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WESTINGHOUSE MATERIALS COMPANY OF OHIO (WMCO), FEED MATRIALS PRODUCTION CENTER WASTE MANAGEMENT PLAN - REV. 1 - (USED AS A REFERENCE IN OU1 RI)

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REPORT

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FMPC-2040
Revision 1
SPECIAL
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FEED MATERIALS PRODUCTION CENTER

WASTE MANAGEMENT PLAN

By

R. E. Watts
T. Allen
S. A. Castle
J. P. Hopper
R. L. Oelrich

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Westinghouse Materials Company of Ohio

P. O. Box 398704

Cincinnati, Ohio 45239

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APPROVED:

W. A. Weinreich
V. Pres. & Tech. Director

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Revision 1
12/31/86

EXECUTIVE SUMMARY

In the process of producing uranium metal products used in Department of Energy (DOE) defense programs at other DOE facilities, various types of wastes are generated at the Feed Materials Production Center (FMPC). Process wastes, both generated and stored, are discussed in the Waste Management Plan and include low-level radioactive waste (LLW), mixed hazardous/radioactive waste, and sanitary/industrial waste. Scrap metal waste and wastes requiring special remediation are also addressed in the Plan.

The Waste Management Plan identifies the comprehensive programs developed to address safe storage and disposition of all wastes from past, present, and future operations at the FMPC. Waste streams discussed in this Plan are representative of the wastes generated and waste types that concern worker and public health and safety.

Budgets and schedules for implementation of waste disposition are also addressed in the Waste Management Plan. The waste streams receiving the largest amount of funding include LLW approved for shipment by DOE/ORO to the Nevada Test Site (NTS) (MgF_2, slag leach filter cake, and neutralized raffinate); remedial action wastes (waste pits, K-65 silo waste); thorium; scrap metal (contaminated and noncontaminated ferrous and copper scrap); construction rubble and soil generated from decontamination and decommissioning of outdated facilities; and low-level wastes that will be handled through the Low-Level Waste Processing and Shipping System (LLWPSS). For the purposes of this Plan, some materials have been identified as "waste streams" which are not directly related to production, i.e., stormwater runoff, thorium, sewage sludge, wooden pallets, construction rubble. Though not production wastes, these are, nevertheless, site concerns. Thus they are defined as waste streams in Waste Management Plan. Waste Management milestones are also provided.

The Waste Management Plan is divided into eight major sections:

Section 1.0 - Introduction. Historical information on the FMPC and a general overview of the Waste Management Plan are discussed in Section 1.0.

Section 2.0 - Site Waste and Waste Generating Process. Section 2.0 summarizes the waste streams and concerns discussed in the Plan, the regulations which apply to the waste streams, and the facilities for treatment, disposal, and storage of wastes.

Section 3.0 - Strategy. Waste Management strategies are developed in Section 3.0. The general strategy is described, and plans for handling the individual waste streams are presented.

Section 4.0 - Projects and Operations. Funding for projects and operations by DOE programs (AR and GE) are discussed in Section 4.0.

Section 5.0 - Waste Stream Budgets. Section 5.0 summarizes budgeting for programs by waste type.

Section 6.0 - Milestones. Milestones are presented in Section 6.0, with schedules provided where known.

Section 7.0 - Quality Assurance for Waste Management. Section 7.0 is a summary of Quality Assurance practices for Waste Management activities.

Section 8.0 - Environmental Monitoring Program. Section 8.0 is a brief summary of the Environmental Monitoring Program (EMP) at the FMPC and provides the reference to the EMP description document. In addition, the current efforts toward investigation of site remediation options are summarized.

The goal of Waste Management is to implement and continue to use a safe storage and disposal system in compliance with applicable federal and state regulations concerning waste storage and disposal. The Waste Management Plan discusses the strategies and actions to be taken to achieve this goal.

Revision 1
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ACRONYMS

ALARA	As Low As Reasonably Achievable
CAA	Clean Air Act
CE	Capital Equipment
CIS	Characterization Investigation Study
CWA	Clean Water Act
D&D	Decontamination and Decommissioning
DOE	Department of Energy
DOE/ORO	Department of Energy-Oak Ridge Operations
EHSI	Environmental Health and Safety Improvements
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EP	Extraction Procedure
EPA	Environmental Protection Agency
FFCA	Federal Facilities Compliance Agreement
FMPC	Feed Materials Production Center
FY	Fiscal Year
GI	Geohydrological Investigation
GPP	General Plant Projects
HEPA	High Efficiency Particulate Air
LLW	Low-Level Radioactive Waste
LLWPSS	Low-Level Waste Processing and Shipping System
MOLE	Mobile Operated Laboratory Equipment
MSA	Major System Acquisition
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
PAWS	Pads and Warehouse Study
PCBs	Polychlorinated Biphenyls
PTA	Plant Test Authorization
QA	Quality Assurance
QAA	Quality Assurance Analyses
RAWC	Remedial Action Waste Cleanup
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
S/I	Sanitary/Industrial
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedures
TSCA	Toxic Substances Control Act
WMCO	Westinghouse Materials Company of Ohio
WPC	Water Pollution Control

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(4) Natural (not applicable)
(5) Other (none)

1.0 INTRODUCTION

The Feed Materials Production Center (FMPC) produces uranium metal products used in Department of Energy (DOE) defense programs at other DOE facilities. Within the DOE nuclear complex, the FMPC plays a vital role in the fulfillment of mission requirements.

Uranium metal is produced at the FMPC using a variety of chemical and metallurgical processes. These processes generate low-level radioactive waste (LLW), mixed hazardous/radioactive waste, and sanitary/industrial waste. The FMPC has also received, and is still receiving, waste from other DOE activities. Changing regulatory requirements and the evolution of better waste processing methods have encouraged the identification and implementation of more effective waste management practices.

The FMPC Waste Management Plan has been developed to set forth site plans for controlling and improving safe storage and disposal of all generated and received waste from past, present, and future operations. The Plan identifies the schedule of, and resources for, activities to be conducted primarily over the next five years; however, planning for the years beyond this period is included where formulated. The FMPC goal is compliance with applicable federal and state regulations.

1.1 FMPC BACKGROUND

FMPC operations began in the early 1950's when the United States Atomic Energy Commission initiated a long-term plan to establish an in-house integrated production complex for processing uranium and its compounds from natural uranium ore concentrates. Current operations no longer involve processing of uranium ores, but various chemical and metallurgical process steps support the primary mission of supplying uranium metal fuel cores for production reactors at Richland, Washington, and Savannah River, South Carolina. A secondary mission is supplying uranium metal for special purposes to DOE facilities at Oak Ridge, Tennessee (Y-12 Plant) and Rocky Flats, Colorado. All FMPC operations are administered through the DOE Oak Ridge Operations (ORO) office. As of January, 1986, Westinghouse Materials Company of Ohio (WMCO) operates the FMPC for the Department of Energy.

Since the FMPC supports important DOE defense programs, its continuing operation is vital to the

fulfillment of DOE mission requirements. Thus, it is imperative that high standards of operations be maintained in the safest possible manner with minimal environmental insult. This comprehensive Waste Management Plan is one element in the overall approach to achieving the aforementioned goal.

1.2 LOCATION AND SITE

The FMPC is located near Fernald, Ohio, approximately twenty miles northwest of downtown Cincinnati. Figure 1-1 shows the location of the FMPC and other neighboring communities, the largest of which, Hamilton, Ohio, is located about ten miles northeast of the plant.

The total area of the FMPC site is 1050 acres: 850 acres in Hamilton County and 200 acres in Butler County. Figure 1-2 presents the current land use at the FMPC, including production facilities, waste pit storage areas, utilities plants, and supporting buildings. The production facilities and supporting buildings cover 136 acres, with 19 acres under roof. Approximately four miles of railroad track and paved road lie on the site. Paved storage areas total approximately one million square feet.

Site elevation is 580 feet. The Great Miami River, into which site drainage flows, has a water level elevation of 555 feet at maximum flood stage in the Ross area. The worst recorded flood in this area (in 1913) would not have affected the present-day site of the FMPC. At present, combined liquid effluents from the general sump in the production area, clearwell in the waste pit storage area, sewage treatment plant, and storm water runoff are discharged to the Great Miami River via an underground line from Manhole 175. During periods of heavy rainfall, storm water runoff may discharge directly into Paddy's Run, a tributary of the Great Miami River, via an outfall ditch.

Wind directions and speeds are observed at both the Cincinnati and Dayton airports. Prevailing winds during the summer months are from the southwest. During the winter months, the prevailing winds are northerly. Beginning in October, 1986, weather data will be collected by the new FMPC meteorological tower, giving a more precise picture of actual site meteorology.

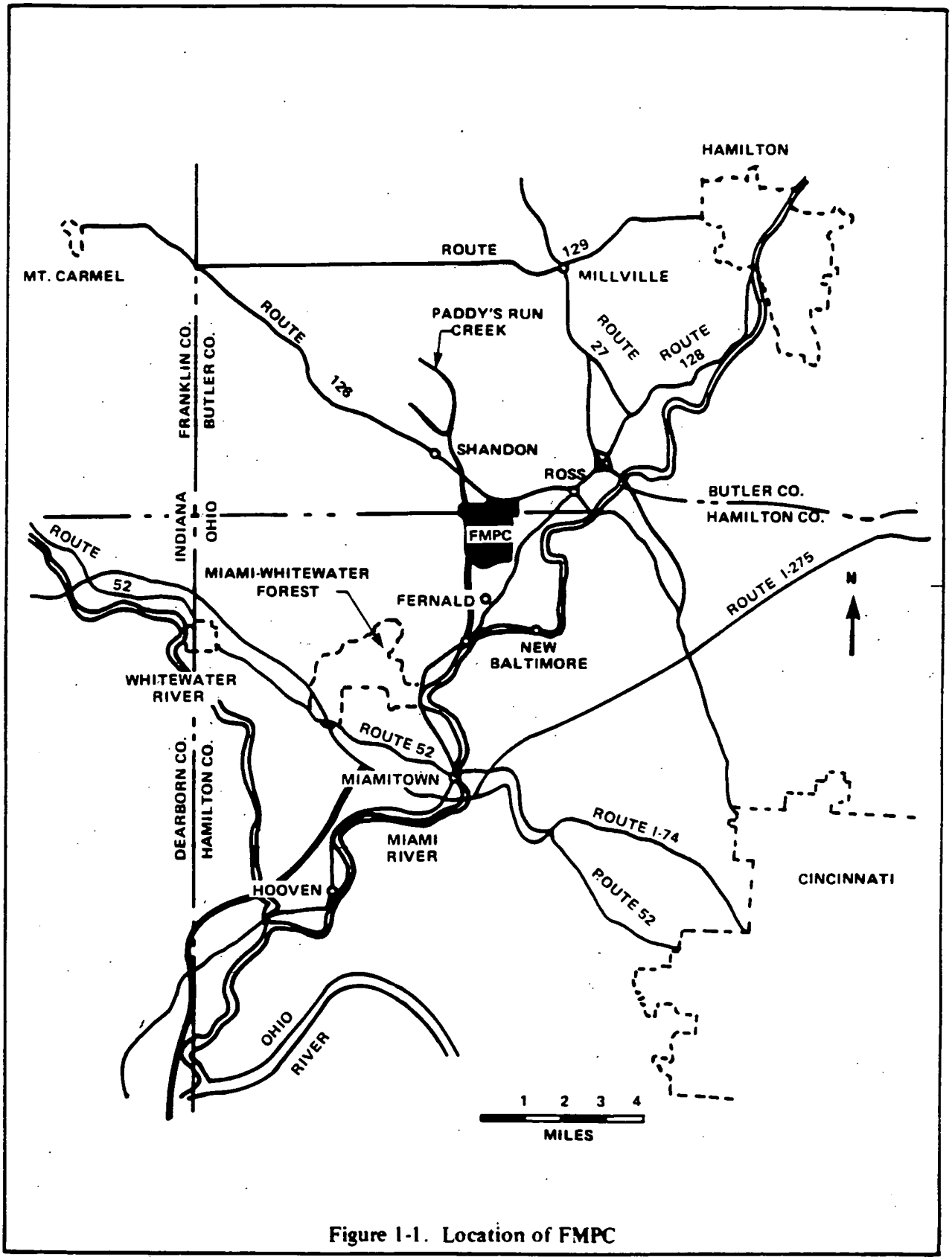
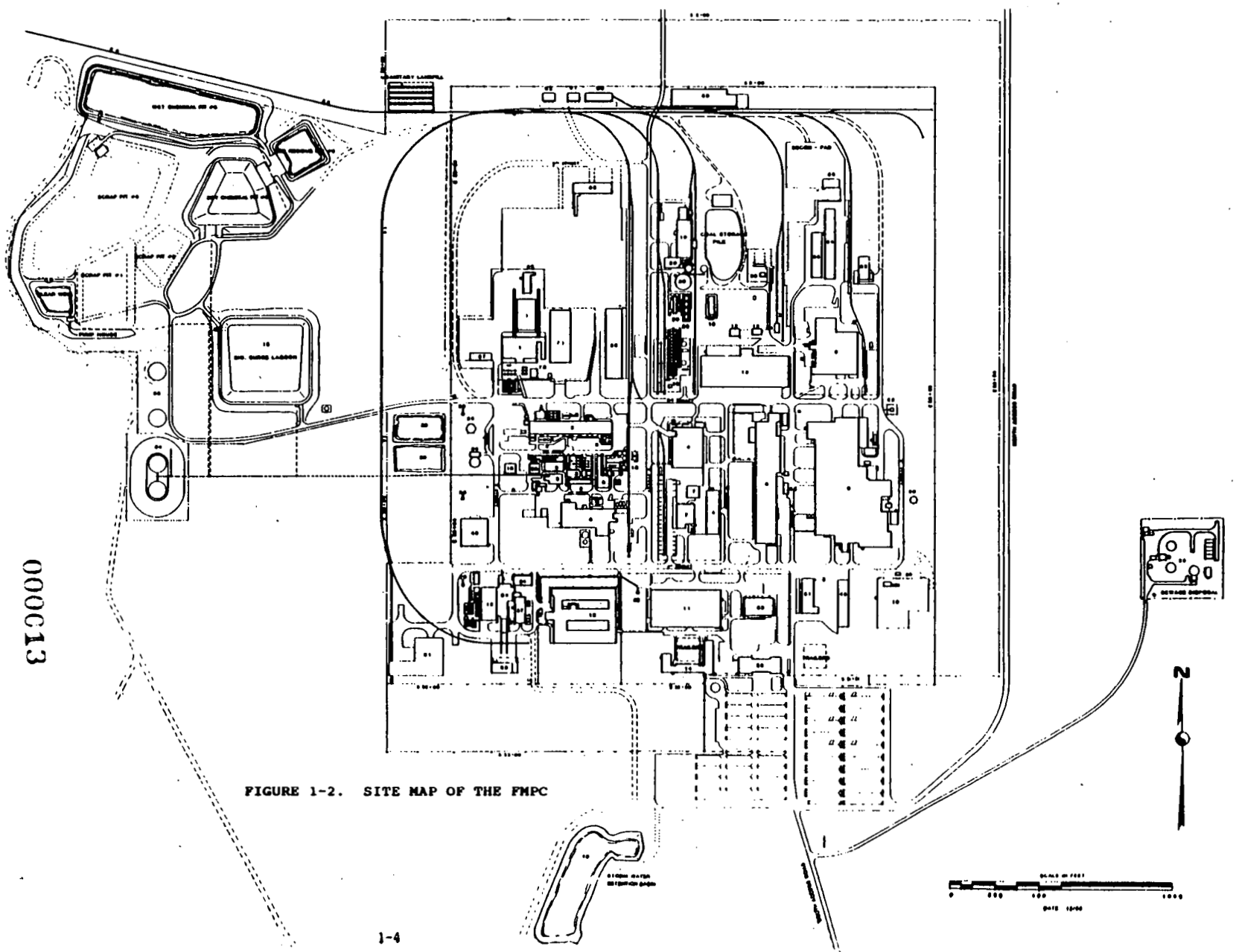


Figure 1-1. Location of FMPC



AREA CODE NUMBER	TITLE
00	General
1	Preparation Plant
	Silo Storage (South of Sampling Plant)
2	Ore Refinery Plant
3	Nitric Acid Recovery Plant
4	Green Salt Plant
5	Metals Production Plant
6	Metals Fabricating Plant
7	Building 7
8	Recovery Plant
9	Special Products Plant
10	Boiler Plant
11	Service Building
12	Mechanical Shop & Storeroom
13	Pilot Plant (Wet End)
14	Administration Building
15	Laboratories
16	Main Electric Sub-Station
17	General Area
	Paved Areas (See 74)
18	Water Pollution Control
	Chemical Feed Building
	General Sump
	Biodenitrification Towers
	Surge Lagoon
	Storm Water Retention Basin
19	Metal Tank Farm
20	Water Supply System
	Cooling Tower
	Cooling Tower Pump House
	Elevated Storage Tank - East
	Treated Water Storage Tank
	Chlorine Building (For Water Treatment Area)
	Water Wells
	Reactivator
21	Roads, Sidewalks, Fences, Pits, Etc.
22	Interplant Service & Product Lines
	Gas Meter House
	Lift Station
	Pipe Trestle
	Truck Scale
23	Communication & Alarm System
24	Railroad System
25	Sanitary Sewer System
	Sewage Disposal
	Imhoff Tanks
	Sludge Beds
26	Fire Protection System
	Elevated Water Tower - West
27	Mobile Equipment (Also See 47)
28	Security System - Guard House
30	Chemical Warehouses
31	Engine House - Garage
32	Magnesium Storage
34	K-65 Storage Area
36	Metal Oxide Storage Area
37	Pilot Plant Annex (Dry)
38	Propane Storage
39	Incinerator Plant
40	Waste Management - Solids
44	Temporary Structures (Trailers)
45	Building 45
46	Heavy Equipment Garage
47	Mobile Equipment (Also 27)
51	UF$_6$ to UF$_4$ Reduction Facility II
53	Health, Safety & Production Control Building
54	UF$_6$ to UF$_4$ Reduction Facility I
56	Slag Recycling Plant - East
58	CP Storage Warehouse
60	Quonset Number 1
61	Quonset Number 2
62	Quonset Number 3
63	KC-2 Warehouse
64	Plant 9 Warehouse
65	Plant 6 Warehouse
66	Drum Reconditioning Building
67	Plant 1 Storage Building (No. 1 & No. 2)
68	Pilot Plant Warehouse
69	Decontamination Building
71	General In-Process Storage Warehouse
73	Fire Brigade Training Center
74	Paved Area Storage
76	Site Preparation, Parking Lots

FIGURE 1-2. SITE MAP OF THE FMPC

1.3 PURPOSE OF REPORT

Development of a site radioactive waste management plan is mandated in DOE Order 5820.2. The purpose of the FMPC Waste Management Plan is to identify the comprehensive program for handling and disposal of waste generated, stored, and received at the FMPC. The Plan provides identification of waste management activities which will ensure compliance with applicable federal and state regulations.

Incorporated into the report are the following:

- Summary and characterization of existing FMPC waste streams, both generated and inventory (backlog)
- Discussion of strategies for the management of low-level radioactive waste, mixed waste, noncontaminated sanitary/industrial waste, scrap metal, remedial action waste, and surplus facilities/equipment
- Discussion of recommended funding needed to implement strategies and achieve goals
- Discussion of schedules and major milestones for Waste Management activities
- Identification of quality assurance systems for Waste Management activities
- Reference to the Environmental Monitoring Program at the FMPC which includes monitoring of Waste Management activities.

Budgets and costs presented in the Waste Management Plan are not firm. Rather, they represent the expected costs of activities required to implement the strategies developed. The budgets may also not be equal to the Waste Management Section budget because many of the efforts involved cross organizational lines. The total cost may be well estimated, but the division of funding among organizations cannot yet be predicted.

The FMPC places a strong emphasis on 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.

The FMPC Waste Management Plan will be updated at least annually, and more often if required.

1.4 WMCO WASTE MANAGEMENT PHILOSOPHY

This Waste Management Plan serves as a reflection of the integrated planning being developed by WMCO and the DOE. Overall strategies are formulated and then applied to individual waste streams and concerns. Concerns are prioritized to identify those which require prompt attention. Short-term and long-term action plans are identified.

The FMPC's ultimate goals include the following: (1) elimination of all unnecessary generation of waste by development of more effective production processes, (2) minimization of waste which cannot be avoided in production, and (3) permanent disposal of waste in a safe and responsible manner with minimum environmental insult. WMCO is committed to accomplishing these goals while using its resources in an effective and responsible manner.

1.5 WASTE MANAGEMENT PROGRAM ADMINISTRATION

DOE/ORO has responsibility for the administration of the prime contract for operations at the FMPC. The DOE/FMPC Site Manager is the responsible DOE Staff Member.

WMCO became the prime site management and operating contractor at the FMPC on January 1, 1986, under prime contract number DE-AC05-86OR21600. The Waste Management Section of the Technical Department has the responsibility for coordination of waste management activities. Figure 1-3 is an organization chart showing the structure of responsibilities for waste management activities. Responsibilities of the contractor relative to the Waste Management Plan include both the implementation and revision of the Plan to assure that the Plan remains applicable to the mission of the FMPC, that it properly reflects changes in regulations pertinent to waste management and environmental protection, and that it remains current with respect to changes in the technology of the production process and in technology of waste treatment.

This Plan is integrated with other planning efforts that affect waste management. These include the Five-Year Environmental Health and Safety Plan, the Productivity Retention Plan, and the Site Utilization and Facilities Development Plan.

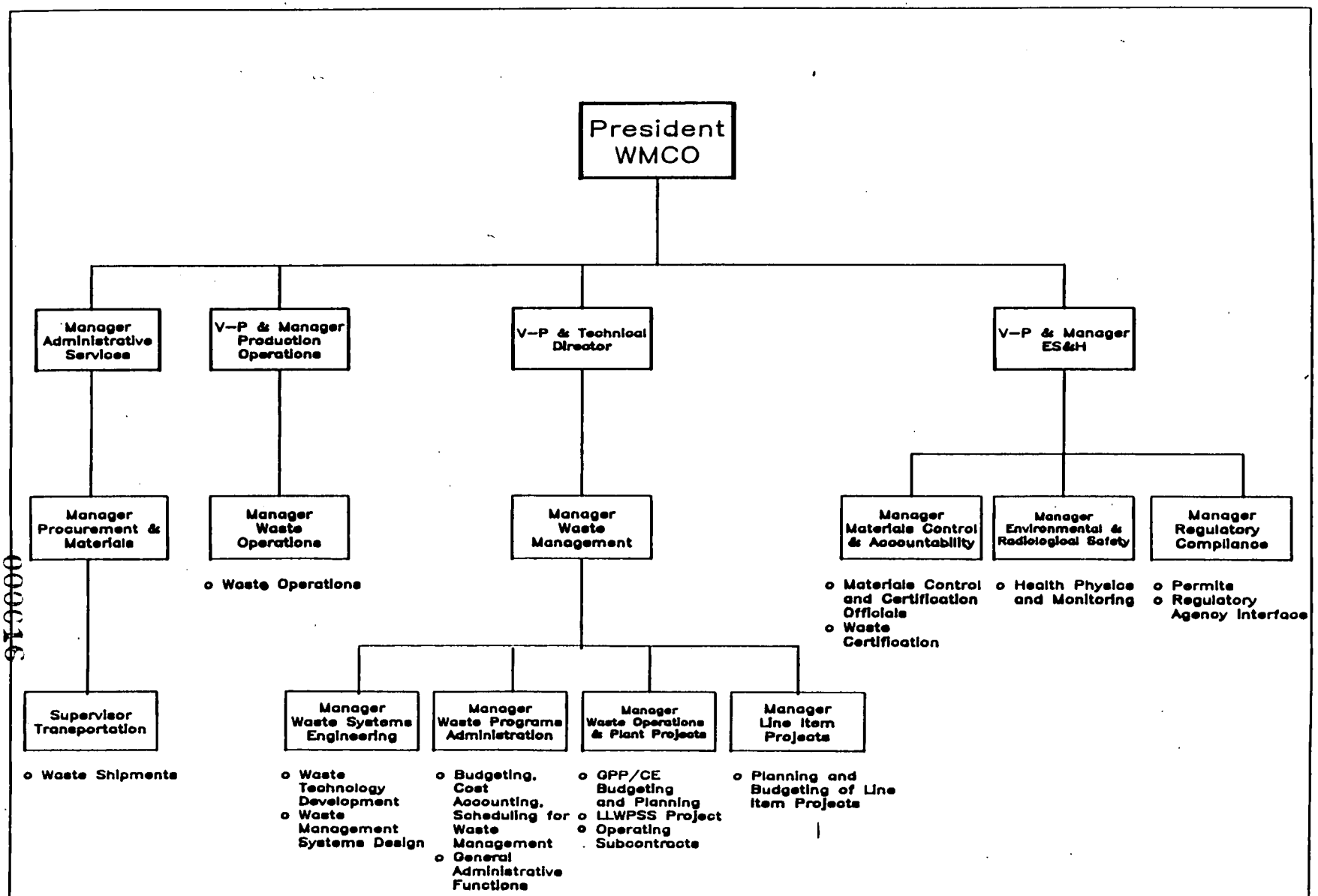


FIGURE 1-3. RESPONSIBILITIES FOR WASTE MANAGEMENT ACTIVITIES

Waste management activities at the FMPC are primarily funded under the DOE Office of Defense Waste and Transportation Management. Supplemental funding is furnished by the Office of Nuclear Material Production.

1.6 STATUS OF COMPLIANCE WITH DOE ORDER 5820.2 REQUIREMENTS

The status of compliance with DOE Order 5820.2 requirements, in particular Chapters I through V which address specific requirements for managing radioactive wastes, is to be reported annually in the FMPC Waste Management Plan.

1.6.1 Management of High-Level Waste

No high-level wastes are handled or generated at the FMPC, therefore, the requirements of DOE Order 5820.2, Chapter I, Management of High-Level Waste, are not applicable.

1.6.2 Management of Transuranic (TRU) Waste

No TRU wastes are handled or generated at the FMPC, therefore, the requirements of DOE Order 5820.2, Chapter II, Management of Transuranic Waste, are not applicable.

1.6.3 Management of Low-Level Waste

DOE Order 5820.2, Chapter III, Management of Low-Level Waste, establishes policies and guidelines for managing low-level wastes and sets forth the requirements for program administration.

A. Waste Disposal

DOE policy for LLW management, as defined in DOE Order 5820.2, provides for disposal of LLW where practical by shallow land burial or greater confinement disposal. Past management practices at the FMPC involved the discard of generated LLW into dedicated surface impoundments, drums, and storage silos. Future waste management plans, as outlined in this plan, call for the processing, packaging and shipment of LLW for off-site disposal, and the eventual transfer of stored waste inventories to a final disposal site.

The FMPC currently generates approximately 5,000 metric tons of solid LLW per year in wet or dry form, which is placed in on-site temporary storage. The majority of these wastes after processing (i.e., dewatering) are suitable for shallow land burial. These wastes are then packaged for shipment to the NTS for disposal.

Approximately 500,000 metric tons of LLW is currently stored on site awaiting eventual disposal. Most of the stored waste is in surface impoundments and will require processing to render it suitable for shallow land burial.

Approximately 14,000 pounds of solid radioactive mixed waste are generated annually by an off-site extrusion operation. This waste is not suitable for shallow land burial in its current form, therefore, a treatment facility has been constructed at the FMPC to investigate options for treatment of the waste to meet disposal site acceptance criteria.

B. Waste Acceptance

DOE Order 5820.2 sets forth waste form acceptance criteria for LLW disposal. These criteria are generally applied to the waste storage activities at the FMPC. Criteria applied to the waste management activities at the FMPC are incorporated in the FMPC LLW packaging and shipping procedures and will be updated as necessary.

Allowable Quantities and/or Concentrations of Radioactivity

Current low-level waste storage activities at the FMPC are guided by discard criteria based upon an evaluation of intrinsic value of the uranium concentration versus the cost of recovery. These limits are documented in the "Standard Operating Procedure for On-Site Shipment and Discard of Depleted Uranium Materials" (NLCO-1021, Rev. 3). Criteria for shipments to the NTS are outlined in NVO-185 (Rev. 4) and NLCO-2029.

Criticality Safety Requirements

Nuclear criticality safety at the FMPC is based on compliance with the FMPC

"Principles of Nuclear Safety" (NLCO-1179), February, 1982. Specific criticality requirements for shipments to the disposal site are contained in NLCO-2029 and NVO-185 (Rev. 4).

Radioactive or Thermal Energy Output

The potential for radioactive or thermal energy releases from FMPC LLW are minimal and thus necessitate no unique waste preparation requirements.

Restrictions on the Generation of Harmful Gases, Vapors, or Liquid in Waste

The restrictions in NLO-2029, NVO-185 (Rev. 4), and Department of Transportation (DOT) regulations preclude the generation of harmful gases, vapors, or liquids within the waste package or the final disposal site.

Generation of harmful vapors from stored radioactive mixed wastes (contaminated organic solvent) is controlled by storage in compliance with "FMPC Hazardous Waste Management Plan" and DOE Order 5480.2.

Restrictions for Radioactive Waste Having Hazardous Chemical Properties

Several types of low-level waste generated or received at the FMPC exhibit hazardous chemical properties and are restricted or controlled by existing procedures. No hazardous wastes are shipped to the NTS.

Toxic mixed wastes (PCBs) are segregated, packaged, and stored in accordance with FMPC procedures. Radioactive mixed waste (organic solvents) generated at the FMPC, or received from RMI, are stored in accordance with the "FMPC Hazardous Waste Management Plan."

