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# PROJECT SPECIFIC PLAN FOR THE GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 AND 6 REVISION 0 JUNE 1995

06/13/95

RI/FS WBS 10.03.11
DOE-FN EPAS
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WORK PLAN

# PROJECT SPECIFIC PLAN

# FOR

# THE GEOTECHNICAL INVESTIGATION OF

# WASTE PITS 5 AND 6

**RI/FS WBS 10.03.11**

**REVISION 0**

**JUNE 7, 1995**

UNCONTROLLED
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Prepared by

Fernald Environmental Restoration Management Corporation

Prepared for

U.S. Department of Energy
Fernald Field Office

Under Contract DE-AC05-92OR21972

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**FOR**
**THE GEOTECHNICAL INVESTIGATION OF**
**WASTE PITS 5 AND 6**
**RI/FS WBS NUMBER 10.03.11**
**REVISION 0, JUNE 7, 1995**

APPROVAL:

for William Benson, Deputy Director — 6/7/95 Date
CRU1

FOR R.F — 6/7/95 Date
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6/7/95 Date
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## LIST OF ACRONYMS

| | |
|---|---|
| AMSL | above mean sea level |
| CA | core advance |
| CERCLA | Comprehensive Environmental Response Compensation and Liability Act |
| CRU1 | CERCLA/RCRA Unit 1 |
| DEEP | Dewatering Excavation Evaluation Program |
| DOE | Department of Energy |
| DOE-FN | Department of Energy-Fernald Field Office |
| DQO | Data Quality Objective |
| EFO | Environmental Field Operations Section |
| EPD | Environmental Programs Development Section |
| EPDM | ethylene propylene diene monomer |
| ERMC | Environmental Restoration Management Contract |
| FACTS | Fernald Analytical Computerized Tracking System |
| FEMP | Fernald Environmental Management Project |
| FERMCO | Fernald Environmental Restoration Management Corporation |
| FMPC | Feed Materials Production Center |
| $MgF_2$ | Magnesium Fluoride |
| OSHA | Occupational Safety and Health Agency |
| OU 1 | Operable Unit 1 |
| PSP | Project-Specific Plan |
| QA/QC | Quality Assurance/Quality Control |
| RCRA | Resource Conservation and Recovery Act |
| SCL | Sample Collection Log |
| SCQ | Sitewide CERCLA Quality Assurance Project Plan |
| SWAR/CR | Sitewide Analysis Request/Custody Record |
| WE | water elevation |

## 1.0 INTRODUCTION

This Project-Specific Plan (PSP) has been developed to provide sample requirements and guidance in sample collection and laboratory analysis activities for the geotechnical investigation of Waste Pit 5 and Waste Pit 6. Waste Pit 5 and Waste Pit 6 are within the boundaries of Operable Unit 1 (OU 1) and all waste characterization and disposal processes are managed by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA)/Resource Conservation and Recovery Act (RCRA) Unit 1, or CRU1. CRU1 has developed the Dewatering Excavation Evaluation Program (DEEP) Treatability Study as a means to address the excavation and eventual contents disposal of Waste Pits 1 through 3. This PSP, and the field and laboratory analysis activities addressed, represent an addendum to the DEEP Treatability Study Work Plan. This investigation of Waste Pits 5 and 6 will provide a portion of the geotechnical data necessary for the treatability process and remedial design for the pits' waste remediation systems.

The Waste Pits were constructed to receive and contain process wastes during the production activities of the former Feed Materials Production Center (FMPC). Waste Pits 5 and 6 were constructed in the later production years, 1968 and 1979, respectively; they were constructed in the same manner (cut and fill) and both have a 60 millimeter thick Royal-Seal ethylene propylene diene monomer (EPDM) elastomeric membrane liner. The pits differ in size, shape and berm configuration.

Waste Pit 5 is approximately 29 feet deep with side slopes of 2.5:1 (see figures in Appendix A). The waste pit berm extends about 10 feet above grade on the south side and 14 feet to 20 feet above grade on the north side. The pit is rectangular in shape and measures approximately 820 feet long by 240 feet wide. The bottom surface area of this pit was sloped during construction from east to west with an overall grade difference of 1.5 feet.

