitoring Programs 58

6.1 Waste Monitoring 58
6.2 Air Monitoring 61
6.3 Groundwater Monitoring 62

Table of Contents (continued)

Page

7.0 Quality Assurance for Waste Management 66

7.1 Standard Operating Procedures 66
7.2 Manufacturing Standards 67
7.3 Product and Process Audits 67
7.4 Documentation Systems 67

FMPC WASTE MANAGEMENT PLAN

Table of Contents (continued)

FIGURES

Page

1. Location of FMPC 2
2. FMPC Site Map 4
3. Layout of Production Facilities and Support Building 5
4. Schematic Diagram of the FMPC Process 13
5. FMPC Environmental Features 21
6. Production Area Waste Treatment Locations 22
7. Liquid Waste Streams 23
8. General Sump Flow Diagram 24
9. Future FMPC Waste Management - 1988 27
10. Sources of Production Wastes 29
11. Functional Flow for FMPC Low-Level Processing and Shipping System . . . 30
12. FMPC Solid Waste Storage Facility Layout 35
13. Major Milestones 41
14. FMPC Integrated Water Pollution Control System 49
15. FMPC Scrap Processing 56
16. FMPC Air and Water Sampling Locations 60
17. FMPC Monitoring Well Locations 63

Tables

I. NPDES Limits 7
II. Environmental Regulatory Requirements 9
III. Low-Level Waste Estimate Current Operations (Nonburnable) 14
IV. Low-Level Waste Estimate Current Operations (Burnable) 17
V. Noncontaminated Waste Estimate Current Operations (Burnable) 18
VI. Noncontaminated Waste Estimate Current Operations (Nonburnable) 19
VII. Radioactive/Hazardous Waste Handled at the FMPC Facility 32
VIII. Basis for Hazardous Designation 33
IX. FMPC Waste Storage Facility Status 36
X. Waste Management Budget - Program AR Operating Cost 47
XI. Clean Air Act - Pollutant Category 59

EXECUTIVE OVERVIEW

The Feed Materials Production Center (FMPC) utilizes a wide variety of chemical and metallurgical processes in the production of uranium metal products used in DOE programs at the reactor sites and elsewhere. The continued operation of the FMPC is necessary to achieve DOE mission requirements.

The FMPC Radioactive Waste Management Plan presents the Site Waste Management Plan. It sets forth site plans for controlling releases of radioactivity and assuring safe storage of radioactive wastes generated by past, present and future site operations.

The FMPC Radioactive Management Plan addresses projects principally funded on the AR budget.

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. A wide variety of chemical and metallurgical process steps are utilized to support the primary mission of supplying metallic fuel cores for the production reactors located at Richland, Washington, and Savannah River, South Carolina. Some metal is shipped directly to DOE facilities at Oak Ridge, Tennessee, and Rocky Flats, Colorado. Operations are administered through the Department of Energy (DOE) Oak Ridge Operations (ORO) Office.

The Richland N-Reactor stream is supported by processing enriched uranium scrap residues generated during the metal production steps 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), which is the starting point for metal production operations. Production depleted uranium metal for the Savannah River Mark 31 stream, the Y-12 Plant and Rocky Flats begins with UF_4 (uranium tetrafluoride) from inventories.

The FMPC is the only facility within the DOE nuclear production complex capable of producing these uranium metal products for the various DOE defense programs that they support. A comprehensive and cost-effective ES&H Management Plan will ensure that all DOE mission requirements are fulfilled while meeting all environmental regulations, health protection objectives and safety standards.

1.2 Site

The Feed Materials Production Center is located near Fernald, Ohio, a community approximately 20 miles northwest of downtown Cincinnati, as shown in Figure 1. The villages of New Baltimore, Ross and Shandon are all located within a few miles of the plant. Hamilton, Ohio, is approximately 10 miles northeast of the plant.

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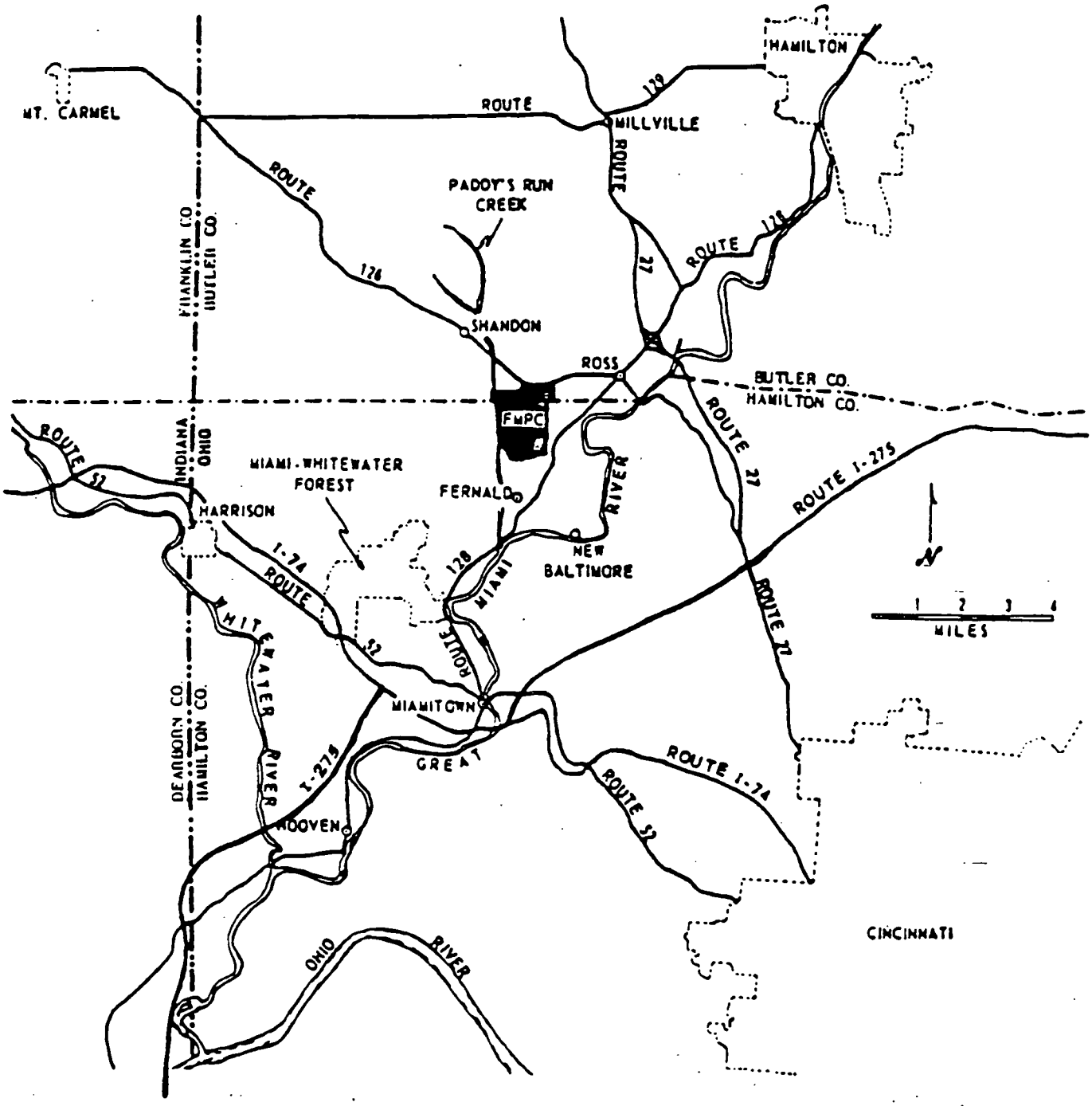

FIGURE 1 LOCATION OF FMPC

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The total area of the site is 1050 acres of which 850 are in Hamilton County and 200 in Butler County, Ohio. Figure 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 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.

1.3 Purpose of Report

The purpose of the FMPC Radioactive Waste Management Plan is to identify the comprehensive program for handling and disposal of waste generated at the Feed Materials Production Center (FMPC). Incorporated into this report are:

- Summary and characterization of existing FMPC waste streams
- Discussion of strategies for management of low-level radioactive waste; low-level radioactive/hazardous mixed wastes; low-level radioactive/toxic mixed wastes; and noncontaminated conventional wastes
- Discussion of schedules and major milestones for waste management activities
- Identification of quality assurance systems for waste management activities.

Important to the FMPC is a strong emphasis upon compliance with federal, state and local environmental safety and health regulations. DOE Orders provide the guidance under which Waste Management programs are planned and implemented.

1.4 Environmental Regulatory Requirements

The environmental regulatory requirements for the FMPC Waste Management Department are outlined in DOE Orders 5480.1A and 5820.2. These orders outline the method by which DOE facilities are to achieve compliance with environmental regulations as required by Executive Order 12088.

1.4.1 Liquid Wastes

Liquid wastes are generated to some degree in every operation at the FMPC. Liquid waste streams are: the process waste stream, sanitary sewage and storm water. The systems for treatment of these liquid wastes are described in Section 3.2.2. The policy for the control and monitoring of liquid wastes that may be discharged is establishd under the Clean Water Act (CWA, Public Law 92-500), and the system for monitoring of liquid waste discharges is established under the National Pollutant Discharge Elimination System (NPDES). Authority to carry out the NPDES Program for the FMPC has been delegated to the Ohio Environmental Protection Agency (OEPA).

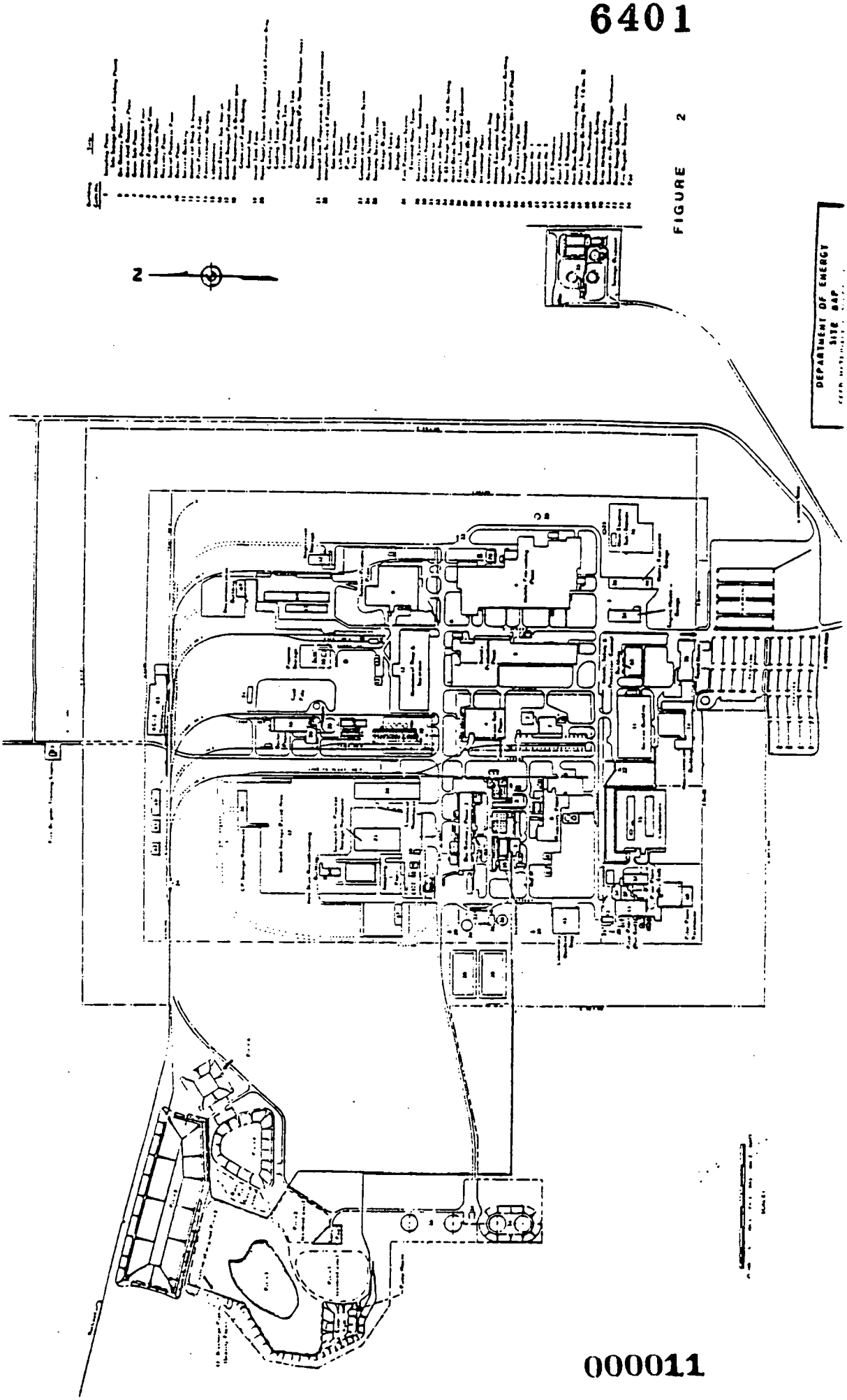

FIGURE 2

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LAYOUT OF PRODUCTION FACILITIES AND SUPPORT BUILDINGS

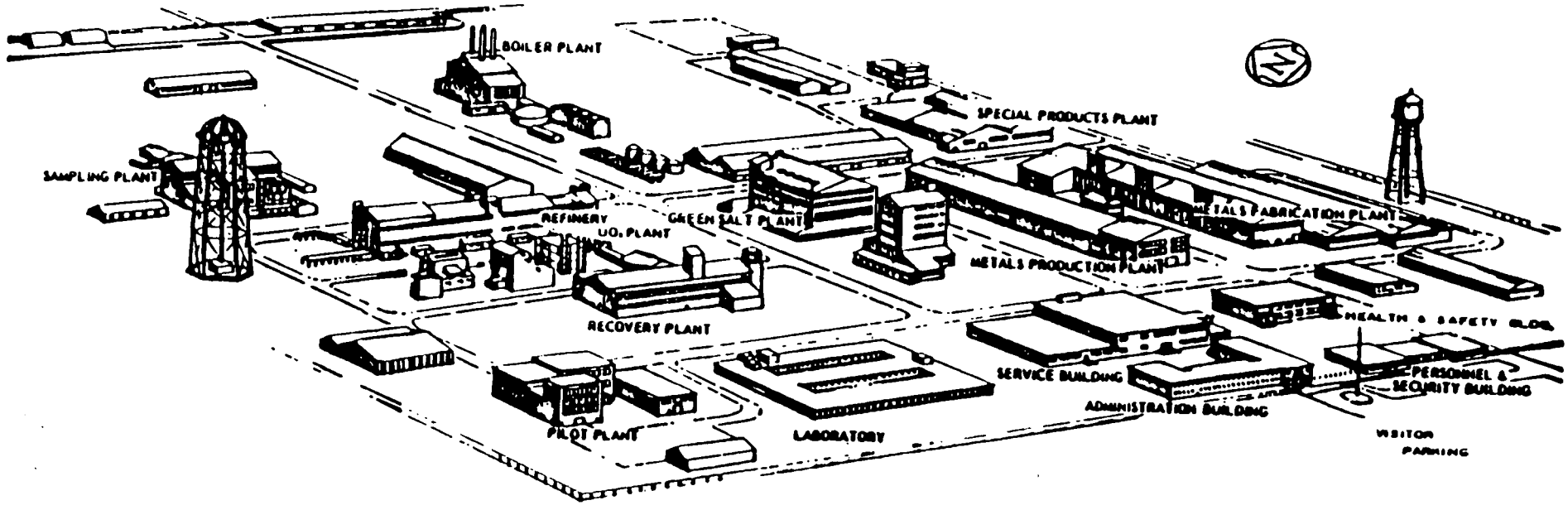

FIGURE 3

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The NPDES Program establishes monitoring methodologies and discharge limits to ensure compliance with the CWA. The current discharge limitations of FMPC liquid effluents are shown in Table I; it should be noted that monitoring of uranium concentrations in liquid effluents is not required under the NPDES Program.

1.4.2 Solid Wastes

Radioactive solid waste management programs for the FMPC are required to be conducted in compliance with DOE Order 5820.2 and 5480.2A. Management of mixed hazardous and toxic wastes are governed under the directives established in DOE Order 5480.2 which incorporates requirements of the Resource Conservation and Recovery Act (RCRA) and the Toxic Substance Control Act (TSCA). Guidance for the management of inactive hazardous waste sites is described in DOE Order 5480.14, which incorporates the substantive requirements of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Handling of non-contaminated conventional wastes is based upon applicable guidelines established by the National Environmental Policy Act (NEPA), the Clean Air Act (CAA), the Clean Water (CWA), and other applicable regulations.

A summary of the major applicable regulations for solid wastes at FMPC is provided in Table II.

1.5 Responsible DOE Area Office

Oak Ridge Operations Office

1.6 Program Administration

WMCO, Inc. under Contract No. DE-AC05-86OR01156, is responsible for all operations, including waste management activities, at FMPC. Responsibility for coordination of activities related to waste management has now been consolidated under a new Waste Management Department.

1.7 Responsible DOE Staff Member

James A. Reafsnyder, Site Manager, DOE

1.8 Funding of Waste Management Activities

Waste Management Activities at FMPC are currently funded under the Office of Waste Management.