Mechanical Stability Requirements for Waste Packages

The current waste management system at the FMPC entails the off-site shipment of some LLW and the long-term storage of some wastes until processing facilities are available. Due to the anticipated shipment schedules,

and to the secondary control measures (curbs, etc.) in place, mechanical stability requirements for the drums currently being used for storage are minimal and generally not applicable. Approved DOT shipping containers meeting the mechanical stability requirements will be utilized for all off-site shipments of LLW materials as required by NVO-185 (Rev. 4) and NLCO-2029.

Restrictions for Chelating and Complexing Agents or Other Substances With the Potential to Mobilize Harmful Contaminants

Solubilization and mobilization of uranium from existing FMPC stored LLW are controlled by the adjustment of pH in the surface impoundments per Standard Operating Procedure (SOP) 43-C-601. The waste acceptance criteria imposed by NVO-185 (Rev. 4) and NLCO-2029 minimize the possibility that wastes shipped for disposal will contain substances which could mobilize radionuclides or other hazardous components.

Physical Properties of Wastes, Including Restrictions on Respirable Substances and Quantities of Free Liquids and Other Items Which are Deemed Necessary by the Field Organizations

Dust suppression techniques are routinely applied at the FMPC during waste packaging operations involving dry waste materials.

Free liquid restriction, meeting disposal site criteria, are specified in NLCO-2029.

C. Disposal Site Selection

No plans exist for the development of new LLW disposal sites at the FMPC; therefore, the requirements of DOE Order 5820.2, Chapter III, 3.C or equivalent storage site selection criteria are not applicable.

D. Disposal Site Design

No plans exist for the development of new LLW disposal sites at the FMPC: therefore, the requirements of DOE Order 5820.2, Chapter III, 3.D or equivalent storage site design criteria are not applicable.

E. Site Operations

DOE Order 5820.2 sets forth site operating requirements for LLW disposal sites. These criteria are generally applied to the storage site operations in place at the FMPC.

Training for Operating Personnel

All personnel involved in the FMPC waste management operations are required to participate in formal training sessions providing instructional information pertinent to their particular job assignment, as specified in the FMPC "Standard Operating Procedures Manual." Nuclear Safety Training is administered to all personnel in accordance with the "Nuclear Safety Policies and Procedures Manual" (NLCO-1194). Industrial Hygiene training is also included as part of job assignment training on an "as needed" basis.

Personnel responsible for sampling, packaging, or certifying waste for off-site shipment receive training in accordance with the FMPC Training Manual, "Certification of Low-Level Waste Packaging, Storage, and Shipping Requirements."

Waste Volume Reduction

Existing policies and procedures in effect at the FMPC focus on volume reduction in the generation of discard materials. These procedures are outlined in the "FMPC Standard Operating Procedures Manual" sections pertinent to each waste generator facility. Segregation of noncontaminated waste and burning of contaminated oil in a liquid waste incinerator in accordance with SOP-2-C-917, achieve volume reduction for a portion of the FMPC's LLW.

Emergency Response Plans

Waste management operations at the FMPC are covered by the existing site-wide "FMPC Emergency Plan." The site emergency forces are available for immediate response. A contingency plan for responding to

emergencies associated with radioactive mixed hazardous and/or toxic wastes in compliance with DOE Order 5480.2 has been prepared.

Waste Documentation System

On-site documentation procedures and forms are contained in the "Standard Operating Procedures for On-Site Shipment and Discard of Depleted Uranium Materials" (NLCO 1021, Rev. 3). Documentation of the transfer and storage of radioactive mixed hazardous and toxic wastes consists of operating and inventory logs as required by DOE Order 5480.2.

Contingency Plan

Wastes which do not meet the uranium specification for discard have, by definition, recoverable values of uranium, and are reprocessed. This administrative control procedure assures that waste discard criteria for uranium and fissile material are met before a waste is discarded.

Contingency plans for treatment of wastes from the proposed packaging and shipping operations, which fail to meet NTS waste acceptance criteria, involve the reprocessing and repackaging of the waste so that it will meet the criteria.

First Aid

Emergency first aid treatment is provided by the on-site Medical Department of the Health and Safety Division.

Availability, Maintenance, and Decontamination of Operating Equipment

Due to the nature of the waste materials encountered at the FMPC, various types of equipment are employed for operation of the storage facilities. This equipment includes transportation vehicles and earth moving equipment, such as pickup trucks, bulldozers, cranes, clamshell buckets, dump trucks, etc. Each of these pieces of equipment is available on the plant site for the transportation and handling of contaminated wastes. Contaminated equipment is thoroughly decontaminated prior to

release to clean areas. Maintenance of equipment is available through existing plant-site maintenance operations.

Environmental Monitoring Program

At the FMPC, effluent streams, stack emissions, ambient air quality, surrounding soil and vegetation are sampled regularly in accordance with the procedures of the "Health and Safety Procedures Manual." Results are reported annually in the "Environmental Monitoring Annual Report."

Procedures to Minimize Interactions Among Wastes

Due to the characteristics of the FMPC low-level radioactive wastes, specific procedures for the segregation of wastes are not requisite to the attainment of the objectives of DOE 5820.2. However, procedures outlined in NLCO-2029 assure that the potential for waste interactions are minimized.

Access Control

All radioactive/toxic mixed wastes not stored within waste surface impoundments and storage silos are currently stored within the FMPC production area. The production area is patrolled by guards and access is strictly limited to cleared personnel.

Low-level waste surface impoundments and silos are adjacent to the production area and encircled by chainlink fence. Access to these areas is restricted to cleared personnel by the Security Department.

Unusual Occurrence Reporting and Quality Assurance and Control

Unusual occurrences associated with waste management operations are reported in accordance with DOE 5484.2. Quality assurance and control policies, procedures, and concepts for all FMPC operations are contained in the "FMPC Quality Assurance Program Manual" (Rev. 9), Nov., 1985.

Waste Packaging

Waste packaging requirements for the shipment of LLW to the NTS are specified in NLCO-2029 and FMPC LLW Packaging and Shipping Procedures. These requirements are

in accordance with applicable DOT guidelines and the acceptance criteria contained within the "Operational Radioactive Defense Waste Management Plan for the Nevada Test Site" (NVO-185, Rev. 4), January 1985.

Packaging requirements for the shipment of liquid LLW to Oak Ridge for incineration will be addressed in a FMPC hazardous waste management plan and will meet applicable DOE guidelines.

Waste Shipping

Procedures for the transportation of LLW material to NTS are incorporated in NLCO-2029, FMPC LLW Packaging and Shipping Procedures, and the FMPC Transportation Department Manual. The procedures are in accordance with the guidelines established within the "Operations Radioactive Defense Waste Management Plan for the Nevada Test Site" (NVO-185, Rev. 4), January 1985.

Procedures for the transportation of liquid LLW to the Oak Ridge incinerator will be addressed in the "FMPC Hazardous Waste Management Plan."

Routings for shipments of LLW have been established by the Oak Ridge Operations (ORO) Transportation Data Base.

F. Site Closure/Post Closure

FMPC LLW materials are currently being stored in surface impoundments, drums, and dedicated storage vessels at the FMPC plant site. FMPC storage facilities maintain an active status pending the eventual transfer of materials to a permanent disposal site. Site closure/post closure criteria, while generally applied to disposal sites, has been applied to the existing FMPC LLW Storage System.

Site Stabilization

The retirement of FMPC waste impoundments involves the construction of a soil and vegetative cover over stored waste materials. The purpose of the soil covering is to stabilize the waste materials in such a manner so as to reduce the potential for migration of contaminated materials to previously clean areas. A Remedial Investigation/Feasibility Study (RI/FS) was initiated in FY-86 to assess the status of the waste storage facilities and the need for further stabilization or perhaps exhumation of the contained material.

Residual Radioactivity Levels for Surface Soils

The FMPC storage area is maintained as an active facility, with continuous surveillance and access control procedures in place. Residual radioactivity levels in surface soils, therefore, are not required to meet established release limits for uncontrolled use areas. A clean soil and vegetative cover is, however, placed over retired impoundments to isolate the stored waste materials from man and the environment.

Security System

Radioactive/toxic mixed waste materials are stored within dedicated storage vessels inside the FMPC production area. The production area is patrolled and access is restricted.

The surface impoundments are located directly adjacent to and within sight distance of the production area. The storage area is encircled with a chainlink fence with access restricted to cleared personnel.

Maintenance of Emergency Response Plans, Facilities and Equipment

Emergency response plans are documented within the "FMPC Emergency Plan" (NCLO 1129, Rev. 4). Complete revisions are made to this plan every two years by the Health and

Safety Division. Emergency facilities and equipment are maintained in strict accordance with this plan by plant site maintenance organizations.

Permanent Identification Markers

Surface impoundments and storage vessels are tied directly into the FMPC grid system. This grid system, which utilizes permanent concrete benchmarks, is fully recoverable by a qualified surveyor. Plant site benchmarks are tied to the Ohio State Plane Coordinate System and are also fully recoverable. Records of the exact locations of retired surface impoundments are maintained for future transfer of materials to a permanent disposal site.

Periodic Surveillance and Maintenance Programs

FMPC surface impoundments are located directly adjacent to existing production operations. Surveillance and maintenance of the impoundments is essentially maintained continuously by plant personnel. Waste storage vessels are inspected routinely for structural integrity by on-site personnel.

Corrective Measures

The waste management system formerly employed at the FMPC involved the storage of LLW in surface impoundments. These surface impoundments do not meet the requirements established by DOE Order 5820.2 for the permanent disposal and management of radioactive wastes. The RI/FS initiated in FY-86 will identify corrective measures to be taken.

1.6.4 Management of Wastes Contaminated With Naturally Occurring Radionuclides

FMPC wastes contaminated with naturally occurring radionuclides are stored and disposed of as low-level wastes, therefore, the requirements of DOE Order 5820.2, Chapter IV, Management of Wastes Contaminated With Naturally Occurring Radionuclides, are not applicable.

1.6.5 Decontamination and Decommissioning of Surplus Facilities

DOE Order 5820.2, Chapter V, Decontamination and Decommissioning of Surplus Facilities, establishes policies and specific requirements for decommissioning activities and managing surplus facilities. Surplus facilities are defined as those facilities that have no identified programmatic use and are radioactively contamianted to levels that require controlled access.

New facilities at the FMPC in which radioactive or other hazardous materials are to be utilized shall be designed to limit dispersion of these materials and to simplify decontamination and decommissioning (D&D) or reuse. To the extent feasible, features and procedures that facilitate decontamination during operation, and ultimate D&D, shall be identified during the design phase. Such features and procedures shall include, to the extent possible, those outlined in DOE Order 5820.2.

Preproject activities for the D&D of surplus facilities shall be in accordance with DOE Order 5820.2. Contractural and legal requirements, economic impacts, future site plans, cost-effective program management and other factors shall be considered in identifying surplus facilities, developing schedules for decommissioning and project implementation plans.

Surveillance and maintenance shall be provided for all surplus facilities to assure adequate containment of contamination, provide physical safety and security, and to reduce potential public and environmental hazards. Radiological criteria for decontamination of surplus facilities shall be developed, as needed, based on accepted radiation protection standards (DOE 5480.1A) and consideration of natural background radiation levels.

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All D&D of surplus facilities shall include the appropriate project activities as outlined in DOE Order 5820.2, Chapter V. All wastes generated by the projects shall be managed according to the requirements of that order, or DOE 5480.2, as appropriate. Following completion of the project, a final report and information on waste quantities and characteristics shall be prepared.

2.0 FMPC SITE WASTE AND WASTE GENERATING PROCESSES

2.1 FMPC SITE WASTE CLASSIFICATION BY REGULATION

The environmental regulatory requirements for FMPC Waste Management are outlined in DOE Orders 5480.1A, 5480.2, 5480.3, 5480.4 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.

2.1.1 Low-Level Radioactive Waste

Management of low-level radioactive wastes (LLW) at the FMPC is principally governed by DOE Orders 5820.2 and 5480.1A. The DOE Order requirements address the management of radioactive wastes, waste by-products, and radioactively contaminated surplus facilities.

Low-level radioactive waste at the FMPC is also governed by Executive Order 12088, 40 CFR, and numerous federal laws including the Clean Air Act (CAA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Resource Conservation and Recovery Act (RCRA), and the Federal Facilities Compliance Agreement (FFCA).

2.1.2 Mixed Radioactive/Hazardous Waste

Mixed radioactive/hazardous waste management at the FMPC is governed by DOE Orders 5480.1A and 5480.2, as supplemented by ORO Order 5480.4, the Atomic Energy Act, the RCRA, and the FFCA.

The RCRA defines hazardous wastes as those materials possessing one or more of the following attributes:

A. The waste possesses one or more of the following characteristic hazards:

- ignitability,
- corrosivity,
- reactivity,
- extraction procedure (EP) toxicity.

B. The waste is generated from a nonspecific listed source or generic listed process.

C. The waste is generated from a specific listed source or process.

D. The waste contains specifically listed, discarded, commercial chemical products. A mixture of nonhazardous waste with hazardous waste becomes hazardous regardless of the relative amounts of each waste prior to mixing.

2.1.3 Toxic Substances Control Act (TSCA) Waste

Specific toxic substances are regulated by DOE Orders 5480.1A, and DOE/ORO Order 5480.4 which incorporates the Toxic Substances Control Act (TSCA). These substances differ from RCRA hazardous materials and include polychlorinated biphenyls (PCBs). To date, the only regulatory element pertinent to the FMPC is the PCBs Rule specified in 40 CFR 761.

2.1.4 Sanitary/Industrial Waste

The Ohio Solid Waste Disposal Act (and subsequent regulations under this act) govern the planning, design, construction, operation and maintenance of solid waste processing and disposal facilities. Solid or dissolved material in domestic sewage flows (subject to permit under the Federal Water Pollution Control Act), and special nuclear materials, as defined under the Atomic Energy Act (as amended), are excluded.

2.2 SITE WASTE CATEGORIES, IDENTIFICATION, AND SOURCES

The FMPC has developed an extensive program for the disposal of solid wastes generated from present production and day-to-day support operations performed at the facility, as well as other solid wastes generated over the years and stored in pits, silos, and drums. The FMPC Waste Management Plan addresses liquid and solid wastes covered by RCRA, TSCA, and other applicable federal, state, and local regulations. (No contained gaseous wastes are produced at FMPC.)

A waste is defined as any nonrecoverable material, nonrecoverable material contaminated with uranium, or any other material at the FMPC that must be disposed of in accordance with federal, state, or local laws and regulations. A solid waste is further defined to include any solid, liquid, or semisolid or contained gas that is being discarded. The solid waste management program for production and process support wastes provides for two categories of waste:

- Wastes generated from continuing production and operational needs of the FMPC. Those wastes for which a disposal category does not exist will become backlogged wastes until a suitable disposal strategy can be implemented.

- Backlogged wastes currently in storage and awaiting treatment, processing, and/or ultimate disposal. These include wastes which were impacted by the changing regulatory requirements which made previous waste management strategies unacceptable. Also included in this category are wastes shipped to the FMPC from other sites for interim storage/treatment prior to disposal. Presently, $BaCl_2$ wastes from RMI are being received and stored per direction of DOE. Scrap metal and other materials (for example, thorium-bearing materials) have been received at the FMPC in the past. The wastes will be stored on site until a suitable strategy can be implemented.

In addition, for the purposes of this Plan, some materials have been identified as "waste streams" which are not directly related to production, i.e., storm water runoff, thorium, sewage sludge, wooden pallets, construction rubble. Though not production wastes, these are, nevertheless, site concerns. Thus, they are defined as waste streams in the Waste Management Plan.

2.2.1 Low-Level Radioactive Waste

Production and plant support activities at the FMPC generate nonhazardous solid waste contaminated by low levels of radioactivity. Table 2-1 lists the low-level radioactive waste (LLW) streams discussed in the Waste Management Plan. These wastes include production wastes as well as wastes from the plant support or ancillary facilities and operations such as materials handling; treatment of liquid and gaseous waste streams; laboratory discards; and wastes produced off site from the RMI extrusion process (shipped to the FMPC for treatment).

TABLE 2-1

LLW WASTE STREAMS DISCUSSED IN THE WASTE MANAGEMENT PLAN

A. DEPLETED MgF_2 SLAG AND RESIDUE

MgF_2 slag
MgF_2 >20 mesh, including dirty prill
Unfired reduction charges and MgF_2 from liner cave-ins

B. SLAG LEACH FILTER CAKE

C. NEUTRALIZED RAFFINATE

D. DEPLETED SUMP CAKE

Wet sump or filter cake

E. GENERAL SLUDGE

General sludge from sumps

F. NONCOMBUSTIBLE DRY PROCESS WASTES

Bad reduction (no derby)
Crushed slag from pot blowouts
Graphite (contaminated)
Magnesium (contaminated)
MgO and Mg Zirconate from crucible cleanout
Off spec UF_4
Samples from lab

G. CONSTRUCTION RUBBLE/SOIL

Construction rubble (contaminated)
Soil (contaminated)

H. MISCELLANEOUS COMBUSTIBLE WASTES

Clothing - Process Area (contaminated)
General waste - process area
Metal spills and extruder ends - high impurity metal
Non-briquettable chips and turnings for oxidation
Partially oxidized metal oxidation feed
Rockwell cleanings and spills
Scrap U_3O_8, high fluoride
Wooden boxes and pallets (contaminated)

I. MISCELLANEOUS URANIUM METAL SLUDGES

RMI Sludges

J. DUST COLLECTOR RESIDUES

Dust collector bags
Dust collector residues

K. CONTAMINATED WASTE OILS

L. ALL OTHER WASTES

Asbestos
Furnace solidified salts-chloride
Incinerator ash
Nonburnable contaminated trash
Nonburnables (filter cartridges) (contaminated)
Sample bottles (glass and plastic)
Scrap salts
Scrap uranium metal
Sewage sludge
Solid metal with imbedded steel other than cores

These wastes can be classified according to their needs for processing, which include (1) drying, (2) filtration, (3) size reduction, (4) stabilization, and/or (5) packaging (for on-site storage and off-site disposal). The wastes can also be roughly grouped into eleven categories based on similarities in form, composition, and processing requirements. These categories are as follows:

A. Depleted MgF_2 slag and residue. The reduction of UF_4 (green salt) to produce depleted uranium metal generates MgF_2 slag. Part of this material is recycled and used as reduction pot liner for subsequent metal production, but the bulk of the MgF_2 is not required for this purpose and becomes waste. This is the single largest waste stream generated at the FMPC, comprising 49% of the total waste by weight. Currently, depleted MgF_2 slag is being shipped to the Nevada Test Site (NTS) for disposal.

B. Slag leach filter cake (VVB-001). In the production of enriched derbies, the MgF_2 that is produced from the metal reduction process is acid-leached to dissolve and recover the uranium. The resulting slurry is neutralized with calcium oxide and filtered. The remaining residue, or slag leach filter cake, is the second largest waste stream generated at the FMPC, comprising 30% of the waste by weight. Current waste inventory of slag leach filter cake is approximately 4892 drums and is primarily located on the Plant 1 pad. It is approved for shipment to the NTS, and will be shipped as priority allows.

C. Neutralized raffinate (VVB-002). In the FMPC refinery operation, uranium-bearing feed materials are digested in nitric acid to dissolve the uranium; this uranium is then extracted from the acidic aqueous phase into a TBP-kerosene solvent, leaving the impurities in a waste "raffinate" solution. The aqueous raffinate, containing most of the nitric acid and impurities and very small quantities of insoluble, nonextractable uranium, is neutralized with lime and filtered. After filtration, it contains nominally 60-70 wt% water. Current waste inventory of neutralized raffinate is 12,134 drums and is primarily located on the Plant 1 pad. The raffinate is approved for shipment to the NTS; however, much of this material must be dried prior to shipment.

D. Depleted sump cake. Liquid wastes are generated in many operations at the FMPC. The major process areas have individual treatment facilities to pretreat the liquid wastes from each process step. Generally, these pretreatment facilities adjust the pH for the precipitation of uranium and filter the resultant slurry. As it is not generally economically feasible to recover depleted uranium, depleted filter or sump cake is drummed and stored on an interim basis.

E. General sludge. The aqueous waste from each of the plant sumps is transferred to the general sump where the pH is raised by the addition of lime to precipitate uranium and other metal species. The waste stream is clarified by sedimentation and decanted to Pit 5, treated, and ultimately flows to the Great Miami River. The sludge is collected from the general sump, drummed, and stored on an interim basis.

F. Noncombustible dry process wastes. Miscellaneous noncombustible dry wastes include materials generated in several buildings. These wastes are principally ceramic pieces and tiles from Plants 5, 6, and 9, and graphite crucibles, cups, and molds from depleted uranium processes, miscellaneous samples and off-spec UF_4 as well as general trash and refuse. Much of this waste is being drummed and stored until a recommendation

for disposition is formulated and submitted by WMCO and approved by DOE. A recommendation will be submitted by WMCO in FY-87.

G. Construction Rubble and Soil. Rubble and soil are being generated in construction activities at an ever-increasing rate. This material is presently being stored on piles in the production area; however, disposition options are being developed to handle the present piles and the rubble and soil to be generated in the future.

H. Miscellaneous combustible wastes. This stream consists of contaminated wastes which may be incinerated, generating ashes for subsequent disposal. At the present time, however, incineration on site is not an option. All miscellaneous combustible waste is being baled and stored. Studies will indicate if supercompaction is feasible for some. The LLWPSS rotary kiln will be evaluated for processing some of this material. Wooden pallets and boxes are also being stored. These may also be candidates for shredding and burning in the kiln.

I. Miscellaneous uranium metal sludges. This waste stream includes residues from machining and other processing operations and consists of sludges contaminated with uranium metal chips, fines, dust, turnings, and other residues. These waste streams require oxidation of the uranium component to eliminate its pyrophoric hazard. The streams are generally from the depleted uranium operations for which the recovery of the scrap has not been economically justifiable. New studies will be performed to consider the entire cycle costs, including storage on site or shipment for burial. These sludges are currently being drummed and stored.

J. Dust collector residues. Handling of materials at the FMPC involves capture of airborne particulates. In the process of capturing these particulates, dust collector residues are generated. These residues are considered waste only if the uranium contained is depleted. Depending on the operation, the composition of the residues includes UF_4, UO_3, U_3O_8, and/or MgF_2. This material and the collector

bags are being drummed and stored.

K. Contaminated waste oils. This waste stream consists primarily of cutting/cooling oil generated in machine tool operations and contains a heavy sludge of uranium metal chips, fines, and turnings, along with other assorted debris. An inventory of approximately 900 drums of waste oil is stored on site. This material will likely be shipped to the TSCA incinerator at the Oak Ridge Gaseous Diffusion Plant (ORGDP) for destruction.

All other production wastes are being drummed and stored on the Plant 1 pad until the Low-Level Waste Processing and Shipping System (LLWPSS) is available for processing (2Q-FY-89). (For more information on the LLWPSS, see Section 3.0, STRATEGY and Section 4.1.1.)

2.2.2 Mixed Waste

Mixed wastes contain both hazardous (or toxic) and radioactive constituents. They are discussed under Mixed Waste because the regulations governing the disposal of mixed waste apply. Their radioactivity, however, requires that they also be managed consistently with the regulations governing the safety, handling, and disposal of radioactive materials.

The following are mixed wastes generated or stored at the FMPC:

A. Spent Solvents. Spent solvents generated from degreasing operations at the FMPC include the general plant-use solvent 1,1,1-trichloroethane, xylene and mineral spirits (paint thinners), and perchloroethylene (used to dry clean leather-palmed gloves). Spent solvent generated is added to the bulk storage tanks located on site.

Spent solvent generated at RMI and spent 1,1,1-trichloroethane from degreasing operations at National Electric Coil in Louisville, KY, are also stored in the spent solvent tanks.

The solvents stored will likely be disposed of by incineration in the ORGDP TSCA incinerator. This program may begin as early as FY-87.

The TSCA incinerator is a major part of the FMPC planned method of disposal for mixed wastes. To insure that the FMPC is aware of TSCA incinerator planning activities and schedules, FMPC representatives maintain contact with ORGDP representatives. The FMPC has received the incinerator Waste Acceptance Criteria for the TSCA facility and has prepared a Transportation Plan for the shipment of waste to the incinerator facility.

B. EP Toxic Wastes/Spent Trichloride Salts. Approximately 36,000 pounds of spent trichloride salt are generated annually by RMI in processing operations for the FMPC. The salt is packaged and shipped to the FMPC for interim storage until a disposal strategy can be implemented.

The heat treat salt is presently stored in a curbed area on the concrete floor in the Pilot Plant warehouse.

The contaminated waste oils (listed in 2.2.1.K) will also be discussed with these mixed wastes, since incineration is the planned method of disposal for both the solvents and oils.

Though polychlorinated biphenyls (PCBs) are regulated by the Toxic Substance Control Act (TSCA), the PCB-contaminated wastes at the FMPC are also uranium-contaminated. Thus, they are classified as mixed waste. Two sources of PCB-contaminated wastes are stored at the FMPC: solvent still bottoms and sludges and PCB-containing capacitors.

A. Solvent Still Bottoms and Sludges. Approximately 20,000 pounds of 1,1,1-trichloroethane, still bottoms, and sludges are presently being stored in the KC-2 warehouse. These wastes are contaminated with uranium and PCBs.

B. PCB-Containing Capacitors. PCB-containing capacitors removed from service at the FMPC and articles used in their handling (rags, clothes, gloves) are stored in drums in a curbed storage area within the KC-2 warehouse.

2.2.3 Scrap Metal Waste

The FMPC has approximately 7500 metric tons of metallic scrap waste in inventory. This scrap has above-background levels of radiation, and is separated into two piles, one composed primarily of ferrous material and another pile composed primarily of copper material.

In the ferrous scrap metal pile, the major constituents are steel, nonreusable drums, discarded furnace parts, aluminum, stainless steel, and brass. Asbestos and deposits of green salt (UF_4) are also visible in the pile. This pile presently contains 6000 metric tons of scrap and is expected to increase in volume by at least 10% each year.

The copper scrap metal pile contains approximately 1500 metric tons, primarily motor windings and copper ingots. Much of this copper was shipped to the FMPC from other DOE sites for processing, and contains slightly above-background levels of radiation.

2.2.4 Sanitary/Industrial Waste

Sanitary/industrial waste is nonhazardous, noncontaminated, nonprocess material such as putrescible cafeteria waste, noncontaminated trash, and fly ash. At this time, only putrescible cafeteria waste is being disposed of off site (by commercial subcontractor). Noncontaminated trash is currently being baled and stored on site on an interim basis. This material may be shipped off site for commercial disposal in FY-87 if monitoring confirms the absence of contamination.

Approximately 2600 tons of fly ash per year is generated in the boiler plant. This fly ash is presently stored in a pile located south of the process area and the storm sewer outfall lagoon area.

2.2.5 Remedial Action Waste

Much attention has recently been given to several materials and waste streams at the FMPC which require remedial action. A Remedial Investigation/Feasibility Study (RI/FS) being conducted by the Roy F. Weston Co., Inc., has begun to identify the steps which should be taken to alleviate concerns regarding the waste pits and silos. The waste streams defined as Remedial Action Waste are quite diverse and should not be construed as being related.

The three primary Remedial Action waste streams are briefly described below. Other wastes placed in the Remedial Action waste category are cold metal (non-radium-bearing) oxides and sewage plant effluent.

A. K-65 Waste

The K-65 silos contain approximately 195,000 cubic feet of radium-bearing K-65 material. This material was formerly the property of the African Metals Corporation and was stored at the FMPC under a lease agreement with DOE. DOE has assumed ownership and responsibility for this material.

The contents of the K-65 silos are of great concern to the site and to the general public due to the structural condition of the centers of the silo domes. Covers have been placed over the dome centers to preserve the integrity of the silos in the event of a dome collapse. Disposition of this material is a high priority item. Recommendations for this action will be contingent on the findings of the Weston RI/FS.

B. Waste Pits

There are six waste pits located on site at the FMPC. Disposal of waste streams into the pits has not been limited to any single waste; each pit contains a mixture of waste streams. Disposition of the waste materials contained in the pits will be contingent upon the findings of the Weston RI/FS.

C. Stormwater Runoff/Clearwell Effluent

This waste concern is a combination of several streams. The clearwell effluent to Manhole 175 is a large component of the discharge to the Great Miami River. Included is much of the General Sump effluent and storm water runoff from the waste pit area. Storm water runoff in the production area is also primarily routed to Manhole 175. The new storm water retention basin will handle excess runoff from the production area to prevent discharge to Paddy's Run. Storm water runoff from the remainder of the FMPC site will be characterized in the remedial investigation conducted as part of the Environmental Impact Statement study.

Storm water runoff from the waste pit area is a major concern at the present time. The Weston RI/FS will attempt to determine if groundwater contamination may be caused by this runoff. A number of actions have been or will be planned to establish storm water controls to handle this concern.

2.2.6 Thorium

Although thorium is not classified as a waste at this time, it is an environmental and personal safety hazard. Thorium disposition must be addressed because of the present on-site storage situation. The FMPC serves as the thorium materials repository for the DOE, maintaining long-term storage for a variety of thorium materials. Approximately two-thirds of the thorium was processed on site, with the remainder originating from other DOE facilities. There are in excess of 1087 metric tons of thorium stored in silos and drums on the plant site. A summary of the FMPC thorium inventory by composition is presented in Table 2.2.

The FMPC is proceeding with plans to repackage the existing drummed thorium material inventory during FY-1987. The 13,000 drums of thorium material in storage are in various stages of deterioration. The plan is to overpack the drums of thorium into overpack containers suitable for long-term storage and acceptable for off-site shipping.

The FMPC will also proceed with plans to package the bulk-stored thorium materials. This packaging effort will involve the sampling, removal, and packaging of thorium materials into containers suitable for storage.

