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**THORIUM LOW LEVEL WASTE MANAGEMENT
AUGUST 1991**

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ATTACHMENT

THORIUM LOW LEVEL WASTE MANAGEMENT

August 1991

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1.0 INTRODUCTION

The purpose of this outline is to set forth the actions necessary to implement a removal action (RA) for thorium stored at the Fernald Environmental Management Project (FEMP). The objectives of the Thorium Low Level Waste Management Program are as follows:

1. Overpack containers of thorium into containers meeting U. S. Department of Transportation (DOT) requirements to provide a safer storage configuration and support the possible off-site disposal of the thorium materials.
2. Provide safe interim storage for the thorium materials or support the disposal at an off-site disposal facility, pending completion of the Operable Unit 3 Remedial Investigation/Feasibility Study (RI/FS) and compilation of final remedial actions.
3. Containerize and cleanup any spilled material released incidental to operations performed to complete 1 or 2 above or released due to container failure.
4. Conduct all operations in a safe and efficient manner considering ALARA principles and best management practices and with appropriate controls to mitigate any releases from the operations.
5. Conduct sampling activities to characterize any containers that require further characterization.

The thorium at the FEMP is included in Operable Unit 3. The objectives stated above contribute to the efficient performance of any future remedial actions to be taken as a result of the Operable Unit 3 remedy selection process. Actions conducted pursuant to this outline will be appropriately integrated with the ongoing RI/FS through both direct communication with the RI/FS contractor and through formal documentation to the Administrative Record File for Operable Unit 3.

2.0 BACKGROUND

Current Conditions and Ongoing Activities

Table I identifies the FEMP warehouses storing thorium materials, the number and condition of containers in each warehouse, the condition of each warehouse, and the status of the evaluations performed on the waste streams contained in the warehouses.

To support further discussion in this outline the existing FEMP thorium inventory has been divided into four categories, A, B, C, and D. Category A represents deteriorated containers that have been evaluated as required by the Proposed Amended Consent Decree and determined to be non-RCRA. Category B represents containers that are in good condition but require further action to complete the evaluation specified in the

TABLE I
THORIUM STORAGE

BUILDING NUMBER	NUMBER OF CONTAINERS	CONDITION OF CONTAINERS	CONDITION OF WAREHOUSE	CATEGORY	OTHER COMMENTS
60	1,788	Excellent	Good	C	None
64	420	Good	Good	B, C	35-gallon drums on pallets, various sizes of wooden crates. Six individual streams of materials.
65	5,599	Poor	Fair	A	Various sizes of drums (35, 55, tall 55-gallon containers) stacked three high, most not palletized. Integrity of drums sitting on concrete floor is deteriorated. Five individual streams of materials--three streams comprised of only four containers. . . mostly from two streams.
67	6,004	Good	Good	B, C, D	Various sizes of containers (mostly cans) in baskets or palletized. One container obviously damaged (5-gallon pail). Some wooded crates and flat pieces of metal. Forty-four individual streams of materials.

Proposed Amended Consent Decree. Category C represents containers that are in good condition that have been evaluated and determined as non-RCRA. Category D represents thorium containers (35 to date) that have been determined to contain RCRA hazardous constituents.

3.0 INTEGRATION WITH ONGOING ACTIVITY

The FEMP is proceeding with the necessary actions at the facility to maintain full compliance with the terms of the Proposed Amended Consent Decree with the State of Ohio. One provision of the proposed amendment pertains to the management of the thorium inventories on site. The FEMP will cooperatively work with the United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) to the maximum extent practical to ensure both the terms of the proposed Consent Decree and the provisions of the Consent Agreement are fulfilled. The milestones/commitments in the schedule provided by Fernald Site Office to OEPA (February 18, 1991) are as follows:

ACTIVITY	DATE
1. Complete Removal Site Evaluation.	May 1991 (Complete)
2. Initiate overpacking and segregation operations for Categories B, C, and D containers.	August 1991
3. Complete segregation and necessary overpacking of Category B containers. Complete relocation of Category B containers to middle bay Building 64.	February 1992
4. Complete relocation of 35 Category D containers of thorium materials in Building 67 to RCRA storage areas as required by Section 3.5.1(f) of the Proposed Amended Consent Decree.	February 1992
5. Complete sampling, visual inspections or other necessary actions on thorium containers requiring further RCRA evaluation.	February 1992
6. Complete analysis of samples of thorium for RCRA evaluations.	June 1992
7. Complete evaluation of all further actions, including analysis of samples, for thorium containers requiring further RCRA evaluation.	June 1992
8. Submit report to OEPA on final RCRA determinations.	June 1992

9. Relocate containers of thorium determined to be Category D to RCRA storage areas as required by Section 3.5.1(f) of the Proposed Amended Consent Decree.