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TABLE I

NPDES LIMITS

	Daily Average	Daily Maximum	Sample
Sewage Plant			
BOD	5.0 kg/day (20 ppm)	10.0 kg/day (40 ppm)	Weekly Grab
TSS	5.0 kg/day (20 ppm)	10.0 kg/day (40 ppm)	Weekly 24 Hr. Comp.
Fecal Coliform	1000	2000	Weekly Grab
pH	6.5 - 9.0		Weekly Grab
M.H. #175			
TSS	20 ppm	60 ppm	Weekly 24 Hr. Comp.
NO_3	1500 kg/day	3180 kg/day	Weekly 24 Hr. Comp.
NH_3	28 kg/day	43 kg/day	Weekly 24 Hr. Comp.
Oil & Grease		15 ppm	Weekly Grab
Residual Cl		0.10 ppm	Weekly Grab
pH	6.5	10.0	Weekly Grab
General - Clearwell			
TSS	6.2 kg/day	12.8 kg/day	Weekly 24 Hr. Comp.
Chromium $^{+6}$	.004	.008	Weekly 24 Hr. Comp.
Chromium (Total)	.05	.102	Weekly 24 Hr. Comp.
Iron	.41	.85	Weekly 24 Hr. Comp.

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TABLE I

NPDES LIMITS

	Daily Average	Daily Maximum	Sample
General - Clearwell - (continued)			
Nickel	.124	.256	Weekly 24 Hr. Comp.
Copper	.025	.051	Weekly 24 Hr. Comp.
Storm Sewer Lift Station			
TSS	30 ppm	100 ppm	Weekly Grab
Oil & Grease		15 ppm	Weekly Grab
Storm Sewer Outfall			
TSS	30 ppm	100 ppm	Grab
Oil & Grease		15 ppm	Grab
pH	6.5	9.0	Grab

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TABLE II

ENVIRONMENTAL REGULATORY REQUIREMENTS

Solid Radioactive and Radioactive Mixed Waste

Waste Type	Order/Regulation	Directives
Low-Level Radioactive Wastes	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. Guidelines are provided for characterization, storage and disposal of low-level radioactive wastes, transuranic wastes and wastes contaminated with naturally occurring radionuclides.
Low-Level Radioactive/ Hazardous Mixed Wastes	DOE Order 5480.1A	This Order assures that hazardous/mixed waste generated by DOE-funded activities will be managed in an environmentally acceptable manner.
	DOE Order 5480.2	This Order is derived from the Resource Conservation and Recovery Act (RCRA) of 1976. This Order regulates the generation, transportation, treatment and disposal of hazardous/mixed wastes and regulates facilities disposing of all solid wastes. Source material, special nuclear material, and by-product material are excluded.
	Resource Conservation and Recovery Act (RCRA) Amendments: The Hazardous and Solid Waste Amendments (October, 1984)	The Hazardous and Solid Waste Amendments re-authorize and expand RCRA through 1988, and require EPA to promulgate new regulations. The amendments have two principal purposes: (1) to regulate previously exempt generators and sources; and (2) to regulate land disposal more stringently, eliminating it where possible.
	Ohio Hazardous Waste Management Rules of the Ohio (OAC 3745-54)	OAC 3745-54 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.

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TABLE II

ENVIRONMENTAL REGULATORY REQUIREMENTS

Solid Radioactive and Radioactive Mixed Waste

Waste Type	Order/Regulation	Directives
	DOE Order 5480-14	This Order provides guidance for the management of inactive hazardous waste sites. It incorporates substantive requirements of the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA).**
Low-Level Radioactive/ Toxic Mixed Wastes	DOE Order 5480.1A	This Order assures that hazardous/mixed waste generated by DOE-funded activities will be managed in an environmentally acceptable manner.
	DOE Order 5480.4	This Order incorporates the substantive provisions of the **Toxic Substances Control Act (TSCA)** of 1976. This Order regulates substances considered toxic and includes polychlorinated biphenyls (PCBs) under the **Polychlorinated Biphenyls (PCBs) Rule**, 40 CFR 761.
Noncontaminated Conventional Industrial Waste	National Environmental Policy Act (NEPA)	The NEPA stipulates that the federal government should use all practical means to assure a safe environment with attainment of the widest range of beneficial uses occuring without environmental quality degradation. The NEPA established use of Environmental impact statements to assess possible impact of proposed action/no action options.
	Clean Air Act (CAA)	The CAA regulatory requirements development of air quality standards and monitoring programs for new and existing air pollution sources.
	Clean Water Act (CWA)	The CWA tasked EPA with development of water quality standards and the development of the **National Pollutant Discharge Elimination System (NPDES).** The NPDES System is used to (1) issue permits for the discharge of any pollutants and (2) monitor and report compliance.

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TABLE II

ENVIRONMENTAL REGULATORY REQUIREMENTS

Solid Radioactive and Radioactive Mixed Waste

Waste Type	Order/Regulation	Directives
	Ohio Solid Waste Disposal Act	This Act governs the planning, design, construction, operation and maintenance of solid waste processing and disposal facilities. Excluded from this Act are NPDES-regulated waste and special nuclear material as defined under the Atomic Energy Act (as amended).

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2.0 Description of Waste and Waste Generating Processes

2.1 Waste Process Flow Charts

A flow chart of the FMPC production processes and the major waste streams is shown in Figure 4.

The primary work at the FMPC is the production of purified uranium metal and compounds for use at other DOE sites. In regard to Uranium-235 content, the uranium may be depleted, normal, or slightly enriched. The average content is close to normal.

Uranium production begins with ore concentrates, recycled uranium from spent reactor fuel, or with various uranium compounds. Impure starting material is dissolved in nitric acid and the uranium is extracted into an organic liquid and then back-extracted into dilute nitric acid to yield a solution of uranyl nitrate.

Evaporation and heating convert the nitrate solution to uranium trioxide (UO_3) powder. This compound is reduced to uranium dioxide (UO_2) with hydrogen and then converted to uranium tetrafluoride (UF_4) by reaction with anhydrous hydrogen fluoride. Uranium metal is produced by reacting UF_4 and magnesium metal in a refractory-lined reduction vessel. This primary uranium metal is then remelted with scrap uranium metal to yield a purified uranium ingot which is extruded to form rods or tubes. Sections are then cut and machined to final dimensions. These machined cores are shipped to other DOE sites for canning and final assembly into reactor fuel elements. Previously, small amounts of thorium were processed; however, thorium processing no longer occurs.

2.2 Waste Characterization

Low-level radioactive wastes generated at the FMPC include wet filter cake, sludge, neutralized raffinate, dry slag, ash, metallic uranium fines, oxides, and miscellaneous contaminated trash. The chemical composition of the wastes is quite varied, but major components are metal oxides and nitrates of copper, aluminum and iron; calcium oxide; free uranium and uranium in various oxidation states; magnesium fluoride; and traces of free magnesium.

The uranium content of the various waste streams varies from about 0.0005 grams U/gram of solids in the neutralized refinery raffinate and slag leach filter cake to 80-100% U in descarded metal and oxides. The precent enrichment in ^{235}U is 0.2% to 1.1% in the contaminated waste materials.

More complete descriptions of the waste characteristics can be found in a report, "Waste Characteristics and Quantities - Low-Level Waste Processing and Storage System - FMPC," prepared for U. S. DOE by NLO, Inc. A summary of major waste characterization is provided in Tables III - VI.

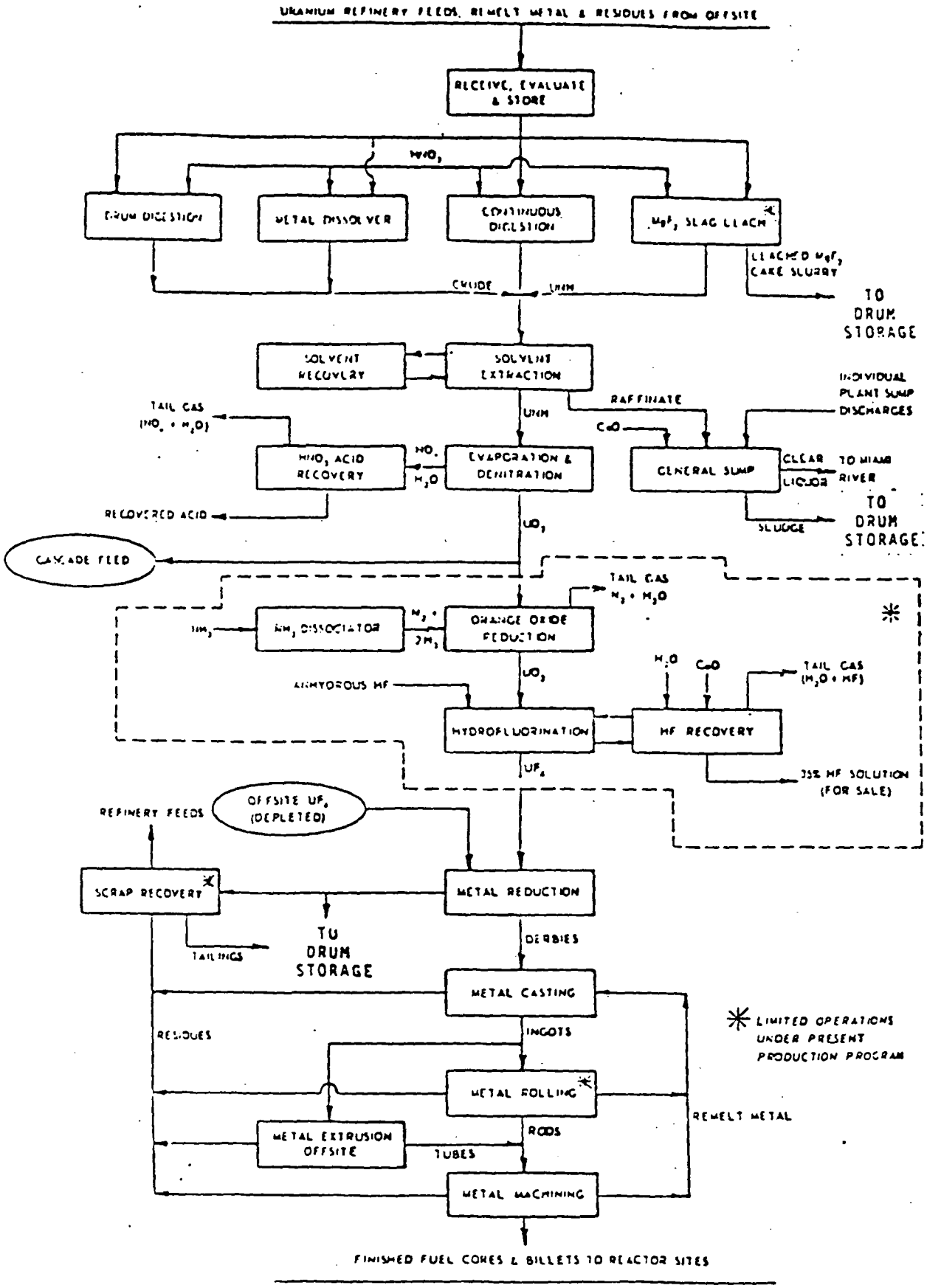

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FIGURE 4 Schematic Diagram of the FMPC Process

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TABLE III*

LOW-LEVEL WASTE ESTIMATE
CURRENT OPERATIONS

Based on 700 lbs per drum
50 weeks per year

WASTE STREAM (NONBURNABLE)	RANK	MT/YR	LBS/YR	DRUMS/YR	DRUMS/DAY
Depleted MgF_2 Slag	1	3830	8,426,000	12,037	48
Slag Leach Filter Cake - Enriched and Normal	2	2370	4,740,000	6,771	27
Neutralized Raffinate	3	700	1,540,000	2,200	9
Dust Collector Residues - Depleted	4	405	891,000	1,273	5
Scrap Salts, High Fluoride	5	260	572,000	817	3
Wet Sump or Filter Cake (Non-Oily - Non-Halide)	6	215	473,000	676	3
General Sump Sludge	7	120	264,000	377	2
Scrap U_3O_8, High Fluorides	8	110	242,000	345	1.3
RMI Residues	9	80	176,000	251	1.0
Off-Spec. UF_4	10	55	121,000	172	0.7
Non-Briquettable Chips and Turnings for Oxidation	11	40	88,000	126	0.5
Furnace Solidified Salts Non-Chloride	12	35	77,000	110	0.44

*Source: Adapted from LLWPSS Design Criteria and Tabulated Waste Streams, D. B. Katz Letter of Transmittal 4/19/85.

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TABLE III*

LOW-LEVEL WASTE ESTIMATE
CURRENT OPERATIONS

Based on 700 lbs per drum
50 weeks per year

WASTE STREAM (NONBURNABLE)	RANK	MT/YR	LBS/YR	DRUMS/YR	DRUMS/DAY
Incinerator Ash	13	35	77,000	110	0.44
Furnace Solidified Salts - Chloride	14	15	33,000	47	0.19
Rockwell Cleanings and Spills	15	15	33,000	47	0.19
Dry Crushed Slag from Pot Blowouts	16	10	22,000	31	0.13
MgF_2 plus 20 Mesh (Including Dirty Prill)	17	10	22,000	31	0.13
Unfired Reduction Charges and MgF_2 from Liner Cave-ins	18	10	22,000	31	0.13
MgO & Mg Zirconate from Crucible Cleanout		2	4,400	6	0.03
Nonburnable Contaminated Trash		2	4,400	6	0.03
Metal Spills and Extruder Ends High Impurity Metal		1	2,200	3	0.01
Contaminated Bricks, Soil, Gravel, Ceramics		1	2,200	3	0.01

*Source: Adapted from LLWPSS Design Criteria and Tabulated Waste Streams, D. B. Katz Letter of Transmittal 4/19/85.

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TABLE III*

LOW-LEVEL WASTE ESTIMATE
CURRENT OPERATIONS

Based on 700 lbs per drum
50 weeks per year

WASTE STREAM (NONBURNABLE)	RANK	MT/YR	LBS/YR	DRUMS/YR	DRUMS/DAY
Partially Oxidized Metal Oxidation Feed		1	2,200	3	0.01
Bad Reduction (No Derby)		1	2,200	3	0.01
Contaminated Mg		1	2,200	3	0.01
Solid Metal with Imbedded Steel Other Than Cores		0.5	1,100	1.5	0.006
Contaminated Non-Burnable Filter Cartridges, Asbestos, Etc.		0.5	1,100	1.5	0.006
Glass Sample Bottles		0.3	660	0.94	0.004
Samples from Lab		.2	440	0.62	0.003
				TOTAL DRUMS PER DAY =	99

*Source: Adapted from LLWPSS Design Criteria and Tabulated Waste Streams, D. B. Katz Letter of Transmittal 4/19/85.

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TABLE IV*

LOW-LEVEL WASTE ESTIMATE
CURRENT OPERATIONS

Based on 50 weeks per year

WASTE STREAM (BURNABLE)	RANK	MT/YR	LBS/YR	LBS/DAY	FT^3/YR	DRUMS/YR
General Waste - Process Area (33 Dumpster loads/week)	1	327	791,000	2,260	175,800	27,050(1)
Wood	2	218	480,000	2,400	32,000	4,000 units
Oils - Plant 6 Decanting	3	57	126,000	360	2,100	300(2)
Filters (3)	4	12	27,000	N/A	4,500	695(1)

(1) Based on packing rate at 6.5 ft^3/drum
(2) Based on packing rate at 7.0 ft^3/drum
(3) Based on 1 bag change/yr for 75 units

*Source: Adapted from Preliminary Feasibility Report FMPC Contaminated Waste Incinerator Facility, S. K. Scheel, 9/85.

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TABLE V*

NONCONTAMINATED WASTE ESTIMATE
CURRENT OPERATIONS

Based on 50 weeks per year

WASTE STREAM (BURNABLE)	RANK	MT/YR	LBS/YR	LBS/DAY	FT^3/YR	DRUMS/YR
Non-Process Area General Waste (Blue Area)	1	61	135,000	386	18,000	2,770(1)
Construction Materials	2	57	125,000	500	15,625	2,404(1)
Cafeteria Waste	3	38	82,500	330	18,350	2,825(1)
Other Non-Process Area Packaging Materials	4	18	40,000	160	6,670	N/A

(1) Based on packaging rate of 6.5 ft^3/drum

*Source: Adapted from Preliminary Feasibility Report FMPC Contaminated Waste Incinerator Facility, S. K. Scheel, 9/85.

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TABLE VI*

NONCONTAMINATED WASTE ESTIMATE
CURRENT OPERATIONS

Based on 50 weeks per year

WASTE STREAM (NONBURNABLE)	MT/YR	LBS/YR	LBS/DAY	FT^3/YR	DRUMS/YR
Rubbish, Type "1", currently assigned to Sanitary Landfill	30	66,000	264	13,200	2,030(1)

(1) Based on packing rate of 6.5 ft^3/drum

*Source: Adapted from Preliminary Feasibility Report FMPC Contaminated Waste Incinerator Facility, S. K. Scheel, 9/85.

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3.0 Waste Management Strategy

3.1 Identification and Location of Waste Management Strategy

The location of waste treatment and waste storage facilities at FMPC are shown in Figure 5. Figure 6 is a plan of the production area, an aid in locating various production plants and waste treatment facilities within the area.

3.2 Description of Waste Treatment Facilities

Solid and liquid radioactive wastes are generated at FMPC. The facilities for handling the wastes are discussed below.

3.2.1 Solid Wastes

Noncombustible solid wastes generated at FMPC are drummed for off-site shipment or discarded in a storage pit. The uranium content of these wastes is regarded as below economic recovery levels.

Contaminated combustible residues, sewage sludge, graphite and oils are treated as process residues and incinerated in various facilities. The uranium values are recovered from the generated ash in the Recovery Plant or the Refinery.

Filter cake, from Plant 8, resulting from the filtration of raffinates and sludges accumulated in General Sump tanks, is now stored in drums awaiting processing for off-site disposal.

3.2.2 Liquid Wastes

Liquid wastes are generated to some degree in every operation at FMPC. The three branches of the liquid waste stream are: process waste, sanitary sewage, and storm water. The system to control the discharge of radioactive wastes to the environment through any of the branches of the liquid waste system is shown in Figure 7.