It is anticipated that interim storage of overpacked thorium drums and the packaged bulk thorium materials will be required at the FMPC. Interim storage will require remedial actions in the existing warehouse storage facilities and may also require the construction of additional storage facilities depending on the type(s) of package/containers used. WMCO is also investigating off-site storage disposition alternatives that may preclude the necessity of providing for storage at the FMPC.

TABLE 2.2
THORIUM INVENTORY COMPOSITION

Thorium Material Form	Metric Tons Thorium	FMPC Storage Location
ThO_2 Dense (GE-Bettis)	4.3	Bldg. 67, Bldg.72
THO_2 Sol Gel	25.9	Bldg. 67
Pilot Plant - WIP	9.2	Pilot Plant Tank #2 & Lab
Impure Thoria Gel	338.3	Pilot Plant Warehouse
Thorium Oxides	174.6	Plant 8 Silo & 2 Bins
Thorium Oxalate Cake	1.2	Bldg. 67, Bldg. 72
Thorium Nitrate Crystals	1.2	Bldg. 67
Low-Grade Residues from General Atomic	321.7	Bldg.65
Off-site Thorium Hydroxide	10.8	Bldg. 67
Off-site Thorium Oxides	74.4	Bldg. 67, Bldg. 72
Thorium Nitrate Solution	0.9	Bldg. 67
ThF_4	0.8	Bldg. 67
Metal	79.9	West Bldg. 65, Bldg. 72, Bldg. 67
Clad Metal	4.4	West Bldg. 65
Alloyed Metal	3.5	West Bldg. 65, Bldg. 67, Bldg. 72
Material Held for Historical Purposes	0.5	Bldg. 67, West Bldg. 65
High Grade Residues (>30% Th)	35.7	Bldg. 67, West Bldg. 65
Low Grade Residues (<30% Th)	0.2	Bldg. 67
TOTAL	1087.5	

2.3 IDENTIFICATION OF WASTE STREAMS

Fifty-eight waste streams have been identified for discussion in the Waste Management Plan. Table 2-3 names the waste streams and identifies the category in which each is placed (LLW, Mixed, Metal, Sanitary/Industrial, Remedial). A brief description is also provided for many of the streams.

The more voluminous waste streams include MgF_2 slag, slag leach filter cake, and neutralized raffinate. These wastes also require the most space for storage while awaiting shipment to the NTS.

The larger quantities of inventory (backlogged) waste streams include wooden boxes/pallets, scrap metal, pit waste, and K-65 waste. There is also a large quantity of thorium stored on site. This material has not been classified as a waste, but it is a concern. Some of the thorium must be repackaged to an acceptable storage configuration.

2.3.1 Radioactive Waste Documentation Systems

Records of wastes discarded to FMPC LLW storage facilities and wastes shipped to off-site disposal facilities are maintained permanently. These records include an inventory of all nuclear materials stored, the waste form and volume as it was placed in storage, the storage facility (though not the specific location within the facility), and the date of discard, the total weight, volume, radioactivity, and radionuclide concentration of the discarded wastes. This information is reported quarterly to the Integrated Data Base Programs as part of the Solid Waste Information Management System (SWIMS).

On-site documentation procedures and forms are contained in the "Standard Operating Procedures for On-Site Shipment and Discard of Depleted Uranium Materials." Documentation of the transfer and storage of radioactive mixed hazardous and toxic wastes consists of operating and inventory logs as required by DOE Order 5480.2.

The primary FMPC system to account for and document the storage of waste materials includes bimonthly physical and biannual storage inventories conducted by the Materials Control and Accountability (MC&A) Section. The inventory taken August 20, 1986 (see Table 3-3) lists backlog quantities of major waste concerns at the FMPC as of that date.

Off-site shipments of waste to the NTS require the completion of all necessary documentation procedures (sampling, testing, inspection, etc). to meet applicable federal, state, and local regulations for off-site shipping and disposal of radioactive wastes. Before the waste materials leave the FMPC, the required forms are completed verifying that applicable federal and state regulations have been met. The necessary forms include the LLW Shipping Report, LLW Shipping Manifest, Radioactivity Survey Report, Shipping Order, and a Nuclear-Materials Transaction Report. Health and Safety monitoring of the shipping activities are conducted to ensure that all wastes are properly contained for transportation.

Reports are generated weekly by the MC&A Section with information on how many off-site waste shipments were made, the number of drums of waste shipped, and the gross weight per shipment. These reports also contain the cumulative totals on waste shipments, and gross shipment weight on a year-to-date basis. Another weekly, MC&A generated report lists current status of backlog materials stored on-site and backlog shipped to the NTS.

Complete waste documentation files are maintained by MC&A on all FMPC waste shipments. In addition to the previously, mentioned forms and reports, uranium assays and tally sheets are included in the shipment files. A data base has also been initiated by MC&A to account for incoming or newly generated materials, waste materials shipped off site as well as waste materials stored on site.

TABLE 2-3

IDENTIFICATION OF FMPC WASTE STREAMS

WASTE STREAM	WASTE TYPE	DESCRIPTION
1 K-65 Waste	Remedial	Radium-bearing residues contained in above-ground storage silos. Australian radium cake
2 Pit Waste	Remedial	Solid/liquid wastes from past operations
3 Thorium		High and low grade Th-bearing compounds
4 Contam. Construction Rubble	LLW	Includes rocks, sand, bricks, and ceramics to be processed for recovery.
5 Storm Water Runoff/Clearwell Effl.	Remedial	Supernatant after clearwell settling
6 Off-Spec UF4	LLW	Depleted, oversized or from dust collector
7 Contaminated Soil	LLW	Above 50 ppm U
8 Contam. Ferrous Scrap	Metal	Scrap drums, steel, furnace parts, etc.
9 Contaminated Asbestos	LLW	From insulation/transite building materials
10 BaCl2 from RMI	Mixed	Hazardous waste from RMI operations
11 Contam. Wooden Boxes & Pallets	LLW	Boxes and pallets used in production which may become contaminated after lengthy use
12 Noncontaminated Asbestos	S/I	From insulation/transite building materials
13 RMI Sludges	LLW	Oily sludges for oxidation, high free metal. Cleanout sludges, nonoily, for roasting. Wet sump or filter cake, oily, contam'd.
14 Dust Collector Bags	LLW	May contain some residues
15 Contam. Copper Scrap	Metal	Ingots, motor windings, etc.
16 Slag Leach Filter Cake	LLW	MgF2 from enriched uranium metal production leached for U recovery, neutralized, filtered, and dried in Plant 2/3. Leached crucible burnout and ash are included.
17 Neutralized Raffinate	LLW	Aqueous from refinery, Plant 2/3, neutralized with lime and caustic.
18 Dust Collector Residues	LLW	High fluoride, and pyrophoric high fluoride

WASTE STREAM	WASTE TYPE	DESCRIPTION
19 Scrap U3O8, Mostly High Fluoride	LLW	Chips and turnings from machining
20 Contaminated Oils	Mixed	Machining oils
21 General Sludge from Sumps	LLW	From neutralization, settling, and altering of production slurries
22 Contam. Clothing - Proc. Area	LLW	Old clothing, gloves, etc.
23 Contam. Solvents - incl. trichlor	Mixed	Spent solvents from degreasing
24 Nonburnable Contaminated Trash	LLW	Unrecoverable incl. polyethylene, etc.
25 General Waste - Proc. Area	LLW	Paper, cardboard, other burnables
26 Incinerator Ash	LLW	Ashes - pass thru grate or screen. Cinders-do not pass thru grate or screen.
27 Scrap Salts	LLW	Includes floor sweepings
28 Noncontam. Scrap Ferrous	Metal	
29 Contaminated Magnesium	LLW	Depleted residue only
30 Non-Briquettable Chips and Turnings for Oxidation	LLW	Pyrophoric
31 Contaminated Nonburnable Filter Cartridges, etc.	LLW	Depleted residue only
32 Unfired Reduction Charges and MgF2 from Liner Caveins	LLW	Mixture of Mg, MgF2, and UF4
33 Contaminated Graphite	LLW	For machining, uncrushed, broken into large pieces (to burner), crushed for processing
34 Crushed Slag from Pot Blowouts	LLW	Mostly MgF2
35 Partially Oxidized Metal Oxidation Feed	LLW	Uranium metal (depleted)
36 MgF2 +20 mesh, including Dirty Prill	LLW	Dirty prill, Code 5 derbies, and Plant 1 Titan mill cleanout. High U content.
37 MgO and Mg Zirconate from Crucible Cleanout	LLW	

WASTE STREAM	WASTE TYPE	DESCRIPTION
38 Fly Ash	S/I	From boiler plant
39 Sewage Plant Effluent	Remedial	
40 Noncontam. Copper Scrap	Metal	
41 MgF2 Slag	LLW	MgF2 slag from production of depleted U metal derbies in Plants 5 and 6
42 Wet Sump or Filter Cake	LLW	
43 Rockwell Cleanings and Spills	LLW	Uranium metal spills from Rockwell furnace
44 Bad Reduction (no Derby)	LLW	Metal, UF4, Mg, MgF2
45 Scrap Uranium Metal	LLW	Metal from broken mold, furnace blowout, etc.
46 Noncontaminated Nonburnables	S/I	Nonreusable materials
47 Sample Bottles (Glass,Plastic)	LLW	To be washed and shredded or compacted
48 Sanitary Burnable - Non-Process Area	S/I	Paper, Cardboard, etc.
49 Furnace Solidified Salts-Chloride	LLW	For Plant 8 recovery
50 Samples from Lab	LLW	Nonmetallic, miscellaneous materials
51 Cold Metal Oxides- (Non-Ra Bearing)	Remedial	Silo 3 materials
52 Noncontam. Construction Rubble	S/I	
53 Metal Spills and Extruder Ends High Impurity Metal	LLW	Metal from spills for double melting.
54 Furnace Solid. Salts-Nonchloride	LLW	Primarily carbonate salts
55 Sewage Sludge	LLW	Anaerobic digester remains
56 Solid Metal with Imbedded Steel Other than Cores	LLW	For dissolver feed
57 Cafeteria Waste	S/I	Noncontaminated putrescible wastes
58 Noncontam. Soil	S/I	Less than 50 ppm U

2.4 DESCRIPTION OF WASTE TREATMENT AND STORAGE/DISPOSAL FACILITIES

2.4.1 Waste Treatment Facilities

Figure 1-2 shows the location of waste treatment and storage facilities at the FMPC. These facilities are discussed below.

2.4.1.1 Solid Wastes

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

Contaminated combustible residues, graphite, solvents, and oils are treated as process residues and drummed for interim on-site storage.

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 disposal.

Rubble and excavated soil generated in construction activities are being placed on piles awaiting implementation of disposition plans. Some rubble and soil may also be drummed or boxed and stored on an interim basis.

2.4.1.2 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 and are represented in Figure 2-1.

A. Process Waste

Plant Treatment Facilities

The FMPC uses a combination of wastewater treatment technologies for controlling pollutant discharges to the Great Miami River. All production plants that require sump equipment have plant sumps for the collection and initial treatment of process wastewater. Greater than 99 percent of the contained uranium is removed by precipitation and sedimentation in these facilities. Effluents from the plant sumps are collected at the General Sump for neutralization with lime and sedimentation. After sedimentation, the treated wastes to be recycled are pumped to Plant 8 for interim processing. Filtrate is returned to the General Sump and finally discharged with other clarified effluents to the Great Miami River via Manhole 175. Other neutralized wastewater from the General Sump is pumped to Pit 5 for further settling prior to sampling at the clearwell and discharge to the Great Miami River via Manhole 175.

Figure 2-2 shows the sources of production wastes sent to the General Sump. 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 both grab and continuous sampling. Controls are simple but effective. The pad is equipped with its own sump and drainage trenches to handle any leaks or accidental spills.

The sump filtrate from the various production plants and service facilities are received at the General Sump, checked for uranium content, and segregated or selectively combined as required. If a certain waste exceeds discard specifications, it is sent to Plant 8 for recovery of uranium in the box furnace or over the vacuum filters.

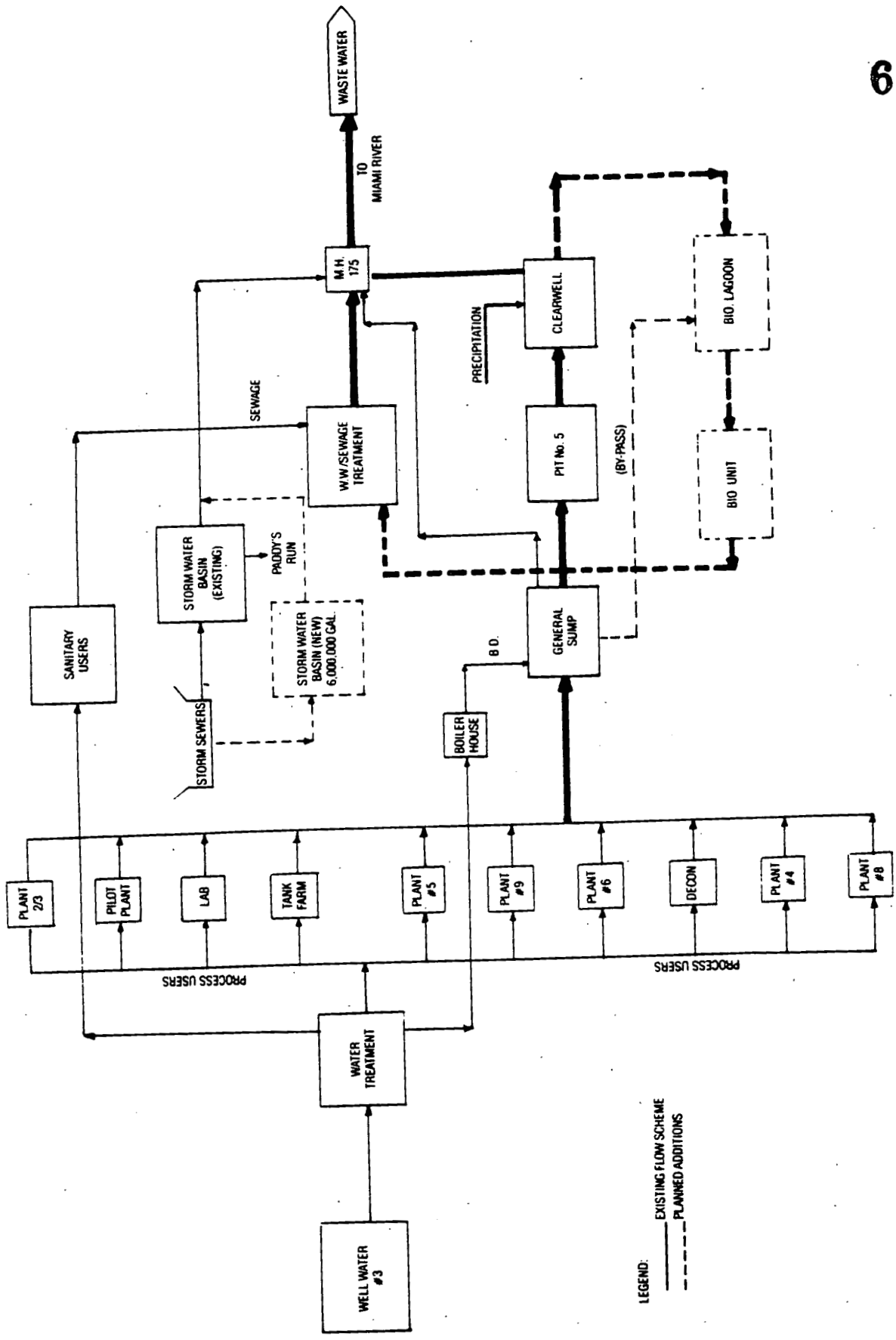

FIGURE 2-1. WASTE WATER FLOW PATHS AT THE FMPC.

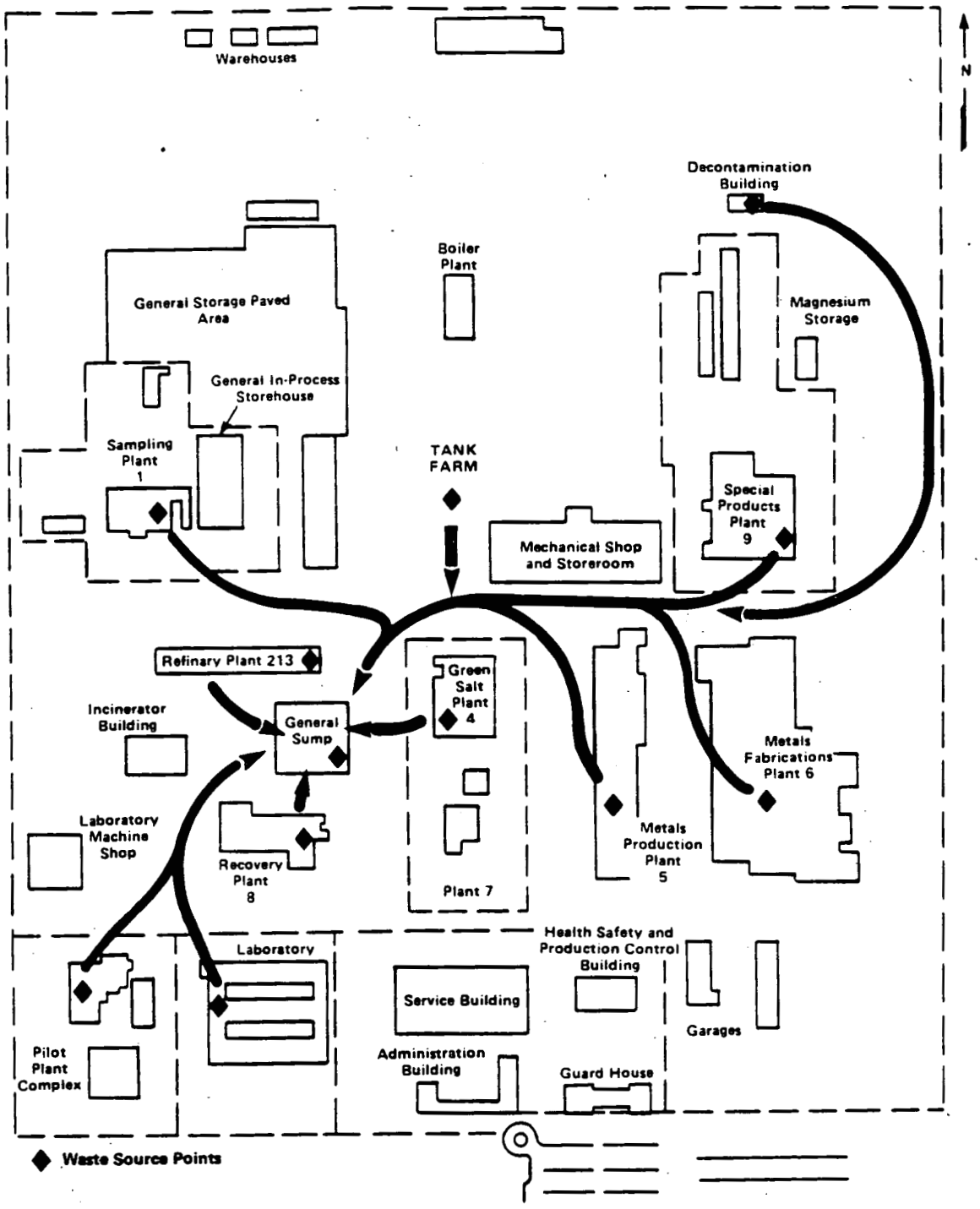

FIGURE 2-2. SOURCES OF PRODUCTION WASTES COLLECTED AND TREATED IN THE FMPC GENERAL SUMP.

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

Most other uranium-bearing wastes are pH-adjusted with calcium hydroxide to obtain a maximum precipitation of radioactive material and settled and decanted in successive steps prior to discharge of the treated supernatant liquor to Pit 5 and subsequently, to the Great Miami River. The settled sludges are also transferred to Plant 8 for filtration.

Before discharge from the General Sump, all liquid wastes are sampled to determine concentrations and total content of radioactive materials. The discharge flow is then pumped to Pit 5, from which it flows by gravity to the clearwell and is then pumped to Manhole 175 for sampling and discharge to the Great Miami River. Water treatment and blowdown water is pumped directly from the General Sump to Manhole 175.

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 storage pads for eventual off-site shipment for disposal. The solids-free filtrate is pumped to sump tanks for treatment and then to Pit 5 and the clearwell enroute to discharge to the Great Miami River.

Pit 5/Clearwell

The Wet Chemical Waste Pit (Pit 5) is a rubber-lined settling basin rectangular in shape, with a surface area of approximately 3.6 acres and a capacity of approximately 21,000,000 gallons. It is now full.

All process flow discharges and General Sump decant are pumped to Pit 5 which overflows through an effluent control tower near the western end of the pit. The overflow is routed into a clearwell from which it is pumped to Manhole 175, sampled and discharged to the Great Miami River.

Some minor precipitation of solids appears to occur in Pit 5 and/or the clearwell as evidenced by a reduced concentration of metals in the clearwell effluent. This may be attributable to the slightly elevated pH maintained in Pit 5.

B. Sanitary Sewage

The FMPC sanitary waste collection and treatment system is completely separated from the process waste system. Sanitary wastes may contain small amounts of uranium, derived from the laundry and showering facilities. At the Sewage Treatment Plant, any significant amount of uranium is captured in the sewage sludge, and thus removed from the effluent. The sludge is dried and removed to the anaerobic digester. Digester remains are drummed and then roasted in Plant 8, primarily to eliminate harmful bacteria. Recovery of uranium values is also accomplished in this step.

C. Storm Water

The stormwater collection system was designed to be uranium-free; however, uranium may enter the system through accidental spills and precipitation runoff from uncontrolled pad areas and roadways. Based on results of a Storm Sewer Evaluation Survey, modifications and rehabilitation to the existing storm sewer system may be required to reduce infiltration and inflow containing elevated concentrations of uranium. Control of stormwater and recovery of spills is possible

through use of existing storm water diversion facilities. Furthermore, a storm water retention basin to handle runoff from heavy rains is near completion. Site runoff is a source of uranium in the combined plant effluent, and activities are planned to reduce off-site emissions, especially from runoff around the pit area.

2.4.1.3 Effluent Controls and Administration Limits

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

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

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

Daily grab samples are collected at river sampling points upstream and downstream from the FMPC discharge to the Great Miami River. These samples are composited monthly for radium analyses

and a weekly grab sample is taken 7.5 km downstream from the confluence of Paddy's Run with the Great Miami River. At least one sample per week from each of the three river sampling points is analyzed for uranium, alpha and beta activity, chloride, fluoride, nitrates, non-filterable solids, and pH. Grab samples are collected weekly from each Paddy's Run sampling location. These samples are analyzed for uranium, alpha and beta activity, and pH. Chloride, fluoride, and nitrate analyses are performed on one sample each month, while radium 226 and 228 are analyzed on bimonthly composites taken from the upstream location and monthly composites from the downstream location.

Applicable Regulations and Status of Compliance

The Water Pollution Control Program for the FMPC is designed to address the concerns and obligations set forth in various Federal regulations and guidelines. DOE Orders 5480.1A and 5480.4 require the FMPC to properly address the compliance requirements of all applicable federal, state, and local environmental regulations.

Federal Water Pollution Control Act (FWPCA)

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

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

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

2.4.2 Waste Storage/Disposal Facilities

The FMPC waste storage facilities include six waste pits, two concrete silos (the "K-65 tanks") and one metal oxide tank located on the west side of the plant approximately 900 feet from the site boundary. The area is relatively flat and occupies approximately 37.7 acres. Paddy's Run, an intermittent tributary of the Great Miami River, runs along the west side of the site between the waste area and the site boundary. Figure 2-3 shows the location of the waste pits and silos.

2.4.2.1 Waste Pits

Six waste pits have been constructed at the FMPC. These pits are identified by numbers based on the chronological sequence of their construction. Table 2-4 summarizes waste pit contents and status.

Pits 1 and 2 were constructed in 1952 and 1957, respectively, and were used for mixed dry solid waste disposal. Large basins were dug into the existing blue clay and the walls of each pit were lined with 1.5 to 2.0 feet of impervious clay. In addition, parts of the bottom of Pit 1 were lined with an additional 4 feet of clay. The maximum depths of Pits 1 and 2 are 17 and 13 feet, respectively. Pit 1 was used from 1952 to 1957; Pit 2 was used from 1957 to mid-1964. Both pits were used for the disposal of neutralized waste filter cake, sump cakes from the production plants, depleted slag, scrap graphite, contaminated brick and sump liquor. From 1958 to 1959, Pit 2 was used as a settling basin for neutralized raffinate. During this period, the remaining capacity of Pit 1 was used as a

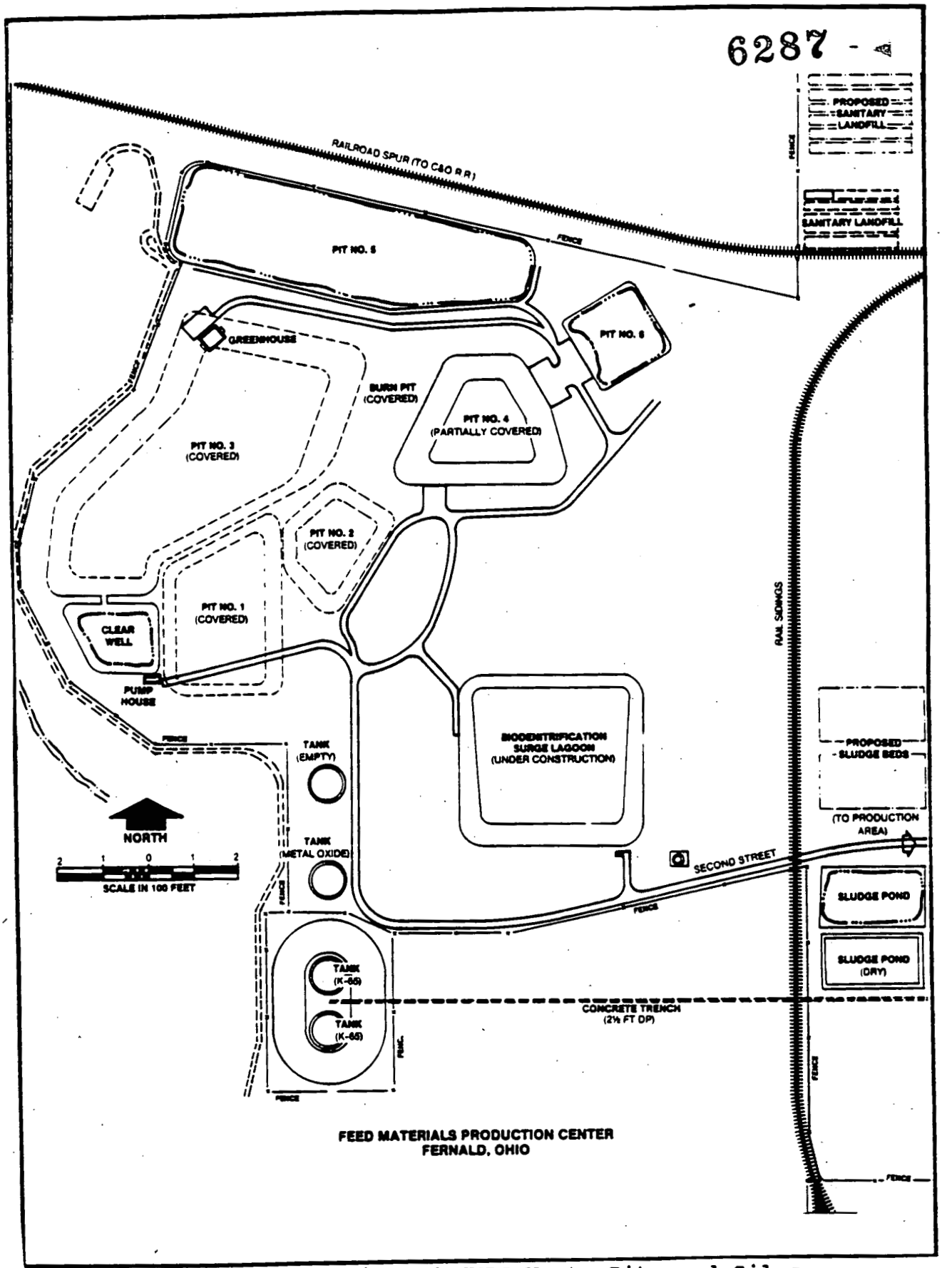

Figure 2-3. Location of FMPC Waste Pits and Silos

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12/31/86

TABLE 2-4

FMPC WASTE PIT AND SILO STATUS

Structure	Liner Material	Volume (Million ft^3)	Status	Contents
Pit 1	Clay	1.08	Retired Covered	U-Bearing Solids-Dry
Pit 2	Clay	0.351	Retired Covered	U-Bearing Solids-Dry
Pit 3	Clay	6.12	Retired Covered	U-Bearing Sludges-Wet
Pit 4	Clay	1.43	Retired	Slags, Abrasives, Metals, Rubble, Crucibles-Dry
Pit 5	Rubber	3.10	Passing General Sump Effluent to Clearwell	U-Bearing Sludges-Wet
Pit 6	Rubber	0.375	65% Full; Not in use	Slags, Misc. Materials, U-Bearing solids-Wet & Dry
Silo 1		0.134	Full	High Radium Tailings
Silo 2		0.134	Full	High Radium Tailings
Silo 3		0.134	Full	Low Radium Metal Oxides
Silo 4		0.134	Empty	

clearwell for effluent from Pit 2. Both pits have been filled and covered with clean, uncontaminated fill and have been graded to provide surface drainage away from the pits.