August 1992

The thorium materials at the FEMP are considered an inventoried radioactive material. DOE is in the process of either identifying a commercial or government buyer for the materials or excessing the materials as a waste. In preparation for the declaration of these materials as a waste, the DOE is in the process of setting up the necessary systems to potentially ship a portion or all of the inventories to an off-site disposal facility. Since the containers in Building 60 are in excellent condition and do not constitute a significant potential for release, the FEMP plans to ship these materials to an off-site disposal facility upon receipt of proper documentation declaring the materials waste and acceptance by the disposal facility.

4.0 PLAN OF ACTION

This section provides a general description of the three major components of this project, overpacking, safe storage, and shipment.

4.1 Overpacking

Two methods of overpacking will be employed based upon the condition of the specific container. The classification of thorium containers was previously discussed. The two methods to be employed are:

- Local overpacking for Category B and C containers at stations located in Buildings 64, 68, and 67.
- Remote overpacking for Category A containers at a facility in Building 65.

4.1.1 Local Overpacking

The local overpacking stations will be set up outside each of the facilities away from general access and work areas. The stations will be established as shown in Figure 1. The key features will be:

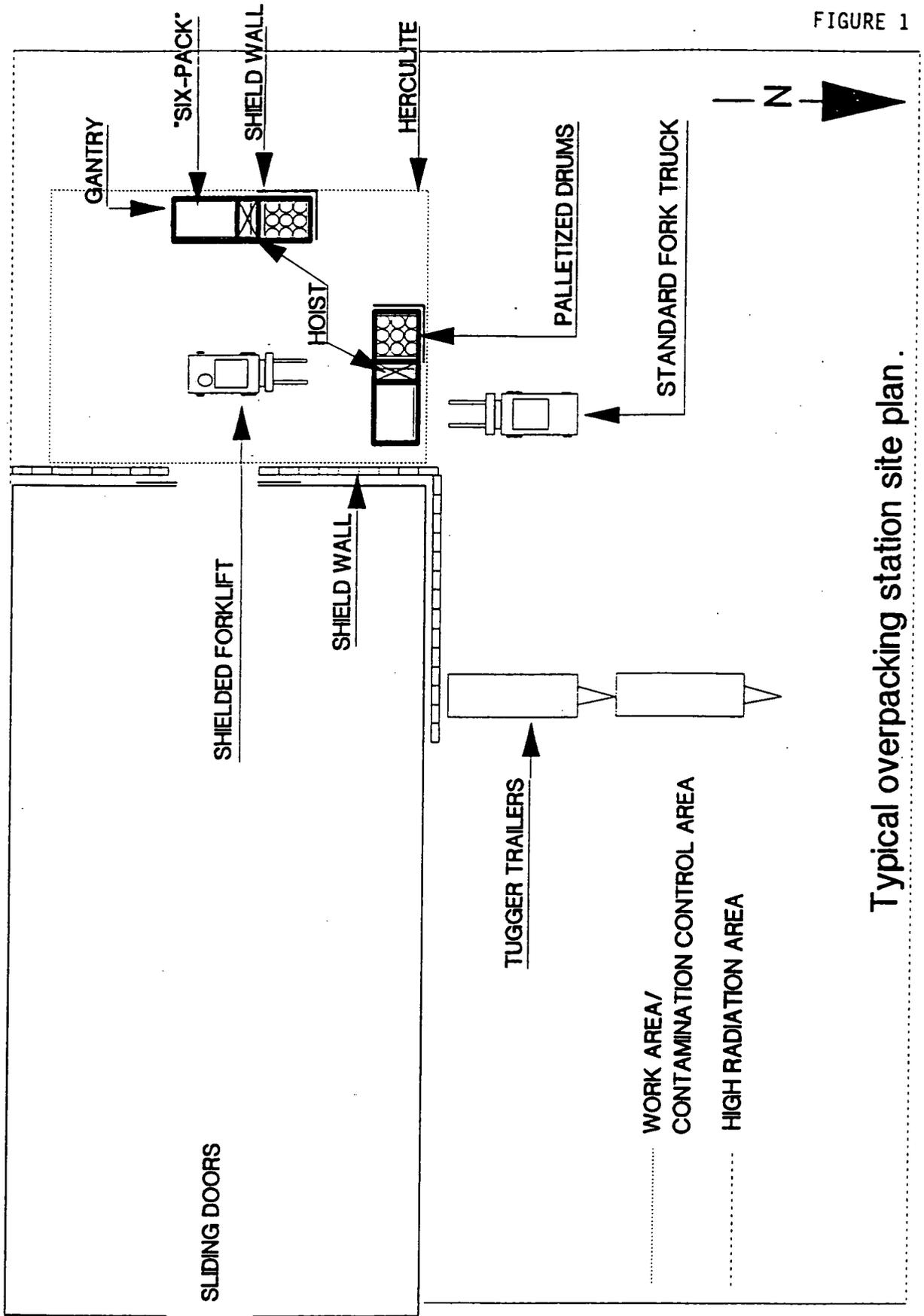
- High radiation area zone barriers
- Warehouse shielding
- Portable overhead hoist and crane
- Moveable shield wall at the overpack and staging area
- Posted operator and inspection area
- Contamination control zone
- Decontamination zone
- Shielded fork lift