3.2.2.1 Process Waste

3.2.2.1.1 Plant Treatment Facilities

All of the major process areas have individual treatment facilities capable of pretreating the liquid wastes that are peculiar to that particular process step. In these plant treatment units, virtually all of the radioactive materials in the wastes are removed as filter cake processed for recovery of U values. The filtrate produced is sent to the General Sump.

3.2.2.1.2 A simplified flow diagram of the General Sump is shown in Figure 8.

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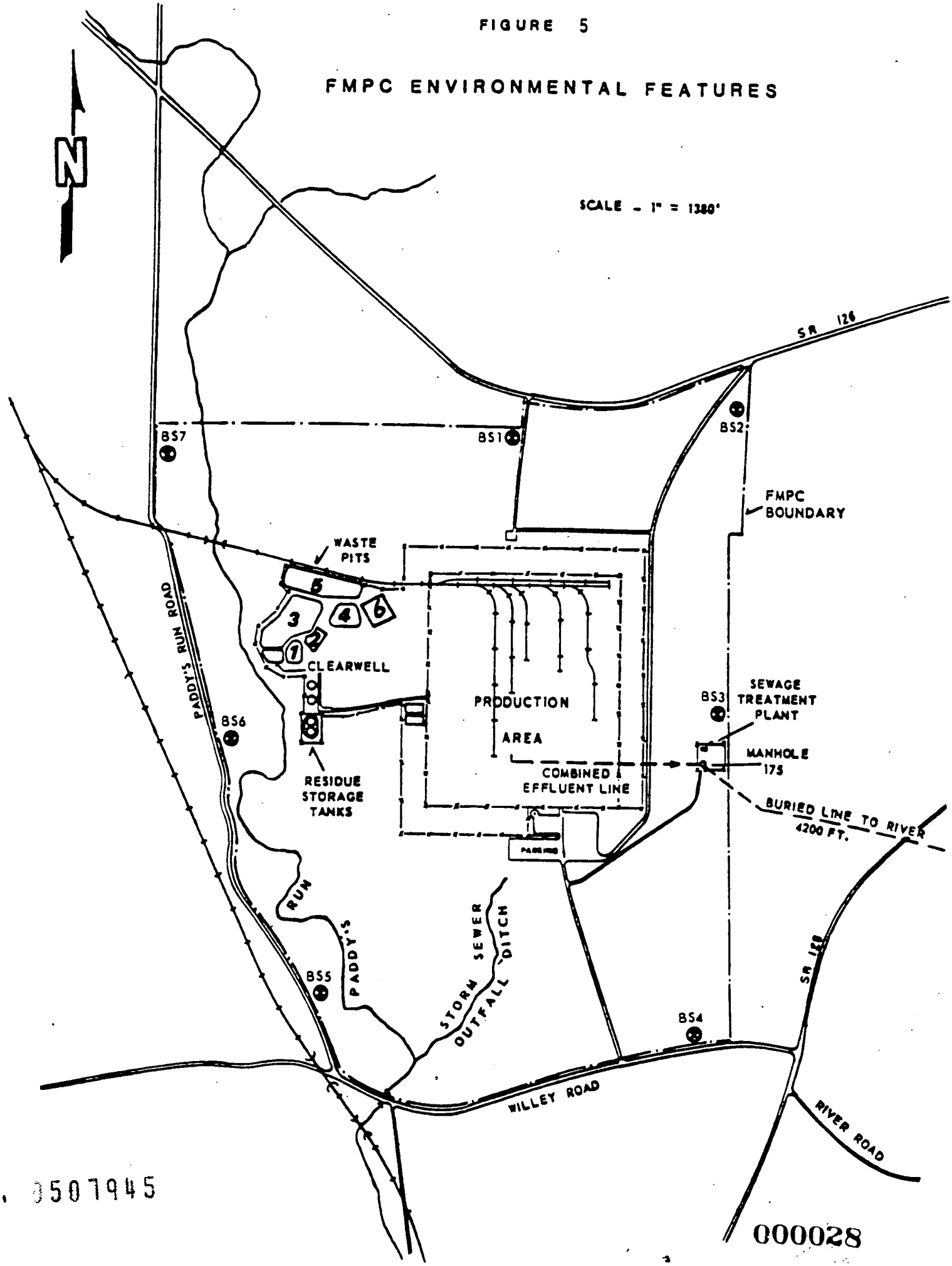
FIGURE 5

FMPC ENVIRONMENTAL FEATURES



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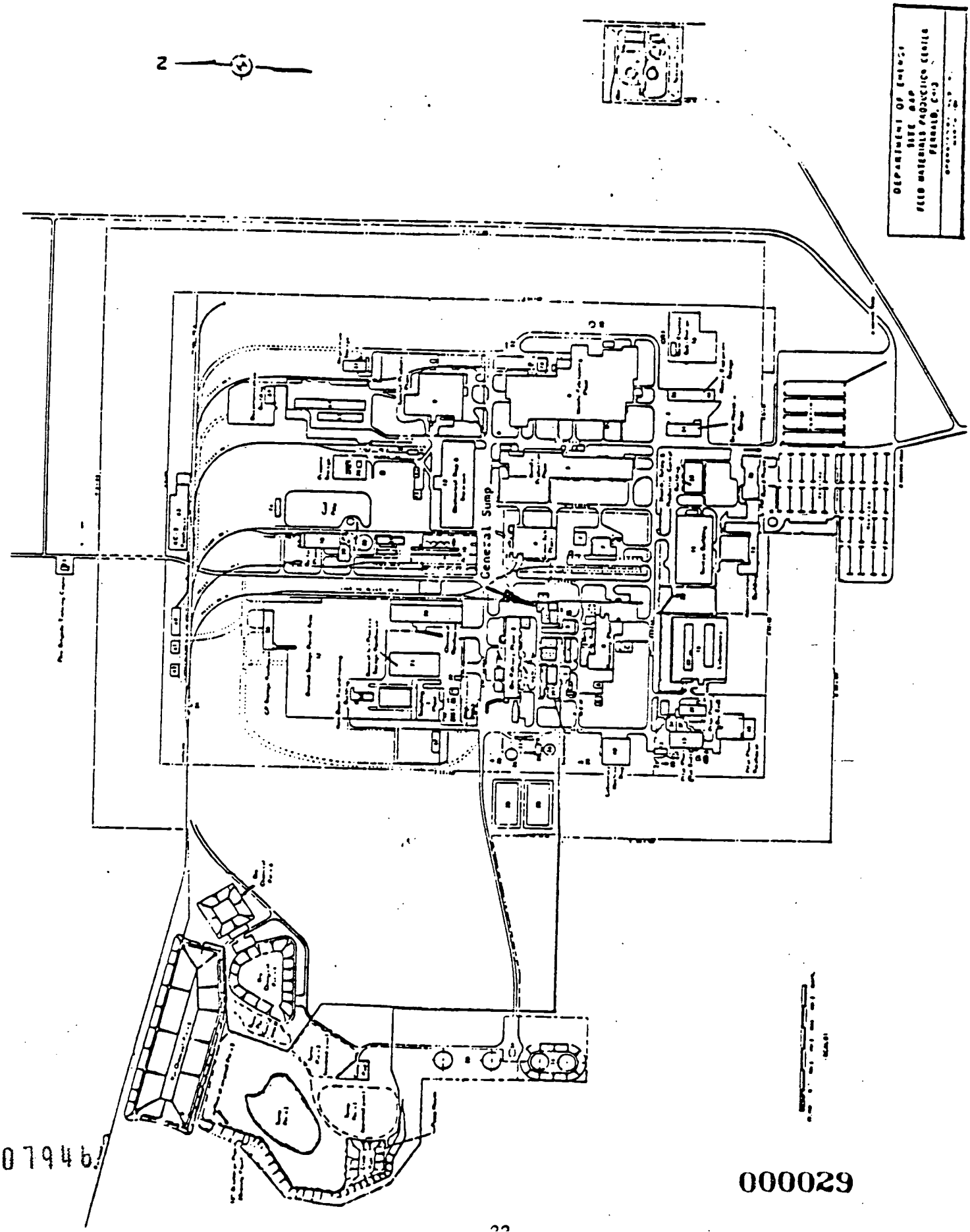
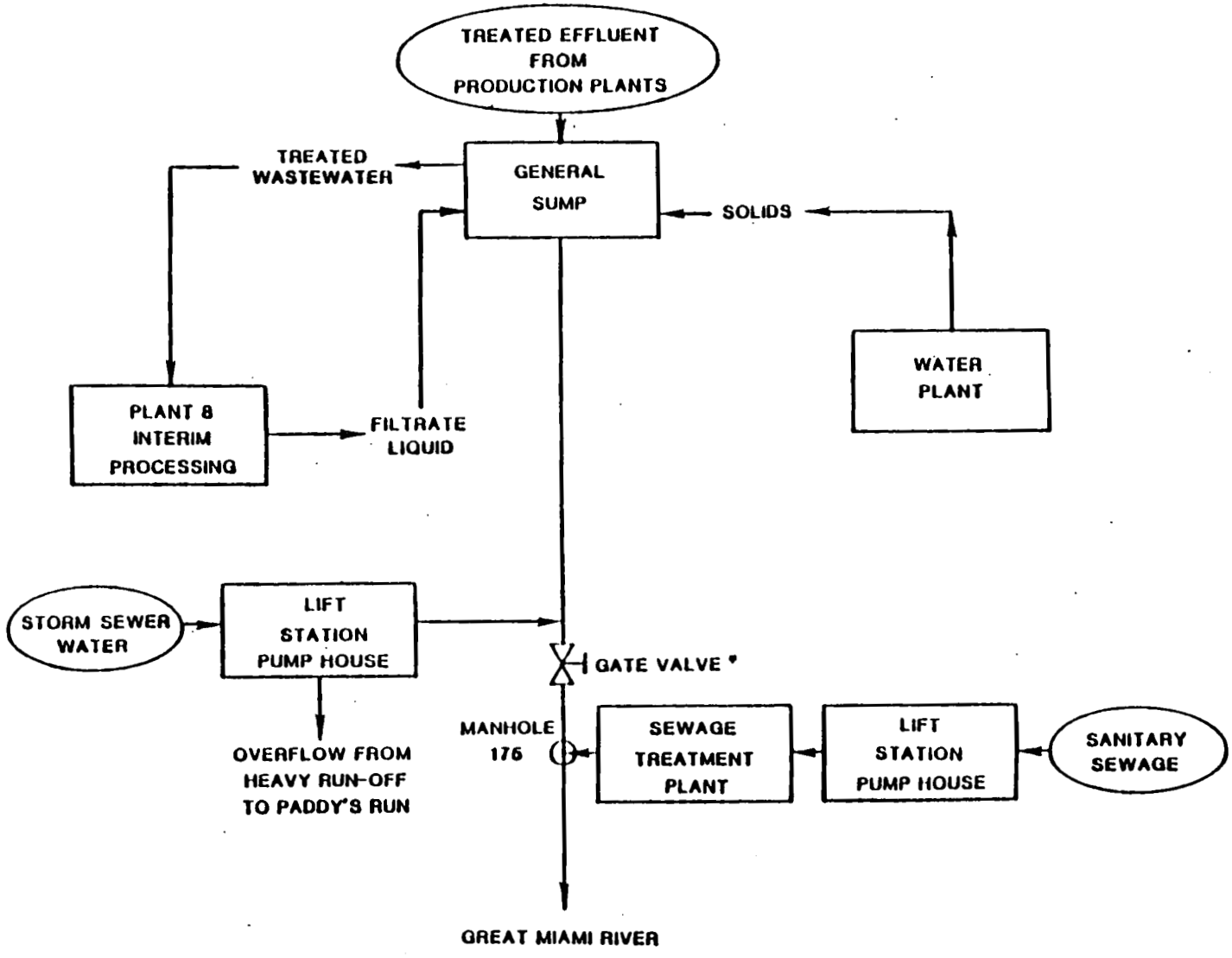

DEPARTMENT OF ENERGY
SITE MAP
FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
General Sump

LIQUID WASTE STREAMS
FIGURE 7



★ STORM SEWER WATER CAN BE DIVERTED TO THE GENERAL SUMP IF URANIUM IS DETECTED.

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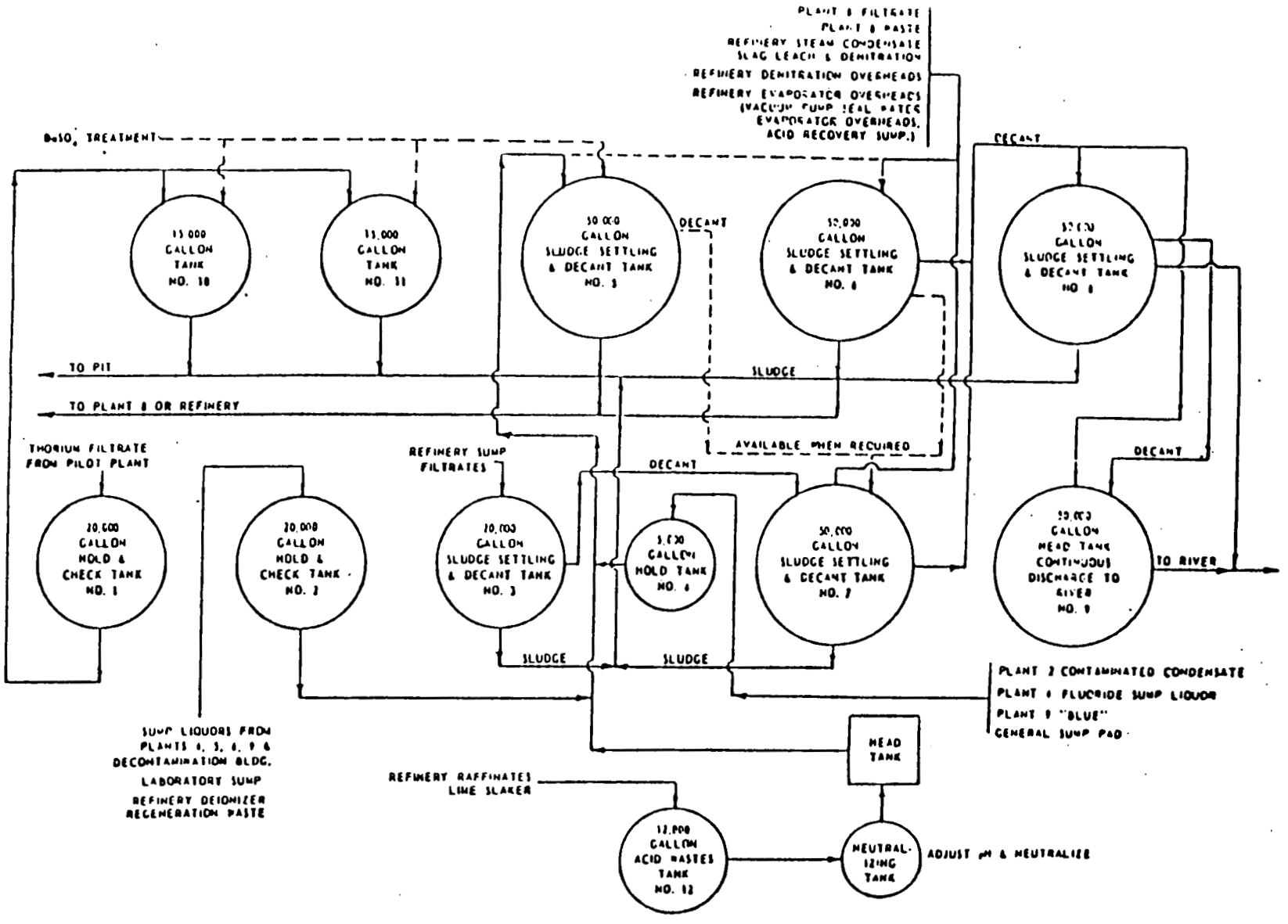

FIGURE 8 General Sump Flow Diagram

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Physically the General Sump is a collection of vertical tanks of various sizes, pumps, piping, and valves established on a controlled pad. It is designed to facilitate the transfer and storage of liquid wastes within the tankage complex and the discharge therefrom, and the addition of various reagents and coagulation aids. Provisions have been made for ease of sampling, both grab and continuous. Controls are simple but adequate. The pad is equipped with its own sump and drainage trenches to handle any leaks or accidental spills.

The process wastes from the various production plants and service facilities are received at the General Sump, checked for SS content, and segregated or selectively combined as required. If a certain waste exceeds discard specifications, it is sent to the Refinery for recovery of SS values.

Acidic raffinates from the refinery extraction process are segregated, neutralized with CaO, and then pumped to Plant 8 for solids removal by filtration on rotary vacuum filters.

Most other uranium-bearing wastes are adjusted for the pH with calcium oxide to obtain a maximum precipitation of radioactive material, and settled and decanted in successive steps prior to discharge of the supernatant liquor to the river. The settled sludges are also transferred to Plant 8 for filtration.

Before discharge from the General Sump to the Wet Chemical Waste Pit or to the Miami River all liquid wastes are sampled to determine concentrations and total content of radioactive materials.

3.2.2.1.3 Plant 8

Waste slurries, including neutralized refinery raffinate, General Sump slurry, and slag leach slurry, are filtered on rotary vacuum filters in Plant 8. The filter cake solids are currently stored in drums on controlled storage pads for eventual off-site shipment for disposal. The solids-free filtrate is pumped to Pit 5 for subsequent discharge to the Great Miami River.

3.2.2.1.4 Chemical Waste Pit No. 5

The Chemical Waste Pit (Pit 5) is a rubber lined settling basin lined settling basin located

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rectangular in shape, with a surface area of approximately 3.6 acres and a capacity of approximately 21,000,000 gallons. It is now filled.