Pits 3 and 5 have been used for disposal of wet chemicals. Pit 3 was constructed between 1958 and 1959; the pit walls were lined with a minimum of one foot of compacted clay. In 1965, the pit capacity was expanded by raising the pit walls an additional two feet. The maximum depth of Pit 3 after expansion was 27 feet.

From 1959 to 1968, Pit 3 was used as a retention or settling basin for liquid effluent and slurries. During the late 1960's, slag leach residues were pumped to Pit 3 until Pit 5 was available as a settling basin. From 1975 to 1977, the remaining capacity of Pit 3 was filled with filter cake, fly ash, and dirt. Pit 3 has been covered with clean, uncontaminated fill and has been graded to provide surface drainage to the clearwell prior to discharge in the Great Miami River.

Pit 5 was constructed in 1968 as a settling basin to replace Pit 3 and was lined with a 60-mil-thick elastomeric membrane liner. Maximum depth of Pit 5 is 30 feet. From 1968 to 1983 Pit 5 was used to receive slurries from the refinery and Plant 8. The principal wastes contained in Pit 5 are neutralized raffinate, slag leach slurry, and sump slurries. Zirnlo slurry and heat-treat quench water were also routed to Pit 5 to permit radioactive solids to settle from the liquid waste.

Pit 5 is currently used for flow-through of liquids prior to discharge to the manhole. Some minor precipitation of solids is thought to occur in Pit 5, as a slightly elevated pH is maintained through lime addition.

Pits 4 and 6, constructed in 1960 and 1978, respectively, were used as dry chemical disposal pits for depleted uranium residues. Pit 4 has a minimum of one foot of compacted clay lining the inner slope of the walls; its maximum depth is 24 feet. Pit 6 is lined with an impermeable elastomeric membrane liner and has a maximum depth of 30 feet.

Pit 4 was used for the disposal of Plant 8 filter cake, process residues, contaminated graphite, and noncombustible trash. From 1981 to 1983, this pit received approximately 23,500 pounds of radioactive waste contaminated with barium chloride ($BaCl_2$) heat treatment salt; this waste is now mixed with 143,000,000 pounds of low-level radioactive waste. Pit 4 is now restricted to receipt of contaminated construction rubble, asbestos, and graphite. However, WMCO policy is to discard no contaminated materials into Pit 4.

Pit 6 contains depleted slag, scrap green salt, process residues, and filter cake. It is no longer used as a waste pit. On an "as required" basis, storm water may be diverted to Pit 6 for holding and passage to Pit 5 and the clearwell.

All of the waste pits have impervious bottoms, consisting of either impermeable clay or rubber lining, and a permeable cover that allows water to enter. Because of this combination, water can accumulate in the pits and spill over during high flow storm water events. The possibility of groundwater contamination from this will be investigated in the Weston RI/FS.

2.4.2.2 Waste Silos

The four waste storage silos at the FMPC are cylindrical structures made from post-tensioned concrete. Table 2-4 summarizes silo contents and status.

Silos 1 and 2 are encased by an earthen embankment. The silos each have a capacity of 134,000 cubic feet and were used to store radioactive waste generated between 1952 and 1958. Silos 1, 2, and 3 are full. Silo 4 has never been used and remains empty.

Silos 1 and 2, the "K-65 tanks", were used for the storage of refinery residues resulting from the processing of pitchblende ores. These residues, or tailings, contain Ra-226. Pitchblende ore processing was discontinued at the FMPC in 1959. The residue was formerly the

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

A recent study has indicated that the K-65 silos are not structurally sound. The twenty-foot center section of each dome was found to be weak and in danger of collapse. A cover was constructed over the center of each dome to preserve the structural integrity of the silo in the event of a dome collapse. In addition, weatherproofing of the domes by application of sealant has begun.

Silo 3, the metal oxide tank, contains similar tailings or residues from refinery operations at the FMPC. However, the residues are the result of processing nonpitchblende ore concentrates and contains only low levels of radium.

2.4.2.3 Buried Rubble

Low-level radioactive debris may have been placed in an area located 2100 feet south-southwest of the Pilot Plant between the patrol road and Paddy's Run and near the old fly ash pile. Periodic spot readings indicate the presence of slightly above-background levels of radiation in that area. No record has been found of disposals in this area, but the rubble may have contained small amounts of radionuclides generated during the expansion work in the 1950's. It is estimated that the maximum area affected would be 100,000 square feet. This area will be investigated in the Weston RI/FS.

2.4.2.4 Fly Ash

In past operations, fly ash from the boiler plant was discarded to a pile located southwest of the production area and adjacent to the east bank of Paddy's Run (see Fig 1-2). Waste oil containing small amounts of uranium may have been placed on the old fly ash pile in past years for dust suppressant purposes.

This fly ash pile will be investigated in the Weston RI/FS. If it is determined that the fly ash is contaminated and poses a potential threat to the environment, the material will either be removed with

appropriate remedial action to the site, or it will be stabilized in place to avoid contaminant transport by air or through surface water runoff.

2.4.2.5 Drum Storage Facilities and Holding Tanks

On-site facilities for storage of drummed materials include the following:

- Plant 1 Pad - outdoor storage pad with storage space for 80,000 55-gallon drums
- KC-2 Warehouse - curbed container storage facility with storage space for 72 55-gallon drums
- Pilot Plant Warehouse - curbed container storage facility with storage space for 180 55-gallon drums.

Additional storage space is provided by the Pilot Plant Tank Farm, a diked tank storage facility with two 10,000 gallon stainless steel tanks. Spent solvent is stored in these tanks.

3.0 STRATEGY

The keys to establishing an effective waste management strategy are well-developed waste processing and shipping/storage plans. The Low-Level Waste Processing and Shipping System (LLWPSS), scheduled to begin operations in FY-89, will eventually allow the FMPC to process much of the generated low-level waste while also gradually working off the backlogged waste. The Volume Reduction Facility, scheduled to start operations in FY-88, will complement the LLWPSS by reducing the volume of several wastes for shipment or storage.

Short-term waste disposition strategy for the FMPC involves shipping approved wastes to the NTS as soon as possible. MgF_2 slag is currently the only waste stream being shipped; shipments of slag leach filter cake and neutralized raffinate will begin in FY-87. As inventories of MgF_2 slag, slag leach filter cake, and neutralized raffinate are worked off, other LLW streams may be identified as candidates for shipment, pending DOE approval.

It is not known if shipments to the NTS are a long-term option. Therefore, another alternative which may play a major role in waste management strategy is durable interim on-site storage. This option would eliminate the problems involved with deteriorating drums and storage pad crowding. In addition, durable storage containers will also be suitable for shipment at a later date. This option also has the virtue of reducing capital investment for storage, as expensive facilities (warehouses, storage buildings) are not necessary for storage purposes.

Demonstration of scrap metal processing technologies, combined with startup of the new Decontamination & Decommissioning (D&D) Facility, will result in eventual elimination of the extensive scrap metal inventory while recovering and recycling much of the material. A subcontractor(s) chosen by DOE/ORO will decontaminate/process a sample of approximately 25 tons of contaminated scrap metal furnished by DOE/ORO. When finished with the demonstration, the subcontractor will return to DOE/ORO the decontaminated metal and the contaminated wastes generated while processing the metal. Testing may be conducted to demonstrate other promising waste processing technologies, i.e., conversion of waste to a less serious waste form and/or conservation of materials.

3.1 ASSUMPTIONS AND CONSTRAINTS

Preparation of the Waste Management Plan requires making assumptions about the future of the FMPC and the constraints under which it will operate.

General points of strategy have been developed using these assumptions coupled with present conditions and future expectations regarding waste handling. Projects and programs (both ongoing and planned) addressing the Waste Management stragegy are outlined in Sections 4.0 and 5.0. Future operations such as the D&D of surplus facilities are also considered.

The Plan must be updated annually due to the effects of variable program factors such as budget; manpower; space; organization; security; facilities; federal, state, and local regulations; and the restrictions on off-site shipments of waste.

Prioritization of problems is established in this Plan. This prioritization aids in identifying the relative importance of each strategy step and sets up a procedure by which future problems can be evaluated.

The following general assumptions were made about waste management at the FMPC:

- The total effect of the Environmental Impact Statement (EIS) program on Waste Management programs has not yet been assessed but could be significant.
- The FMPC will continue to operate and will remain the source of natural, depleted, and low enriched uranium metal for the DOE beyond the year 2000.
- The FMPC will be modernized over the next five to ten years to take advantage of technological advances occurring since the original design of the FMPC.
- Shipment to the NTS or another DOE site will remain a viable option for selected waste disposal in the foreseeable future.
- Regulations regarding waste acceptance criteria and acceptable waste forms and packaging for shipment will not change during the period covered by this Plan.
- Some waste forms will be stored on site in safe durable interim storage until a final disposal plan for that particular waste material is determined.
- Potential funding levels cannot be fully determined at this time and may require an adjustment in programs and schedules.

Waste characterization studies in progress will affect the planning and prioritization of many of the remedial action activities under study for the site. Projects involving the waste pits and silos, in particular, are very dependent on these results. Interim stabilization measures may be applied to these wastes; however, evaluation of final alternatives must wait until characterization and feasibility studies have been completed.

The reduction of backlogged waste and the disposal of generated waste are constrained by the available on-site treatment rate and the rate at which waste can be shipped to off-site disposal areas. As waste from renovation activities, remedial action, and D&D activities on site become significant, waste generation will continue to increase. Existing waste treatment capacity is being provided on an interim basis using converted process equipment. Construction and operation of the LLWPSS, a dedicated waste treatment facility which will provide increased waste treatment capacity, figure heavily in the Plan.

3.2 GENERAL WASTE MANAGEMENT STRATEGY

The general waste management strategy is shown in Figure 3-1. The chart presented incorporates the elements of strategy under which the FMPC Waste Management Plan was developed. These elements of strategy include the following:

1) Ship as rapidly as practical the high-volume waste streams already approved for disposal at the NTS.

   Accumulated production wastes that are presently stored in drums on concrete pads constitute a maintenance problem, take up valuable storage space, and create a potential health and environmental hazard as the drums begin to deteriorate. Emphasis is being given to shipping packaged wastes in a stable, dry form. MgF_2 slag, slag leach filter cake, and neutralized raffinate have been approved for disposal at the NTS.

2) Pursue an Aggressive Waste Minimization Program.

   Measures are being developed and initiated to reduce the volumes of material that are disposed of as low-level or hazardous waste. These measures include the following:

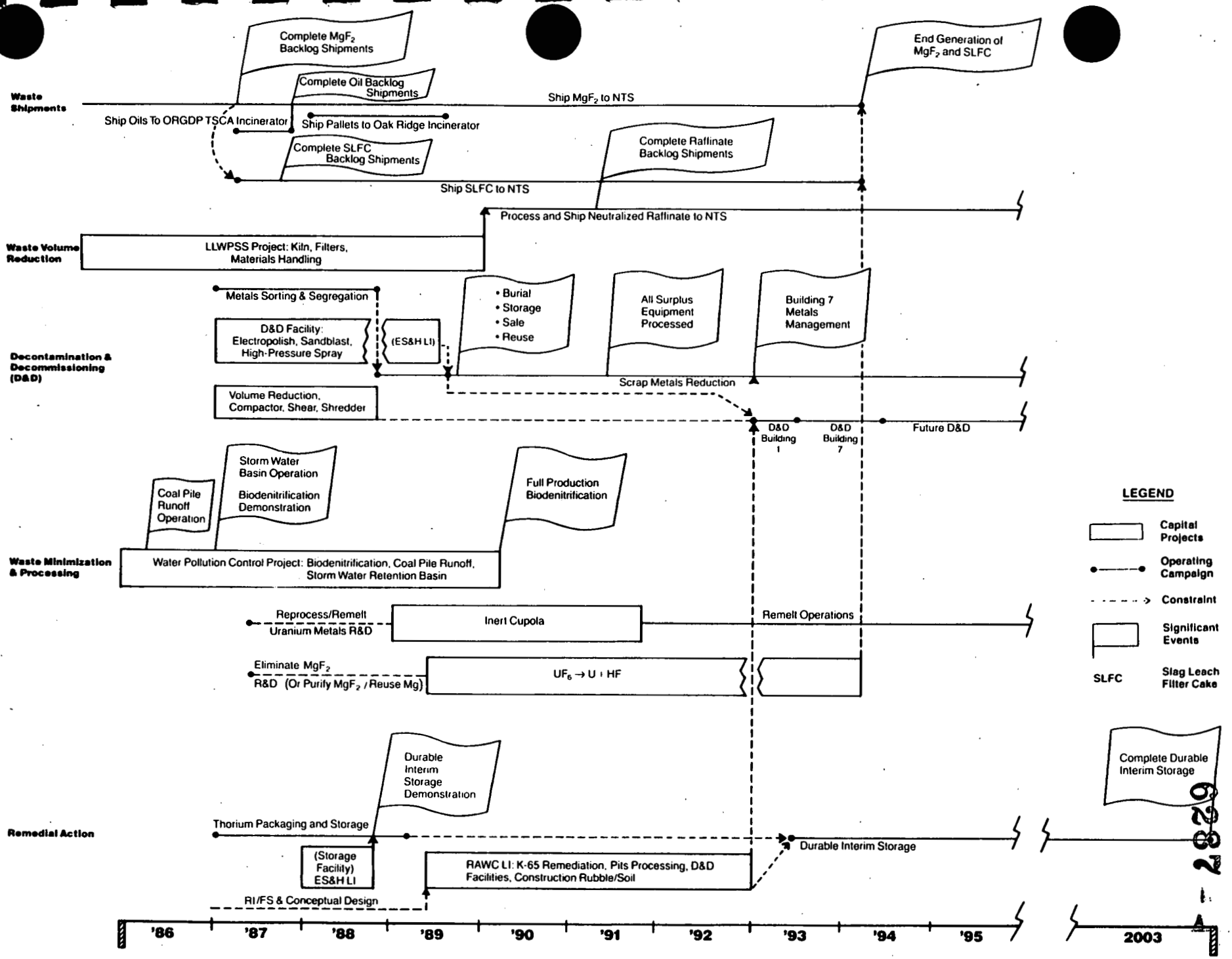

FIGURE 3-1. STRATEGY FOR WASTE MANAGEMENT AT THE FMPC

- Zoning of Production Areas. To avoid the inadvertent contamination of clean materials or work areas, areas where radioactive materials may and may not be handled will be clearly defined. Radioactive materials, or materials suspected of being contaminated, will be permitted only in areas that are specifically designated for handling these materials. Measures will be adopted to ensure that radioactive materials are not inadvertently carried into nonhandling areas or outside of designated buildings and facilities. This strategy minimizes the potential for creating additional low-level waste by the inadvertent contamination of clean facilities, equipment, and other articles. By controlling the spread of contamination out of designated areas, the potential for allowing contamination to escape to the environment through surface water runoff or the transport of airborne particulates is reduced. This policy is also consistent with the Health Protection Program objective of minimizing worker exposure (ALARA).

- Segregation and Zoning of Waste Streams. Radioactive and hazardous waste streams will be isolated at the source of generation whenever it is feasible. This is to avoid the inadvertent contamination of clean waste streams and to minimize the volume of material disposed of as low-level or hazardous waste. An emphasis will be placed on minimizing contact with material handling systems or materials other than those required to render the waste into a form suitable for disposal. This will minimize the creation of additional contaminated materials and equipment that ultimately require disposal as hazardous or low-level waste.

- Maximize Decontamination and/or Recycle of Contaminated Materials. Contaminated equipment, components and other articles will be decontaminated whenever it is feasible to do so. The cleaned materials can then be disposed of as conventional waste, recycled, or released for resale to the commercial sector. This reduces the volume of material requiring disposal as low-level waste.

  Evaluations will be made as to whether there are equipment, materials, and process and production wastes, presently discarded as

low-level or hazardous waste, which are amenable to treatment to remove the hazardous or radioactive component. Investigations will also be made into the feasibility of processing waste streams so that they are rendered suitable for recycle within the facility. In either instance, a determination will be made as to the cost effectiveness of treating a waste stream as opposed to continuing to discard it as low-level or hazardous material.

- Investigate the Use of More Durable and/or Recyclable Materials. When feasible, more durable materials, materials handling systems, and/or equipment will be substituted to minimize the waste generated due to replacement of damaged or worn-out articles. In addition to reducing the volume of material to be discarded as low-level waste, this also minimizes costs incurred from the item's replacement. The substitution of materials and articles which can be more easily decontaminated and/or recycled will also be pursued.

- Substitution of Nonhazardous Materials. Where feasible, nonhazardous and nontoxic materials will be substituted in production and process support operations. This will minimize the volume of hazardous or toxic waste requiring special handling and disposal.

- Investigate soundness of current internal standards for residue reprocessing. Waste disposal costs have increased over the past several years, and will likely continue to increase. An economic analysis may show that less reprocessing of residue is favorable since the value of the recovered uranium may not balance the reprocessing cost plus the cost for disposal of the additional waste generated.

- Investigate Establishment of a Threshold "De Minimus" Level. The establishment of a de minimus level at the FMPC would permit wastes with very low levels of contamination to be disposed of according to their nonradiologic characteristics, or would permit their release to the commercial sector for resale and/or recycle. Treatment technologies which cannot thoroughly decontaminate waste streams, but which do decontaminate them to within the threshold level, may become more attractive alternatives to the continued disposal of

the material as low-level waste. The ES&H Department has begun a study to determine if a de minimis level could be established for soil. A pathways analysis is being conducted to assess risks.

3) Ship Mixed Wastes and Contaminated Oil for Destruction in ORGDP TSCA Incinerator.

Inventories of mixed wastes consisting primarily of spent solvents and materials contaminated with polychlorinated biphenyls (PCBs) will be maintained in storage on site until the Toxic Substance Control Act (TSCA) incinerator at the Oak Ridge Gaseous Diffusion Plant (ORGDP) becomes available. At that point, schedules for PCB-contaminated material shipment and destruction will be developed.

Low-level wastes generated at RMI in support of FMPC operations which cannot be disposed of directly by RMI are processed and managed in conjunction with FMPC wastes. Mixed spent solvent will be received and stored at the FMPC until the ORGDP TSCA incinerator becomes available. Mixed waste heat treatment salts containing $BaCl_2$ will be stored on an interim basis, then processed at the FMPC to stabilize the hazardous EP toxic barium constituent. The barium will be converted to $BaSO_4$, which is nonhazardous and can then be shipped for disposal to the NTS.

The solid waste incinerator on site was shut down in 1986 due to the presence of elevated concentrations of uranium in the incinerator ash. The possibility of restarting the incinerator for destruction of noncontaminated wastes may be investigated at a later date.

4) Develop Decontamination and Decommissioning (D&D) Plans for Surplus Facilities and Implement These Plans According to Need.

A formal D&D plan will be made for every outdated and unused structure and facility targeted for demolition. The D&D plan will address the disposal of the generated waste and the environmental protective measures that will be taken during the demolition.

Unless structures and facilities targeted for demolition pose an extreme health or environmental hazard or interfere with Productivity Retention activities, D&D activities will be deferred until there is the necessary capacity available to manage the resulting solid waste.

5) Develop Remedial Action Plans Based on Results of the Weston Remedial Investigation/Feasibility Study (RI/FS) for the Waste Pits and Silos.

A subcontract will be utilized to characterize the existing FMPC waste storage facilities. The study will examine alternatives for stabilization and/or removal of the wastes contained therein, and for implementing any environmental corrective measures that may be required. Plans will be developed based on results of the RI/FS. Interim corrective measures will be applied to the waste storage facilities, as required, to isolate and contain their contents until the remedial action plans can be implemented.

6) Minimize the volume of off-site waste disposal.

The waste minimization program will reduce the volume of waste to be disposed of, as will waste compacting and use of durable interim on-site storage. This should not interfere with plans to ship wastes approved for disposal at the NTS, as reduction of the present backlog is a vital step in the Waste Management program. However, long-term planning must take into account that off-site shipment may be reduced or curtailed entirely.

7) Support the investigation of options which would eliminate generation of process waste.

Emphasis will be placed on identifying opportunities for total elimination of waste streams. For example, implementation of a direct conversion process for UF_6 to uranium metal and HF would eliminate generation of some process wastes. Large volume waste streams such as MgF_2 slag and slag leach filter cake could be eliminated. Another possible innovation is the use of plasma torch technology to purify MgF_2 slag, producing reusable noncontaminated magnesium metal.

8) Utilize durable interim on-site storage where demonstrated to be feasible.

With permanent on-site waste disposal an undesirable option from many standpoints and the future of off-site disposal cloudy, it is necessary to examine interim storage options which will provide safe, durable storage of all wastes for a given period of time.

9) Use on-site demonstrations to determine the effectiveness of promising technology in the solution of site problems.

Many opportunities exist for the inclusion of the private sector in demonstrations which may lead to improvements in waste processing, decontamination, and disposal. DOE is encouraging use of such demonstrations to identify and evaluate the available technologies. For example, subcontracts are being placed for a demonstration to decontaminate scrap metal samples at several DOE sites. Feasible technologies will be identified for best eliminating the piles of scrap metal and for preventing further inventory buildup.

10) Optimize the Control of Storage Space and Inventory.

A two-step approach is being taken to address the goal of most efficient use of storage facilities. First, a Pads and Warehouse Study (in progress) is collecting data on how present space is utilized, and on the materials requirements of the site, hence, the storage space needed. From the results, a database and materials flow model to ascertain current utilization and requirements will be developed. These tools can then be used to optimize current storage techniques and predict future needs.

Secondly, a planned bar code system will permit more efficient tracking of wastes and recoverable materials. The improved control over inventory will aid in the above effort to optimize use of storage space.

11) Incorporate Solid Waste Management into All Facets of the Productivity Retention Plan.

Productivity Retention Plan projects will be investigated for the potential of incorporating process improvements and design modifications that will optimize solid waste management. Elements which will be addressed in facets of the facility upgrade program include the potential for the following:

- o minimized process waste generation
- o operational cleanliness
- o ease and accessibility for routing decontamination
- o process containment and reduced spread of contamination
- o final disassembly, decontamination and decommission

12) Develop Plans for Disposal of Waste Generated from the Productivity Retention Program.

For each construction project, plans will be prepared to address the disposal of the generated waste and environmental protection measures to minimize the volumes of low-level waste created as materials are brought into contaminated areas.

13) Minimize the Amount of DOE Capital Investment Required.

Minimization of DOE capital investment at the FMPC will be realized through strong project management, use of options/cost benefits studies, and value engineering.

14) Implementation of an Aggressive, Internal Review Mechanism.

The FMPC will maintain a continuing awareness of new technologies and will review the application of these new technologies and waste management practices as required to apply the As-Low-As-Reasonably-Achievable (ALARA) concept.

3.3 PRIORITIZATION OF WASTE CONCERNS

Development of the strategy for waste disposal (how will the material be disposed of) is important; however, just as important is addressing the problem of prioritization (in what order will resources be allocated to implement the strategy). A list of six criteria has been prepared for establishing priorities. These criteria are as follows:

Public Health and Safety -- Is there a threat to the public health or safety arising from the way a given waste stream is processed, stored, or disposed of at the present time?

Worker Health and Safety -- Is there a threat to worker health and safety from a given waste stream?

Compliance -- Is the processing, storage, or disposal of a given waste stream in compliance with the applicable federal, state, and local regulations?

Environmental Impact -- Is there a potentially significant environmental impact from this waste stream other than those which would be included in the public and worker health and safety and compliance criteria above?

Public Perception -- Does the public perceive that there is a threat in the way that a given waste stream is processed, stored, or disposed of?

Facility Capacity -- Is there sufficient storage space and/or processing capacity for the given waste stream? Are the storage facilities a potential hazard in their present form?

For prioritization, each waste stream was scored on each criterion. The scoring was set on a scale from one to five, depending on the expected impact the waste stream might have on each criteria. A score of one indicates a more immediate or a more serious impact, and a score of five, indicates a less immediate or less serious impact.

Also, the six criteria were weighted depending on their relative importance. Health and safety issues were deemed most important, environmental impact and compliance issues were considered to be of medium concern, and public perception and facility capacity issues were assigned lowest relative priority.

A combination of criterion score and criterion weighting determined the total score and priority. Table 3-1 lists ranges of scores and their corresponding priority levels.

TABLE 3-1
Scoring and Corresponding Priority Levels

Total Score	Waste Streams	Priority Level	Description
12-26	9	1	Top Priority
27-33	12	2	Urgent
34-39	13	3	Routine
40-44	15	4	Low Priority
45-60	9	5	Deferrable

Setting the priorities for waste streams is the first step in disposition of the waste. Many of the highest ranking waste streams cannot be dealt with at this time due to regulatory or safety issues or difficulty of processing. Streams lower on the priority list, such as MgF_2 slag, can be shipped off site now because they are already approved for disposition and do not require complicated processing. Changes in technology, issues, budgets, and directions may influence the priorities set at any time. The prioritization performed is subject to change as required and is not the sole determining factor for order of addressing concerns.

3.3.1 Application

The application of this Plan requires the detailed consideration of each waste stream. The streams were scored on the criteria, total scores were tabulated, and the streams were then prioritized. The priority of each waste stream determines the order in which the developed strategies will be implemented. The selection of specific treatment processes and storage or disposal options will involve questions of applicability, cost, and existing capabilities on site. Once a tentative processing/storage/disposal scheme is available for a waste stream, the question of combining waste streams should be considered. Streams of similar composition or which are amenable to similar processing and disposal options may be combined for efficiency of operation or to obtain the economic benefits of larger scale operations.

3.3.2 Classification and Prioritization

A total of 58 waste streams have been identified for inclusion in this plan. These materials account for the bulk of the currently generated and inventoried waste at the FMPC. Included as waste streams are special cases such as the contents of the waste pits and K-65 silos, whose disposition will be a primary component of the Remedial Action program. Also included are items such as the storm water runoff and sewage plant effluent, which are not classified as FMPC waste streams but are nonetheless site remedial concerns.

The waste streams are divided into five categories: low-level radioactive, mixed, sanitary/industrial, scrap metal, and remedial action.

Table 3-2 lists the priorities assigned to each stream as compiled with assistance of the Environment, Safety & Health, Community & Environmental Affairs and the Production Operations Departments.

TABLE 3-2. PRIORITIZATION MATRIX

	CRITERIA WEIGHT	1	1	2	2	3	3		
	WASTE STREAM	PUBLIC H&S	WORKER H&S	COMPLIANCE	ENV. IMPACT	PUBLIC PERCEPTION	FACILITY CAPACITY	TOTAL SCORE	PRIORITY LEVEL
1	K-65 Waste	2	1	1	1	1	1	13	1
2	Pit Waste	2	1	1	1	1	1	13	1
3	Thorium	3	1	1	1	1	1	14	1
4	Contam. Construction Rubble	4	4	2	1	1	1	20	1
5	Storm Water Runoff/Clearwell Effl.	5	5	1	1	1	2	23	1
6	Off-Spec UF4	4	2	3	3	1	1	24	1
7	Contaminated Soil	5	5	1	2	2	1	25	1
8	Contam. Ferrous Scrap	4	4	2	2	2	1	25	1
9	Contaminated Asbestos	3	1	2	1	2	3	25	1
10	BaCl2 from RMI	5	3	2	3	1	2	27	2
11	Contam. Wooden Boxes & Pallets	5	5	2	2	2	1	27	2
12	Noncontaminated Asbestos	3	1	2	1	2	4	28	2
13	RMI Sludges	5	3	3	3	1	2	29	2
14	Dust Collector Bags	4	4	1	2	3	2	29	2
15	Contam. Copper Scrap	5	5	2	3	2	2	32	2
16	Slag Leach Filter Cake	4	3	3	4	3	1	33	2

	CRITERIA WEIGHT	1	1	2	2	3	3		
	WASTE STREAM	PUBLIC H&S	WORKER H&S	COMPLIANCE	ENV. IMPACT	PUBLIC PERCEPTION	FACILITY CAPACITY	TOTAL SCORE	PRIORITY LEVEL
17	Neutralized Raffinate	4	3	3	4	3	1	33	2
18	Dust Collector Residues	4	2	2	4	2	3	33	2
19	Scrap U308, Mostly High Fluoride	4	2	4	2	4	1	33	2
20	Contaminated Oils	4	3	5	2	2	2	33	2
21	General Sludges from Sumps	5	5	3	1	2	3	33	2
22	Contam. Clothing - Proc. Area	5	5	3	3	3	1	34	3
23	Contam. Solvents - incl. trichlor.	5	3	5	1	2	3	35	3
24	Nonburnable Contaminated Trash	4	4	3	3	3	2	35	3
25	General Waste - Proc. Area	5	5	5	3	2	1	35	3
26	Incinerator Ash	5	4	1	5	1	4	36	3
27	Scrap Salts	5	4	2	3	4	2	37	3
28	Noncontam. Ferrous Scrap	5	5	2	3	2	4	38	3
29	Contaminated Magnesium	4	4	4	2	3	3	38	3
30	Non-Briquettable Chips and Turnings for Oxidation	4	2	5	2	3	3	38	3
31	Contaminated Nonburnable Filter Cartridges, etc.	5	4	5	2	3	2	38	3
32	Unfired Reduction Charges and MgF2 from Liner Caveins	5	4	5	2	4	1	38	3

	CRITERIA WEIGHT	1	1	2	2	3	3		
	WASTE STREAM	PUBLIC H&S	WORKER H&S	COMPLIANCE	ENV. IMPACT	PUBLIC PERCEPTION	FACILITY CAPACITY	TOTAL SCORE	PRIORITY LEVEL
33	Contaminated Graphite	4	4	5	3	2	3	39	3
34	Crushed Slag from Pot Blowouts	5	3	5	3	4	1	39	3
35	Partially Oxidized Metal Oxidation Feed	4	2	5	3	4	2	40	4
36	MgF2 +20 mesh, including Dirty Prill	5	4	5	3	4	1	40	4
37	MgO and Mg Zirconate from Crucible Cleanout	5	4	5	3	4	1	40	4
38	Fly Ash	5	5	3	2	2	5	41	4
39	Sewage Plant Effluent	4	4	4	2	2	5	41	4
40	Noncontam. Copper Scrap	5	5	2	3	3	4	41	4
41	MgF2 Slag	4	3	5	4	5	1	43	4
42	Wet Sump or Filter Cake	5	5	5	4	4	1	43	4
43	Rockwell Cleanings and Spills	5	3	4	3	4	3	43	4
44	Bad Reduction (no derby)	4	2	5	3	4	3	43	4
45	Scrap Uranium Metal	4	2	5	3	4	3	43	4
46	Noncontam. Nonburnables	5	5	4	2	3	4	43	4
47	Sample Bottles (Glass, Plastic)	5	5	5	4	3	2	43	4

CRITERIA WEIGHT		1	1	2	2	3	3		
	WASTE STREAM	PUBLIC H&S	WORKER H&S	COMPLIANCE	ENV. IMPACT	PUBLIC PERCEPTION	FACILITY CAPACITY	TOTAL SCORE	PRIORITY LEVEL
48	Sanitary Burnable - Non-Proc. Area	5	5	2	3	3	5	44	4
49	Furnace Solidified Salts-Chloride	5	5	5	3	4	2	44	4
50	Samples from Lab	5	4	3	3	3	5	45	5
51	Cold Metal Oxides (Non-Ra Bearing)	4	4	5	2	3	5	46	5
52	Noncontam. Construction Rubble	5	5	3	3	4	4	46	5
53	Metal Spills and Extruder Ends High Impurity Metal	5	3	5	4	4	3	47	5
54	Furnace Solid. Salt - Nonchloride	5	5	5	3	5	2	47	5
55	Sewage Sludge	5	5	5	3	3	5	50	5
56	Solid Metal with Imbedded Steel Other than Cores	4	3	5	4	4	5	52	5
57	Cafeteria Waste	4	4	5	5	5	3	52	5
58	Noncontam. Soil	5	5	5	3	4	5	53	5

Top priority status was assigned to nine waste streams. The three most serious concerns of the FMPC site were identified as the K-65 waste, the pit waste, and the thorium stored on site. Twelve waste streams received an Urgent status rating. At the other end of the scale, 24 streams received Low Priority or Deferrable status.