Operations in the area will be as follows:

1. Establish and verify all barriers as per appropriate radiation controls.
2. Operators don personal protective equipment per the health and safety plan.
3. Stage overpack container on a scale under the hoist and crane (inside portable shield).
4. Shielded fork lift enters the warehouse and removes containers.
5. Shielded fork lift places the containers near the overpack behind the portable shield wall.
6. Operator manipulates the crane and hoist in position to lift the container.
7. Operators record identification markings on the containers.
8. Operators lift and place container in the overpack.
9. Operators record weight increase of the overpack.
10. Process repeats until the overpack is filled.
11. When the overpack is full, the lid is placed on the overpack and closure devices are secured.

FIGURE 1

BUILDING 67



Typical overpacking station site plan.

12. Shielded fork lift removes the overpack and stages in the inspection area.
13. The overpack is labeled with identification code and weight information.
14. Radiation safety personnel will record dose rate and contamination surveys.
15. Utility fork truck moves the filled overpack to a transport trailer for delivery to an interim staging facility.
16. Repeat process.

4.1.2 Remote Overpacking

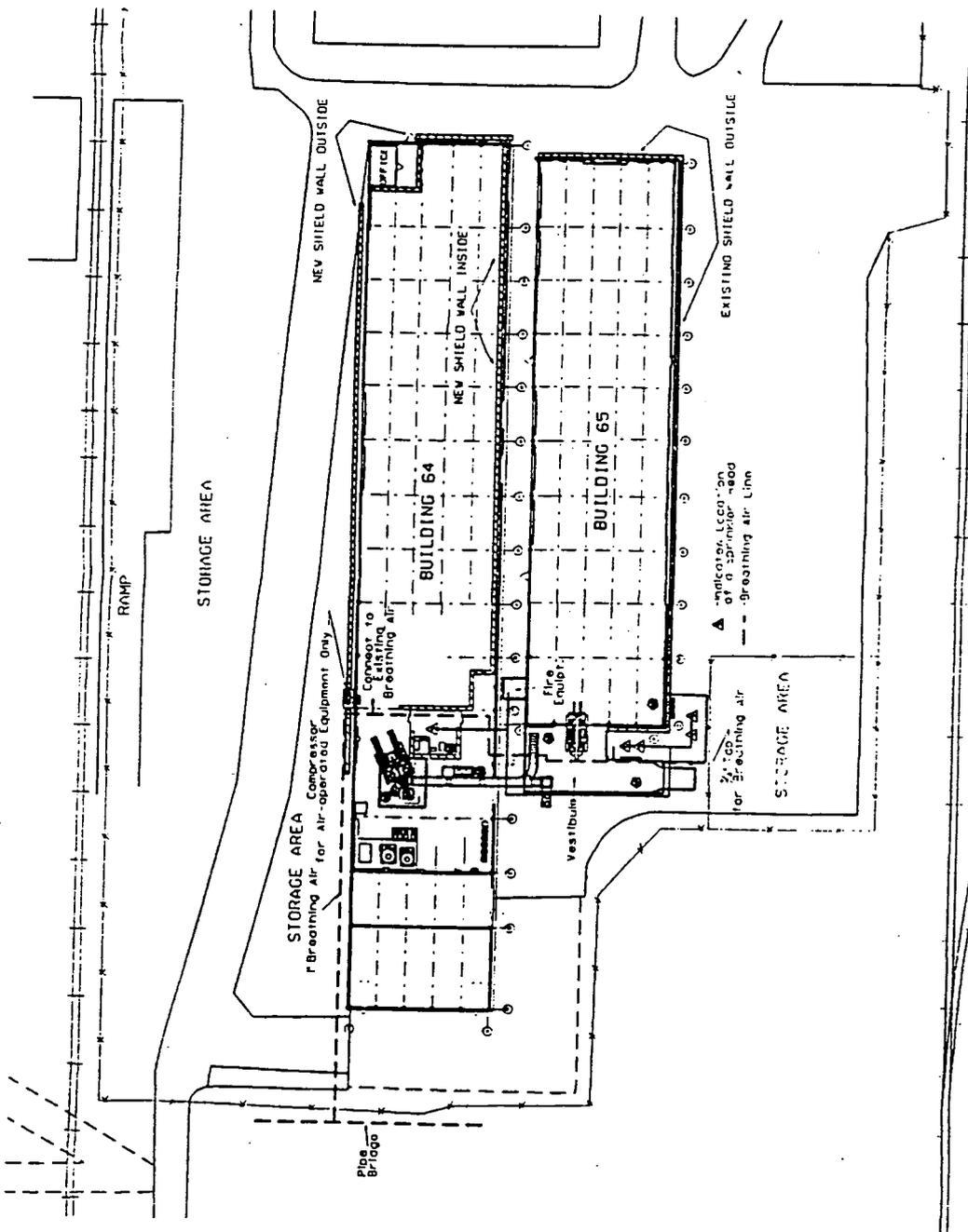
The remote overpacking operations will take place inside the south bay of Building 64. The station will be established as shown in Figure 2.

The facility features are:

- A vestibule, 25' X 35' Butler type building, to be built on the north end of Building 64. The station will be established as shown in Figure 2.
- A conveyor will extend from the vestibule to the overpack area in Building 64.
- An enclosure will be built around the conveyor, crane, and six-pack.
- The vestibule, conveyor, and overpack station will have a negative pressure created by an exhaust fan which will discharge through a high efficiency particulate air (HEPA) filtered stack.
- Drums will be retrieved from Building 65 using a shielded drum handling vehicle.
- Drums will be placed on the conveyor and moved to the overpack station.
- A jib crane with drum grabber will place drums in a six-pack, the crane will be operated remotely from behind a shielded wall.
- Full six-packs will be removed from the overpack station, lidded, and moved to the south end of Building 64 for storage using a shielded forklift.

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FIGURE 2



WESTINGHOUSE MATERIALS CO. OF OHIO PERM. ALD. OHIO FEED MATERIALS PRODUCTION CENTER U.S. DEPARTMENT OF ENERGY		BLDG. 64 & 65 CONCEPTUAL WAREHOUSE THORUM OVERPACK GENERAL VIEW FIGURE 1	
PROJECT NO. 100-100-100-100 DRAWING NO. 100-100-100-100 DATE 10/10/10 SCALE 1/4" = 1'-0"		SHEET NO. 100-100-100-100 TOTAL SHEETS 100-100-100-100	
NOTE: 1. THIS DRAWING IS FOR INFORMATION ONLY. 2. NO CONSTRUCTION SHALL BE PERMITTED WITHOUT THE WRITTEN APPROVAL OF THE PROJECT ENGINEER.		DATE: 10/10/10 DESIGNED BY: [Name] CHECKED BY: [Name] APPROVED BY: [Name]	