The filtrate liquid from the Plant 8 rotary vacuum filters is pumped to wet chemical Pit No. 5 which overlows through an effluent control tower near the western end of the pit into a clearwell from which it is pumped to the Miami River.

3.2.2.2 Sanitary Sewage

The sanitary waste collection and treatment system is completely separated from the process waste system. Uranium contamination occurs only through the plant laundry and showers; however, most of the uranium is removed in the normal sanitary sewage treatment and captured in the sludge, which is dried and roasted in Plant 8 for recovery of uranium values.

3.2.2.3 Storm Water

It it possible for uranium to enter the storm water system through accidental spills or pickup of settled particulates from stack emissions. Control and recovery of spills is made possible through diversion facilities provided, however, contamination from site runoff is a major source of uranium in the combined plant effluent.

3.3 Waste Management Strategies

The overriding strategy for handling contaminated and non-contaminated wastes at the Feed Materials Production Center is the minimization of waste products coupled with the cost effective disposition of the wastes in a manner that is environmentally sound. Inherent in waste management efforts is the intent to meet or exceed applicable health and safety standards, environmental pollution control standards, and ALARA standards.

Waste Management Strategies are presented for the handling and disposition of Low-Level Radioactive Wastes, Low-Level Radioactive/Hazardous Mixed Wastes, Low-Level Radioactive/Toxic Mixed Wastes, and Noncontaminated Conventional Industrial Wastes.

The relationship of management strategies for future management of waste materials at the FMPC is illustrated in Figure 9.

3.3.1 Low-Level Radioactive Wastes

The Liquid and Solid Low-Level Radioactive Wastes identified in Section 3.2 are no longer discarded to on-site storage pits. (Those waste materials previously discarded into storage pits are discussed in Section 4.0). Instead, low-level radioactive wastes are treated and prepared for off-site disposal.

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FIGURE 9

FUTURE FMPC WASTE MANAGEMENT

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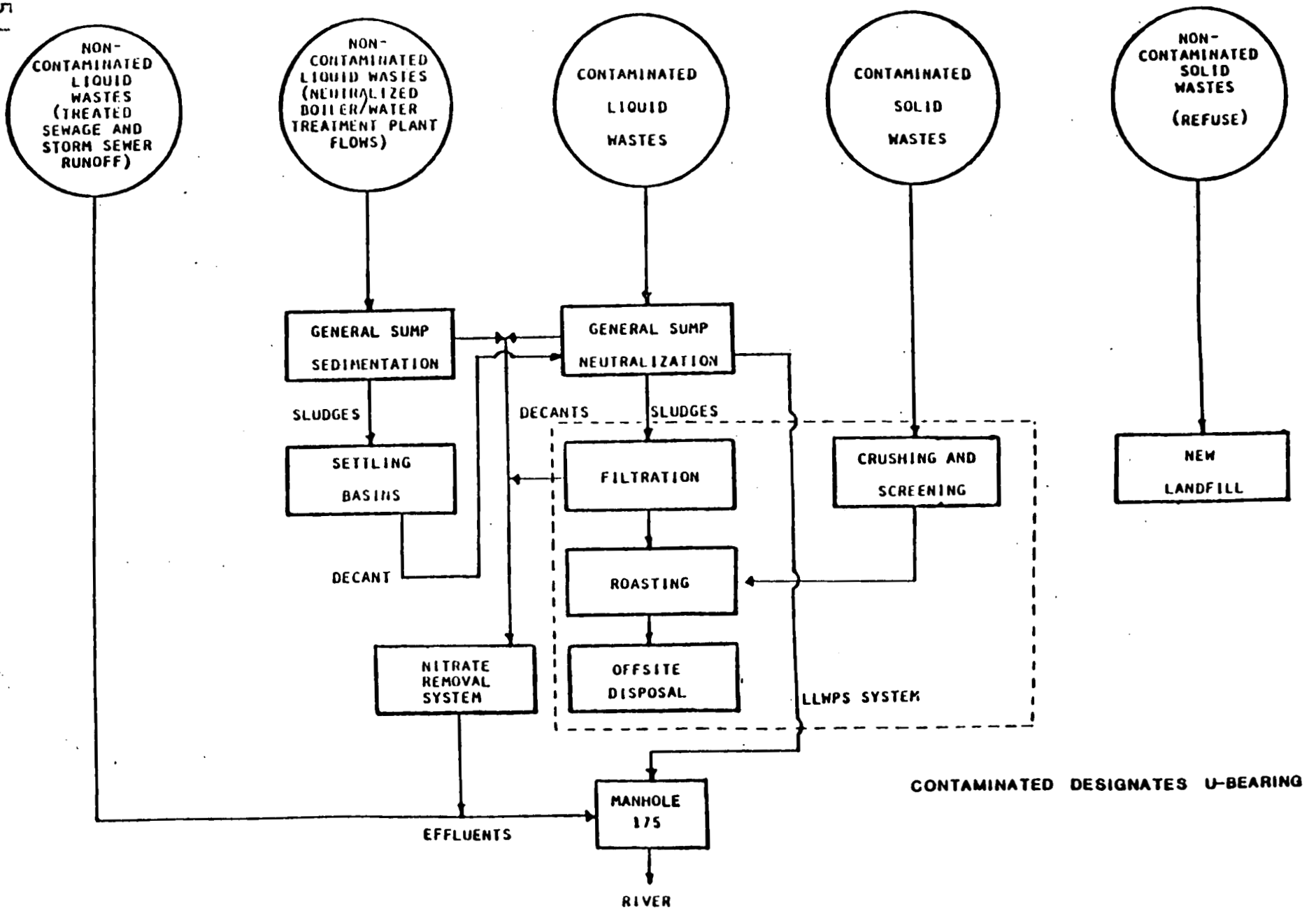

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The sources of Production Wastes in the FMPC are identified in Figure 10. As shown in this Figure, wastes from the various chemical and metallurgical plants are collected and treated at the General Sump.

As reported in the FMPC Environmental, Safety and Health Management Plan (NLCO 2037 Special UC-11) of November, 1985, five major waste volume minimization techniques are employed at the Feed Materials Production Center, and are:

- Segregation
- Material Substitution
- Process Innovation
- Mechanical Volume Reduction
- Recycle/Reuse

Management of Low-Level Radioactive Wastes at FMPC is principally guided by DOE Order 5820.2. Its requirements address the management of radioactive waste, waste byproducts and radioactively contaminated surplus facilities. The requirements of DOE Order 5820.2 stipulate the proper waste disposal, waste acceptance, disposal site selection, disposal site operation and disposal site closure/post-closure.

Current plans for operation of FMPC Low-Level Radioactive Waste Management involve the segregation, preparation, and packaging of low-level wastes currently generated and under short-term storage (inventory).

Plans for processing and packaging of currently generated low-level radioactive waste are presented under the Low-Level Waste Processing and Shipping System (LLWPS); this project identifies facilities and equipment necessary for processing of wastes into a form suitable for off-site shipment and receipt at the Nevada Test Site. Functional flows through the LLWPS system are identified in Figure 11.

Prior to the completion of the LLWPS system in FY-1988, an Interim LLWPS system will be used to process wet waste streams into a form suitable for off-site shipment and receipt at burial sites. The Interim LLWPS system will be used to package for off-site shipment those low-level radioactive wastes currently stored in drums and on controlled storage pads.

Materials processed under the Interim LLWPS System include contaminated metals slag and raffinates, contaminated magnesium fluoride, contaminated wood pallets, contaminated soil, contaminated construction rubble, and other contaminated low-level waste materials. Preparation and shipment of contaminated metals (ferrous and copper scrap) also fall under the Interim LLWPS System.

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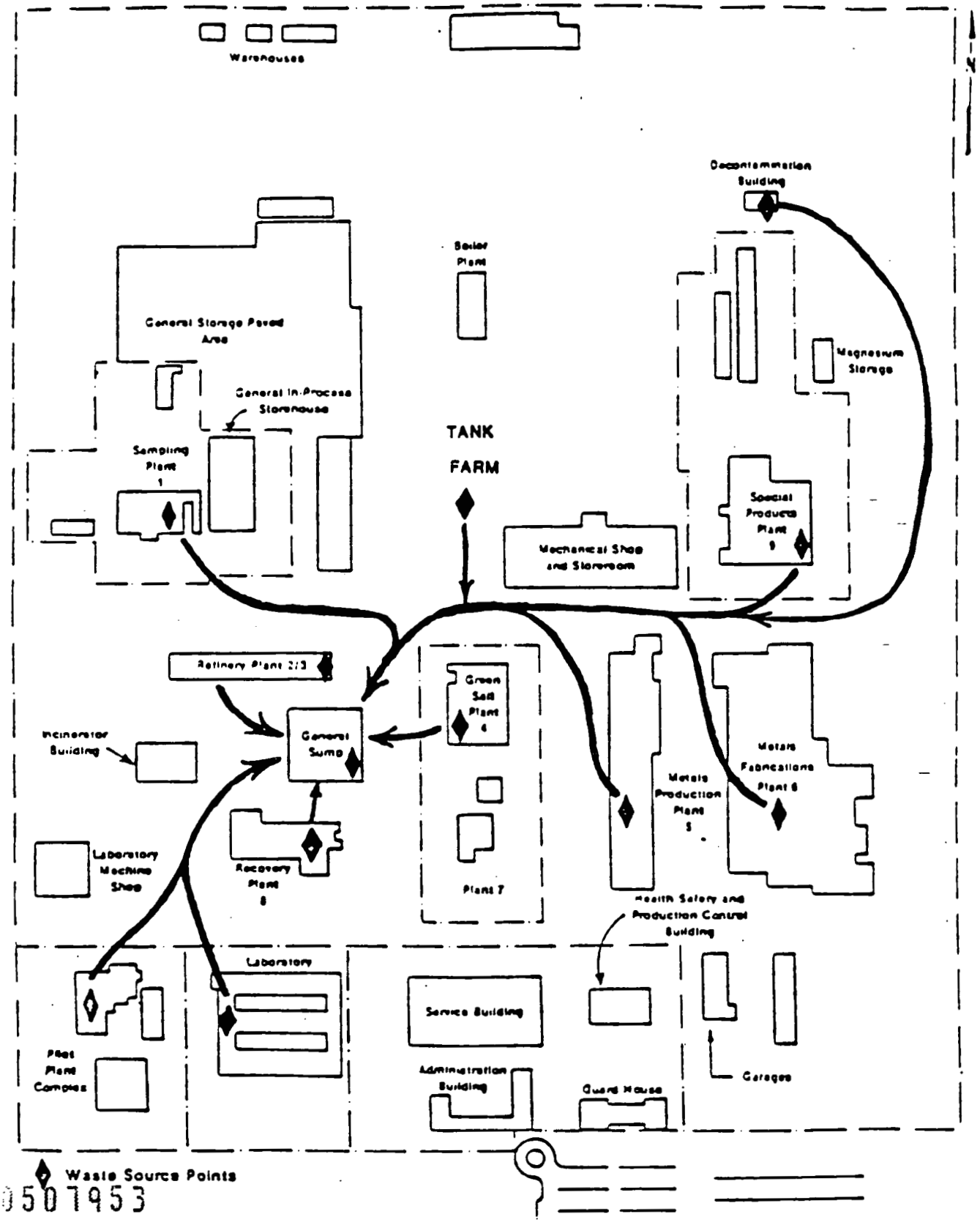
FIGURE 10

Sources of Production Wastes

COLLECTED & TREATED IN THE GENERAL SUMP



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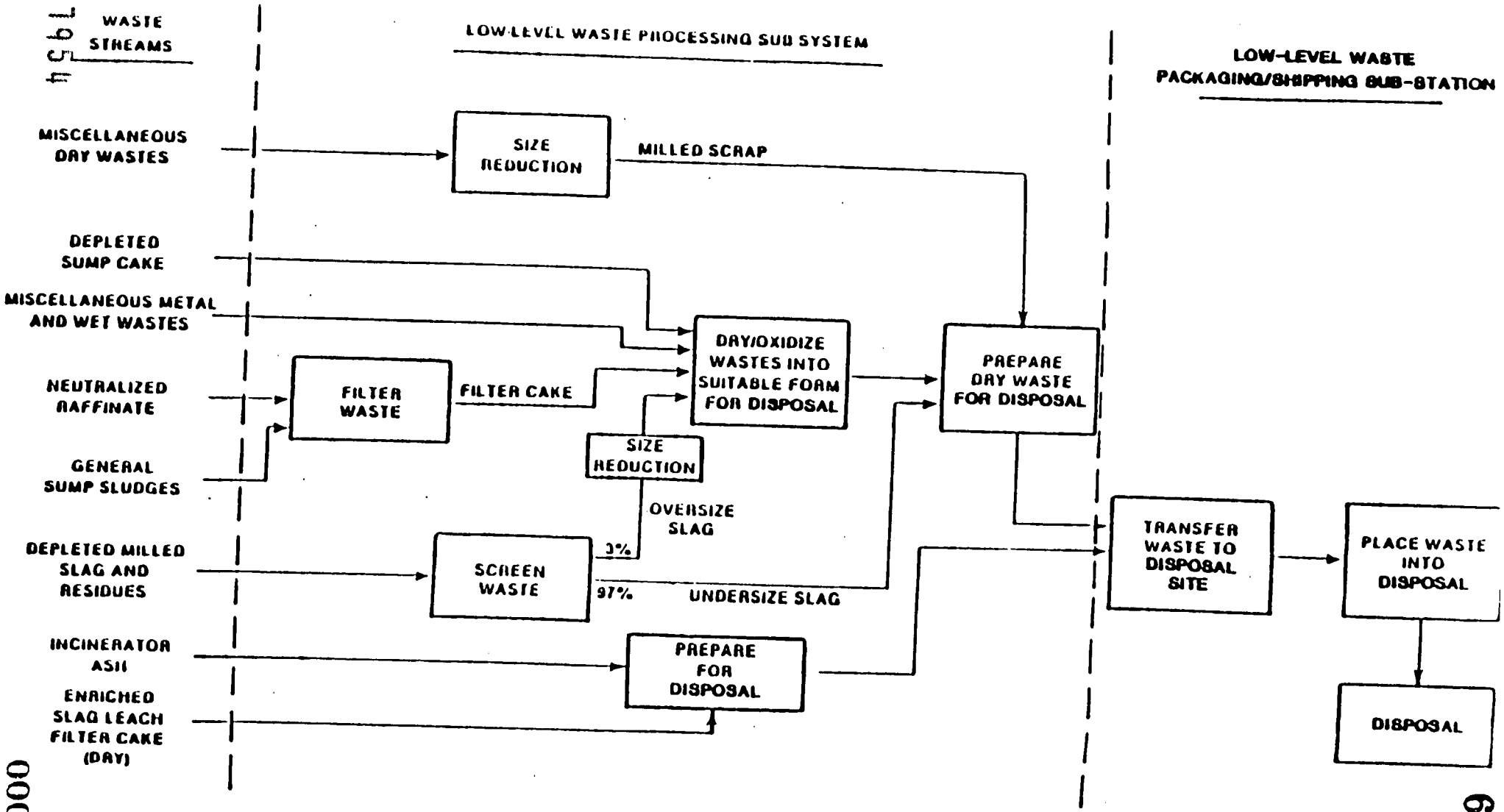

FIGURE 11

Functional Flow for FMPC Low-Level Waste Processing and Shipping System

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Inventory of low-level radioactive waste materials as of January 31, 1986 and to be handled in the Interim LLWPS System is shown below:

Drummed Magnesium Fluoride .....5,029 drums

Depleted Low-Level Waste .....10,311 containers
1 gallon to 55-gallon drums

Drummed Slag Leach Filter Cake ....4,892 drums
(VBB-001)

Drummed Neutralized Raffinate ....12,134 drums
(VVB-002)

Copper Scrap ..... 1,500 tons

Wood Pallets/Boxes .....16,000 units

Waste Oil ..... 1,500 drums

Construction Rubble ..... TBD (2Q86)

3.3.2 Low-Level Radioactive/Hazardous Mixed Wastes

Low-Level Radioactive/Hazardous Mixed Wastes are a small fraction of total FMPC waste management activities. Volumes and characterizations of FMPC Low-Level Radioactive/Hazardous Mixed Wastes are provided in Tables VII and VIII.

There are three (3) main approaches to handling and disposition of these materials at the FMPC. First, all wastes of this type are received and handled, treated, and stored in containers compatible with the materials being stored. All containers are properly labeled, stacked and maintained for safe operation of the container storage facility.

Second, where possible low-level radioactive/hazardous mixed wastes are chemically treated to minimize their hazardous qualities. This is currently being accomplished in a plant test for the conversion of barium chloride to barium sulfate.

Third, Radioactive/Hazardous Mixed Wastes which cannot be converted to non-hazardous forms are stored until final disposition can be arranged. Characterization and volumes of wastes suitable for hazardous waste incineration have been identified. FMPC waste materials have been placed on the list of feed sources for the Oak Ridge Operation TSCA Incinerator which was described as becoming operational in 1986. Alternative disposition arrangements are also being made should the start-up of the Oak Ridge, Tennessee TSCA incinerator prove unacceptably long.

TABLE VII

RADIOACTIVE/HAZARDOUS WASTES HANDLED AT THE FMPC FACILITY

Waste Name	EPA Waste No.	Existing Inventory	Annual Generation
Spent Solvent (1,1,1-Trichloroethane)-Tank	F002	136,874 lbs.	1,100 lbs/year
Spent Solvent (1,1,1-Trichloroethane)-Container	F002	20,000 lbs.	---
Spent Eutectic Salts (BaCl, KCl, NaCl)	D005	35,000 lbs.	36,000 lbs/year*
Spent Solvent (methylene chloride, perchloroethylene)	F001	---	1,300 lbs/year*

* Material generated at RMI, Ashtabula, Ohio.