3.4 WASTE MANAGEMENT STRATEGIES

The overriding strategy for handling contaminated and noncontaminated wastes at the FMPC 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 handling and disposition of low-level radioactive wastes, mixed wastes, scrap metal wastes, sanitary/industrial wastes, remedial action wastes, and surplus facilities.

Table 3-3 summarizes the quantity of wastes generated annually and backlogged as well as planned strategies for each waste stream.

3.4.1 Low-Level Waste

In addition to low-level wastes currently being generated at the FMPC, an extensive backlog also exists at the present time. Currently generated waste can be divided into two categories: waste approved for shipment to the NTS and waste not yet approved for shipment.

Depleted MgF_2 slag, slag leach filter cake (VVB-001), and neutralized raffinate filter cake (VVB-002) are the waste streams approved for shipment to the NTS. If the approved waste does not require processing to meet the NTS Waste Acceptance Criteria, it can be packaged for shipment and shipped as soon as transportation is available. This category of waste has the highest priority for shipment to the NTS. MgF_2 slag has the top priority for shipment within this category, and is, in fact, the only waste currently being shipped to the NTS.

TABLE 3-3. WASTE STREAM ACTION PLANS AND INVENTORY

WASTE STREAM	BACKLOG DRUMS (8/20/86)	BACKLOG WEIGHT (#) (8/20/86)	ACTION PLANS SHORT-TERM	LONG-TERM
1 K-65 Waste		19,385,126	RI/FS Characterization/Repack	RAWC/Process/Ship or Durable Interim Storage
2 Pit Waste			RI/FS Characterization	RAWC/Process/Ship or Durable Interim Storage
3 Thorium		2,397,534	Remove from silo/Repack/Decide if Waste or Resource (DOE)	Process/Durable Interim Storage
4 Contam. Construction Rubble			Contam. rubble pile/Conc. Des. Ship to NTS	Process/Ship or Store
5 Storm Water Runoff/Clearwell Effl. (including pit area runoff)			RI/FS/Establish runoff controls, Cover pits	Process pit waste/EH&SI Improvements (Water Quality)
6 Off-Spec UF4	930	223,541	Storage	LLWPSS/Ship or Store
7 Contaminated Soil	814	281,560	Contam. soil pile/Conc. Design	Process/Ship or Store
8 Contam. Ferrous Scrap		13,231,705	Segregation/Storage/Demos Vol. reduction	Segregation/Vol. reduction DOE metal programs
9 Contaminated Asbestos			Encapsulation/Storage	Encapsulation/Storage
10 BaCl2 from RMI	168	109,200	Conversion or Storage	Conversion or OR incinerator
11 Contam. Wooden Boxes & Pallets		2,160,000	Off-site disposal	Minimize generation/LLWPSS/ Off-site disposal
12 Noncontaminated Asbestos			Encapsulation/Storage	Encapsulation/Disposal (On- or Off-site)

WASTE STREAM	BACKLOG DRUMS (8/20/86)	BACKLOG WEIGHT (#) (8/20/86)	ACTION PLANS SHORT-TERM	LONG-TERM
13 RMI Sludges			Storage	LLWPSS/Storage
14 Dust Collector Bags	335	20,393	Vol. reduction/Storage or Ship to NTS	Vol. red./LLWPSS kiln/Store or Ship to NTS
15 Contam. Copper Scrap		3,307,500	Segregation/Storage/Demos/Vol. reduction	Segregation/Vol. reduction DOE metal programs
16 Slag Leach Filter Cake	4,908	2,206,297	Storage/Ship to NTS	LLWPSS/Ship to NTS/Elim. gen.
17 Neutralized Raffinate	12,134	5,460,300	Storage/Ship to NTS	LLWPSS/Ship to NTS
18 Dust Collector Residues	4,071	1,471,816	Storage	LLWPSS/Storage/Ship to NTS
19 Scrap U308, Mostly High Fluoride	1,128	515,568	Storage	LLWPSS/Storage
20 Contaminated Oils	318	143,630	Storage/ORGDP TSCA incinerator	Incineration at ORGDP
21 General Sludge from Sumps	136	46,150	Storage	LLWPSS/Storage
22 Contam. Clothing - Proc. Area			Storage	Vol. reduction/LLWPSS Storage/OR incinerator
23 Contam. Solvents - incl. trichlor	278	151,427	Storage/ORGDP TSCA incinerator	Phase out hazardous solvents
24 Nonburnable Contaminated Trash	29	15,443	Vol. reduction/Storage	Vol. reduction/Storage
25 General Waste - Proc. Area	899	42,227	Vol. reduction/Storage	Vol. reduction/LLWPSS/Storage
26 Incinerator Ash	616	149,728	Storage	Storage
27 Scrap Salts	1,415	1,252,978	Storage	LLWPSS/Storage
28 Noncontam. Ferrous Scrap			Storage	Recovery or disposal
29 Contaminated Magnesium	101	16,467	Storage	LLWPSS/Storage

WASTE STREAM	BACKLOG DRUMS	BACKLOG WEIGHT (#)	ACTION PLANS SHORT-TERM	LONG-TERM

WASTE STREAM	BACKLOG DRUMS (8/20/86)	BACKLOG WEIGHT (#) (8/20/86)	ACTION PLANS SHORT-TERM	LONG-TERM
30 Non-Briquettable Chips and Turnings for Oxidation			Storage	LLWPSS/Storage/Remelt
31 Contaminated Nonburnable Filter Cartridges, etc.	28	1,136	Storage	LLWPSS/Storage
32 Unfired Reduction Charges and MgF2 from Liner Caveins	621	584,227	Storage	LLWPSS/Storage
33 Contaminated Graphite	98	31,376	Storage	LLWPSS/Storage
34 Crushed Slag from Pot Blowouts	193	117,142	Storage	LLWPSS/Storage
35 Partially Oxidized Metal Oxidation Feed	5	1,971	Storage	LLWPSS/Storage/Remelt
36 MgF2 +20 mesh, including Dirty Prill	179	128,021	Storage	LLWPSS/Storage
37 MgO and Mg Zirconate from Crucible Cleanout	113	41,805	Storage	LLWPSS/Storage
38 Fly Ash		157,760,000	Storage on pile/off-site disposal	Fly ash landfill or off-site disposal
39 Sewage Plant Effluent			RI/FS, EIS	EH&S LI (Water Quality Imp.) RAWC LI(pending investigation)
40 Noncontam. Copper Scrap			Segregation/Storage	Recovery, disposal
41 MgF2 Slag	6,648	2,287,941	Ship to NTS/Clear backlog	Ship to NTS/Eliminate gen. Storage
42 Wet Sump or Filter Cake	1,321	519,592	Storage	LLWPSS/Storage
43 Rockwell Cleanings and Spills	251	130,820	Storage	LLWPSS/Storage

44 Bad Reduction (no Derby)	1	[illegible]6	Storage	LLWPSS/Storage
45 Scrap Uranium Metal	1,031		Storage	LLWPSS/Storage/Remelt
46 Noncontaminated Nonburnables			Storage	Landfill or off-site disposal
47 Sample Bottles (Glass, Plastic)	26	1,225	Storage	Vol. red./LLWPSS/Storage
48 Sanitary Burnable - Non-Proc. Area	180	216,000	Vol. reduction/Off-site disposal or on-site storage	Off-site or on-site landfill, on-site incineration
49 Furnace Solidified Salts-Chloride	160	97,694	Storage	LLWPSS, storage
50 Samples from Lab	26	1,225	Storage	LLWPSS/Storage
51 Cold Metal Oxides- (Non-Ra Bearing)		3,898,288	Removal from silo/disposal	Storage, off-site disposal
52 Noncontam. Construction Rubble			Store on noncontam. pile	Dispose off-site or on-site
53 Metal Spills and Extruder Ends High Impurity Metal	2	631	Storage	LLWPSS/Storage
54 Furnace Solid. Salts-Nonchloride	591	170,877	Storage	LLWPSS/Storage
55 Sewage Sludge				
56 Solid Metal with Imbedded Steel Other than Cores	12	3,090	Storage	LLWPSS/Storage
57 Cafeteria Waste			Monitored off-site disposal	On-site or off-site disposal
58 Noncontam. Soil			Store on noncontam. pile	Use as fill/Dispose

Shipments of other approved waste streams are expected to commence upon special training for waste handling operators in the materials contaminated with low levels of plutonium.

Interim storage of some newly generated waste at the FMPC may be necessary due to either unavailability of sufficient transportation or a need for processing such as drying of filter cake. If additional processing is required, technology demonstrations by private sector contractors will be considered on a periodic basis to assure that the most suitable technology is available and is being evaluated.

Currently generated waste not approved for shipment to the NTS will be drummed and stored on an interim basis and will be considered as candidates for processing and storage demonstrations. Volume reduction and waste stabilization will be used to decrease the storage space required and will contribute to the performance of long-term storage demonstrations.

Existing LLW inventory that has been approved for shipment to NTS and does not require processing will be shipped on an availability basis, with MgF_2 slag again having the highest priority. Wastes requiring processing will be stored on an interim basis at the FMPC. When processing is complete, the waste will be shipped to NTS.

The waste drums presently in storage are not arranged in an organized fashion by waste type. A certain amount of sorting and arrangement of the drums will be required to locate the waste types approved for shipment. Many waste containers are deteriorating. During the rearrangement and sorting, all waste drums which are failing will be repacked or overpacked, regardless of their status for shipment. Unapproved wastes will be considered as candidates for demonstrations of on-site processing and storage technology. Long-term storage demonstrations on site will reduce the volume of waste that must be shipped and may eventually qualify as disposal technology. Durable interim on-site storage options may

also become viable alternatives.

The Pads and Warehouse Study (in progress) will be used to develop optimized storage techniques for the storage space available. Implementation of a planned bar code system will aid in tracking the waste inventory. As wastes are sorted and repacked if necessary, they will be coded and entered into this tracking system. This will also reduce lost time in locating wastes for disposition.

Low-level waste stream strategies are discussed below. The number in parentheses represents the overall ranking of that particular waste stream in the prioritization of sitewide waste streams.

o Contaminated Construction Rubble (4)

Contaminated rubble from construction at the FMPC is presently being stored on a pile in an area west of Building 56. Several options for disposition are under consideration. These include a short-term storage facility (designed to hold one year's generation), durable interim on-site storage, and resumption of shipment to the NTS.

Studies are needed to assess the entire problem and to design a solution. With the amount of generated rubble increasing, a long-term storage facility will be necessary unless off-site shipment is allowed. As an attempt to minimize this waste, the ES&H department has begun a pathways analysis to determine if establishment of a de minimis level for rubble and soil is feasible. This would lower the amount of rubble and soil classified as contaminated. A mobile operated laboratory equipped (MOLE) vehicle is also being considered for acquisition. Use of such a vehicle to test rubble and soil at the point of generation could result in a major reduction in turnaround holding time and a reduction in the quantity of suspect rubble and soil held.

Should funding levels allow, the options will be evaluated, and a selected solution will be designed and implemented by FY-91.

- Off-Spec UF_4 (6)

  Off-spec UF_4 is being drummed and stored. It is not approved for off-site shipment and disposal. In the LLWPSS, off-spec UF_4 will be drummed for shipment or storage. Long-term strategy is to use durable interim on-site storage or to seek approval for off-site shipment.

- Contaminated Soil (7)

  Contaminated soil from excavation at the FMPC is presently being stored in a pile west of Building 56. Future disposition options for this soil will be developed in conjunction with the planning for contaminated construction rubble outlined previously in this section.

- Contaminated Asbestos (9)

  Asbestos is a major concern at the FMPC. Some asbestos is deposited on the metal in the scrap metal pile. The asbestos is also presently being excavated during construction activity and is being packaged and stored. Until long-term or permanent storage options are developed, asbestos will be stored in drums on an interim basis. Encapsulation of this material can reduce the airborne particulate hazard.

- Contaminated Wooden Boxes/Pallets (11)

  About 18,000 wooden boxes and pallets are stored on Plant 1 Pad. Removal of this material would free considerable space on the storage pad. The current strategy is to ship the pallets to OR for incineration. Future action will evaluate shredding the material and either burning it in the LLWPSS or supercompacting and storing it. Substitution of metal pallets for wooden pallets will minimize the generation of scrap wood. Establishment of a unpacking zone in the nonprocess area may also be considered as an option for minimizing contamination.

- RMI Sludges (13)

  These sludges are presently stored in drums. In the LLWPSS, the sludges will be dried and drummed. Long-term strategy will be to use durable interim on-site storage or to seek approval for off-site shipment.

- Dust Collector Bags (14)

  Dust collector bags are presently being compacted and stored in drums. The bags will be shredded in the Volume Reduction Facility and stored on an interim basis. These bags may be burned in the LLWPSS kiln. Residues can then be drummed and stored on site or shipped to the NTS.

- Slag Leach Filter Cake (VVB-001) (16)

  Slag leach filter cake has been approved for shipment to the NTS; however, processing and/or repackaging of much of the backlog is necessary. In addition, special operator training is required for the handling of this waste, as it is contaminated with low levels of plutonium. Upon completion of this training, and approval by the DOE, disposition of this waste will begin. Newly generated and backlogged waste will be shipped to the NTS as rapidly as possible, within the priorities set for shipment. Short-term storage of currently generated slag leach filter cake may be necessary due to unavailability of sufficient transportation or the need for specialized processing. If additional processing is necessary, technology demonstrations may be considered to assure that new technologies are being evaluated for suitability. Durable interim on-site storage may become necessary at a later time.

- Neutralized Raffinate (VVB-002) (17)

  Neutralized raffinate filter cake has been approved for shipment to the NTS; however, processing and/or repackaging of much of the backlog is necessary. In addition, special operator training is required for the handling of this waste, as it is contaminated with low levels of plutonium. Upon completion of training, and approvals

by DOE, disposition of this waste will begin.

Newly generated filter cake will be shipped to the NTS, and the backlog will be worked off as space permits. Short-term storage of neutralized raffinate filter cake may be necessary due to unavailability of sufficient transportation or need for specialized processing. If additional processing is necessary, technology demonstrations may be considered to assure that new technologies are being evaluated for suitability. Durable interim on-site storage may become necessary at a later time.

- Dust Collector Residues (18)

  Depleted dust collector residues are currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will undergo drying and drumming. Options for disposition are durable interim on-site storage or shipment to the NTS as a dry residue.

- Scrap U_3O_8, Mostly High Fluoride (19)

  Scrap U_3O_8 (depleted) is presently drummed and stored on site. It is not approved for off-site shipment at this time. When the LLWPSS becomes operational, screening and drumming of scrap U_3O_8 will be performed. Long-term strategy is to use durable interim on-site storage or to seek approval for off-site shipment.

- General Sludges from Sumps (21)

  Depleted sump sludges are presently drummed and stored. Treatment in the LLWPSS, when completed, will include filtering/dewatering, drying, and drumming. This stream is not currently approved for off-site shipment. Long-term strategy is to use durable interim on-site storage or to seek approval for off-site shipment.

- Nonburnable Contaminated Trash (24)

  Nonburnable contaminated trash currently is being compacted, baled, and stored. Shipment to the NTS is not approved. Processing planned for this waste are shredding, compacting, and drumming. The long-term strategy for nonburnable contaminated trash will likely be durable interim on-site storage; though approval for off-site shipment may be sought, this stream is of low relative importance and thus, other wastes take precedence for disposal.

- General Waste - Process Area (including Paper, Cardboard) (25)

  Contaminated burnables are being compacted, baled and stored. These materials will be size-reduced, oxidized, and drummed in the LLWPSS. This waste will be stored on an interim basis until wastes of higher priority are dispositioned. An attractive option is incineration in an LLW incinerator, should one be constructed on site or should an off-site incinerator become available.

- Incinerator Ash (26)

  The on-site incinerator was shut down in 1986 when elevated concentrations of uranium were found in the ashes. These ashes are now stored in drums and will be stored on site on an interim basis.

  Should cleanup and restart of the incinerator occur, the newly generated ashes should be noncontaminated.

- Scrap Salts (27)

  Depleted scrap salts are currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will undergo drying and drumming. Options for disposition are off-site shipment, durable interim on-site storage, or storage in drums.

- Contaminated Magnesium (29)

  Contaminated magnesium is being drummed and stored. It is not approved for off-site shipment and disposal. The magnesium will be drummed in the LLWPSS. This stream is of low volume and low priority; thus, it will be stored on an interim basis until such time as higher priorities have been dispositioned. The storage of metallic magnesium requires special fire protection to ensure proper storage of the material and proper response in the event of metallic magnesium fire. The FMPC maintains emergency response procedures to respond to emergencies associated with magnesium materials.

- Non-Briquettable Chips and Turnings for Oxidation (30)

  Nonbriquettable chips and turnings for oxidation are currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will be dried and drummed. Options for disposition are off-site shipment, durable interim on-site storage, or storage in drums. The feasibility of remelt and recovery of metal will also be evaluated.

- Filter Cartridges (31)

  Contaminated filter cartridges are being compacted and stored. The LLWPSS will shred and compact filter cartridges to prepare them for drumming or crating. They will be stored on an interim basis until wastes of higher priority are dispositioned.

- Unfired Reduction Charges and MgF_2 from Liner Caveins (32)

  Depleted unfired reduction charges and MgF_2 from liner caveins are currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will undergo drying and drumming. Options for disposition are off-site shipment, durable interim on-site storage, or storage in drums.

o Contaminated Graphite (33)

Contaminated graphite is being drummed and stored. It is not approved for off-site shipment and disposal. When the LLWPSS becomes operational, contaminated graphite will be size-reduced, dried, oxidized, and drummed. Due to the low relative importance of this waste, interim storage is the most likely short-term option. The long-term strategy is dependent upon disposition of wastes considered as higher priority, but recommendations will likely be in favor of durable interim storage.

o Crushed Slag from Pot Blowouts (34)

Crushed MgF_2 slag waste from pot blowouts is currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will undergo drying and drumming. Options for disposition are off-site shipment, durable interim on-site storage, or storage in drums.

o Partially Oxidized Metal Oxidation Feed (35)

Partially oxidized metal used for oxidation feed is being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is mandatory to eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use durable interim on-site storage or to seek approval for off-site shipment and disposal. The option of remelt will be investigated.

o MgF_2 >20 mesh, including Dirty Prill (36)

MgF_2 slag which is larger than 20 mesh, including dirty prill, is being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is mandatory to eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use

durable interim on-site storage or to seek approval of off-site shipment and disposal.

- o MgO and Mg Zirconate from Crucible Cleanout (37)

  MgO and Mg zirconate waste from crucible cleanout is currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will undergo drying and drumming. Options for disposition are off-site shipment, durable interim on-site storage, or storage in drums.

- o Magnesium Fluoride Slag (41)

  MgF_2 slag is the only waste being shipped to the NTS at this time. Currently generated slag has the highest priority for shipment, with backlogged waste being repackaged (when necessary) and shipped when space is available. Long-term strategy is to totally eliminate the backlog by shipment off site and to prevent buildup of new inventory.

  Should the option of disposal be closed, slag will be placed in durable interim on-site storage.

- o Wet Sump or Filter Cake (42)

  Depleted wet sump or filter cakes are currently being drummed and stored. When the LLWPSS is completed, newly generated waste will be packaged for storage/shipment in that facility. This stream will undergo drying and drumming. Options for disposition are off-site shipment, durable interim on-site storage, or storage in drums.

- o Rockwell Cleanings and Spills (43)

  Spilled metal from the Rockwell furnace is being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is mandatory to eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use durable interim on-site storage or to seek approval of off-site shipment and disposal.

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- Bad Reduction (No Derby) (44)

  Remnants from bad reductions are being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is desirable to reduce or eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use durable interim on-site storage or to seek approval of off-site shipment and disposal.

- Scrap Uranium Metal (45)

  Scrap uranium metal is being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is mandatory to eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use durable interim on-site storage or to seek approval of off-site shipment and disposal. The option of remelt will be investigated.

- Sample Bottles (Glass and Plastic) (47)

  Sample bottles are crushed and drummed. This will be done in the LLWPSS when the facility is available. This waste will be stored on an interim basis until wastes of higher priority are dispositioned.

- Furnace Solidified Salts - Chloride (49)

  Furnace solidified salts such as NaCl or KCl are being drummed and stored. These salts are not approved for shipment to the NTS. Long-term strategy is to use durable interim on-site storage or to seek approval for off-site shipment and disposal.

- Samples from Lab (50)

  Lab samples are drummed and stored. In the LLWPSS, these samples will be dried and drummed. This waste will be stored on an interim basis until wastes of higher priority are dispositioned.

- Metal Spills and Extruder Ends, High Impurity Metal (53)

  Metal spills and extruder ends from machining operations are being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is mandatory to eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use durable interim on-site storage or to seek approval of off-site shipment and disposal. The option of remelt will be investigated.

- Furnace Solidified Salts - Nonchloride (54)

  Furnace nonchloride salts, such as K_2CO_3 or Li_2CO_3, are being drummed and stored. These salts are not approved for shipment to the NTS. Long-term strategy is to use durable interim on-site storage or to seek approval for off-site shipment and disposal.

- Sewage Sludge (55)

  Sewage sludge may be contaminated with very ow llevels of uranium from showers and the laundry. The sludge is normally recovered and roasted.

- Solid Metal with Imbedded Steel Other than Cores (56)

  Solid metal waste with imbedded steel is being drummed and stored. This waste is not approved for shipment to the NTS. Oxidation of this material is desirable to reduce or eliminate the pyrophoric hazard of uranium. In the LLWPSS, the waste will be oxidized and drummed. Long-term strategy is to use durable interim on-site storage or to seek approval of off-site shipment and disposal. The option of remelt will be investigated.

3.4.2 Mixed Waste

Mixed waste on site is currently either stored in drums or in the bulk storage tanks. The preferred option for disposal is destruction in the TSCA incinerator currently under construction at the Oak Ridge Gaseous Diffusion Plant (ORGDP). Should this option not be applicable, other strategies must be evaluated. Mixed waste can only be accepted at sites licensed for their handling; several sites are currently seeking RCRA permits, including the NTS.

For mixed wastes, such as RMI barium chloride ($BaCl_2$) salts, the hazardous component may be converted to a nontoxic (by EP test standards) form by chemical treatment or encapsulation. Demonstrations will be conducted by subcontractors when possible to test processing options for mixed waste streams. Interim on-site storage will be employed until feasible disposal processes become available. Utilization of durable interim on-site storage may also be implemented.

- $BaCl_2$ Salts from RMI (10)

  $BaCl_2$ salt for heat treating is received from RMI and stored on site. The EP toxic constituent can be removed by converting the barium chloride to barium sulfate, which is not EP toxic. This is the preferred strategy for this waste, though incineration at ORGDP may also be possible. An on-site facility is being planned for conversion treatment of $BaCl_2$ salt.

- Contaminated Oils (20)

  These machining oils are presently drummed and stored. The planned strategy is destruction in the ORGDP TSCA incinerator, when operational. These oils are not truly classified as hazardous; however, they are grouped with the mixed wastes because they are to be treated as mixed waste.

- Contaminated Solvents (23)

  Contaminated solvents, primarily 1,1,1-trichloroethane, are stored in the bulk storage tanks and in drums. The planned strategy is destruction in the ORGDP TSCA incinerator which is under construction. Higher priority is to be placed on the solvent currently stored in drums.

3.4.3 Scrap Metal Waste

Currently generated scrap metal waste will be sorted at the source by applying Waste Acceptance Criteria to determine whether it is contaminated. Noncontaminated scrap metal will be recycled or discarded as noncontaminated trash. Contaminated scrap metal will be sorted at the generating operation by alloy and type so that it can be collected in separate areas for more economical processing. Unrecoverable contaminated scrap metal will be categorized as low-level waste and disposed of in an appropriate fashion.

The planned D&D Facility will play an important role in the processing of this generated scrap recovery and recycle.

There is a sizeable inventory of scrap metal at the FMPC: 6000 metric tons of ferrous scrap and 1500 metric tons of copper scrap. Except for one isolated pile of copper, this metal is not sorted by alloy or type of material. Sorting and size reduction operations have recently begun on the ferrous scrap pile. Smaller piles of contaminated and noncontaminated ferrous materials, nonferrous materials, and nonrecoverable metals are being formed. Asbestos removed from the ferrous scrap pile during sorting is being drummed. Some of the metal is unrecoverable and will be recategorized as low-level or sanitary/industrial waste when reduction of inventory begins. This unrecoverable waste will be shredded and compacted, or supercompacted, for storage and final

disposition.

Technology demonstrations are planned to determine whether the contaminated scrap can be decontaminated to a level acceptable for recycle on a cost recovery basis. A subcontractor(s) chosen by DOE/ORO will decontaminate/process a sample of about 25 tons of contaminated scrap metal from each of the following sites: Oak Ridge Gaseous Diffusion Plant, Paducah Gaseous Diffusion Plant (Paducah, KY), Portsmouth Uranium Enrichment Complex (Piketon, OH), and the FMPC. All work will be in compliance with applicable federal, state, and local regulations. The decontaminated metal and contaminated processing wastes will be returned to DOE. If this recovery proves to be cost effective, the inventory will be processed for recycle by contracting to the private sector.

Alternative plans are being developed to deal with the scrap if the recycle does not prove economical. The D&D Facility, under planning as part of the Environmental Health and Safety Improvements (EHSI) Line Item, will greatly enhance FMPC capabilities in recovery of this scrap metal inventory. Another option to commercial resale is volume reduction and durable interim on-site storage.

- Scrap Ferrous Metal [Contaminated (8) and Noncontaminated (28)]

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

  Sorting and size reduction operations have recently begun on the ferrous scrap pile. Smaller piles of contaminated and noncontaminated ferrous materials, nonferrous materials, and nonrecoverable metals are being formed. A plan for

final disposition of this backlog will be submitted.

Scrap metal generated in future activities will also be sorted into contaminated and noncontaminated groups and also by type of metal. Noncontaminated scrap ferrous will either be recovered or disposed of as noncontaminated waste. Contaminated scrap will be decontaminated and recovered if economically or classified as low-level waste if not economically feasible.

- Scrap Copper Metal [Contaminated (15) and Noncontaminated (40)]

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

  Demonstrations by qualified subcontractors will determine if contaminated copper scrap can be decontaminated for resale/recycle on a cost recovery basis.

  Noncontaminated copper scrap will be recycled or released for resale to the private sector.

3.4.4 Sanitary/Industrial Waste

Putrescible cafeteria waste is the only waste in this category being disposed of off site at this time. Noncontaminated trash is currently being baled and stored on site on an interim basis. The Environment, Safety & Health Department will monitor this waste and if it is found to be noncontaminated, it will be disposed of at a local sanitary landfill. Fly ash is being placed on a fly ash disposal area; a permit to install a fly ash landfill may be sought in the near future.

An application for a permit to expand the on site sanitary landfill for disposal of noncontaminated trash has been submitted to the Ohio EPA; however, approval of this application is expected to take some time. If off-site disposal is to be used as a short-term option, safeguards will be instituted to prevent the inclusion of sensitive information or radioactive material in such waste.