REMOTE OVERPACKING OPERATIONS--BUILDING 64

4.3 Interim Storage/Staging

Safe interim storage/staging will be provided for the overpacked thorium material at the FEMP. The locally overpacked thorium will be transported to an existing warehouse or a newly constructed tension support structure. The site of the interim storage facility will be based on ALARA considerations and accessibility. The remotely overpacked materials will be stored in the south bay of Building 64. Best management practices will be utilized to assure that the storage will not result in environmental releases and that adequate worker protection is provided in accordance with applicable facility procedures.

4.4 Shipping

Contingent upon the DOE declaring the thorium as a waste and acceptance by an off-site disposal facility, the FEMP will ship the overpacked thorium to an off-site facility. The FEMP has completed an environmental assessment for the shipment of this material. Packaging, labeling, and shipment will be in accordance with applicable regulations and local procedures. The DOE will formally notify the USEPA upon receipt of approval to dispose of the thorium material.

4.5 Special Handling Actions

In addition to overpacking activities, a small group of containers require special handling.

1. Waste requiring further characterization will be staged in the middle bay of Building 64 and subsequently sampled per approved sampling and analysis plans. The containers will be overpacked and stored in a permitted RCRA facility until final disposition.
2. Potentially pyrophoric material will be overpacked into salvage containers with a specially designed head to allow the application of an argon purge. The containers will be sampled and analyzed to determine the pyrophoric nature. If found to be pyrophoric, the waste will be stored until provisions can be made to oxidize the material prior to final disposition.
3. Containers requiring further RCRA evaluation, due to inadequate process knowledge will be temporarily stored in the middle bay of Building 64 until sampling and analysis (to include overpacking) can be performed in accordance with the schedule set forth above. Upon receipt of the analysis results, any containers of mixed waste will be stored in a permitted RCRA warehouse. Containers determined to be not subject to RCRA will be transferred to the interim storage facility.

5.0 MITIGATING MEASURES

ALARA principles are a prime concern for these activities due to the relatively high penetrating dose rates associated with these materials.

Standard nuclear industry practices related to time, distance, and shielding will be emphasized in all aspects of this project. The DOE has issued procedures to implement appropriate radiological controls. The controlling safety documents for this action are:

- Task specific health and safety plans meeting the requirements of 29 CFR 1910.120.
- Operational safety requirements, as appropriate, defined in DOE Order 5481.1b.

The thorium storage facilities will remain locked except for inspections or overpacking activities.

6.0 STANDARDS OF REQUIREMENTS

Table 2 summarizes both regulatory requirements and departmental orders that pertain to the implementation of this action.

7.0 HEALTH AND SAFETY

A task specific health and safety plan per the requirements of 29 CFR 1910.120 will be developed prior to operations. All personnel involved in the overpacking operations will be trained to the contents of the health and safety plan. Two task-specific health and safety plans will be developed, one for the local overpacking operations and one for the remote overpacking operations.

8.0 SAMPLING AND ANALYSIS

Only limited sampling and analysis is anticipated to support this action. Included are:

1. Health and safety monitoring will be conducted consistent with the task specific health and safety plans developed for the project.
2. Hazardous Waste determinations required pursuant to the Proposed Amended Consent Decree will be conducted consistent with the RI/FS Quality Assurance Program Plan (QAPP) to the maximum extent practical as supplemented by container sampling protocols contained in SW 846. Analysis samples will be performed by the on-site laboratory due to the significant radioactivity of the material.

9.0 QUALITY ASSURANCE

This project will be conducted according to the overall Quality Assurance Program at the FEMP as described in the Site Quality Assurance Plan, FMPC 2139. The Quality Assurance Plan is based on the criteria specified in ASME NQA-1, Federal EPA guideline QAMS-005/80, and DOE Orders 5700.6 and 5400.1. Detailed requirements are implemented by the WEMCO Site Policies and Procedures Manual, FMPC-2054, by WEMCO departmental procedures, and topical manuals. Specific quality assurance requirements will be incorporated into written and approved procedures and during personnel training. Periodic Quality Assurance surveillances will be performed to verify compliance.