Source: RCRA Part B Application, FMPC, November, 1985.

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TABLE VIII

BASIS FOR HAZARDOUS DESIGNATION

WASTE NAME	HAZARD	PROPERTIES						
		Mol. Wt.	b.p.	autoign. temp.	vap. press. (mm Hg)	sol. in water (mg/l)	flash point	density
SPENT SOLVENT (1,1,1-Trichloroethane)	Toxic	133.42	74.1°c	-	100 mm @ 20.0°c	950 @ 25°c	none	1.3492 @ 20°/4°c
SPENT SALT (Barium Chloride)	Toxic	208.27	1560°c	-	-	-	-	3.856 @ 24°c
SPENT SOLVENT (Methylene Chloride)	Toxic	84.94	40.1°c	1224°F	380 mm @ 22°c	20,000 @ 25°c	-	20°/4°c
(Perchloroethylene)	Toxic	165.85	121.20°c	-	15.8 mm 22°c	150 @ 25°c	none	15°/4°c

Source: RCRA Part B Application FMPC, November, 1985.

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3.3.3 Low-Level Radioactive/Toxic Mixed Wastes

The FMPC has drums of solvent still bottoms and sludges that are slightly contaminated with uranium and PCBs. Arrangements have been made to place these wastes onto the waiting list of feed materials for the Oak Ridge, Tennessee TSCA Incinerator. In the event that use of the TSCA Incinerator becomes unacceptably long, arrangements are also being made to consider on-site incineration of these waste materials.

3.3.4 Conventional Industrial Wastes

Noncontaminated Industrial Wastes are handled through incineration at the FMPC or sanitary landfill disposal. Volume and characterization of FMPC Noncontaminated Burnable and Non-burnable wastes can be found in Tables V and VI.

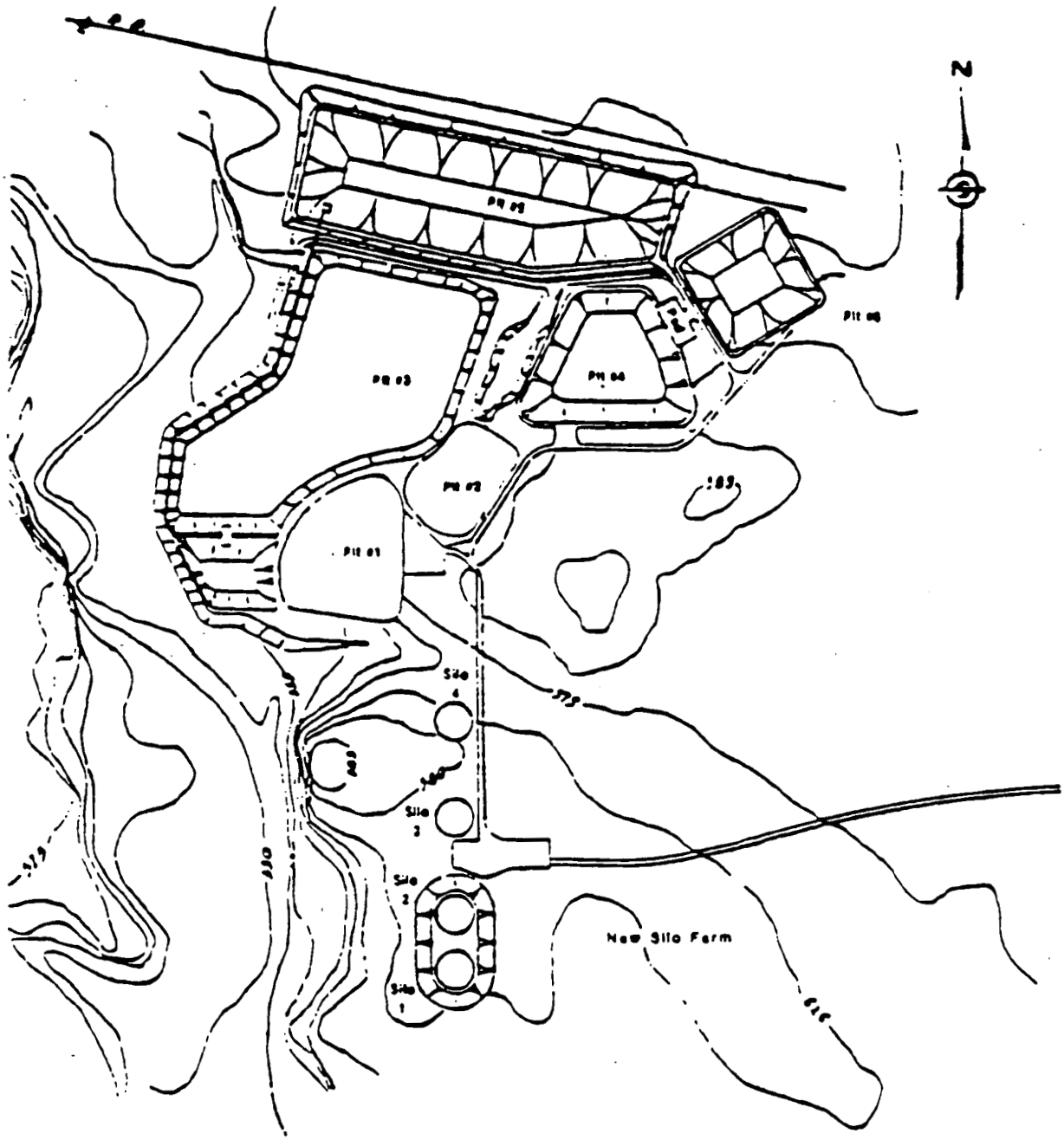
4.0 Waste Storage Facilities

The radionclides encountered at FMPC are basically uranium, thorium, and the radioactive daughters of each. The processing of small quantities of recycle compounds does introduce TRU radionclides such as plutonium and neptunium, as well and fission fragments like ruthenium, technetium, etc. Technetium and ruthenium are present in FMPC effluent in detectable quantities but always below DOE concentration guides for water in uncontrolled areas. Other radionclides are present in only trace quantities and, therefore, do not cause any probelms or require any additional treatment in the handling of wastes.

The three types of facilities at FMPC used for long-term storage of wastes are the Chemical Waste Pit, the K-65 Tanks and the Metal Oxide Tanks. Short-term storage of waste materials employs metal drums and holding tanks for interim storage prior to off-site shipment. These impoundments and silos are considered waste storage and not permanent disposal facilities beause of their design, the nature of the waste contained and their location. The locations and current status of long-term and short-term waste storage facilities are shown in Figure 12 and Table IX.

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 infiltration of surface and groundwaters.

FIGURE 12 FMPC SOLID WASTE STORAGE FACILITY LAYOUT



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

TABLE IX

FMPC WASTE STORAGE FACILITY STATUS

Structure	Type	Volume (Million ft^3)	Status	Contents
Pit 1	Dry	1.08	Retired, covered	U-Bearing-Wet & Dry Solids
Pit 2	Dry	0.351	Retired, covered	U-Bearing-Wet & Dry Solids
*Pit 3	Wet	6.12	Retired, covered	U-Bearing - Mixed Sludges, Wet
*Pit 4	Dry	1.43	Being Retired	Slags, Abrasive, Metals, Dry[1]
**Pit 5	Wet	3.10	Removed from Sedimentation Service	U-Bearing - Mixed Sludges, Wet
Pit 6	Dry	0.375	50% Full; Removed from Active Use	Slags, Misc. Materials, Wet & Dry
Silo 1	Wet	0.134	Full	High Radium Tailings, Dry
Silo 2	Wet	0.134	Full	High Radium Tailings, Dry
Silo 3	Dry	0.134	Full	Low Radium Metal Oxides, Dry
Silo 4	Dry	0.134	Empty	- - -

[1] Limited to disposal of construction rubble, crucibles and contaminated asbestos as of March 11, 1985.

* Clay Lined
** Rubber Lined

Because of the above-background concentrations of uranium in off-site wells, studies are in progress to characterize groundwater around the waste storage pits and determine options for Remedial Action, if any. Additional information on this may be found in section 5.2.6.

4.1 Low-Level Radioactive Waste

There are three principal types of solid wastes generated at the present time at FMPC. They are:

A) Depleted Uranium Residues - Process residues of depleted uranium (0.142 - 0.44% ^{235}U) that are not suitable for remelt or containing uranium values in amounts not economical for recovery.

B) Contaminated Ceramics - slighly contaminated refactories from production electric furnaces discarded during repairs.

C) General Refuse - various types of trash, generally noncombustible, which have become slightly contaminated through incidental contact with radioactive substances.

The Solid Waste Information Management System (SWIMS), now includes all radioactive wastes stored at FMPC owned by DOE.

The majority of radioactive waste at the FMPC is low-level radioactive waste. The FMPC production operations generate approximately 8000 metric tons of low-level radioactive waste per year (see Table III). About 6000 tons of this waste will be transferred to the Nevada Test Site (NTS) for shallow-land burial. The primary wastes in the low-level waste streams include: magnesium fluoride reduction slag, various waste stream filter cakes, sump contents, and other contaminated wastes. These low-level radioactive wastes must be processed to a liquid-free, nonreactive form suitable for emplacement as received by the disposal facility.

Low-level wastes that are to be prepared for off-site shipment are stored in DOT-specification 17H steel 55-gallon drums. Low-level wastes which are stored in drums that are not 17H will be inspected prior to preparation for off-site shipment and, if necessary, overpacked using 16-gauge 83 gallon steel overpacks.

Metallic scrap is stored on controlled storage pads prior to sorting for disposal. Contaminated construction rubble is also stored on storage pads prior to emplacement of the rubble into wooden shipping boxes for shipment to NTS; the boxes used for interim storage and shipping of construction rubble have been specially built to meet DOT specifications as a strong, tight container.

Contaminated wooden pallets are also stored on storage pads prior to inspection and disposition.

4.1.1 K-65 and Metal Oxide Tanks

There are two (2) K-65 tanks and two (2) metal oxide tanks, each of which has a capacity of 134,000 cubic feet and is constructed of post-tensioned concrete.

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The inventory of material stored in the **K-65 tanks** is as follows:

Description	Total Waste (Lbs.)	S.S. Content (Lbs.)
Australian Ra Cake	380,451	606
K-65 (Radium bearing from pitchblende ores)	19,004,675	24,121
TOTAL	19,385,126	24,727

Estimated volume of material stored in the **K-65 tanks** is 195,000 cu.ft.

This material was formerly the property of the African Metals Corporation and was stored under a lease agreement with DOE at FMPC. Under a recent settlement, DOE has assumed ownership and responsibility for this material.

The inventory of material stored in the **Metal Oxide Tank** No. 3 is as follows:

Description	Total Waste (Lbs.)	S.S. Content (Lbs.)
Metallic Oxides (Residues from ore concentrates)	3,989,288	39,627

Estimated volume of material stored in **Metal Oxide Tank** No. 3 is 134,000 cu.ft. The metal Oxide Storage Tank No. 4 has never been used and remains empty.

4.1.2 Chemical Waste

Six (6) chemical waste pits have been constructed at the FMPC. These pits are identified by a number based on the chronological sequence of their construction.

Pits No. 1 through 4 vary in depth from approximately 12 feet to 27 feet. Pits 1 and 2 were excavated into the existing clay-bearing soil, and then partially lined with additional clay. The wall and bottoms of Pits 3 and 4 were lined with 1.5 to 2 feet of impervious blue clay. Pits No. 5 and 6 have a rubber membrane liner.

Chemical Pits No. 1 and 2 were used as dry pits for mixed solids. These pits have been retired and covered.

Chemical Waste Pit No. 3 was used as a retention or settling basin for liquid effluent and slurries, also contained the solids dripped out in the settling process. This pit has been retired and covered.

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Chemical Waste Pit No. 4 is used as a dry pit for construction rubble, crucibles and contaminated asbestos.

Chemical Waste Pit No. 5 was used as a settling basin in accumlating solids dropped out in the settling process. This pit is full and does not accept slurries; used now for liquid only.

Chemical Waste Pit No. 6 is no longer used (as of 3/11/85).

When a pit was filled with waste, it was covered with earth as soon as the contained material had been stabilized and was capable of supporting the earth burden.

Well samples were analyzed and indicated the presence of certain contaminants in levels slightly higher than background concentrations, thus providing an indication that the natural clay liners used in Pit Nos. 1 through 4 were not completely impervious; because of this an engineering evaluation of possible groundwater pollution was undertaken by Dames and Moore. A report of the groundwater study is available in the Department of Energy Feed Materials Production Center Groundwater Study Task C Report prepared by Dames & Moore for NLO, Inc., July 1985.

4.2 Low-Level Radioactive/Hazardous Mixed Wastes

Radioactive/hazardous mixed waste production, management, treatment, and storage activities occupy a small portion of the FMPC facility. Table VII provides a list of all radioactive/hazardous wastes handled at the FMPC and includes the name of the waste, EPA waste number, and the estimated quantity on-site and generated annually. Table VIII provides the representative properties and hazard classification for each of the hazardous waste materials handled on-site.

As can be seen after examination of Table VII, radioactive/hazardous waste management, treatment, and storage activities occupy only a small portion of total FMPC radioactive waste management operations.

On-site facilities for the storage of radioactive/hazardous waste include:

1) KC-2 Warehouse - curbed container storage facility with storage space for seventy-two 55 gallon drums.

2) Pilot Plant Warehouse - curbed container storage facility with storage space for one hundred eighty 55 gallon drums.

3) Pilot Plant Tank Farm - diked tank storage facility with two 10,000 gallon stainless steel storage tanks.

On-site facilities for the disposal of radioactive/hazardous waste include use of Waste Pit No. 4. On-site facilities for chemical and physical treatment of hazardous waste are located at the Pilot Plant.

All hazardous wastes generated, handled, treated and stored at the FMPC facilities are compatable with the containers the materials are stored in. All containers are properly labeled, stacked and maintained for safe operation of the container storage facility.

Detailed information on the operation of the FMPC radioactive/hazardous waste program is available through the RCRA Part B Permit Application prepared for the U. S. Department of Energy FMPC Facility, Fernald, Ohio (November 1, 1985).

4.3 Low-Level Radioactive/Toxic Mixed Wastes

The FMPC has sixty-one 55 gallon drums of solvent still bottoms and sludges that are slightly contaminated with uranium and PCBs. These still bottoms and sludges, resulting from a campaign to recycle spent solvent generated in the CIP/CUP Program, are no longer generated at the FMPC.

PCB-containing capacitors are periodically removed from service at the FMPC. These capacitors and articles used in their removal and handling (rugs, clothing, gloves) are stored in drums in the covered, curbed storage area. Nonradioactive PCB wastes are shipped to an EPA-approved disposal site. PCB wastes containing low levels of radioactivity are retained in storage for eventual destruction in a DOE toxic waste incinerator.

The FMPC is looking toward elimination of bulk quantities from the plant to achieve compliance with 40 CFR 741 - the polychlorinated biphenyl (PCBs) Rule.

4.4 High-Level Radioactive Wastes

No high-level wastes are stored at FMPC.

5.0 Schedules and Major Milestones for Waste Management Activities

See Figure 13 and Table X for a summary of milestone and budget schedules for radioactive waste management projects.

5.1 Management of Liquid Waste

A major source of uranium in the combined liquid effluent stream is the storm sewer system. A new integrated water pollution control system is planned, which will remove this source of uranium discharge and treat other nonradioactive pollutants in the effluent stream. Figure 14 illustrates the new water pollution control system.

Facilities will be provided to:

- Treat by biodenitrification, the effluent stream from the General Sump and the Clearwell, which is made up of neutralized effluents from all in-plant process waters, Water Treatment Plant and the Boiler Plant blowdown water.

FIGURE 13

MAJOR MILESTONES

TITLE	Starting Date	Completion Date
I. WASTE MANAGEMENT OPERATIONS		
a. Install and test out mag. fluoride dust suppressant system.		
b. Initiate workoff of stored MgF_2 (approximately 1500 bbls)		
c. Begin repackaging of VVB-001 materials currently stored on-site.		
d. Install and test out dust suppressant system at raffinate cake repackaging system.		
e. Initiate construction of loading and staging facility for LLW.		
II. CONTAMINATED SCRAP METAL MANAGEMENT		
a. Issue RPF to process 8,000 tons (+/-) contaminated scrap metal.		
b. Receive proposals on processing scrap metals.		
c. Complete review of proposals.		
d. Issue contract and notice to proceed on scrap metal processing.		
e. Complete processing of contaminated scrap metal.		
f. Issue notice to proceed with transporting processed scrap metal to ORGDP for size reduction and stock piling.		
g. Begin shipping of scrap metal to ORGDP.		
h. Complete shipping of scrap metal to ORGDP.		
i. Ship four barrels of contaminted scrap copper to Quadrex, Inc. for decontamination study/analysis.		

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

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FIGURE 13

MAJOR MILESTONES

TITLE	Starting Date	Completion Date
j. Submit final report on decontamination of contaminated scrap copper to HQ.		
k. Continue shredding/packaging/storing of contaminated scrap copper.		
III. K-65 SILOS MANAGEMENT		
a. Issue subcontract for structural stability analysis of silos.		
b. Interim report from subcontractor due to FMPC on structural analysis.		
c. Submit final report and recommendations on structural stability analysis to DOE.		
d. Receive final report on radon monitoring and recommendations from ORNL/Mound Labs.		
e. Prepare letter of recommendation(s) for remedial actions to DOE.		
f. Continue monitoring of K-65 silos.		
g. Drill monitoring wells at K-65 silos (to ascertain containment integrity of existing concrete silos).		
h. Prepare and submit report to DOE-HQ on K-65 silos integrity/ recommendations for long-term actions.		
IV. RADIOACTIVE WASTE STORAGE FACILITIES		
a. Issue RFP for characterize pits, silos, and adjacent areas.		
b. Proposal conference.		