The advantage of disposing of noncontaminated waste to a private landfill rather than expanding the present landfill is that space on the FMPC site can be conserved for other uses. Evaluation of long-term strategy options for this waste category will take into account planned future land use patterns. Though economics currently favor on-site disposal of sanitary/industrial waste, innovations in technology or changes in overall strategy may force a reevaluation of opinions.

- Noncontaminated Asbestos (12)

  As asbestos is excavated during construction in nonprocess areas, it is being drummed and stored on an interim basis. This material may be encapsulated to reduce the airborne particulate hazard. It should eventually be disposed of in a landfill (on or off site).

- Fly Ash (38)

  Fly ash is presently stored on a disposal pile. A fly ash landfill is tentatively planned, though no application for a permit to install has yet been filed. Off-site shipment to a local landfill is also being considered. Studies are being conducted to assure that this fly ash can be safely disposed of. There is also an older fly ash pile, which may have been contaminated in previous years. This will be investigated in the Weston Remedial Investigation/Feasibility Study (RI/FS).

- Noncontaminated Nonburnables (46)

  Noncontaminated nonburnables are currently being compacted, baled, and stored. Off-site shipment of noncontaminated rubbish or disposal in the proposed expanded landfill on site are the two options for disposition of this material.

- Sanitary Burnable Waste, Non-Process Area (48)

  Sanitary burnable waste is currently being compacted, baled, and stored on an interim basis. The short-term strategy is to monitor the waste to determine if it is contaminated or noncontaminated. If the material is noncontaminated it may be shipped to an off-site sanitary landfill. An application for a Permit To Install (PTI) an expansion to the existing FMPC on-site sanitary landfill has been submitted to the Ohio EPA; however, there is no firm schedule for the approval of the PTI and expansion of the landfill.

- Noncontaminated Construction Rubble (52)

  Noncontaminated construction rubble is being placed in an area south of the sanitary landfill. Future plans for disposition of rubble depend upon plans for segregating noncontaminated from contaminated rubble. Off-site disposal will be considered for this material.

- Cafeteria Waste (57)

  Putrescible cafeteria waste is presently being shipped off site for disposal. The waste is removed from the cafeteria daily and transported to a loaded dumpster, which is opened only for addition or removal of waste. The dumpster and the waste are monitored to ensure that no contaminated material is discarded. An off-site contractor removes the waste and transports it to a sanitary landfill. This practice is expected to continue for the present time.

- Noncontaminated Soil (58)

  No soil is being currently removed from the FMPC site. However, if the soil has been identified as noncontaminated, it may be used as backfill in project activities. Noncontaminated soil is currently being placed south of the sanitary landfill. Future plans for this material are tied to the planning for rubble and soil.

3.4.5 Remedial Action Waste

Remedial Action wastes include material stored in the K-65 silos and the waste pits. Remedial investigation of pit and silo contents is currently underway and WMCO and DOE will use the results to recommend actions to be taken for disposition of the material. The EPA will have the right to approve recommendations.

In addition, concerns such as storm water runoff and sewage plant streams are included in this category, as characterization of groundwater and study of discharge to Paddy's Run Creek are remedial concerns. Again, EPA will determine actions to be taken for remediation.

- K-65 Waste (1)

The Weston RI/FS in progress will provide the information necessary to determine the appropriate actions to be taken in disposing of the contents of the K-65 silos. Proposals for remedial action are expected to include removal of the material from the silos, processing, and/or repackaging for disposal. It is believed the primary disposal options will be shipment off site for burial or durable interim on-site storage. This work would be performed under the proposed Remedial Action Waste Cleanup (RAWC) line item and AR operating funding.

- Pit Waste (2)

The RI/FS will provide the information necessary to determine the appropriate actions to be taken in disposing of the contents of the waste pits. Options for remediation of the pit area will be

recommended by WMCO and DOE to the EPA for approval. This work would also be performed under the RAWC line item. Activities would include processing of liquid and solid wastes, decontamination of large equipment, packaging, and disposition. Due to the tremendous volume of waste, off-site shipment, if feasible, will span many years; therefore, durable interim on-site storage will be required.

- Stormwater Runoff/Clearwell Effluent (5)

  These site effluents will be addressed in the Weston RI/FS and the Environmental Impact Statement (EIS) studies. Remediation and improvements are planned in several areas.

  Stormwater runoff from the pit area is a concern because of the possibility that it may contribute to contamination of the groundwater. Pit 4 has been bermed to force runoff to Pit 6, which can be routed to the clearwell via Pit 5. Further control of runoff in the pit area is also planned.

  The new stormwater retention basin will be used to control runoff from the production area, and to prevent discharge to Paddy's Run.

  On a more general note, the Water Quality Improvements subproject of the EHSI line item will have an impact on the clearwell effluent to Manhole 175. The goal is to approach a "total water recycle" and to improve the water quality of the discharge.

- Sewage Plant Effluent (39)

  The need to address this stream will be assessed in the RI/FS and the EIS. Currently, the effluent is monitored. The Water Quality Improvements subproject of the ES&H Line Item and in-house development projects will address this stream. If necessary, remediation may be performed under the RAWC line item.

- Cold Metal Oxides (Nonradium bearing) (51)

  The cold metal oxides currently stored in Silo 3 will remain there until priorities permit their removal, repackaging, and disposition. This will probably be performed under the RAWC line item.

3.4.6 Thorium (3)

Current planning of the Environmental Health & Safety Improvements (EHSI) Line Item include a subproject for the removal and repackaging of the contents of the thorium storage facilities. The material will be put into more durable storage until a decision is made to keep the thorium inventory as a valuable resource or to declare it as waste and dispose of it. Disposition of this material may be performed under the RAWC Line Item.

The RAWC Project is a Line Item which will address the disposition of the stored thorium material. During FY-86, preliminary planning for the project was completed. Conceptual Design of the facility is planned to be completed in FY-88 with construction of the facility anticipated to begin in FY-91. The RAWC facility will provide for the long-term storage of thorium materials at the FMPC if suitable off-site disposition facilities are not available.

3.4.7 Surplus Facilities

The issues of aging and deterioration of FMPC facilities must be addressed. Replacement of some existing facilities and demolition of other structures no longer used or needed will generate a large amount of equipment and materials requiring decontamination and decommissioning.

Construction of an upgraded decontamination facility is part of the EHSI Line Item. If built, this facility would have separate incoming and outgoing staging areas for the temporary storage of contaminated and cleaned equipment and materials. The decontamination facility would also have the capability to decontaminate various types of

plant equipment, construction scrap, and vehicles, with an option to expand to decontamination of rail cars in the future.

3.5 WASTE MANAGEMENT ECONOMICS

This section provides a basis for understanding some of the costs associated with waste disposition at the FMPC. Additionally, recent economic studies are summarized, and proposed actions and studies which support the elements of strategy presented earlier in this section are identified. This section is not a comprehensive survey of operating costs or a tradeoff study in itself. Rather, this summary identifies the basic costs of storage and disposal to point to areas where further study might yield significant cost savings through implementation of different practices.

First, the current costs of LLW shipments to the NTS are presented along with the description of on-site storage options which may be implemented in the future for all LLW, including the contents of the waste pits and silos. Then, proposed and completed economic studies which affect the key elements of strategy discussed in Section 3.2 are discussed. These studies are necessary in choosing the actions which best combine cost effectiveness with the goal of safe and responsible waste management.

3.5.1 LLW Disposition

The three process wastes produced in highest volumes (MgF_2 slag, slag leach filter cake, and neutralized raffinate) are approved by DOE/ORO for shipment to the NTS for burial. MgF_2 slag is currently being shipped, and shipments of the other two wastes will begin in FY-87. Current shipping costs for MgF_2 slag are presented in Table 3-4. A brief discussion of each cost constituent follows the table.

TABLE 3-4
SHIPPING AND BURIAL COSTS - MgF_2 SLAG
(Based on 42 drums in sixpacks/shipment)

Containers		3570
Manpower	4730	
Shipping	3000	
Disposal/Burial		2700
		14000
		($333/drum or $44/ft^3)

Containers

The containers used for off-site waste shipments from the FMPC are drums, sixpacks, and overpacks. Another disposition container under evaluation is a durable reinforced, concrete storage container.

Drums are used to store waste material being shipped to NTS and for storage of waste materials awaiting off-site shipment or other disposition. Drums designated for off-site shipment are placed in sixpacks or overpacks.

A sixpack is a rectangular overpack container made of steel capable of accommodating six 55-gallon drums of waste material. The sixpacks are loaded onto a tractor-trailer and transported to the NTS. A tractor-trailer can haul seven loaded sixpacks without exceeding various state and local gross vehicle weight limits.

An overpack is a white 83-gallon drum into which a 55-gallon drum is placed. Vermiculite is placed around the 55-gallon drum after it has been loaded into the overpack. The overpack is then sealed and transported to the NTS. Overpacks are primarily used for drums which have deteriorated.

Manpower

Manpower effort includes handling and packaging of wastes. This includes the loading of drums, sixpacks and/or overpacks; sampling and testing of material for accountability; container surface contamination checks; waste certification as required by the DOT and the NTS; and the loading of the containers onto a tractor-trailer.

Shipping

Presently, waste transportation to the NTS is provided by a contract operator (known as a "licensed exclusive-use shipper") chosen through the solicitation of competitive bids. The operator is under constant evaluation for performance and adherence to governing federal, state, and local rules and regulations.

Disposal/Burial

The NTS charges a burial/disposal fee to users. In 1986, the burial/disposal fee for the FMPC was $3.00/ft^3 for boxed/drummed waste ($2.00 ft^3 for bulk-shipped waste). For 1987, the fee for boxed/drummed waste is expected to be $4.00/ft^3, increasing to $6.00/ft^3 in 1988.

By comparison, the 1986 burial/disposal fee charged to commercial industry is $25.00/ft^3. It is important to note this difference in costs. Comparisons to commercial studies are impossible because of this difference.

The feasibility of bulk shipment of some LLW waste streams will be examined. An estimated total cost for this method of disposal is $26.00/ft^3. This represents significant potential for cost reduction; however, the aspects of this option have not been sufficiently studied as of yet.

Approximately 36,000 drums of low-level waste are presently in storage on site. The storage facilities are inadequate for proper long-term storage. Planned remediation of the waste pits and silos will result in an estimated additional 13 million cubic feet of waste (equivalent to approximately 1.75 million drums). Construction activity and demolition will also generate massive quantities of waste in the next ten years. Should the current restrictions on off-site shipment of waste continue, on-site interim storage is the only alternative.

Two primary options have currently been identified for interim storage: a dedicated warehouse for drums and a monitored outdoor storage area for durable containers. Each area would consist of approximately 30 acres of storage area. Though a detailed tradeoff study comparing the two configurations has not been undertaken, the basic elements of cost for each have been identified and are listed in Table 3-5. For such a study, costs should be estimated on a 30-year life cycle.

TABLE 3-5
ELEMENTS OF COSTS FOR INTERIM STORAGE

WAREHOUSE

- o Packaging
- o Containers (drums)
- o Maintenance
- o Monitoring/surveillance (rad checks)
- o Final disposition:
  - a. Repack/rehandle
  - b. Permanent disposal of waste
- o Facility D&D at end of life cycle
- o Site remediation.

OUTDOOR STORAGE AREA

- o Packaging
- o Containers (reinforced concrete)
- o Container production plant
- o Monitoring/surveillance
- o Final disposition:
  - a) Berming, dirt cover, site closure for surface LLW site (30 years)
  - b) Off-site shipment after some amount of years.

The largest portion of expense incurred under the warehouse interim storage option would occur at the end of the life cycle: the waste must be disposed of, the facility decontaminated and decommissioned, and the site remediated.

The largest expenses incurred under the outdoor interim storage area option may be the cost of construction of a dedicated container production plant and the cost of the containers. A potential savings in container cost may be realized through the use of volume reduction, which will be discussed further below. Two scenarios for waste disposal are possible at the end of the outdoor storage area life cycle: the site may be bermed, covered, and closed for permanent storage, or the containers may be shipped off site.

3.5.2 Areas of Study

In Section 3.2, the general elements of strategy for waste management were discussed. Some of these elements include the following:

- o LLW Shipments to the NTS
- o Waste Minimization
- o Use of ORGDP TSCA Incinerator
- o Elimination of Generated Wastes
- o Use of Durable Interim Storage
- o Minimization of DOE Capital Investment Requirement.

The strategy elements described below discuss waste streams, with an emphasis on economic feasibility/tradeoff studies, completed or proposed. The implications the studies may have on waste management strategy are also discussed.

- o LLW Shipment to the NTS

  The cost of shipment was discussed in Section 3.5.1; savings may be realized through the use of bulk shipments.

  A study has been proposed for identifying suitable dust suppressants for reducing fines in MgF_2 slag prior to shipment. This could result in eliminating use of costly sixpacks.

- o Waste Minimization

  Many activities have been proposed to help develop this strategy. Goals are to maximize the effective use of resources (storage resources and production resources).

  The Pads and Warehouse Study (PAWS) currently in progress will present recommendations for optimization of available storage space. A bar coding system which will be implemented on site will efficiently track, segregate, and count the stored wastes.

  A supercompactor pilot program is currently being conducted on site

utilizing a supercompactor service. Volume reduction as high as 7:1 is being achieved. In a cost study it was estimated that over ten years, about $9 million could be saved due to reduction in storage required. It has been recommended that supercompaction be implemented at the FMPC. A shredder has also been recommended to work in conjunction with the supercompactor. The shredder is particularly effective in volume reducing steel, which is expected to be one of the major wastes generated during site renovation activities in the next decade. A new FMPC supercompactor facility is estimated to cost $1.2 million, with a shredder costing an additional $500,000. Cost comparisons between the construction and operation of a supercompactor facility and the continued use of a supercompactor service will be made utilizing data from the current pilot program.

Use of more durable materials will also be examined. For example, the replacement of wood pallets with metal pallets is being evaluated. The outlook is very favorable, and implementation would significantly reduce wood scrap generation on site.

The increasing generation of construction rubble and soil is a major concern. Relief is being requested to ship this material to the NTS. Another proposed approach is the acquisition of a mobile operated laboratory equipment vehicle (MOLE), which could analyze the generated rubble and soil at the Project Site to determine if it is contaminated. This could have a major impact in reducing rubble/soil held for weeks as suspect material. Other studies for immediate, short-term, and durable interim storage for rubble are needed; however, funding is not available.

Establishment of de minimis levels are being studied for some materials. In a related vein, economic studies are required to update the analysis of uranium reprocessing levels. With the increasing cost of disposal, materials

previously reprocessed for recovery may no longer be economically attractive. It may be desirable to dispose of slightly more concentrated wastes in much smaller quantities.

Another option is the reprocessing of waste until uranium levels fall below an established threshold for disposal as landfill material. An example of this would be the acid leaching of MgF_2 slag.

If de minimis levels are established, further studies into the feasibility of reprocessing waste to or below the de minimis level will be evaluated. Some of the parameters to be considered include use of existing facilities, upgrade/modification to existing facilities, and impact on production.

Minimizing worker exposure is also a primary goal of the strategy. Construction of an automated warehouse would significantly reduce exposure and handling of waste.

- Use of ORGDP TSCA Incinerator

  In a cost study conducted by Waste Management on contaminated scrap wood (pallets/boxes) disposition alternatives, it was determined that shredding the contaminated wooden pallets and boxes would be the least inexpensive disposal option available. However, because of prolonged radiation exposure to workers who would have to repeatedly handle the shredded material, recommendations of off-site shipment for incineration at Oak Ridge have been made.

- Elimination of Generated Wastes

  As mentioned earlier, it is desirable to replace wood pallets with metal pallets, as the metal pallets are much more durable. In addition, this would eliminate wood pallets as a waste requiring disposal.

  A major goal of the Waste Management Section is to identify opportunities for eliminating process waste streams such as

MgF_2 slag and slag leach filter cake. It is hoped that studies on eliminating MgF_2 slag generation may be initiated in the next year. The cost savings in waste handling would be enormous, as this material is the most voluminous waste stream generated on site.

- Use of Durable Interim On-Site Storage

  It is believed that durable interim on-site storage using reinforced concrete containers offers a cost advantage over other methods of on-site storage, in addition to its advantages in flexibility. Studies are required to evaluate specific applications.

- Reduce DOE Capital Investment Requirement

  This may be done through feasibility/tradeoff studies which may indicate better options that allow planned projects to be reduced in scope or eliminated. One such analysis, recently completed, studied the cost of reconditioning drums versus the cost of supercompaction/disposal/new drums. Assuming construction of the planned Drum Reconditioning Facility and operating costs, reconditioning cost per drum will be $53.10. Assuming supercompaction of old drums, shipment to NTS, and purchase of new drums as replacements, cost per drum is $25.40. Thus, a significant cost savings can be achieved through use of a supercompactor.

  Studies such as this one are often required because of the shift in priorities on site. They may lead to large reductions in capital investment requirement.

3.5.3 FMPC Operations & Waste Management

At the present time, it is difficult to estimate the manpower dedicated sitewide to waste monitoring/disposition efforts. Many operations (sewage plant, biodenitrification area, the general sump, etc.) indirectly involve waste management activities. A total cost of waste handling on site has not been calculated. Future studies should be

conducted to further define the total costs of waste management.

4.0 PROJECTS & OPERATIONS

The total estimated funding required to complete Waste Management goals for Fiscal Years 1987-91 is identified in this section. The budget presented represents the level of funding required to meet the schedules and milestones set forth by WMCO. Budget numbers for years beyond FY-87 are rough estimates and will be refined as the budget submittal date for each year is reached. Selected projects will be cancelled or stretched out over longer periods of time if necessary because of imposed funding limits.

Funding for Waste Management activities at the FMPC is provided through the DOE offices of Defense Waste and Transportation Management (AR program) and Nuclear Materials Production (GE program). Within each program, planned expenditures are broken down into the categories of Operating, Line Item projects, general plant projects, and capital equipment. Cost and schedule information is presented in each category.

Table 4-1 is the budget summary for FY-87-91 for waste management activities. Approximately $300 million will be required to meet the schedules discussed in this section and in Section 6.0, Milestones. In addition, the need for an estimated $430 million in Operating and Line Item funding has been identified in the Out Years (approximately 5-10 years beyond FY-91).

Funding for FY-87 (as of 10/1/86) is presented in Section 4.1. The FY-87 budget was developed before WMCO assumed responsibilities at the FMPC, and does not reflect the emphasis WMCO has placed upon waste management. Operating funds allocated are insufficient to complete all desired programs; thus, priorities have been set and some programs will be limited in scope or eliminated as required. WMCO will seek additional funding for waste management activities where necessary.

The projected budget for FY-88-91 and beyond is presented in Section 4.2. The budget process has begun for FY-88. WMCO is developing its budget strategy for future years. Though the information in Section 4.2 is, in some cases, only a rough estimate of required funding, the estimate provides an early foundation for better identification of necessary programs.

TABLE 4-1

WASTE MANAGEMENT BUDGET SUMMARY - FY-87-91
(in $1,000,000's)

FUNDING Type	FY-87-91 Total	FISCAL YEAR 1987	1988	1989	1990	1991
AR-OP	57.272	5.660	9.787	12.850	13.925	15.050
AR-LI	64.628	10.000	4.628		7.000	43.000
AR-GPP	16.982	1.490	1.592	4.200	4.600	5.100
AR-CE	3.137	0.320	0.117	0.800	0.900	1.000
4A	4.800	2.400	2.400			
GE-OP	36.341	4.611	6.700	7.725	8.340	8.965
GE-LI	91.300	2.400	11.200	29.600	18.000	30.100
GE-GPP	13.750	0.750	2.500	3.100	3.500	3.900
GE-CE	12.650	2.850	2.000	2.400	2.600	2.800
TOTALS	300.860	30.481	40.924	60.675	58.865	109.915

MANPOWER FUNDING	10/86	10/87
AR	13.5	17.0
GE	14.5	20.0
CAPITAL	16.0	17.0

4.1 FY-87 FUNDING

Funding of Waste Management activities for FY-87 (as of 10/1/86) is summarized in Table 4-1. This includes operating funds and funding for Line Item projects, general plant projects, and capital equipment acquisitions. Manpower requirements are also presented. Additional operating funds are being sought for FY-87 to allow identified programs to be carried out. Should this funding not be provided, some programs will be limited in scope, deferred, or eliminated.

The funding discussion is separated with respect to source of funding. Defense Waste and Transportation Management (AR) funding is discussed in Section 4.1.1. Nuclear Materials Production (GE) funding is discussed in Section 4.1.2.

4.1.1 Defense Waste and Transportation Management (AR)

Funding for FY-87 is summarized in Table 4-1. $5.66 million is allocated for Operating (OP), $10. million for Line Item projects (LI), $1.49 million for general plant projects (GPP), and $320 thousand for capital equipment (CE). As mentioned before, additional operating funding is being sought to allow identified programs to begin or continue.

- Operating

Table 4-2 lists the AR operating funds allocated for FY-87 and the additional funding desired. Since it is unlikely that all this additional funding could be granted, priorities have been set and listed for the use of supplemental funding received.

Categories of expenditure are briefly summarized below.

LLW Shipment to the NTS - The $5.04 million allocated for low-level waste shipments (primarily MgF_2 slag) to the NTS is expected to cover handling, shipping, and disposal of currently generated waste and a small amount of backlogged waste. If currently generated waste approved for shipment is not available, backlogged material will be shipped instead. This will prevent buildup of inventory. Tracking, forecasting,

TABLE 4-2
AR OPERATING FUNDING - FY-87
(in 1000's)

	FY-87 ALLOCATED	PRIORITY	SCOPE	FY-87 SUPPLEMENT	PRIORITY	SCOPE
LLW Shipments to the NTS						
- Currently Generated LLW	2400	2	LLW shipments			
- Currently Generated LLW (Credit from Other Program)	2400	1	LLW shipments			
- Backlog LLW	240	2	LLW shipments	3600	2	Additional shipments
LLW Volume Reduction	435	5	Supercompactor rental, operations, studies			
Mixed Waste Mgmt/Disposition	360	6	BaCl2 support	470	5	ORGDP incinerator fee
Scrap Metal Mgmt/Disposition	780	7	Limited Quadrex contract	1200	7	Finish Quadrex contract
				700	8	Modify Quadrex contract
Remedial Investigation/ Feasibility Study	500	3	Limited Weston contract	900	1	Finish Weston contract
				3400	3	Modify for FFCA work
Interim Pit Stabilization	395	3	Cover Pit 4, support	1500	4	Pit stabililzation work
Surplus Facilities Mgmt	200	8	Planning, studies			
In-House Development/Studies	550	4	Studies, development	800	9	Additional studies
Pallets/Boxes Disposition				450	6	Pallet disposition
SUBTOTAL	8260			13020		SUPPLEMENTAL
FY-86 Carryover	-200					
Credit for LLW Shipment	-2400					
AR Funding (as of 10/1/86)	5660					

reporting, planning, and engineering for process wastes and construction rubble disposition will also be performed under this funding. This funding includes a $2.40 million credit from the 4A program. An additional $3.60 million, if allocated, would fund more shipments, thus helping reduce the waste backlog, presently estimated at approximately 40,000 drums.

LLW Volume Reduction - This funding ($435 thousand) will be used to continue supercompactor rental and operation, and to support Volume Reduction Facility development.

Mixed Waste Management/Disposition - The $360 thousand allocated will support planning, engineering, and studies for disposal of backlogged solvent, oil, still bottoms, and $BaCl_2$ from RMI. Support for the RMI Salt Treatment Facility project must also come from this funding. The additional $470 thousand identified as supplemental funding would cover the disposal fee for contaminated oils and solvents designated for destruction in the TSCA incinerator nearing operational readiness at the ORGDP.

Scrap Metal Management/Disposition - The $780 thousand allocated for scrap metal management will support a limited portion of the ongoing subcontract with Quadrex for sorting of the ferrous scrap pile and various planning and engineering studies. An additional $1.20 million would allow completion of the ferrous scrap pile sorting in FY-87. Another $700 thousand would fund an expansion of the Quadrex contract.

Remedial Investigation/Feasibility Study - The Weston RI/FS will be allocated $500 thousand in FY-87; this represents a significant reduction in planned funding and will cause a slip in the schedule for the proposed Remedial Action Waste Cleanup (RAWC) Line Item project. Supplemental funding of $900 thousand would permit completion of the current Weston subcontract

in FY-87, and an additional $3.40 million would fund expansion of the RI/FS to accommodate requirements established in the Federal Facilities Compliance Agreement (FFCA).

Interim Pit Stabilization - Approximately $395 thousand is allocated for pit stabilization activities (including the covering of Pit 4) and studies to identify and evaluate solutions for problems concerning pit area runoff. An additional $1.50 million in supplemental funding would be used for implementing runoff controls or recommendations from the RI/FS.

Surplus Facilities Management - The $200 thousand in FY-87 funding will be used for planning, studies, and preliminary engineering. The need for funding in this category will increase significantly in the next five years as decontamination of obsolete facilities begins.

In-house Development and Studies - The $550 thousand allocated will be used for option, tradeoff, and feasibility/engineering studies in the areas of effluent treatment, waste minimization, LLW shipping and storage, and new technologies and processing. An additional $800 thousand would fund more in-house development projects.

Pallets/Boxes Disposition - The disposition of contaminated scrap wooden boxes and pallets will be deferred. An estimated $450 thousand would allow this program to continue. Potential disposal options at this time include: shredding and storing; burning in the LLWPSS kiln; or off-site disposal at a LLW incinerator facility or burial site.

o Line Item - LLWPSS

The LLWPSS is a FY-86 Line Item project expected to begin operations in FY-89. The LLWPSS will convert most production/process wastes to dry solids and package them for off-site disposal or on-site storage.

The LLWPSS consists of six subsystems for treating and packaging low-level wastes: 1) filtration, 2) a rotary kiln for drying and/or oxidation, 3) a box furnace for incineration, 4) size reduction, 5) dust suppressant blending and waste form sampling, and 6) drumming and decontamination, in addition to a system for air filtration. All secondary wastes generated in the LLWPSS are disposed of through the LLWPSS. Atmospheric emissions from the LLWPSS are reduced to environmentally acceptable levels by a series of scrubbers, roughing filters, and HEPA filters. Used filters can be disposed of through the LLWPSS or they may be compacted and packaged in the Volume Reduction Facility prior to disposition.

At the present time, a redefinition of scope is under consideration for the LLWPSS because of the recent change in direction from DOE/ORO which places future off-site shipment of most LLW in some doubt. Some of the subsystems may be resized or eliminated, and different processing equipment may be substituted. WMCO will make recommendations to DOE regarding these changes.

The LLWPSS is appropriated $10 million in FY-87. The activities funded include:

- technical support of Title I and II Design
- technical support of Title III Inspection
- planning, budgeting, and reporting
- construction and procurement
- preparation of procedures and training programs for training of operating personnel.

- General Plant Projects

Three new GPPs will be funded in FY-87: the Trash Monitoring/Segregation Facility ($740,000), the RMI Salt Treatment Facility ($350,000), and the Vehicle Monitoring Facility ($400,000).

The Trash Monitoring/Segregation Facility will improve FMPC capabilities in nondestructive testing of the contents of waste packages, which will help reduce costs and worker exposures associated with LLW disposition. Real time radiography testing will provide nondestructive assay capability.

The RMI Salt Treatment Facility will convert mixed waste ($BaCl_2$ salt sludges) to low-level waste by removing or stabilizing the hazardous barium component. This will allow disposition of the sludges as low-level waste, removing the need for a licensed hazardous waste disposal facility.

The Vehicle Monitoring Facility will provide better monitoring of vehicles in service at the FMPC and incoming and outgoing vehicles, including trucks involved in LLW shipments.

General plant projects funded in FY-86 which will still be active in FY-87 are the Surface Water Controls, the Chemical Waste Building, and the Waste Compactor Facility projects.

o Capital Equipment

$320 thousand has been allocated for capital equipment acquisitions in FY-87. This funding includes procurement, installation, and training. A brief summary of the acquisitions follows.

Drum handling equipment (forklift truck, towmotors, and drum rotator trucks) will be acquired at a cost of $100 thousand. This will increase the capability to manage the increasing drum inventory and to pack drums into overpack containers.

Test equipment for the Trash Monitoring/ Segregation Facility will be acquired at a cost of $40 thousand.

Equipment for surface decontamination of rubble, metal, and other material will be acquired at a cost of $180 thousand. This equipment will aid in the processing of additional scrap and rubble to be generated in construction.

4.1.2 Nuclear Materials Production (GE)

GE funding for FY-87 is listed in Table 4-1. $4.611 million is allocated for Operating (OP), $2.40 million for Line Item projects (LI), $750 thousand for general plant projects (GPP), and $2.85 million for capital equipment acquisitions (CE). Each category will be discussed below.

- Operating

Table 4-3 lists the GE Operating funds allocated for FY-87. Additional desired funding is listed in the second column. Each expenditure category is briefly described herein.

Management, Administration, and Planning - Approximately $570 thousand is allocated for management of the Waste Management section for reporting, budget activities, tracking, procedure preparation, and coordination of computer systems, contracts, and procurements.

Construction Rubble/Soil Management - $300 thousand is required for a study/conceptual design for the disposition of contaminated rubble and soil generated in construction activities. Construction of storage facilities, the acquisition of Mobile Operated Laboratory Equipment (MOLE) for expedient testing of suspect material, and off-site shipment have all been mentioned as candidates for study as methods of for gaining relief. Development of an integrated approach to construction waste handling and disposition is being developed. An additional $500 thousand would fund the study at the level recommended by the Waste Operations and Plant Projects group.