10.0 ROLES OF PARTICIPANTS

The thorium action will be successfully accomplished through a cooperative relationship between DOE, OEPA, USEPA, and WEMCO. The major responsibilities of these organizations are:

1. The DOE is the lead agency at the FEMP and will coordinate and execute this action. The State of Ohio is a participant in the negotiations of the Consent Agreement and are provided an opportunity for meaningful review and input into FEMP regulatory activities.
2. USEPA and OEPA shall review, comment on the activities, and follow the progress through routine meetings and the Consent Agreement progress reports.
3. WEMCO, the management and operations contractor to the DOE at the FEMP, will manage, implement, monitor, and prepare all reports associated with the thorium action.

11.0 COMMUNITY RELATIONS

An addenda to the RI/FS community relations plan will be prepared and issued to solicit community concerns, conduct interviews, and work in unison with the community. Progress of all activities will be formally presented at the quarterly RI/FS community meetings and documented in the Administrative Record.

12.0 AMENDMENTS

The Department of Energy, as lead agency, has the responsibility to administer this action consistent with all CERCLA provisions. Given the dynamic nature of the factors that could affect the implementation of this action, DOE may amend this outline and will provide timely notification to regulatory agencies of any amendments.

13.0 SCHEDULE

The FEMP will proceed with activities described in this outline in parallel with USEPA review. Activities will be conducted according to the schedule submitted under the Proposed Amended Consent Decree.

As previously stated, FEMP is pursuing shipments of all or a portion of the thorium materials to an off-site disposal facility. In the event disposal capacity is identified, the USEPA and OEPA will be notified prior to waste shipment of the materials.

TABLE II

SUMMARY OF REQUIREMENTS AND ORDERS PERTAINING TO IMPLEMENTATION OF THORIUM REMOVAL ACTION

REQUIREMENT	APPLICABILITY/DESCRIPTION
Resource Conservation and Recovery Act (RCRA, Subtitle C (42USC6901, <u>et. seq.</u>)	Sets standards, applicable to waste determined to contain hazardous characteristics or constituents, for treatment, storage, and disposal.
NRC Licensing Requirements for Land Disposal of Radioactive Waste (10 CFR 61)	Provides general population protection requirements for radioactive releases (<25 mrem/year)
NRC Regulations for Standards for Protection Against Radiation (10 CFR 20)	Establishes dose limits for unrestricted areas, restricted areas, radiation workers, and for waste disposal. Provides standards for surveys and monitoring.
Clean Air Act (42USC7401, <u>et. seq.</u>) National Emission Standards for Radionuclide Emissions from DOE Facilities (40 CFR 61 Subpart H)	Provides annual limit of 10 mrem/gem (effective whole body) for air emissions.
Transportation (49 CFR)	Sets transportation requirements for packaging labeling, shipping, and receiving radioactive waste.
Ohio Location Standards (OAC 3745-45018)	Governs location of hazardous waste storage. Applicable to thorium waste containing RCRA hazardous waste.
OSHA (29 CFR 1910)	Provides occupational worker protection standards.
Radioactive Waste Management (DOE Order 5820.2A)	Sets requirements for management of radioactive wastes at DOE facilities.
Radiation Protection of the Public and the Environment (DOE Order 5400.5)	Sets requirements for protection of the public and the environment from radioactive materials at DOE facilities.

REQUIREMENT	APPLICABILITY/DESCRIPTION
Radiation Protection for Occupational Workers (DOE Order 5480.11)	Sets requirements for protection of workers from radiation and radioactive materials at DOE facilities.
CERCLA Program (DOE Order 5400.4)	Provides direction for DOE to implement a CERCLA program.
Hazardous and Radioactive Mixed Waste Management (DOE Order 5480.2)	Establishes hazardous waste management procedures for facilities operated under authority of the Atomic Energy Act of 1954, as amended.
Safety Analysis and Review System (DOE Order 5481.1B)	Establishes procedures to conduct safety analysis and operational safety requirements.
Quality Assurance (DOE Order 5700.6B) (September 23, 1986)	Establishes DOE's quality assurance program.
Threshold Limit Values, American Conference of Governmental Industrial Hygienists	Sets requirements for air concentrations during remedial activities.