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

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TITLE	Starting Date	Completion Date
c. Receive proposals.		
d. Award contract and notice to proceed on pit, silos, and adjacent areas characterization study.		
e. Subcontractor completes field investigation on pits, silos, and adjacent areas.		
f. Submit final draft of investigation analysis to DOE-HQ.		
g. Initiate feasibility study(s) for remedial actions.		
h. Issue final draft feasibility study(s).		
i. Initiate NEPA documentation on pits, silos, and adjacent areas.		
j. Complete NEPA documentation on pits, silos, and adjacent areas.		
k. Issue record of decision on pits, silos, and adjacent areas.		
l. Issue conceptual design report for final disposition of silo/pit contents.		
m. Complete design for final disposition of silo/pit contents.		
n. Begin construction for final disposition of silos/pits contents.		
o. Begin operations.		
p. Complete operations/remedial actions.		
V. MIXED WASTE MANAGEMENT		
a. Obtain representative samples from contaminated solvent storage tanks and submit for analytical lab analysis.		

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

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TITLE	Starting Date	Completion Date
b. Issue laboratory analysis (contaminated solvent).		
c. Issue RFP for disposition of contaminated solvents.		
d. Issue contract and notice to proceed for final disposition of contaminated solvents.		
e. Complete workoff of contaminated solvents.		
f. Initiate feasibility study for solvent recovery system.		
g. Complete feasibility study for solvent recovery system.		
h. Submit conceptual design for solvent recovery system.		
i. Initiate title I/II solvent recovery system.		
j. Complete title II design solvent recovery system.		
k. Begin operations solvent recovery system.		
VI. CONTAMINATED WASTE OIL MANAGEMENT		
a. Obtain representative samples of contaminated waste oils for laboratory analysis.		
b. Develop action plan for treatment/disposal/reuse of contaminated oils and submit report to ORO.		
c. Issue RFP for disposition of contaminated waste oil.		
d. Receive proposals for final disposition of contaminated oils.		
e. Issue contract and notice to proceed for final disposition of contaminated oils.		

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

FIGURE 13

MAJOR MILESTONES

TITLE	Starting Date	Completion Date
f. Complete workoff of contaminated oils.		
g. Initiate routine workoff of contaminated oils.		
VII. WASTE MANAGEMENT PLAN		
a. Submit outline and scope of waste management plan to ORO for review and comment.		
b. Submit first draft of WMP to ORO for review and comment.		
c. Submit final draft WMP to DOE-HQ.		
d. Submit annual update to ORO.		
VIII. WASTE STREAM CHARACTERIZATION		
a. Identify waste streams and submit report to ORO.		
b. Complete characterization of waste streams and submit final report to DOE-HQ.		
IX. SURPLUS FACILITIES MANAGEMENT		
a. Initiate surplus facilities program.		
b. Identify surplus facilities inventory and submit first draft report to ORO.		
c. Begin characterization of sites.		
d. Complete characterization of surplus facilities sites and submit report to ORO.		

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

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FIGURE 13

MAJOR MILESTONES

TITLE	Starting Date	Completion Date
X. DOE ORDER 5820.2		
a. Submit revised Implementation Plan to HQ per Appendix 1.	This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.	See reference letter from cover sheet for current FY-86 commitment dates.

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TABLE X

WASTE MANAGEMENT BUDGET - PROGRAM AR

OPERATING COST

(Dollars in Thousands)

Operating - AR	ES&H Designation	1985	1986	1987	1988	1989	1990	1991	1992
LLWP Operations									
Salaries/Wages/Payroll Tax/OH									
Fuel/Energy Consumption									
Packaging									
Shipping - NTS									
Disposal									
Subtotal:									
Contaminated Waste Incinerator									
Waste Segregation									
Contaminated Scrap Metal									
Contaminated Scrap Cooper									
Contaminated Solvent									
RMI Waste Processing									
Silo No. 3 Disposition									
Subtotal:									
Total Operations:									

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

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TABLE X

WASTE MANAGEMENT BUDGET - PROGRAM AR

OPERATING COST

(Dollars in Thousands)

Operating - AR	ES&H Designation	1985	1986	1987	1988	1989	1990	1991	1992
Studies									
RI/FS									
Pit Residue Studies									
Waste Oil Disp. Study									
Remedial Action									
CD Contaminated Waste Incin.									
K-65 Studies									
Subtotal:									
Maintenance/Monitoring									
Pit Area Maintenance									
Road Resurfacing									
Int. Pit Stabilization									
Subtotal:									

This report responds to an FMPC contract commitment from NLO. An updated Waste Management Plan will be issued to DOE by WMCO in September 1986, as negociated with DOE. The September submittal will incorporate all Waste Management commitment dates that were deleted from this submittal.

See reference letter from cover sheet for current FY-86 commitment dates.

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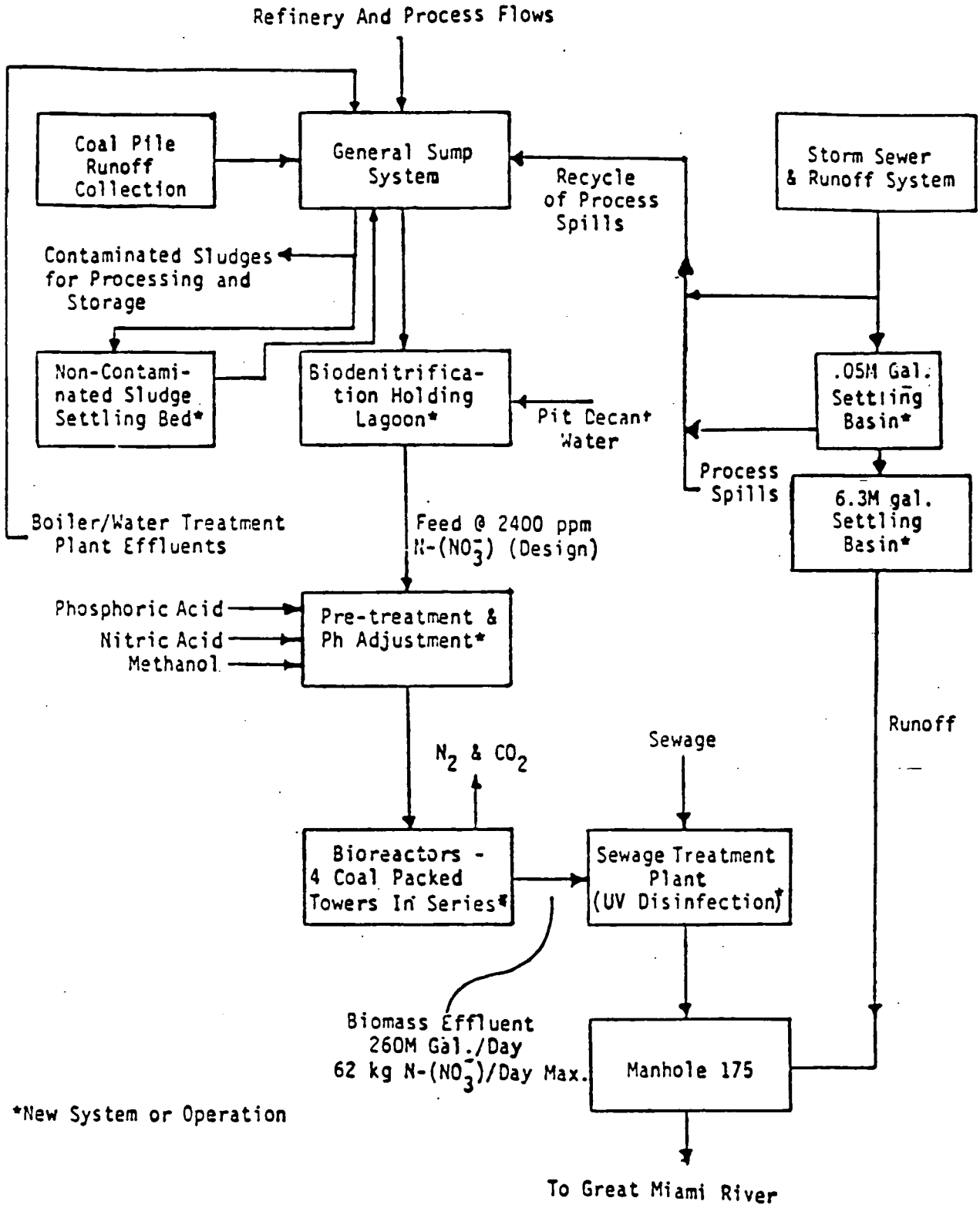
FIGURE 14

FMPC - INTEGRATED WATER POLLUTION CONTROL SYSTEM



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- Impound and settle all rainwater falling within the production area of the FMPC, and process this with treated effluents for final disposition to the Great Miami River. The facility will consist of a 50,000 gallon lagoon which will hold for recycle to the General Sump any inadvertent chemical spill within the production area; a 2.5 million gallon settling basin for storm-water retention; and necessary pumping station to transfer and mix the settling basin effluent with the effluents from Pit No. 5.

- Collect and treat acidic water drainage from the Boiler Plant coal pile. A concrete collection trench system, sump, neutralization bed and pumps for transferring the effluent to the General Sump will be included.

- Reduce the chlorine residuals from the FMPC Sewage Treatment effluent by replacing the existing chlorination system with an ultraviolet disinfection unit.

5.2 Management of Solid Wastes

DOE Order 5820.2 addresses the management of radioactive waste, waste byproducts and radioactivity of contaminated surplus facilities. Its requirements must be met for proper waste disposal, waste acceptance, disposal site selection, disposal site design, disposal site operation and disposal site closure/post-closure.

Overall objectives for management of low-level radioactive solid wastes at FMPC include: (1) processing, shipping and disposal of wastes as they are generated; (2) maintenance and improvement of existing waste storage facilities; and (3) achieval of final disposal of wastes currently stored at FMPC.

5.2.1 Past Operations

During past FMPC operations (1952-1983), contaminated solids and slurries with concentrations of uranium and thorium too low to permit economic recovery, were placed in dry scrap pits, wet chemical waste pits, or above-ground concrete storage silos. The existing waste storage facilities consist of four (4) dry scrap pits (Pit Nos. 1, 2, 4 and 6), two (2) wet chemical pits (Pit Nos. 3 and 5), and four (4) concrete storage silos.

Waste Pit Nos. 1, 2, and 3 are now covered and are not in use. Pit No. 4 is nearly full and is restricted to the disposal of contaminated construction rubble, graphite and packaged asbestos. Pit No. 5 was filled to capacity with solids during FY 1983 and is reserved for treatment of treated process waters which flow through Pit No. 5 prior to being combined with the sewage treatment plant effluent and discharged to the Great Miami River. Pit No. 6 is approximately 50% full with solids and is presently inactive.

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The four (4) concrete storage silos were constructed in the early 1950's. Silos No. 1 and 2 contain radium bearing residues (labeled K-65) which were originally the property of Afrimet-Indussa (formerly African Metals Corporation) but are now owned by the Department of Energy (DOE). Silo No. 3 contains dry cold metal oxides and is full. Silo No. 4, also designated for cold metal oxide storage, was never utilized and remains empty.

5.2.2 Current Operations

Current plans for the handling of low level radioactive solid wastes involve the segregation and packaging of waste now being generated for shipment to offsite disposal, and the packaging and preparation of previously-generated low-level radioactive waste solids.

Due to the limited amount of storage space on-site and the desire to minimize the amount of waste materials stored on-site, a new system is being developed for handling currently-generated low-level waste (LLW) solids; this system, entitled the Low-Level Waste Processing and Shipping System (LLWPS) (FMPC Project No. 86-OR-AR-1), is comprised of two (2) phases: the Interim LLWPS and the LLWPS for FY 1988.

The Interim LLWPS will utilize existing facilities and equipment at the FMPC to process and package low-level radioactive wastes into a form suitable for off-site shipment and disposal at the Nevada Test Site (NTS).

The LLWPS will convert all sludges and solids with above background levels of uranium to a uniform dry solid suitable for packaging, shipping, and disposal. The treatment paths for the various streams involved are diagrammed in Figure 10. Dry slag and scrap will be crushed and screened to the proper size for packaging. VVB-002 will be fed to a rotary kiln. The kiln will be permitted in accordance with EPA regulations.

Liquids from the filtration step will proceed to the biodenitrification system for treatment and discharge. A scrubber, NO_x destructor, and dust collectors will control atmospheric emissions from the kiln. The Biodenitrification system and kiln will be permitted in accordance with EPA regulations. An incinerator for burnable materials will convert these wastes to an ash compatible with off-site disposal. Emissions equipment will be provided and installed in accordance with applicable permit terms and conditions.

The LLWPS equipment will be located in existing Plant 8 and a new annex on the south side of Plant 8. Equipment will include a kiln, crusher, screen, filters, tanks, box furnaces, mill, conveyor, incinerator, and emissions control equipment.

5.2.3 Magnesium Fluoride Conversion

An operations analysis of processing depleted uranium residues is in progress to determine the feasibility of reducing burdens on waste management and storage systems. This process, developed by NLO's Development Department (Technical Division), would convert waste slag (magnesium fluoride) to a salable product (calcium fluoride), thereby removing the largest waste stream from FMPC production operations. A pilot run to test the process was completed during July, 1984. Although laboratory bench tests proved highly effective in converting magnesium fluoride, plant-scale tests were less successful, indicating little economic feasibility for attempting the conversion using existing in-plant equipment. A reevaluation of the conversion process cost with considertion for disposal costs included will be undertaken.

5.2.4 K-65 Residue Disposition

Selection of the optimum mode for stabilization or disposition of the radium-bearing K-65 residues will require a number of studies to assess the state of the materials, tank condition, material retrieval methods, and radon abatement methods. Studies currently underway or planned are outlined below:

- Radon Monitoring - A program to determine radon flux from the K-65 silos and to monitor ambient radon concentrations in the area was initiated 1Q85.

- Structural Analysis - An analysis of the structural integrity of the K-65 silos will be performed to assess their fitness for continued storage of the residues.

- Groundwater Monitoring - Installation of groundwater monitoring wells to assess groundwater impacts of the stored K-65 wastes is being planned as part of the overall FMPC groundwater monitoring plan.

5.2.5 Management of Mixed Hazardous Waste

DOE Order 5480.2, effective on December 13, 1982, establishes hazardous waste management procedures for the FMPC. Facilities were constructed during FY 84 and FY 85 for the storage and treatment of the small quantities of radioactive mixed hazardous wastes at the FMPC. These include a small amount of contaminated spent solvent and still bottoms from an off-site source, and barium-containing heat treat salt wastes from an off-site extrusion operation.

An inventory and characterization of FMPC wastes suitable for incineration in the ORGDP TSCA Incinerator has been completed and submitted during 1Q85. Offsite shipment of the waste and incineration of the wastes at ORGDP is currently scheduled to begin November, 1986.

5.2.6 Long-Term Waste Management and Remedial Action Planning

5.2.6.1 Pit Residue Disposition

Past waste management practices at the FMPC involved the placement of low-level radioactive waste into silos and surface waste pits on-site. These silos and waste pits are considered waste storage only and not permanent disposal facilities.

Selection of a mode for final disposition of the pit residues will be dependent upon data developed through a number of studies to assess residue characteristics, pit conditions, and engineering options. Development of a comprehensive characterization program was initiated 3Q85 with the assistance of Oak Ridge National Laboratory. Areas of study being considered are outlined below:

- Coring in Pits - Core samples will be taken at locations within each pit, with chemical and physical analyses of the samples to determine constituents within the residues. This work will begin in 4Q85 and require approximately 3 months for field work, 7 months for lab work, and 3 months for data analysis and reporting.

- Piezometer Installation - Observation wells will be installed in the core holes to provide a sampling point for pit liquids and for observing water levels within the pits.

- EM Survey of Pits and Pit Area - An electromagnetic terrain conductivity survey will be conducted over each pit and the surrounding area. The EM survey will help locate edges of covered pits, detect potential groundwater plumes, and detect buried metallic objects. EM surveys of the pits and surrounding area will require about 7 months.

- Soil Sampling - Soil samples will be taken by boring at selected locations in and around the pit area. These samples will be physically and chemically analyzed to characterize the fluid transmitting properties, chemical and radionuclide attenuation capacities, and contaminant concentrations. The soil sampling will begin 1Q86 and require approximately 4 months field work and 6 months analytical work.

- Well Installation - New groundwater monitoring wells have already been installed in the pit area as part of a site geohydrological investigation. Additional wells may be required as a result of findings from the EM survey of the area, and if so, these wells will be drilled during the first and second quarter of FY 1986.

- Uranium Solubility Studies - An evaluation of the behavior of uranium in aqueous solutions representative of the groundwaters around the FMPC will be conducted. This lab study will determine a uranium solubility product for use in modeling groundwater migration patterns. The study will require approximately 12 months to complete.

- Paddy's Run Characterization - A study of Paddy's Run will be conducted to determine environmental impact if any, of the waste pit storage area. The study will include hydrologic characterization (installation of a weir), sediment analysis, and biological studies. Some of these studies are already underway, but may be expanded as required.

The residue/pit characterization studies will require approximately 20 months from their initiation to complete at a total cost of about $1.7 million. With the data generated as a result of these studies, an engineering evaluation of alternative disposition methods will be conducted, and NEPA documentation for the proposed option will be prepared. The engineering evaluation and EIA/EIS are anticipated to require up to 18 months, placing the date for initiation of design and construction at the beginning of FY 1989, with actual residue disposition work beginning in FY 1990.