TABLE 4-3
GE OPERATING FUNDING - FY-87
(in 1000's)

	FY-87 ALLOCATED	DESIRED SUPPLEMENT
Management/Administration/Planning	516	
Construction Rubble/Soil Mgmt	300	500
Scrap Metal Mgmt/Disposition	285	
Water Pollution Control Operating		
- Support	706	
- Nitrate Reduction Development	150	
EHSI Support		
- Revise CDR	807	
- Management Support	960	
Engineering Studies/Support	677	200
Development		
- In-house	210	50
- Subcontract		200
Procedure Development (Subcontract)		200
GE FUNDING	4611	1150

Scrap Metal Management/Disposition - The $285 thousand allocated to scrap metal management will be used to acquire bins and boxes for storage of segregated scrap metal, and to develop and implement storage and disposition plans for this scrap.

Water Pollution Control Line Item Support - The $856 thousand allocated for Water Pollution Control Operating is divided into two parts. $706 thousand is marked for management and engineering of the biodenitrification demonstration facility, completion of Phase II planning and the Conceptual Design Report, and implementation of storm water retention basin and surge lagoon safety features. The remaining $150 thousand will support a review and implementation of nitrate reduction options.

Environmental Health & Safety Improvements (EHSI) Line Item Support - An estimated $1.767 million is allocated for support of the EH&SI project. $807 thousand will fund revision of the Conceptual Design Report, and the remaining $960 thousand will be used for project management support, including documentation/reporting and development of Design Criteria for the FY-88-89 subprojects.

Development - Funding of $210 thousand is allocated for performing and managing in-house development programs such as the identification and evaluation of alternative materials for pallets. An additional $50 thousand is desired for further in-house development work and $200 thousand is desired for development work to be subcontracted. Initial plasma torch technology development studies may be included in this category, as would other new waste elimination or treatment technologies.

Engineering Support and Studies - Funding of $677 thousand is being allocated for engineering support and studies. Areas of study may include, but are not limited to: 1) development and operation of environmentally sound waste handling, packaging, and disposal systems, 2) determination of filtration alternatives, 3) Major Systems Acquisition support activities, 4) implementation of waste tracking through use of a bar code system, 5)

evaluation of environmental impacts of waste storage and handling (for DOE), 6) identification of problem areas and solutions to problems in waste storage of currently generated waste (disposition of fly ash, sanitary waste, and construction waste), 7) identification of options for minimizing waste generation in production (new processes, solvent substitution, etc.), and 8) evaluation of pit area runoff solutions.

Procedures - Though not provided for at this time, development of waste operating and management and project management procedures is needed. An estimated $200 thousand would be required for this work.

- Line Item

The Line Item projects funded under the GE program are the Water Pollution Control (WPC) and the Environmental Health and Safety Improvements (EHSI) Line Items.

The WPC project is a FY-83 Line Item. Approximately $500 thousand will be received in FY-87 to support the Biodenitrification Demonstration Facility. The demonstration run will be completed in the first quarter of FY-87.

The EHSI Line Item is a package of projects and subprojects intended to continue the containment and, where possible, the elimination of major pollution sources and hazards at the FMPC. Approximately $10 million total is appropriated for FY-87. Much of this funding is dedicated to projects which impact on health and safety concerns rather than waste management concerns. Two FY-87 projects which are waste management related are the Thorium Handling and the D&D Facility subprojects.

The Thorium Handling project ($1.9 million committed in FY-87) involves the removal of thorium residues from a silo and two bins adjacent to Plant 8. The thorium will be packaged for durable interim storage.

The D&D Facility project ($500 thousand committed in FY-87) covers an addition to the existing decontamination building, renovation of the facilities, and installation of state-of-the-art decontamination equipment.

- o General Plant Projects (GPP)

  A Fly Ash Stabilization/Disposition project is planned for FY-87 at a cost of $750 thousand. This funding is for actions required to remove and/or stabilize material on the old fly ash pile should the Weston RI/FS show remediation to be necessary.

- o Capital Equipment (CE)

  Four capital equipment acquisitions are planned for FY-87 at a total cost of $2.85 million.

  A shredder system ($700 thousand) and a shear ($450 thousand) will be used as part of the volume reduction effort and to aid in scrap metal management.

  A 50 ton forklift truck ($400 thousand) and drum handling equipment ($1.30 million) will be used in the thorium handling/repackaging effort.

4.2 FY-88-91 BUDGET

The estimated required budget for waste management programs in FY-88-91 and beyond is summarized in Table 4-1. This includes operating funds and funding for Line Items, GPPs, and capital equipment acquisitions. The budget process has begun for FY-88; however, most of the budget information contained herein is estimated and must not be accepted as final. As in Section 4.1, discussion will be broken down by AR and GE programs.

4.2.1 Defense Waste and Transportation Management (AR)

AR budget for FY 88-91 is summarized in Table 4-1. Included is $51.6 million for Operating (OP), $54.6 million for Line Item projects (LI), $15.5 million for general plant projects (GPP), and $2.8 million for capital equipment (CE). This is only an estimate of required funding and likely will change as priorities shift and new programs are identified.

o Operating

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Table 4-4 lists the estimated AR operating budget for FY-87-91 and beyond. A total of $57.3 million is required in the next five years to begin or maintain operating programs at their desired levels. The preliminary funding level identified for FY-88 is $9.787 million. Priorities will be set to meet allocated funding in FY-88 and future years as the allocations for those years are set.

Operating categories are the same as those identified in Section 4.1.1 for continuous programs. New programs are discussed in more detail below.

LLWPSS Operating - Beginning in FY-89, the LLWPSS will process and package much of the LLW generated on site. Wastes approved for off-site disposal will be shipped; other wastes will be placed in storage.

Trash Segregation/Monitoring Operating - Beginning in FY-89, operating funding will be required for operation of the Trash Monitoring/Segregation Facility.

Remedial Action Waste Cleanup - Funding for conceptual design of the proposed RAWC Line Item will be needed in FY-88. Assuming the Line Item is approved, operating money for support will be required, beginning in FY-89.

TABLE 4-4

AR OPERATING BUDGET - FY-87-91
(in $1000's)

	FISCAL YEAR 87	88	89	90	91	OUT YEAR
LLW Shipments to the NTS						
- Currently Generated LLW	2400	2400				
- Currently Generated LLW (Credit from Other Program)	2400	2400				
- Backlog LLW	240	600	2400	2400	2400	4000
LLWPSS Operating			3600	3900	4200	21000
LLW Volume Reduction Operating	435	275	275	300	300	1375
Pallets/Boxes Disposition		500	325	325	100	400
Buried Rubble Disposition			300	500		
Trash Segregation Operating			500	500	500	2500
Mixed Waste Management/Disposition						
- Solvents/Oils Disposition		650	600	400	400	500
- RMI Salt Treatment Operating	360	350	350	300	250	750
Scrap Metal Mgmt/Disposition	780	1200	1800	2000	2200	11000
RI/FS	500	1600				
Interim Pit Stabilization	395	325	1000			
RAWC Line Item						
- RAWC Conceptual Design		1100				
- RAWC Management/Engineering			750	800	850	6000
- RAWC Operating				1200	2500	100000
Surplus Facilities Mgmt	200	400	500	800	800	4000
In-House Development/Studies	550	400	450	500	550	2700
	8260	12200	12850	13925	15050	154225
Carryover	-200					
Credit for LLW Shipment	-2400	-2400				
AR Budget	5660	9800	12850	13925	15050	154225
AR Allocation as of 10/1/86	5660	9787				

o Line Item

Table 4-5 lists the estimated Line Item budget for FY-88-91. The LLWPSS will receive $4.628 million in funding in FY-88, with completion scheduled for late FY-88.

TABLE 4-5

AR LINE ITEM BUDGET - FY-88-91
(in $1,000,000's)

	Fiscal Year 88	89	90	91	O.Y.
LLWPSS	4.6				
RAWC			7	43	200

The Remedial Action Waste Cleanup (RAWC) project is a FY-89 Line Item which will address the cleanup of the silos and waste pits located on the west side of the plant. Waste characterization studies are in progress and feasibility studies are planned for the second quarter of FY-87. Conceptual design is to be completed in FY-88 and construction should begin in FY-91. Treatment and disposal facilities are expected to be located just east of the waste pits. Further evaluation for the need of a treatment process facility is being considered.

A financial baseline for the RAWC project will be developed during preparation of the Conceptual Design Report. The project is being considered a Major System Acquisition (MSA), and preliminary estimates of total cost for remediation (Line Item and Operating funding) are on the order of $350-400 million. An estimated $250 million in Line Item funding will be required.

- General Plant Projects

An estimated $15.5 million will be required in FY-88-91 for GPPs relating to waste management activities. Specific projects have not yet been identified for years beyond FY-88.

Three GPPs will begin in FY-88. These projects are the Surface Water/Groundwater Controls, Waste Oil/Solvent Recycle Facility, and Pit Area Road Maintenance projects.

The Surface Water/Groundwater Controls project ($800 thousand) will combine a number of modifications in the waste pit area to reduce storm water discharge to Paddy's Run from the pits. This is a major site concern.

A Waste Oil/Solvent Recycle Facility ($600 thousand) has been planned to minimize amounts of waste oils and solvents generated. Construction of this facility could be affected by other programs, such as the ORGDP TSCA incinerator program.

The Pit Area Road Maintenance project ($192 thousand) will improve the roads around the waste pits. These roads will be resurfaced, and needed maintenance will be performed.

- Capital Equipment

Approximately $2.8 million in Capital Equipment funds are budgeted for FY-88-91. Funding in FY-88 is $117 thousand for equipment for the Waste Monitoring/Segregation facility.

4.2.2 Nuclear Materials Production (GE)

GE funding for FY-88-91 is summarized in Table 4-1. Included is $31.7 million for Operating (OP), $91.3 million for the Water Pollution Control and the Environmental Health & Safety Improvements Line Item projects, $13 million for general plant projects, and

$9.8 million for capital equipment acquisitions. Each category will be discussed below.

- Operating

Table 4-6 lists the estimated GE Operating budget for FY-87-91 and beyond. A total of $36.3 million is required in the next five years to begin and continue operating programs. If funding levels do not meet the required budget, low priority programs will be stretched out over a longer period of time or cancelled. The operating categories are identical to those discussed in Section 4.1.2 for continuous programs. One new program is discussed below.

Sanitary Landfill Development/Fly Ash Management - An expansion to the on-site sanitary landfill is planned. This funding will support the expansion and maintenance of the landfill. Alternatively, should off-site disposal of sanitary waste become a reality, this funding would be required to support safe disposal practices. A fly ash landfill is also being planned; however, off-site disposal of fly ash will also be investigated.

- Line Item

The Line Item projects funded under the GE program are the Water Pollution Control (WPC) and the Environmental Health & Safety Improvements (EHSI) Line Items. Table 4-7 is a summary of total estimated funding for these projects for FY-88-91.

The WPC project is a FY-83 Line Item project. Total estimated cost from FY-83-87 is $9.5 million. This funding level covers the following four subprojects:

- Ultraviolet Disinfection
- Coal Pile Runoff
- Storm Water Retention Basin
- Biodenitrification Demonstration Facility.

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TABLE 4-6

GE OPERATING BUDGET - FY-87-91
(in $1000's)

	87	88	89	90	91	OUT YEAR
Management/Administration/Planning	516	575	600	640	690	4000
Construction Rubble/Soil Mgmt	300	2250	2600	3000	3500	20000
Scrap Metal Mgmt/Disposition	285	300	325	375	450	2750
Sanitary Waste/Fly Ash		200	200	200	200	800
Water Pollution Control Operating						
- Support	706	350	350	450	500	2500
- Nitrate Reduction Development	150	75				
EHSI Support						
- Revise CDR	807	600	200			
- Management/Engineering Support	960	900	1000	750	500	1500
- Operating		500	1300	1750	1850	9000
Engineering Studies/Support	677	450	500	550	600	2500
Development						
- In-house	210	100	150	250	325	1600
- Plasma Torch		400	500	375	350	1500
GE FUNDING	4611	6700	7725	8340	8965	46150

TABLE 4-7

GE LINE ITEM FUNDING - FY-88-91
(in $1,000,000's)

	Fiscal Year				
	88	89	90	91	O.Y.
Water Pollution Control		2.0	3.0	0.1	
EH&S Improvements	11.2	27.6	15.0	30.0	31.2

The first three subprojects are complete. The biodenitrification demonstration run will be completed in the first quarter of FY-87.

Phase II of the Biodenitrification Demonstration subproject is being planned to convert the demonstration facility to a full-scale production unit. Current estimates for this work are on the order of $3-5 million in FY-89-91 and will be finalized upon successful completion of the demonstration run when all design parameters have been evaluated.

The EHSI Line Item is a package of projects and subprojects intended to continue the containment and, where possible, the elimination of major pollution sources and hazards at the FMPC. These projects include the construction of new facilities and modifications to existing facilities which will address those site concerns. Each project and subproject has a separate priority and schedule. Table 4-8 is a listing of those subprojects which actually impact waste streams. Funding listed in this Plan is based on these subprojects only (about $91 million). Total funding for the EHSI Line Item is $330 million.

- General Plant Projects

  An estimated $13 million in funding will be required for general plant projects in FY-88-91. Though specific projects have not been identified, target areas may include the sewage system, the fly ash and buried rubble areas, a new sanitary landfill, thorium remediation, construction rubble processing, etc.

- Capital Equipment

  An estimated $9.8 million in funding will be required for capital equipment acquisitions in FY-88-

TABLE 4-8

EH&S IMPROVEMENTS
WASTE MANAGEMENT RELATED

SUBPROJECT NUMBER	FY	PLANT/ LOCATION	PROJECT DESCRIPTION
1. 4.3	87	Plant 8	Thorium Handling - Removal of thorium oxide in a silo and two bins near Plant 8. The thorium shall be packaged for long-term storage.
2. 4.6	87	NE end	D&D - Construction of a new D&D Facility and installation of state-of-the-art decontamination equipment.
3. 3.3	88	Plant 8	Controlled Pad - Replace an existing concrete pad with new concrete and a sump system (6,000 sq. ft.).
4. 3.5	88	Bldg. 13	Pilot Plant Improvements - To improve the containment & treatment of contaminated waste streams prior to discharge into the general sump. To achieve this, existing facilities will be demolished; in addition, a new water collection and treatment system will be constructed.
5.	89		Plant 1 Pad and Shelter - To shelter and curb Plant 1 Pad for better runoff/spill retention.
6. 3.9	90		Water Quality Improvements, Recycle and Reuse - To improve water quality and to allow a theoretical total recycle of plant water, based on a zero plant discharge philosophy.

91. An Emergency Response Vehicle ($250 thousand in FY-88) equipped with survey instruments, monitors, and spill containment equipment is necessary to provide emergency cleanup capability. Other potential acquisitions include Mobile Operated Laboratory Equipment (MOLE) for monitoring generated construction rubble/soil and equipment for thorium remediation or rubble processing.

5.0 WASTE STREAM BUDGETS

Waste management projects and operations were summarized in Section 4.0. In this section, the budget previously discussed will be used to perform a study in which budget by waste category (LLW, mixed waste, scrap metal, etc.) and waste stream is developed. Though some speculation and generalizations are involved in such a study, the exercise allows inspection of whether the funding of programs is consistent with the priorities established. The Waste Management Section must plan aggressively to help WMCO maintain its goal of high standards of operation with minimal environmental insult. Early identification of future needs allows more efficient use of resources.

Table 5-1 is the basis for this study. All budgeting listed in Table 4-1 (page 4-2) are also in Table 5-1 except the following:

- AR-GPP (FY-89-91)
- AR-CE (FY-89-91)
- GE-GPP (FY-88-91)
- GE-CE (FY-88-91)

Specific projects and capital equipment to be acquired under these budget categories have not been identified for the years in question; therefore, they are not included in the study.

All other funding items identified in Section 4.0 are assigned to the waste stream or streams which each stream addresses. Two examples of the method of allocation follow.

1) The RMI Salt Treatment Facility will convert $BaCl_2$ from a hazardous waste to a low-level waste. Therefore, the $350,000 for this FY-87 AR general plant project is allocated to $BaCl_2$.

2) A more complex example is the shipment of LLW to the NTS. MgF_2 slag, slag leach filter cake, and neutralized raffinate are presently approved for shipment. In addition, it is believed that at a later date depleted dust collector residues and contaminated construction rubble may also be cleared for shipment. The annual funding was split among these streams by estimating generation and shipment rates of these wastes projected over the next five years, with allowances made for reduction of backlogged wastes. The results of this allocation may be examined in the tables.

TABLE 5-1

WASTE MANAGEMENT FY-87-91 BUDGET FOR WASTE STREAM PROGRAMS
(in $1,000,000's)

Type	FISCAL YEAR 1987	1988	1989	1990	1991	OUT YEAR
AR-OP	8.260*	12.200**	12.850	13.925	15.050	154.225
AR-LI	10.000	4.628		7.000	43.000	200.000
AR-GPP	1.490	1.592				
AR-CE	0.320	0.117				
GE-OP	4.611	6.700	7.725	8.340	8.965	46.150
GE-LI	2.400	11.200	29.600	18.000	30.100	31.200
GE-GPP	0.750					
GE-CE	2.850					
TOTAL	30.681	36.437	50.175	47.265	97.115	431.575

* Includes $200,000 FY-86 carryover and $2,400,000 4A credit
** Includes $2,400,000 4A credit

The complete results are presented in Sections 5.1 through 5.7. In each section, key points summarizing funding of a waste category are presented along with a summary table (Tables 5-2 through 5-8). Following the summary are unnumbered budget tables for individual waste streams to which at least one funding item was assigned. (Because generalizations were used to simplify the analysis, several waste streams are not assigned funding. Also, some waste streams are combined because their generation source or method of disposition are identical, e.g. construction rubble and soil). The summary for each waste stream includes the budget table and a listing of the budget items assigned. The overall ranking as established for each waste stream in Section 3.3 is also noted. Thus, the total budget can be inspected against the priority to determine if the proper emphasis is being placed on the waste.

As mentioned earlier, choice of waste streams to allocate funding to is, at best, speculation, especially for the years beyond FY-1988. However, this breakdown of budget by waste stream allows a cursory inspection to determine if established priorities are being pursued to the degree permissible.

Among the waste categories, low-level waste is still receiving a majority of the funding; however, this will likely be short-lived, as much of the attention has been shifted to the remedial action wastes such as the pits

and silos, and within two years, the budget will reflect this new attention. In the next decade, waste management activities may be heavily focused on remediation of various parts of the site.

Construction and remediation activities will continue to generate large amounts of construction wastes for which there is no acceptable long-term or interim storage option available. Demolition of obsolete buildings will produce massive quantities of steel and other scrap requiring decontamination. Therefore, the planned budget places an emphasis on identification and implementation of facilities to shoulder the burden of the increase in generated wastes expected.

5.1 LOW-LEVEL WASTE

The planned FY-87-91 budget for low-level waste management activities is summarized in Table 5-2. Programs of high importance in this area include the following:

- Construction/operation of the LLWPSS/Volume Reduction Facility
- Interim LLWPSS operations (including LLW shipment to the NTS of MgF_2 slag, slag leach filter cake, neutralized raffinate, or any other waste stream approved for shipment later)
- Development of production processes which minimize or eliminate generation of wastes
- Implementation of improved inventory control through bar code/database system, better control of storage pads
- Disposition of wooden boxes/pallets
- Demonstrations of durable interim on-site storage
- Waste segregation operations.

Individual budget summaries for the waste streams are presented below. Many of the LLW streams are not assigned funding; most are to be processed by the LLWPSS. Others are generated in such small quantities that they present no large problems. To limit the detail provided, LLWPSS Line Item and Operating funding were only divided among the eight waste streams projected to be processed in greatest volume. This choice is sensible as these streams account for over 90% of the planned capacity of the LLWPSS.

The following LLW waste streams do not have budget specifically allocated to them. Those marked with an asterisk are candidates for LLWPSS and/or Volume Reduction Facility processing, but are relatively minor waste streams:

* Off-Spec UF_4 (6)
  Contaminated Asbestos (9)
* RMI Sludges (13)
* Dust Collector Bags (14)
* General Sludges from Sumps (21)
* Contaminated Clothing - Process Area (22)
  Incinerator Ash (26)
* Filter Cartridges (31)
* Unfired Reduction Charges and MgF_2 from Liner Caveins (32)
* Contaminated Graphite (33)
* Crushed Slag from Pot Blowouts (34)
* MgF_2, >20 mesh, including Dirty Prill (36)
* MgO and Mg zirconate from Crucible Cleanout (37)
* Rockwell Cleanings and Spills (43)
* Bad reduction (No Derby) (44)
* Sample Bottles (Glass, Plastic) (47)
* Furnace Solidified Salts - Chloride (49)
* Samples from Lab (50)
* Metal Spills and Extruder Ends - High Impurity Metal (53)
* Furnace Solidified Salt - Nonchloride (54)
* Sewage Sludge (55)
* Solid Metal with Imbedded Steel Other than Cores (56)

TABLE 5-2

LOW-LEVEL WASTE MANAGEMENT BUDGET FOR WASTE STREAMS
(in $1000's)

	FISCAL YEAR					OUT
Type	1987	1988	1989	1990	1991	YEAR
AR-OP*	5500	6300	7485	8135	7950	35880
AR-LI	10000	4628		1000	5000	10000
AR-GPP	1140					
AR-CE	140	117				
GE-OP*	863	3097	3600	3951	4493	24740
GE-LI						
GE-GPP						
GE-CE	100					
TOTAL	17743	14143	11085	13086	17443	70620

* Includes $220,000 AR-OP for Development/Engineering Studies; $563,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

The bulk of the proposed funding is allocated to construction rubble/soil and the wastes which are approved for disposal at the NTS. The construction rubble is a serious problem because of the increase in construction activities with no acceptable long-term or interim storage option available. Operating funding to develop such options or to ship rubble to the NTS is necessary in the very near future.

Though many of the other waste streams were assigned higher priority than MgF_2 slag, the emphasis placed on its shipment is justified since it is currently the only LLW being shipped. When the slag leach filter cake and the neutralized raffinate are ready for shipment, their disposal will also be given high priority.

Contaminated Construction Rubble (4)
Contaminated Soil (7)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	130	170	410	735	2595	10550
AR-LI				1000	5000	10000
AR-GPP						
AR-CE						
GE-OP	300	2250	2600	3000	3500	20000
GE-LI						
GE-GPP						
GE-CE						
TOTAL	430	2420	3010	4735	11095	40550

- Processing/packaging (volume reduction) - AR-OP
- Disposition (storage or off-site shipment) - AR-OP
- RI/FS - AR-OP
- RAWC Conceptual Design, support, and operating - AR-OP
- RAWC Remediation - AR-LI
- Study/Conceptual Design, operating for disposition - GE-OP

Contaminated Wooden Boxes & Pallets (11)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP		500	325	325	100	400
AR-LI						
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE	100					
TOTAL	100	500	325	325	100	400

- Shipment off site or storage on site - AR-OP
- Shredder acquisition - GE-CE
- Shredding/volume reduction - AR-OP

Slag Leach Filter Cake (16)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	1090	1910	700	700	700	3500
AR-LI	1700	787				
AR-GPP	80					
AR-CE	20					
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	2890	2697	700	700	700	3500

- Shipments to NTS - AR-OP
- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI
- Vehicle Monitoring Facility - AR-GPP
- Drum handling equipment - AR-CE

Neutralized Raffinate (17)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	150	2090	2750	610	350	1750
AR-LI	810	375				
AR-GPP	40					
AR-CE	10					
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	1010	2465	2750	610	350	1750

- Shipments to NTS - AR-OP
- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI
- Vehicle Monitoring Facility - AR-GPP
- Drum handling equipment - AR-CE

Dust Collector Residues (18)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP			300	2440	560	1500
AR-LI	690	319				
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	690	319	300	2440	560	1500

- Possible shipments to NTS - AR-OP
- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI

Scrap U_3O_8, Mostly High Fluoride (19)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP			110	180	250	1250
AR-LI	250	116				
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	250	116	110	180	250	1250

- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI

Nonburnable Contaminated Trash (24)
General Waste - Process Area (25)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	110	70	570	575	575	2850
AR-LI						
AR-GPP	740					
AR-CE	40	117				
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	890	187	570	575	575	2850

- Trash segregation/monitoring operating - AR-OP
- Volume reduction operating - AR-OP
- Trash Segregation/Monitoring Facility - AR-GPP
- Waste segregation equipment - AR-CE

Scrap Salts (27)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP			110	190	260	1300
AR-LI	260	120				
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	260	120	110	190	260	1300

- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI

Contaminated Magnesium (29)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP						
AR-LI						
AR-GPP						
AR-CE						
GE-OP		80	100	75	70	300
GE-LI						
GE-GPP						
GE-CE						
TOTAL		80	100	75	70	300

- Plasma torch development (magnesium recycle) - GE-OP

Non-Briquettable Chips and Turnings for Oxidation (30)
Partially Oxidized Metal Oxidation Feed (35)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP						
AR-LI						
AR-GPP						
AR-CE						
GE-OP		160	200	150	140	600
GE-LI						
GE-GPP						
GE-CE						
TOTAL		160	200	150	140	600

- Plasma torch development (for recovery) - GE-OP

Magnesium Fluoride Slag (41)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	3800	1400	1800	1800	1800	9000
AR-LI	5750	2661				
AR-GPP	280					
AR-CE	70					
GE-OP		80	100	75	70	300
GE-LI						
GE-GPP						
GE-CE						
TOTAL	9900	4141	1900	1875	1870	9300

- Shipments to NTS - AR-OP
- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI
- Vehicle Monitoring Facility - AR-GPP
- Drum handling equipment - AR-CE
- Plasma torch development (magnesium recycle) - GE-OP

Wet Sump or Filter Cake (42)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP			170	280	390	1950
AR-LI	390	181				
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	390	181	170	280	390	1950

- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI

Scrap Uranium Metal (45)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP			60	100	150	750
AR-LI	150	69				
AR-GPP						
AR-CE						
GE-OP		80	100	75	70	300
GE-LI						
GE-GPP						
GE-CE						
TOTAL	150	149	160	175	225	1050

- LLWPSS operating - AR-OP
- LLWPSS construction - AR-LI
- Plasma torch development (for recovery) - GE-OP

5.2 MIXED WASTE

The planned FY-87-91 budget for mixed waste management activities is summarized in Table 5-3. Programs of high importance in this area include the following:

- Processing/shipping of mixed waste and contaminated oil to the ORGDP TSCA incinerator
- Construction/operation of RMI salt treatment facility
- Waste oil/spent solvent recycle facilities.

Contaminated oils, though actually classified as low-level waste, are included in this category. The oils will be incinerated at the ORGDP TSCA incinerator with the solvents.

Funding for mixed waste management will be modest over the next five years. Though $BaCl_2$ and the spent solvents are hazardous, the quantities on site are relatively small; moreover, disposition options for these wastes will become available in the near future. Thus, they are funded on a relatively low priority.

TABLE 5-3

MIXED WASTE MANAGEMENT BUDGET FOR WASTE STREAMS
(in $1000's)

	FISCAL YEAR					OUT
Type	1987	1988	1989	1990	1991	YEAR
AR-OP*	415	1040	995	750	705	1520
AR-LI						
AR-GPP	350	600				
AR-CE						
GE-OP*	140	113	125	144	162	810
GE-LI						
GE-GPP						
GE-CE						
TOTAL	905	1753	1120	894	867	2330

* Includes $515,000 AR-OP for Development/Engineering Studies; $1,494,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

$BaCl_2$ from RMI (10)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	360	350	350	300	250	750
AR-LI						
AR-GPP	350					
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	710	350	350	300	250	750

- Treatment facility operating - AR-OP
- RMI Salt Treatment Facility - AR-GPP

Contaminated Oils (20)
Contaminated Solvents (23)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP		650	600	400	400	500
AR-LI						
AR-GPP		600				
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL		1250	600	400	400	500

- Shipment/incineration at ORGDP TSCA incinerator - AR-OP
- Waste Oil/Solvent Recycle Facility - AR-GPP

5.3 SCRAP METAL WASTE

The planned FY-87-91 budget for scrap metal waste management activities is summarized in Table 5-4. High priority programs include the following:

- o Demonstrations of scrap metal decontamination and recovery (for backlog)
- o Construction/operation of the Decontamination & Decommissioning (D&D) facility (for later generation).

Disposition of the copper scrap pile is on hold, awaiting recommendations and implementation of DOE metal programs. A strong emphasis is being placed on disposition of the ferrous scrap pile; consequently, ferrous scrap receives the most attention and funding.

No individual waste stream summaries are presented. Table 5-4 is the summary for all ferrous scrap, contaminated and noncontaminated.

The expanded decontamination facility and the Volume Reduction Facility are necessary to handle the scrap steel from upcoming construction activity. Scrap metal from demolition of obsolete buildings may become the largest waste stream on site in the next decade.

5.4 SANITARY/INDUSTRIAL WASTE

The planned FY-87-91 budget for sanitary/industrial waste management activities is summarized in Table 5-5. High priority programs include the following:

- o Construction/operation of waste segregation/volume reduction facilities
- o Possible shipment of sanitary/industrial waste to an off site landfill
- o Application for construction/operation of expansion to the on site sanitary landfill
- o Application for construction/operation of fly ash landfill
- o Investigation into feasibility of off site fly ash disposal.

TABLE 5-4

SCRAP METAL WASTE MANAGEMENT BUDGET FOR WASTE STREAMS
(in $1000's)

Contaminated Ferrous Scrap (8)
Noncontaminated Ferrous Scrap (28)

Type	FISCAL YEAR 1987	1988	1989	1990	1991	OUT YEAR
AR-OP*	1050	1375	1980	2200	2405	11945
AR-LI						
AR-GPP						
AR-CE	90					
GE-OP*	1025	1163	750	819	612	3560
GE-LI	500	4200				
GE-GPP						
GE-CE	1050					
TOTAL	3715	6738	2730	3019	3017	15505

* Includes $515,000 AR-OP for Development/Engineering Studies; $1,494,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

- Decontamination technology demonstrations - AR-OP
- Sorting of ferrous scrap pile - AR-OP
- Volume Reduction Facility, operating - AR-OP
- Decontamination equipment - AR-CE
- Decontamination facility mgmt./engrg., operating - GE-OP
- Decontamination Facility (EH&SI) - GE-LI
- Shredder acquisition - GE-CE
- Shear acquisition - GE-CE
- Scrap metal management/disposition - AR-GE-OP

Noncontaminated construction rubble (52), cafeteria waste (57), and noncontaminated soil (58) do not have budget summaries presented. All three are relatively minor concerns at this time.

The primary issues in this program are the decisions which must be made concerning disposition of sanitary waste. The options are on-site incineration, on-site landfill, and off-site landfill. Radiological and economic planning and site development studies must be performed to assess the feasibility of each option.

TABLE 5-5

SANITARY/INDUSTRIAL WASTE MANAGEMENT BUDGET FOR WASTE STREAMS
(in $1000's)

Type	FISCAL YEAR 1987	1988	1989	1990	1991	OUT YEAR
AR-OP*	75	140	65	80	185	870
AR-LI				300	1000	1500
AR-GPP						
AR-CE						
GE-OP*	140	313	325	344	362	1610
GE-LI						
GE-GPP	750					
GE-CE						
TOTAL	965	453	390	724	1547	3980

* Includes $515,000 AR-OP for Development/Engineering Studies; $1,494,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

Fly Ash (38)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	20	100	20	30	130	600
AR-LI				300	1000	1500
AR-GPP						
AR-CE						
GE-OP		100	100	100	100	400
GE-LI						
GE-GPP	750					
GE-CE						
TOTAL	770	200	120	430	1230	2500

- RI/FS - AR-OP
- RAWC Conceptual Design, support, and operating - AR-OP
- RAWC remediation - AR-LI
- Fly ash management/landfill - GE-OP
- Fly ash stabilization - GE-GPP

Noncontaminated Nonburnables (46)
Sanitary Burnable Waste - Non-Process Area (48)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP						
AR-LI						
AR-GPP						
AR-CE						
GE-OP		100	100	100	100	100
GE-LI						
GE-GPP						
GE-CE						
TOTAL		100	100	100	100	100

- Sanitary landfill/off-site disposal development - GE-OP

5.5 REMEDIAL ACTION WASTE

The planned FY-87-91 budget for remedial action waste management activities is summarized in Table 5-6. High priority programs include the following:

- Interim remedial action waste management
- Remedial Investigation/Feasibility Study (RI/FS)
- K-65 disposition planning
- Preparation for the proposed RAWC Line Item
- Removal/repackaging of thorium from silos and drums
- Surface water/groundwater monitoring.

This category is receiving much attention from both a worker and general public standpoint. Health and environmental concerns surround the discussion and proposed action for these different wastes. A large piece of the total budget is being reserved for the remediation of these concerns. All Remedial Action wastes have planned budget over the next five years.

If implemented, the remediation of the waste pit and silo area will be the major nonproduction activity at the FMPC in the next decade. Estimates of total cost are as high as $450-500 million. Dedicated packaging and durable interim storage facilities will be necessary for the waste pit contents as off-site disposition of the material would take many years, due to the sheer volume involved.

The storm water runoff and clearwell effluent will receive funding from a variety of projects under the EHSI and WPC Line Items. The runoff from the pit area is a very important concern at this time, and several stabilization options are being considered to establish runoff controls in the pit area.

TABLE 5-6

REMEDIAL ACTION WASTE MANAGEMENT BUDGET FOR WASTE STREAMS
(in $1000's)

Type	FISCAL YEAR 1987	1988	1989	1990	1991	OUT YEAR
AR-OP*	830	2465	1655	1680	2135	71870
AR-LI				4700	27000	128500
AR-GPP		992				
AR-CE						
GE-OP*	1463	1038	1975	2094	2312	13360
GE-LI		4800	29600	18000	30100	31200
GE-GPP						
GE-CE						
TOTAL	2293	9295	33230	26474	61547	244930

* Includes $515,000 AR-OP for Development/Engineering Studies; $1,494,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

K-65 Waste (1)

Type	FISCAL YEAR 1987	1988	1989	1990	1991	OUT YEAR
AR-OP	160	650	300	900	1050	7200
AR-LI				2000	10000	12000
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	160	650	300	2900	11050	19200

- RI/FS - AR-OP
- RAWC Conceptual Design, support, and operating - AR-OP
- RAWC silo remediation/content removal - AR-LI

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Pit Waste (2)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	550	1560	940	700	900	63800
AR-LI				2400	16000	115000
AR-GPP	592					
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	1142	1560	940	3100	16900	178800

- RI/FS - AR-OP
- RAWC Conceptual Design, support, and operating - AR-OP
- Interim pit stabilization - AR-OP
- RAWC Pit Remediation - AR-LI
- Surface Water and Groundwater Controls - AR-GPP
- Pit Area Road Maintenance - AR-GPP

Storm Water Runoff/Clearwell Effluent (incl. pit area runoff) (5)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	45	115	350			
AR-LI						
AR-GPP	400					
AR-CE						
GE-OP	1223	825	1590	1550	1720	10040
GE-LI		4800	29600	15000	24100	25200
GE-GPP						
GE-CE						
TOTAL	1668	5740	31540	16550	25820	35240

- Interim pit stabilization - AR-OP
- Surface Water and Groundwater Controls - AR-GPP
- Biodenitrification Phase II Conceptual Design - GE-OP
- Water Pollution Control operating - GE-OP
- EHSI Conceptual Design, support, and operation - GE-OP
- Water Quality Improvements project (EHSI) - GE-LI
- Controlled Storage Pad project (EHSI) - GE-LI
- Plant 1 Pad & Shelter project (EHSI) - GE-LI
- Pilot Plant Sump Improvements project (EHSI) - GE-LI

Sewage Plant Effluent (39)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP						
AR-LI						
AR-GPP						
AR-CE						
GE-OP	100	100	260	400	430	2510
GE-LI				3000	6000	6000
GE-GPP						
GE-CE						
TOTAL	100	100	260	3400	6430	8510

- Water Pollution Control operating - GE-OP
- EHSI Conceptual Design, support, and operating - GE-OP
- Water Quality Improvements project (EHSI) - GE-LI

Cold Metal Oxides (Non-radium bearing) (51)

Type	1987	1988	FISCAL YEAR 1989	1990	1991	OUT YEAR
AR-OP	20	100	20	30	130	600
AR-LI				300	1000	1500
AR-GPP						
AR-CE						
GE-OP						
GE-LI						
GE-GPP						
GE-CE						
TOTAL	20	100	20	330	1130	2100

- RI/FS - AR-OP
- RAWC Conceptual Design, support, and operating - AR-OP
- RAWC removal of silo contents - AR-LI

5.6 THORIUM

The planned FY-87-91 budget for thorium management activities is summarized in Table 5-7. Programs of high importance in this area include the following:

- o Thorium Handling project of the EHSI Line Item
- o Characterization of the thorium on site
- o Repackaging of the thorium.

A significant amount of funding is being planned for thorium management in the next five years. Unfortunately, no direction has been given as to whether thorium will eventually be classified as waste to be disposed of. Presently, it is still a resource with a value on site in the millions of dollars. Some of the proposed programs for the thorium are mentioned below.

TABLE 5-7

THORIUM MANAGEMENT BUDGET
(in $1000's)

Thorium (3)

Type	FISCAL YEAR 1987	1988	1989	1990	1991	OUT YEAR
AR-OP*	115	340	85	210	435	14070
AR-LI				1000	5000	30000
AR-GPP						
AR-CE						
GE-OP*	840	863	825	844	862	1260
GE-LI	1900	2200				
GE-GPP						
GE-CE	1700					
TOTAL	4555	3403	910	2054	6297	45330

* Includes $515,000 AR-OP for Development/Engineering Studies; $1,494,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

- o RI/FS - AR-OP
- o RAWC Conceptual Design, support, and operating - AR-OP
- o RAWC remediation of silos, bins - AR-LI
- o Process/repackage - GE-OP
- o Thorium Handling project (EHSI) - GE-LI
- o Forklift acquisition - GE-CE
- o Drum handling equipment - GE-CE

5.7 SURPLUS FACILITIES

The planned FY-87-91 budget for disposition of surplus facilities is summarized in Table 5-8. High priority programs include the following:

- Identification and decontamination of surplus facilities
- Construction/operation of upgraded D&D facility.

In the next five years as construction activity increases and the D&D facility increases its operations, a larger share of the Waste Management budget will be devoted to the processing of surplus facilities and equipment.

TABLE 5-8

SURPLUS FACILITIES WASTE MANAGEMENT BUDGET
(in $1000's)

	FISCAL YEAR					
Type	1987	1988	1989	1990	1991	OUT YEAR
AR-OP*	275	540	585	870	1235	18070
AR-LI					5000	30000
AR-GPP						
AR-CE	90					
GE-OP*	140	113	125	144	162	810
GE-LI						
GE-GPP						
GE-CE						
TOTAL	505	653	710	1014	6397	48880

* Includes $515,000 AR-OP for Development/Engineering Studies; $1,494,000 GE-OP for Admin/Planning/Development (not charged to any individual waste stream).

- Surplus management - AR-GE-OP
- RI/FS - AR-OP
- RAWC Conceptual Design, support, and operating - AR-OP
- RAWC remediation - AR-LI
- Decontamination equipment - AR-CE

6.0 MILESTONES

The following milestones are being set based on the strategies, programs, and funding described in this plan. Funding shortfalls or changing priorities may cause a reevaluation and resetting of these goals.

Schedule charts for FY-87 milestones are presented in Section 6.1. Goals for the next 3-5 years are listed in Section 6.2.

6.1 FY-87 MILESTONES

Table 6-1 lists FY-87 AR milestones (as of 10/1/86). Table 6-2 lists FY-87 GE milestones (as of 10/1/86). These milestones are contingent on receipt of the required funding. The achievement of several milestones may be delayed if sufficient funding is not allocated. These milestones are noted on the chart.

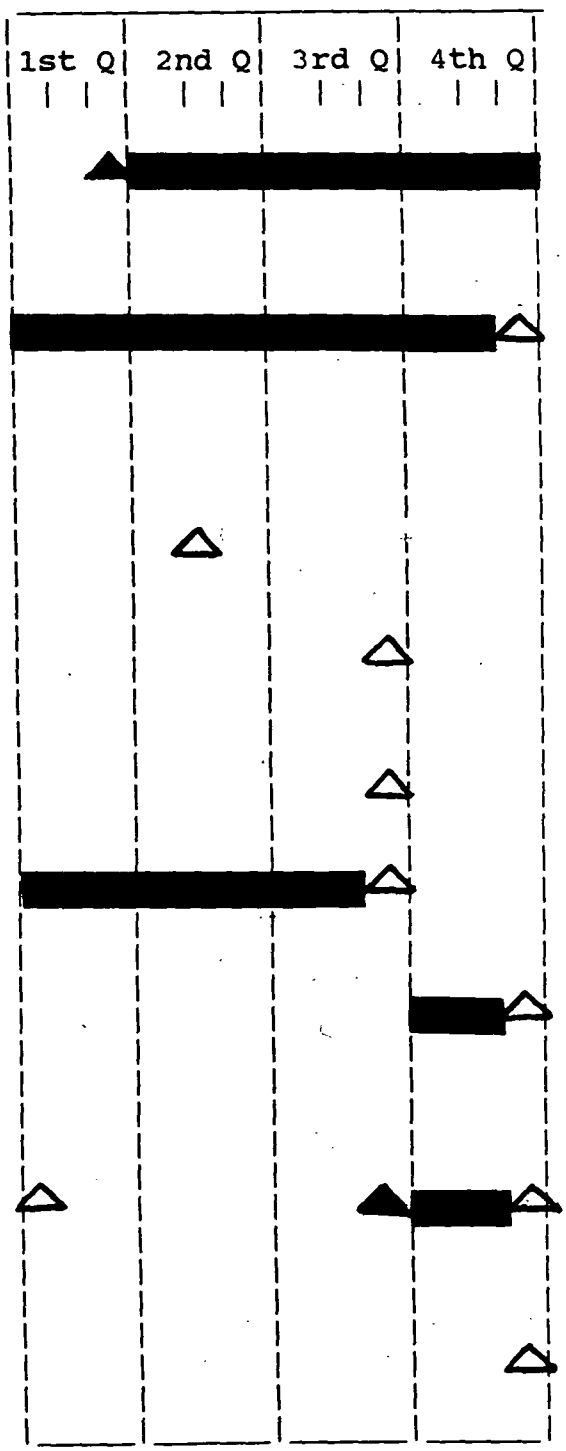
6.2 FY-87-91 GOALS

Table 6-3 lists AR program goals for FY-87-91. Table 6-4 lists GE program goals for FY-87-91. Many of these goals cannot be achieved at the present level of funding. Priorities will be set, and programs stretched out or eliminated if necessary.

TABLE 6-1

FY-87 WASTE MANAGEMENT MILESTONES - AR
(As of 10/1/86)

▲ EVENT INITIATED
△ TARGET



SCRAP METAL MANAGEMENT

- Procedures to separate metals into desired types and contamination levels
- Complete segregation of 3000 metric tons of scrap metal to DOE reclamation program[1]

REMEDIAL ACTION

- Complete installation of temperature/pressure monitoring system on K-65 silos
- Installation of closed circuit television monitoring and lighting system for K-65 silos
- Preliminary design of radon control system for K-65 silos
- Complete sampling program of the pit area RI/FS (pending DOE/EPA approval 1Q87)[2]
- Complete report on the RI of the pit area RI/FS (pending DOE/EPA approval 1Q87)[2]

REPORTS

- Issue Waste Management Plan to DOE - 1987 and 1988

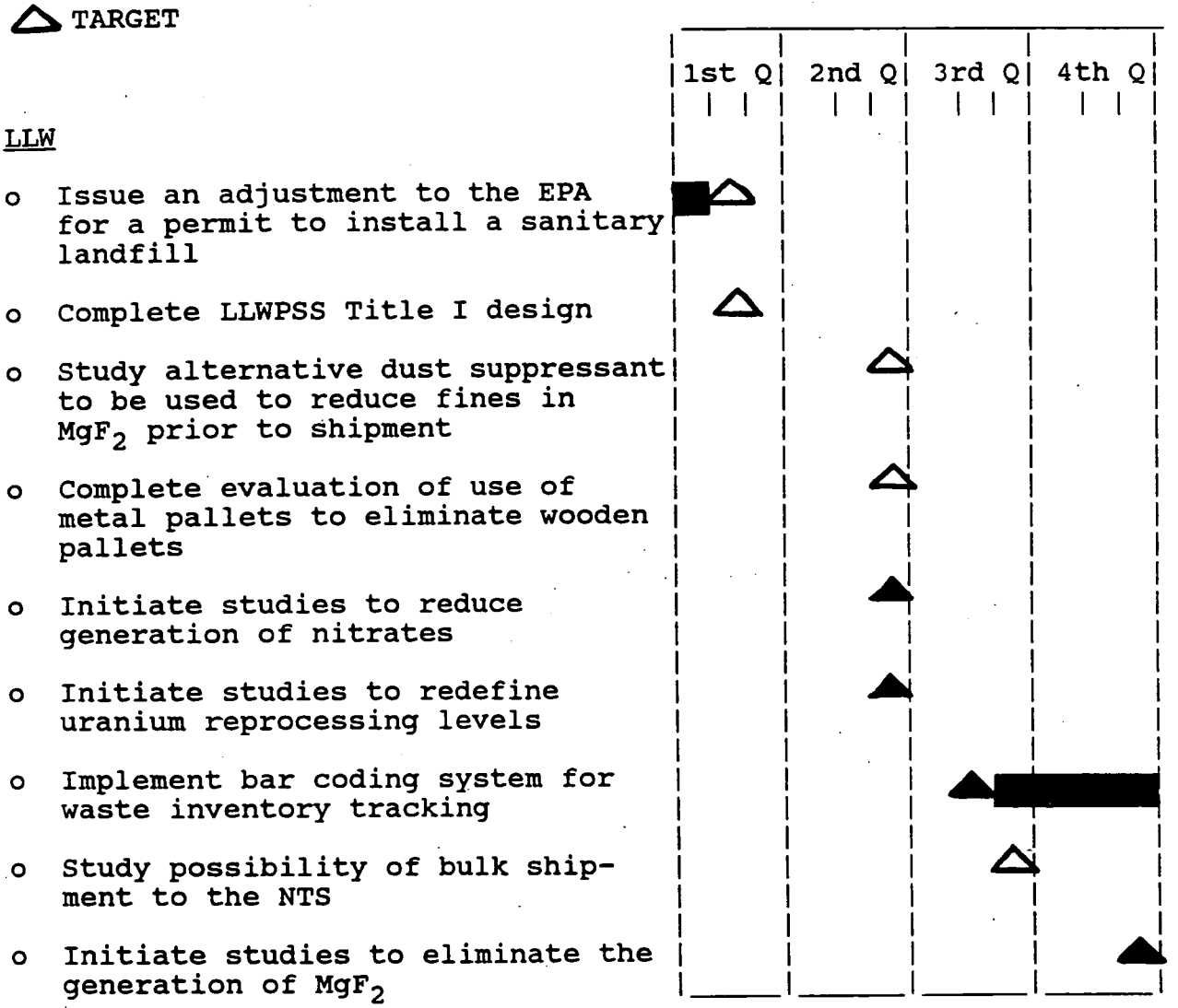
OILS/SOLVENTS

- Completion of transportation of contaminated oils/solvents to TSCA ORGDP incinerator[1]

TABLE 6-1 (continued)

FY-87 WASTE MANAGEMENT MILESTONES - AR
(As of 10/1/86)

▲ EVENT INITIATED
△ TARGET



LLW

- o Issue an adjustment to the EPA for a permit to install a sanitary landfill
- o Complete LLWPSS Title I design
- o Study alternative dust suppressant to be used to reduce fines in MgF_2 prior to shipment
- o Complete evaluation of use of metal pallets to eliminate wooden pallets
- o Initiate studies to reduce generation of nitrates
- o Initiate studies to redefine uranium reprocessing levels
- o Implement bar coding system for waste inventory tracking
- o Study possibility of bulk shipment to the NTS
- o Initiate studies to eliminate the generation of MgF_2

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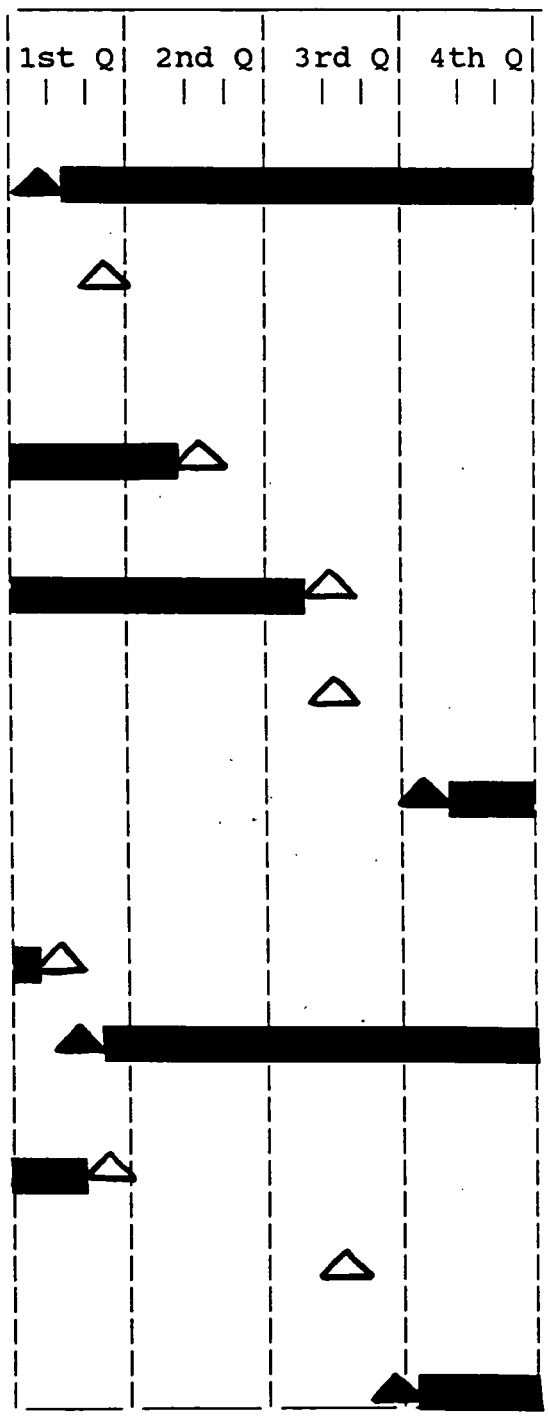
1 No funding available.
2 Funding limited.

TABLE 6-2

FY-87 WASTE MANAGEMENT MILESTONES - GE
(As of 10/1/86)

▲ EVENT INITIATED
△ TARGET



WATER POLLUTION CONTROLS

- o Storm Water Basin Operation
- o Complete design, construction and turnover of interim winterization modifications
- o Complete operation of bio-denitrification demo. run
- o Complete Phase II planning and CDR for Water Pollution Control Project
- o Request Water Pollution Control Phase II Funding for FY-89
- o Implement remaining storm basin and surge lagoon safety features

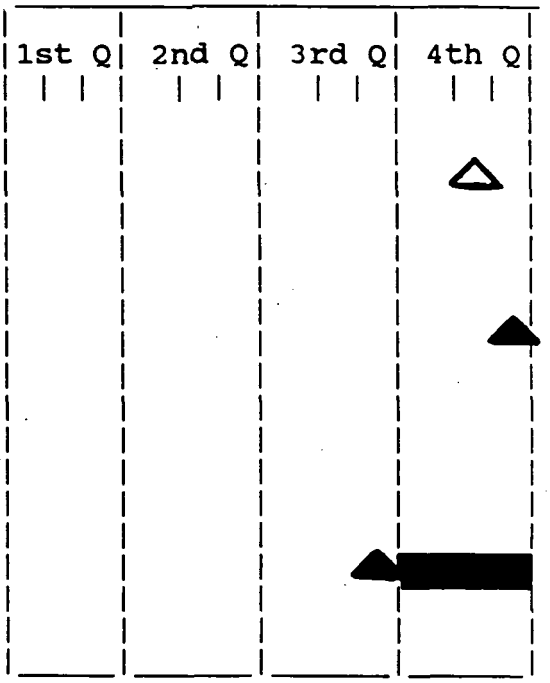
EH&SI

- o Issue EH&SI Revised CDR (FY-87 and FY-88 scope)
- o Initiate EH&SI Title I and II Design (pending funding approval)
- o Issue Pad and Warehouse Study Report
- o Issue EH&SI Second Revised CDR (FY-89 and FY-90 scope) (pending DOE approval by 3/1/87)
- o Initiate EH&SI Construction

TABLE 6-2 (continued)

FY-87 WASTE MANAGEMENT MILESTONES - GE
(As of 10/1/86)

▲ EVENT INITIATED
△ TARGET



EH&SI Continued

- Complete EH&SI "Issue for Approval" Design Criteria Report for FY-88 subprojects
- Start development of Design Criteria Report for FY-89 subprojects

CONSTRUCTION RUBBLE/SOIL

- Disposition Study Initiation[1]

[1] Limited funding.

TABLE 6-3

FY-87-91 GOALS FOR WASTE MANAGEMENT PROGRAMS - AR

	GOAL	FY COMP. DATE
	DEFENSE WASTE AND TRANSPORTATION MANAGEMENT (AR) GOALS	
1.	Complete Pits and Silos RI/FS Phase I and transmit reports (HOLD: FUNDING LIM.)	3Q87
2.	Complete RI/FS Phase II and transmit report (HOLD: FUNDING LIMITED)	1Q88
3.	Complete disposal of contaminated pallets and boxes (HOLD: NO FUNDING)	2Q88
4.	Complete shipment of MgF_2 backlog	2Q88
5.	Complete shipment of backlog of contaminated solvents and oils (mixed waste) (HOLD: NO FUNDING)	2Q88
6.	Complete shipment of slag leach filter cake backlog (pending processing and sufficient funding)	4Q88
7.	Complete disposal of ferrous scrap pile (INSUFFICIENT FUNDING)	4Q88
8.	Complete RAWC conceptual design (CONTINGENT ON COMP. PHASE II RI/FS)	1Q89
9.	Complete disposal of copper scrap pile (ON HOLD AWAITING RECOMMENDATION)	1Q89
10.	Begin hot operation of LLWPSS (Project 86-D-174)	3Q89
11.	Complete processing and disposal of backlog surplus equipment.	2Q91

TABLE 6-4

FY-87-91 GOALS FOR WASTE MANAGEMENT PROGRAMS - GE

	GOAL	FY COMP. DATE
NUCLEAR MATERIALS PRODUCTION (GE) GOALS		
1.	Begin storm water basin operation	1Q87
2.	Complete biodenitrification demonstration	2Q87
3.	Durable interim storage demonstration - thorium storage	3Q88
4.	Begin operation of biodenitrification facility - full scale	4Q90

7.0 QUALITY ASSURANCE FOR WASTE MANAGEMENT

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

Quality assurance at the FMPC is the responsibility of individual departments, and is verified by the Quality Assurance (QA) Department. The QA site plan, developed by the QA Department, contains policies and a description of the procedure systems which allow implementation of the policies. It is reviewed and updated annually. A Quality Assurance Manual/Plan specific to waste shipments to the Nevada Test Site has also been developed.

Quality Assurance Analyses (QAAs) are performed on each waste operation and are updated annually by the department involved. The QA level of each operation is identified on the QAA Form and requires the approval of the appropriate Department Manager. Formal Quality Assurance Plans are required for each operation assigned a QA Level IA, IB, or II. These plans are prepared by the department responsible for their implementation and are subject to review/approval by the Quality Assurance Department.

7.1 STANDARD OPERATING PROCEDURES

Procedures used in waste management at the FMPC are prepared and submitted as Standard Operating Procedures (SOP). The SOPs are reviewed by involved departments (including Quality Assurance) and then approved for use by the Waste Management Section.

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

Applicable SOPs are revised by the Waste Management Section. Changes to a SOP are noted and a formal revision to the SOP is prepared, circulated to the departments which originally approved the SOP and incorporated into the SOP. Waste Management activities require an internal self-audit of SOPs at least annually.

7.2 PRODUCT AND PROCESS SURVEILLANCE AND AUDITS

The QA department is responsible for verifying performance to the quality requirements. This is done by conducting surveillances and audits. Surveillances are conducted on a periodic basis.

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

The first type of audit is the annual audit of the waste management operations. This audit will be conducted by DOE based on the waste acceptance criteria established by the FMPC Waste Management Department. The other type of QA audit is an annual internal (internal to FMPC) audit of the operation. The internal audit team shall be selected by the Manager of Quality Systems, QA Department. Waste Management may also request an internal audit as needed to check its own performance.

7.3 TRAINING AND DOCUMENTATION OF TRAINING

In compliance with NQA-1, NVO-185, and DOE Order 5480.1A, all personnel directly involved in waste shipments will receive formal training in the waste handling system. The training will be documented, updated annually, and available for inspection by any auditing official. Those receiving training may include, but are not limited to, the following:

- Transportation supervisors, checkers, and material handlers
- Production supervisors and chemical operators
- ES&H supervisors and personnel
- QA personnel
- Nuclear Materials Control personnel
- Technical supervisors and packers.

Since the handling and off-site disposal of LLW is a new system, it is mandatory that the system staff be trained according to new procedures in advance of the first shipment. Waste Management will lead the initial training program development and implementation. The training program will be set up as a number of performance-oriented modules. Each training module will contain objectives,

conditions, and an evaluation to measure the trainee's competence in performing required tasks. Waste Management will provide instruction for LLWPSS operating personnel, maintain training records, and conduct an annual evaluation of the effectiveness of the training program.

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

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

8.0 ENVIRONMENTAL MONITORING PROGRAM

A comprehensive environmental monitoring program is continually conducted at the FMPC by the Environment, Safety & Health (ES&H) Department. Elements of the program include surface water monitoring, groundwater monitoring and air sampling and air pollution control monitoring. The monitoring program additionally identifies the parameters to be tested, the analysis method(s) to be used, the methods to be used for sample collection preservation and monitoring, and the instrumentation to be used. The Environmental Monitoring Program (EMP) pays particular attention to quality assurance requirements, data documentation, and recording.

The description document for the EMP is "Environmental Monitoring Program at the FMPC," FMPC Response to Items A1-A3 of Radiation Discharge Information Section, Federal Facilities Compliance Agreement, 30 Day Deliverable, dated August 17, 1986, Transmitted via WMCO:EH (RC):86-0105, dated August 16, 1986. This document should be referred to for all inquiries concerning the EMP.

As part of the comprehensive waste management/environmental program for 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 detailed Remedial Investigation to characterize the FMPC waste storage facilities and a Feasibility Study examining the various remedial alternatives. Activities associated with the Remedial Investigation 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). Tasks performed under the Engineering Feasibility Study 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 Site Investigation. Phase II entails completion of the Feasibility Study. Both are accomplished in a single, two-phased project.

Following a detailed evaluation of prospective subcontractors, WMCO selected Roy F. Weston, Inc., of West Chester, PA, in February, 1986, to perform the CIS. The first draft of the Support Documentation for the CIS

was submitted to WMCO in July, 1986, and the final draft was submitted in August, 1986, for review and concurrence from WMCO and DOE/ORO. Mobilization for field activities was initiated in August, 1986.