5.2.7 Contaminated Metallic Scrap

5.2.7.1 Ferrous Scrap

The Feed Materials Production Center has approximately 5,000 tons of metallic scrap containing above-background levels of uranium stored on an above-ground scrap yard. The scrap pile consists primarily of ferrous material with the remainder a mixture of aluminum, stainless steel, copper, brass and nickel. The scrap includes but is not limited to vessels, wiring, cable, duct, pipe, tubing, valves, grating, sheets, plates and miscellaneous abandoned equipment.

The contaminated metallic scrap pile contains an estimated 4,000 tons of steel suitable for furnace feed and about 1,000 tons of Refuse material. Refuse material, for the purposes of this report, is defined as material not suitable for furnace feed, such as nonmetals or metals with hard-to-remove nonmetallic wrapping; hazardous material such as asbestos, and electric equipment containing dielectric.

Based on planned equipment removal estimates provided by the FMPC Project Engineering Department, the contaminated metallic scrap pile is expected to increase in volume by at least 15 percent per year. An increase of this size is estimated to result in the generation of an additional 750 tons of metallic scrap per year.

In evaluating the appropriate action(s) for disposition of the backlog of contaminated metallic scrap, a number of alternatives were considered; these included (1) the use of on-site and/or subcontracting personnel to survey, segregate and decontaminate as necessary for off-site sale and release of suitable metallic scrap, and (2) the use of on-site and/or subcontracting personnel to survey, segregate, and transport contaminated metallic scrap for off-site disposal. The use of rail and truck transport for shipment of metallic scrap to both the Nevada Test Site and the Oak Ridge Operations K-25 Metals Scrap Yard were also considered.

In establishing a plan for handling of the contaminated metallic scrap pile, three (3) considerations were given priority:

A) Potential to handle metal scrap on an environmentally safe and acceptable manner;

B) Potential to handle metal scrap in a timely manner; and

C) Potential to handle metal scrap in a cost-effective.

In making a final decision, the option of unrestricted sale of decontaminated metallic scrap was eliminated; this was because the requested amendment to the Code of Federal Regulations establishing de minimus limits for uranium and technetium-99 contents for unrestricted sale of decontaminated metals has not been approved. Accordingly, the Waste Management Department has centered on disposal options as opposed to resale options.

It was determined that use of a qualified subcontractor to prepare metallic scrap for off-site shipment represented the optimum choice. To initiate this activity in a timely manner, a Request for Proposals for Handling of the Contaminated Metallic Scrap Pile was prepared and submitted during 4Q, FY85. The Statement of Work accompanying the RFP outlined the requirements for accomplishing the handling the metallic scrap as follows:

A) Radiologically survey the metal scrap and segregate the scrap into categories acceptable as feed to the Oak Ridge Gaseous Diffusion Plant, Tennessee;

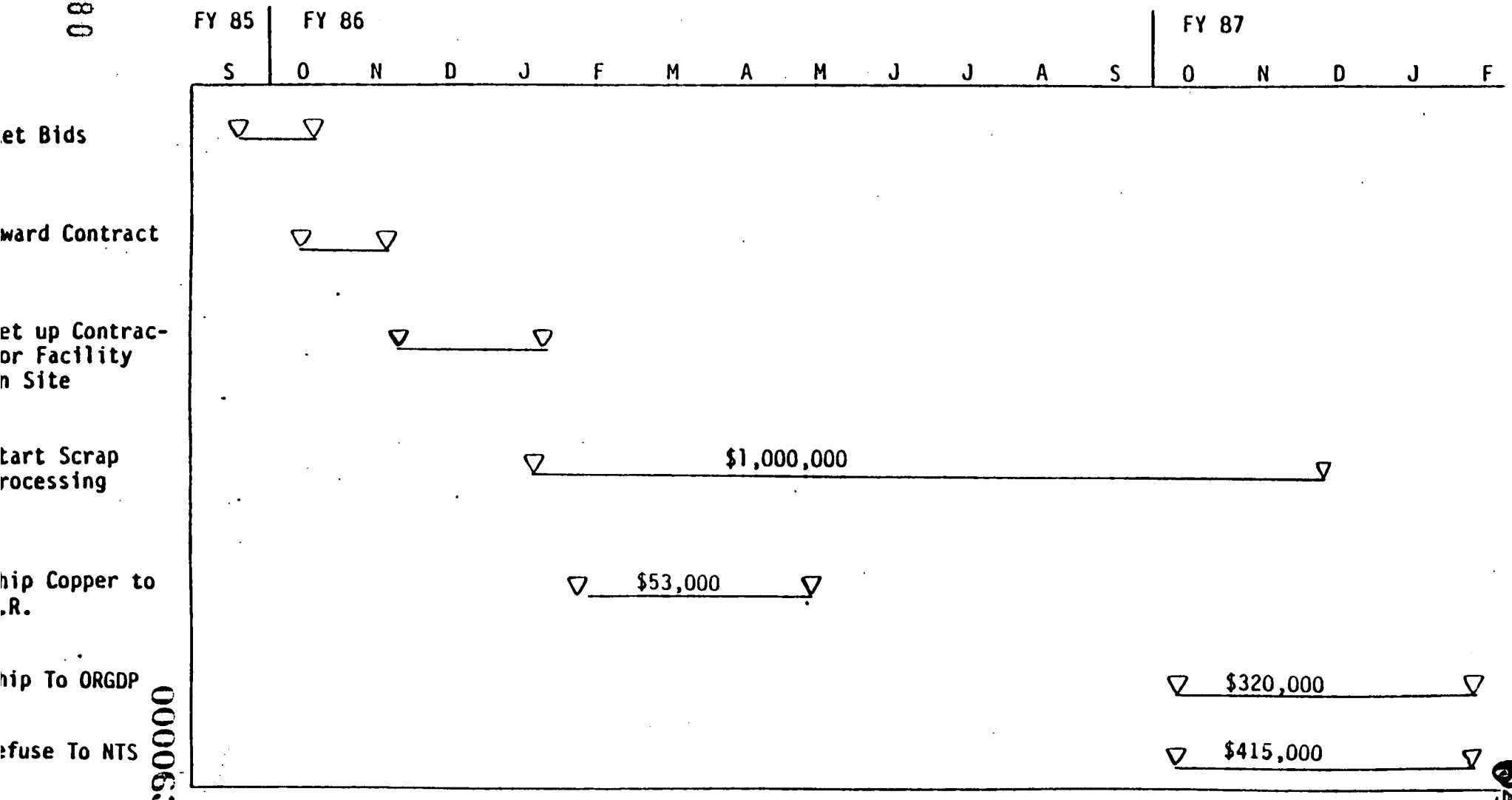
B) Size reduce metal scrap as needed for future truck shipment to the Oak Ridge Gaseous Diffusion Plant, Tennessee; and

C) Size reduce refuse as needed for future truck shipment to the Nevada Test Site.

The time needed to accomplish these tasks and estimated costs for accomplishing these tasks is shown in Figure 15.

FIGURE 15

FMPC SCRAP PROCESSING



ther Cost

ail to O.R. - $140,000

ruck to NTS - $525,000

ESTIMATED COST

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5.2.7.2 Copper Scrap

There are approximately 1,500 tons of mica-coated copper scrap containing slightly above-background levels of uranium; the scrap copper is stored in an above-ground storage pad. The FMPC inventory of copper resulted from the cascade and uprating (CIP/CUP) programs.

A Construction Proposal, approved in CY 1985, allowed modification of the FMPC scrap preparation unit to remove more insulation, thus yielding a cleaner, shredded-copper product. The Copper Shredding System was successfully started during 1Q85. Current efforts are directed towards processing of the copper scrap pile as quickly as possible and drumming of the palleted product.

In-house and out-of-house uses for the FMPC copper continue to be investigated. A preliminary decontamination study on the potential for decontamination of the copper scrap was successfully completed by Quadrex HPS, Inc. It appears that it may be economically feasible to decontaminate the copper scrap through a suitable licensed recycling center for subsequent disposition/resale. Further efforts in this investigation continue.

A schedule of anticipated activities and costs associated with the disposition of the FMPC copper scrap is provided in Figure 15.

5.3 Management of Airborne Radioactive Waste

The FMPC utilizes a high efficiency dust collector and scrubber equipment and tight operational and maintenance procedures to effectively minimize gaseous and particulate discharges to the atmosphere. The FMPC operates with over 400 air emission point sources regulated under the Clean Air Act (CAA), as amended. A listing of criteria and noncriteria pollutants identified under the CAA is provided in Table XI. Air emissions from the facility are generally limited to quantities of listed criteria pollutants, radionuclides, and trace amounts of hydrogen fluoride (HF) and kerosene fumes.

The FMPC has implemented an Air Emission Control Master Plan to provide long-range direction for the improvements needed to assure full compliance with regulatory requirements. The Plan defines areas of responsibility, cites potential deficiencies and proposes improvement actions. Projects identified under the Air Emission Control Master Plan include upgrading of sampling, monitoring, and emission control systems.

The current management structure at the FMPC divides administrative control for air pollution related activities among various functional groups. Monitoring activities currently fall under the control of the Industrial Hygiene Department with permitting and compliance

Operations of control equipment is under the direct responsibility of the Production Division. Provision of fundamental engineering necessary to support radioactive waste management programs is under the Waste Management Department.

6.0 Environmental Monitoring Programs

A comprehensive environmental monitoring program has been initiated at the FMPC. In it, the frequency and location of sample collection points for monitoring air, water, and solid waste pollution are identified. The monitoring program additionally identifies the parameters to be tested; the analysis methods(s) to be used; the methods to be used for sample collection preservation, and monitoring; and the instrumentation to be used. The Environmental Monitoring Programs pay particular attention to quality assurance requirements, data documentation, and recording.

A complete discussion of the FMPC Environmental Monitoring Programs is contained in Appendix D of the Preliminary FMPC Environmental, Safety and Health Management Plan (NLCO 2037 Special UC-11, November, 1985). A brief summary of the Environmental Monitoring Programs particular to Waste Management Operations is discussed below.

6.1 An off-site water monitoring program is used to comply with Ohio Environmental Protection Agency (OEPA) Water Quality Standards for nonradioactive contaminants, which were adopted from U.S. Environmental Protection Agency Standards. The OEPA Water Quality Standards for receiving waters apply only beyond a specified zone permitted by OEPA for mixing and dilutation of point source discharges from industrial and municipal sources.

An off-site water quality monitoring program is conducted to determine the effect of FMPC releases on the receiving stream water quality. A total of six (6) sampling locations are utilized; two (2) of the sampling points are discharged outfalls with discharges regulated under a National Pollutant Discharge Elimination System (NPDES) Permit. The NPDES Permit, issued by Region V of theUS-EPA, is administered through the OEPA. It requires the FMPC to characterize the point source discharges at the two NPDES sampling locations and then report results to the OEPA on a monthly basis and the US-EPA (Region V) on a quarterly basis.

Approximately 150 analyses per month are performed to comply with NPDES sampling and analysis requirements. Exceedances in either the daily maximum or monthly average limits of specified effluent parameters must be immediately reported to DOE/ORO for their submittal to the OEPA. NPDES Discharge Monitoring Reports and monthly and quarterly reports summarizing wastewater quality and compliance status are prepared and submitted to DOE/ORO for review and submittal to the appropriate authority.

The sampling locations that are used in implementing the water quality monitoring program are shown in Figure 16. Daily samples are Point W1 to provide an indication of the quality of the surface water upstream of the FMPC discharge point. At the final access point on

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TABLE XI

CLEAN AIR ACT

POLLUTANT CATEGORIES

CAA CRITERIA POLLUTANTS	NONCRITERIA POLLUTANTS	
	Hazardous Contaminants	Nonhazardous Contaminants
Total Suspended Particulates (TSP)	Asbestos	Fluorides
Sulfur Dioxide (SO_2)	Beryllium	Sulfuric Acid Mists
Nitrogen Oxides (NO_x)	Mercury	Hydrogen Sulfide
Carbon Monoxide (CO)	Vinyl Chloride	Total Reduced Sulfur
Ozone (Voltatile Organic Compounds - VOCs)	Radionuclides	
Hydrocarbons (Nonmethane)		
Lead		

Source: NLO, Inc. Environmental, Safety and Health Plan, FY-1986 Issue, 11/1/85.

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FIGURE 16 FMPC AIR AND WATER SAMPLING LOCATIONS

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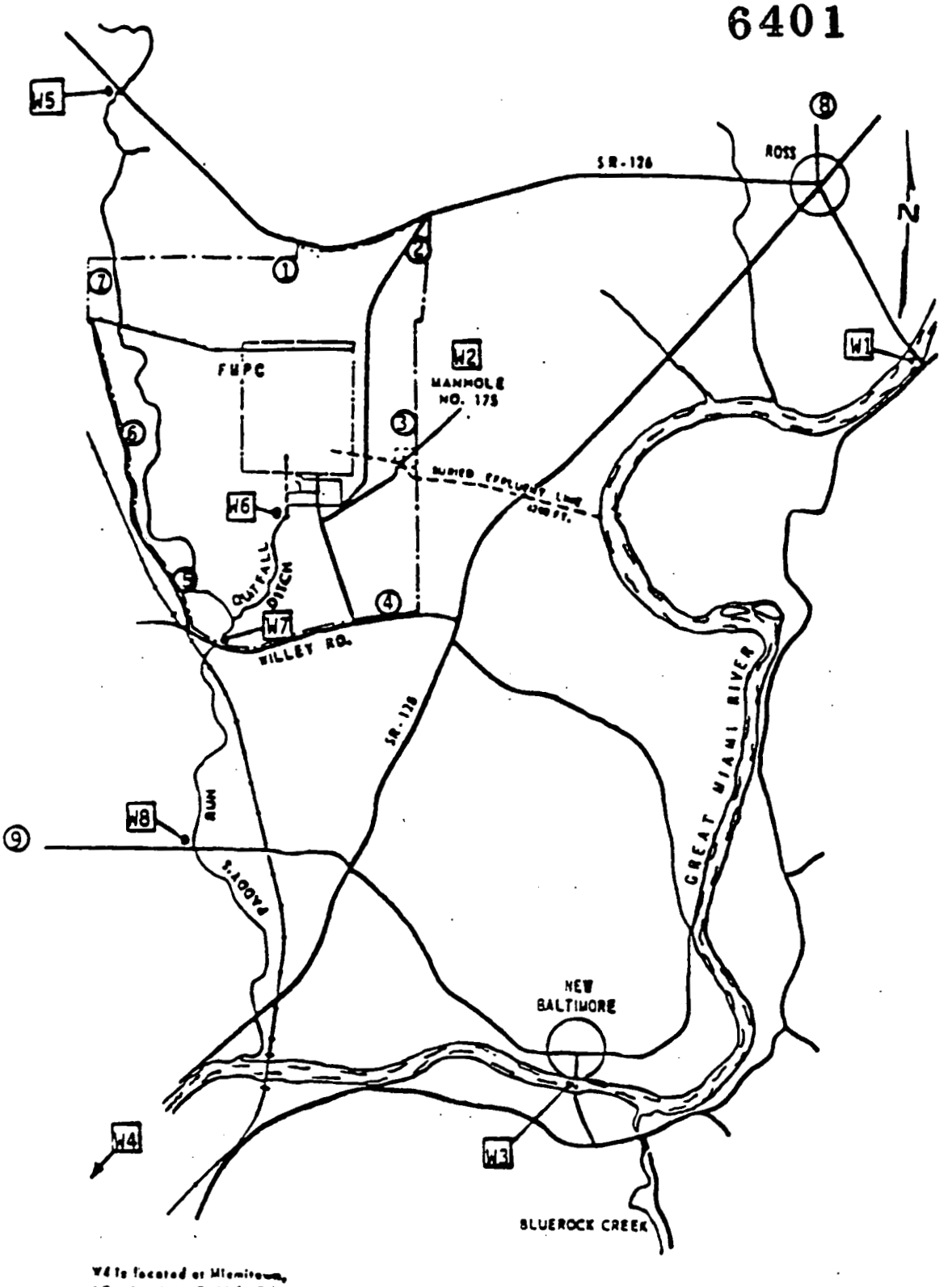

W4 is located at Miamitown, 4.7 miles from Paddy's Run.

(N) BOUNDARY AIR SAMPLING STATIONS

[N] WATER SAMPLING LOCATIONS

SCALE: 1" 3000'

AIR SAMPLING STATIONS 8 AND 9 ARE LOCATED AT NEARBY ELEMENTARY SCHOOLS.

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proportional sampler collects 24-hour composite samples which are collected daily and analyzed for uranimum, alpha and beta activity and pH. On a weekly basis, the 24-hour composite sample is also analyzed for chlorides, fluorides and nitrates. Monthly composites of the a daily samples are analyzed for 226Ra, 228Ra, 106Ru and thorium.

Annual composites are analyzed for other radionuclides of interest, such as 90Sr, 99TC, 137Cs, 237Np and 238Pu, etc.

Point W3 is located downstream from the FMPC discharge point; a continuous sample is withdrawn at least weekly to help identify the impact of the FMPC discharge on the receiving stream. The fourth sampling location, Point W4, is located in Miamitown and is also used to help indicate effects of FMPC discharges to the receiving stream.

There is a small intermittant stream on the west side boundary of the FMPC. The stream, Paddy's Run, joins the Great Miami River a little more than 3 km south of the FMPC. During periods of heavy runoff, excess water in the storm drainage system overflows at Point W6 to a natural drainage ditch which discharges into Paddy's Run at a point just north of Point W7. Grab samples are collected weekly from each W7, or W8 if no water is available at W7). These samples are analyzed for uranium, alpha and beta activity and pH. Monthly samples are analyzed for chlorides, fluorides and nitrates. 226Ra and 228Ra analyzes are performed on bimonthly composites of water collected at W5 and, when available, on monthly composites collected at W7.

An NPDES Permit Renewal Application was submitted in late 1984 and is under review by the OEPA. Approval on the Permit Renewal Application will not be awarded until the water pollution control projects under construction at the FMPC are fully operational. These projects include: Storage and Denitrification of FMPC Effluent: Settling and Retention of Coal Pile Run-off: Settling Basins for the Storm Water Drainage; and Disinfection of the Sewage Effluent.

6.2 Air Monitoring

For environmental monitoring purposes, DOE criteria for air in off-site areas were generally used as the standard of comparison; however, the National Emission Standards for Hazardous Air Pollutants (NESHAP) ([3]), which became effective on February 6, 1985, will be used henceforth as applicable.

6.2.1 Sampling Program

An environmental air sampling program is employed at the FMPC to determine the amount of air emissions resulting from FMPC activities.

High volume air samples located along the FMPC boundary collect continuous samples of airborne particulate matter (samples are collected and analyzed at weekly intervals). Seven such sampling stations (see Figure 17) were in operatioun during 1984. Two additional off-site stations have been installed in 1985.

Current planning calls for an additional four stations, two on FMPC property and two off-site, to be installed by the end of 1986. The proposed locations for these stations are also shown in Figure 17. These four new site locations were selected to obtain values of the maximum short term, and annual average of materials released from the FMPC. Atmospheric dispersion models were used to predict the locations at which this information could be obtained. Samples are analyzed for particulates, uranium content, beta activity and trace radionuclides. More frequent analyzes for other radionuclides (e.g., ^{237}Np, ^{239}Pu and ^{232}Th) is not considered necessary due to the extremely small amounts of these elements present on site and as evidenced by analysis of the previous sample.

Average uranium concentrations and gross beta activity of the various radionuclides present in the air samples are reported in the Annual Environmental Monitoring Report. Analysis of the trace radionuclides ^{237}Np, $^{238, 239, 240}Pu$, $^{228, 230, 232}Th$ are performed from the quarterly composites of the weekly samples. These data are also reported in the Environmental Monitoring Report. Trend analyses of the quarterly average uranium levels since 1982 is performed to identify possible trends in emission levels. ^{230}Th, ^{241}Pu, ^{90}Sr, ^{99}Tc, ^{106}Ru, ^{137}Cs, ^{226}Ra and ^{228}Ra are to be included in future analyses as part of a continuing effort to further enchance the environmental program at the FMPC.

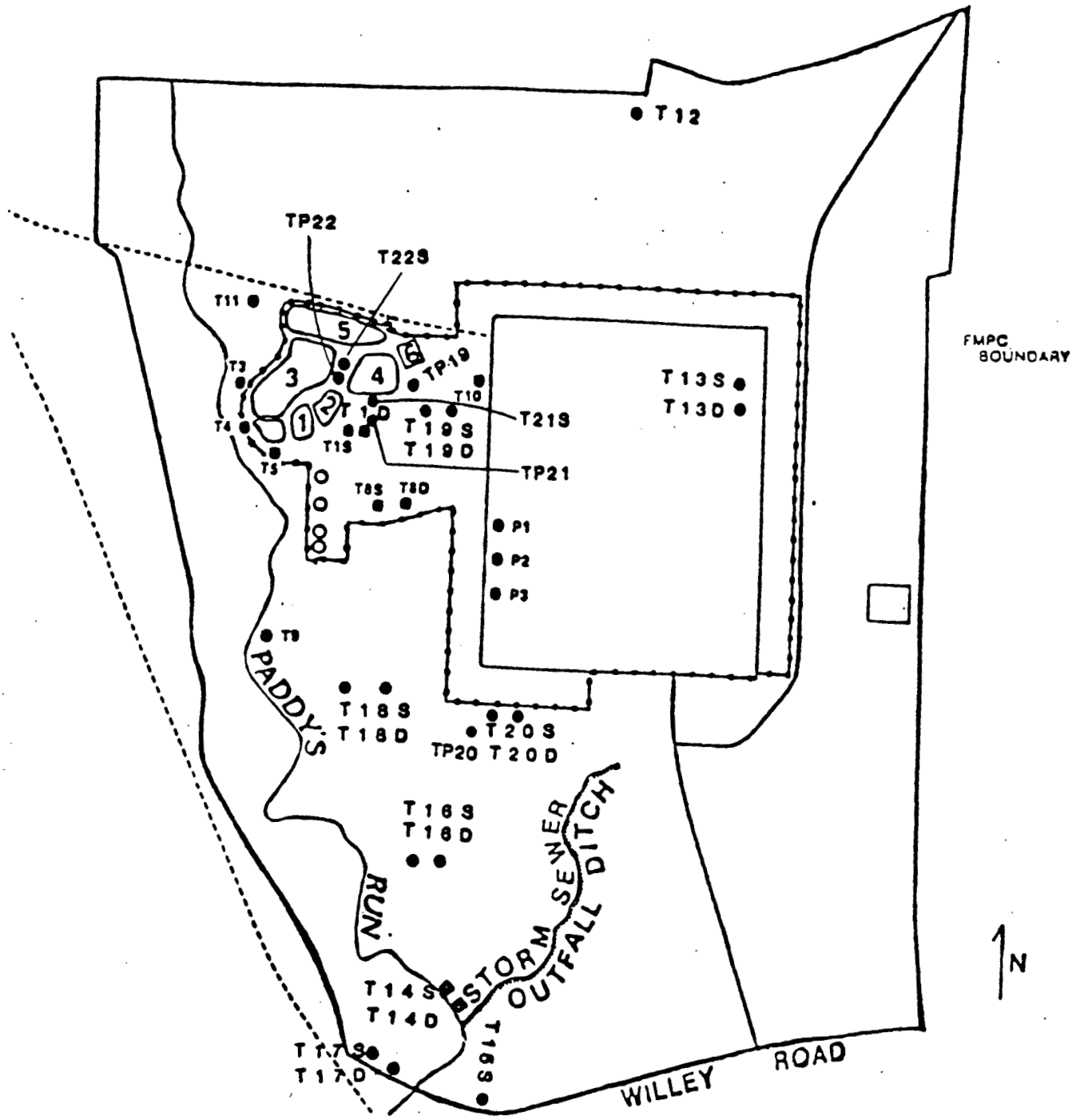
Radon (^{222}Rn) is a naturally occurring element which is produce from the decay of radium (^{26}Ra), also a natural element which is found in soils and rock. Concentrations of ^{222}Rn, are monitored at 14 on-site and 2 off-site monitoring stations using commerically available track-etch devices. Statistical analysis of the data is performed to determine if there exists a difference between on-site and off-site levels. Typical background levels of ^{222}Rn are reported in the Annual Environmental Monitoring Report for comparison.

In addition to those data collected by the FMPC, data collected by the Monsanto Research Corporation (MRC), Miamisburg, Ohio, during the period from September 20, 1984 to February 5, 1985, using a passive detection device which employed a charged thermoluminescent dosimeter. This additional data collection was made to evaluate the radon flux emanating from the K-65 storage silos.

6.3 Groundwater Monitoring

Water samples are collected monthly from each of 13 on-site and 21 off-site wells during the year. The locations of these wells are shown in Figures 17. Water from on-site wells is analyzed for pH, chlorides, sulfates and nitrates on a monthly basis, and for alpha and beta activity and uranium concentration on a quarterly basis. It is planned to have all the aforementioned parameters analyzed monthly beginning in 1986.

FIGURE 17 FMPC MONITORING WELL LOCATIONS



● - WELL LOCATION

✱ - WELL INSTALLATION NOT COMPLETE

P - PRODUCTION WELL

T - TEST WELL

D - DEEP WELL

S - SHALLOW WELL

TP - TEST PIT

Twenty-two (22) additional groundwater monitoring wells were installed on-site in 1984 and 1985 as well as one (1) off-site monitoring/supply well (Figure 17.) These wells were installed as part of the Dames & Moore Groundwater Study for the FMPC and vicinity, with four (4) of the aforementioned wells being located near Storage Pit No. 4 in order to satisfy regulatory requirements for permitting Pit 4. All of these wells have been sampled and the water analyzed for uranium and iron concentration, with samples from a number of the wells also being analayzed for thee parameters listed in 40 CFR Part 265, Subpart F, as well. This type of sampling and analysis is expected to be performed on all on-site wells on a quarterly basis for one year and then annually in subsequent years. In addition, water samples taken from 21 on-site wells and 4 off-site wells were analyzed for trace metals as part of the FMPC groundwater monitoring program.

6.3.1 Supplemental Groundwater Monitoring Program

During the second quarter, FY 1985, a new groundwater monitoring program was developed by the Waste Management Department. This new program, designed to supplement the existing on-site groundwater monitoring, will locate and identifyany groundwater contamination emanating from the K-65 storage silos.

The supplemental groundwater monitoring system will consist of a series of shallow and deep monitoring wells. Initial efforts will include a detailed testing and analysis program of groundwater and soil samples. Longer-term groundwater sampling will follow.

The supplemental groundwater monitoring program was developed in accordance with the recommendations of the Geohydrological Investigation (GI) conducted of the FMPC. It was later incorporated into the Waste Facility Remedial Investigation/Feasibility Study (RI/FS).

6.3.2 Waste Facility Remedial Investigation/Feasibility Study

As part of the comprehensive waste management/environmental programfor the FMPC, specific remedial alternatives are being developed and evaluated for the final disposition of the low-level radioactive waste inventory currently stored at the site. The alternatives currently identified include on-site stabilization, retrieval/reprocessing and off-site disposal. The purpose of this action is to conduct a Remedial Investigation to characterize the FMPC waste storage facilities and a Feasibility Study examining the various remedial alternatives. Activities associated with the Remedial Investigtion will.include, but are not limited to, evaluation of the current situation, assessment of existing data and reports, development of a detailed work plan, performance of field investigations, data interpretation and analysis, laboratory and bench-scale studies (optional), and final

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will include, but are not limited to, development of remedial alternatives, initial screening of alternatives, detailed analysis of options, ranking of alternatives, and final reporting.

The work associated with this action consists of two separate phases. Phase I entails completion of the Remedial Investigation. Phase II entails completion of the Feasibility Study. Both will be accomplished in a single, two-phased project. All work will be performed by a consultant under subcontract to NLO, Inc.

A Request for Proposals (RFP) was prepared and sent to prospective offerors on July 26, 1985. Preproposal conferences and site tours were held for prospective offerors on August 15 and 23, 1985. A total of 28 firms received the RFP, with 19 of them attending the preproposal conference. Five proposals were received. An evaluation team was formed. It is composed of on-site Waste Management and Environmental Management personnel.

At years end proposal evaluations were in progress. Best and Final Offers were scheduled for November 18, 1985. Contract Award was to be not later than December 18, 1985.

6.4 Air Pollution Control Monitoring

The steam generation plant at the FMPC utilizes two boilers with a total design capacity of 150,000 pounds of steam per hour. Electrostatic precipitators keep the particulate discharge below the Ohio EPA particulate limit of 0.19 pounds per million BTU input. Compliance testing, as required by the OEPA, was performed on the steam plant in the early part of 1985 and subsequently permitted by the Ohio EPA. Discharge from the steam generation plant is in full compliance with OEPA standards. The process of compliance testing occurs once every three years in order for the permit to be renewed.

Sulfur dioxide (SO_2) emission limits for stationary facilities have been adopted by the OEPA. Under these rules, the limit forthe FMPC steam plant is less than 1 kg (2.2 pounds) of SO_2 per million BTU input from each boiler. This limit is equivalent to the use of coal containing 1.3 percent sulfur. Coal containing only one percent or less sulfur is purchased in order to meet the states SO_2 emission requirement.

Maximum rates of emission of particulates from industrial processes are described by OEPA Rule 37450-17-11, Restrictions on Particulate Emissions from Industrial Processes. Through the use of numerous dust collectors, scrubbers, electrostatic precipitators and various other types of air cleaning equipment, non-radioactive particulate emissions from FMPC process operations are well below the established OEPA limits. All air emission points are being permitted in 1985 and all

product processed through each operation. A NESHAPS source report was also prepared in 1985. This report pertains to hazardous air pollutants and addresses uranium as the site specfic parameter for the FMPC. The NESHAPS regulation became effective in February 1985.

The FMPC solid waste incinerator is used for the destruction of nonradioactive combustible material such as wood, discarded paper and plastic. The incinerator was specified to meet state emission standards of one gram particulate matter per kilogram of liquid, semi-solid or solid refuse and salvageable material charged. An incinerator operating permit has been issued by the State of Ohio for the solid waste incinerator and compliance testing was performed on this facility in 1985. A liquid waste incinerator has been constructed for the disposal of nonhazardous waste oils. A permit to operate this device was filed with the Ohio EPA in June 1982. Stack emissions from this incinerator are minimized by a bag-house collector.

7.0 Quality Assurance for Waste Management

The Quality Assurance procedures employed in the management of radioactive waste for the FMPC are designed to ensure that radioactive waste management activities conform to all applicable federal, state, and local environmental and industrial safety requirements.

Quality Assurance for the FMPC initiates with the Quality Assurance Department. The Quality Assurance Program Manual, developed by the QA Department, contains policies, procedures, and concepts for the plantwide QA program. It is reviewed and updated annually by the FMPC QA Committee. Revision 9 of this Manual was issued November 1985.

Quality Asssurance Analyses are performed on each operation and are updated annually by the division involved. The QA Level of each operation is identified on the QA Analysis Form and requires the Division Director's approval. Formal Quality Assurance Plans are required for each operation assigned QA Level 1A, 1B, or III. These plans are prepared by the division responsible for their implementation and are subject to review/approval by

each member of the Quality Assurance Committee. Formal Audits of QA Plans are conducted on either a two-, three-, or five- year minimum basis; the frequency of Formal QA Auditing depends upon the assigned QA Level for the project. In-plant audits are conducted by the Quality Assurance Audit Committee at an average rate of one per month.

Monthly Quality Assurance Reports are compiled by Quality Control to identify the various types of QA activity conducted by each reporting division during the calendar month. The Monthly QA Report gives visibility to the QA Program and highlights the FMPC QA Program's effectiveness.

7.1 Standard Operating Procedures

Procedures used in the management of radioactive waste at the FMPC are prepared and submitted as Standard Operating Procedures (SOP). The SOPs are reviewed by involved departments and approved for

in the Waste Management Department and then forwarded to the Quality Assurance Department for formating into a FMPC Standard Operating Procedure.

Radioactive Waste Management activities also include use of Plant Test Authorizations (PTA). The PTA is used before completion of a Standard Operating Procedure to identify the steps necessary to complete a radioactive waste management task. The PTA is normally completed for a "trial period" during which the stepwise procedures and refined and reformatted as needed. PTAs are reviewed by involved departments and approved for in-plant use.

Changes to a Standard Operating Procedure are accomplished through the QA Department. The changes are noted and a formal revision to the SOP is prepared, circulated and incorporated into the SOP. Waste Management activities require internal self-audit of SOPs at least annually.

7.2 Manufacturing Specifications

Manufacturing Specifications, like Standard Operating Procedures, are an integral part of the FMPC Radioactive Waste Management QA effort. These standards are maintained to reflect current operations. Manufacturing specifications for acceptable waste form criteria for FMPC radioactive waste off-site shipments have been developed and have been incorporated.

7.3 Product and Process Audits

Planned and systematic audits of radioactive waste process operations will result in better operating procedures and improved compliance with environemntal regulations, as well as health and safety requirements. Three types of audits are used for waste management activities.

The first type is the annual audit of the waste management operations. This audit will be based on the waste acceptance criteria established by the FMPC Waste Management Department. The second type of audit is a QA plan audit, conducted every 2 years by the FMPC QA Audit Committee, which reviews the QA Analysis and QA Plan to see if they are updated and currently correct. This Committee will consist of a designated representative from Engineering, Procurement, Production, Decontamination & Decommissioning, and the Health & Safety Divisions chaired by the Department Head of Quality Control (Technical Division). The third category of QA audits is an annual internal (internal to FMPC) audit of the operation. The internal audit team shall be selected by the Waste Management Department Head, in consultation with the QA/QC Department Head.

7.4 Training and Documentation of Training

In compliance with NQA-1, NVO-185, 49 CFR Section 173.16, and DOE Order 5480.1A, Chapter V, the radioactive waste handling system will conduct formal training of all personnel directly involved in the

shipments. The training will be documented, updated annually, and available for inspection by any auditing official.

Since the handling and off-site disposal of LLW is a new system, it is mandatory that the system staff be trained according to the new procedures in advance of the first shipment. The LLW Certifying Official, in coordination with the FMPC Training Department Head and the Transportation Department Head, will lead the initial training program development and implementation. The training program will be set up as a number of performance-oriented modules. Each module will contain objectives, conditions, and an evaluation to measure the trainee's competence in performing required tasks. The Training Department will provide instruction for LLWPS system operating personnel, will maintain training records, and will conduct an annual evaluation of the effectiveness of the training program.

The FMPC Transportation Department will be an integral part of the LLWPS system training program. This department has maintained a Training Manual and Training Program (Training Program No. PROC-TRANSP-TP-1) since 1973 for the employees directly involved in off-site shipments. These employees include, but are not limited to:

- Transportation supervisors, checkers, and material handlers;
- Production supervisors and chemical operators;
- Health and Safety supervisors and personnel;
- QA/QC personnel;
- Nuclear Materials Control personnel; and
- Technical supervisors and packers.

The Transporation Department will also furnish use of industrial truck operators and equipment for the LLWPS system. A program exists for training operators in the safe operation of powered industrial trucks. The program is administered by a transportation supervisor and a training instructor utilizing classroom instructions, demonstrations, and on-th-job training. The program consists of four phases: familiarization, operation, qualifications (written examination and performance tests), and nuclear safety. See the FMPC Transportation Manual, Section 2 and the FMPC Health & Safety Manual, Section 12 for additional details.