Waste Pit 5 received a liquid waste stream during refinery operation which entered the pit through piping located in the eastern end. The process waste which entered into Waste Pit 5 was neutralized raffinate, a by-product of the ore extraction process. The raffinate (a nitric acid solution) held metal nitrates, silicon, filter aid and 0.05 percent total uranium in solution. Upon neutralization, these materials dropped out of solution to create a "slurry" which was then pumped to the pit. Desiccation and airborne transport of the waste material in the pit is prevented with a layer of water.

Waste Pit 6 is approximately 24 feet deep with side slopes of 2.5:1 (see figures in Appendix A) and a berm exists around all sides with the exception of the west side which is adjacent to Waste Pit 4. The berm varies in height from approximately 4 to 8 feet above grade. The pit is square in shape with each side measuring approximately 210 feet. Due to its small size, the bottom floor of this pit was not sloped during construction. Waste Pit 6 received a variety of waste materials, principally: depleted magnesium fluoride ($MgF_2$) slag, slag leach filter cake, depleted sump cake, general sump sludge and dust collector residues. These waste streams are defined in Appendix B. The pit surface of Waste Pit 6 is also covered with water to reduce the release of fugitive airborne emissions.

## 1.1 PURPOSE

Additional geotechnical information for the solid waste media within Waste Pits 5 and 6 is necessary to provide engineering treatability design criteria for remediation. In addition, due to the extensive effort required to collect samples from the waste pits, archive samples will be collected in anticipation of any potential studies that may be required in the future.

The Data Quality Objective has been developed for sampling, analysis and data management activities to be performed under this PSP. The Data Quality Objective (DQO TS-022) for this sampling project is included in Appendix C of this document. The assigned analytical support level for the geotechnical testing is "B".

## 1.2 SCOPE

The geotechnical area of interest in obtaining the waste pit samples is moisture content of the pit material and density as it relates to a moisture content change in the waste material. Initially, a unit weight and moisture content analysis will be performed on every 5-foot section of core and a standard proctor test will be performed on a total core composite from each core. The results of these tests will determine what further testing will be required. Additional tests may include: specific gravity, liquid limit, plastic limit, plasticity index, minimum index density and grain size analysis, and additional standard proctors specific to a 5-foot depth interval.

Twenty sample locations have been randomly selected. Fourteen of the twenty are located in Waste Pit 5 and six located in Waste Pit 6. Sampling will be performed with a Vibra-Corer® type drilling device. The depth that the Vibra-Corer® core barrel advances will vary according to the location of the sample point within each pit.

"Determination of Maximum Distance of Vibra-Corer® Advance" in Section 3.1 explains the formulas used to calculate the safe bottom elevation for each core and lists the maximum advance for each location. A 5-foot margin above the pit liner and below the bottom of the boring will be maintained in every sample location as a precautionary measure. Two cores will be obtained from each location, one to be used for sample extraction and the second to be designated as archive. A liner will extend the length of the Vibra-Corer® core barrel.

The use of the Vibra-Corer® drilling device (see Section 3.1.2, "The Coring Operation") will require the support of crane equipment. Subcontractor construction personnel to Fernald Environmental Restoration Management Corporation (FERMCO) will provide field support for the use of this equipment throughout this project. This PSP outlines the process in obtaining the required samples (see Section 3.1, "Sampling Methodology").

The Vibra-Corer® sampling tool consists of a core barrel, a screw-type cutting shoe attachment, an inner catch basket and piston assemblage. An air compressor activates the piston assembly through an attached cable line. The piston action causes the piston assembly to vibrate which in turn vibrates the core barrel. The vibrations allow the core barrel to be advanced with minimal disturbance to the sample core. The core barrel is 25 feet in length with an inner diameter of 4 inches. A continuous plastic liner, 25 feet in length, will be inserted into the core barrel prior to sampling; the cutting shoe with basket will hold the liner in place. Operational guidance for the Vibra-Corer® device is provided in Appendix D (Work Guide).

Testing methods shall be as designated by the American Society for Testing and Materials (ASTM) and the United States Corps of Engineers, Engineering Manual (EM). All testing procedures shall be performed following the analytical support level (ASL) of B as indicated by the DQO approved for this project. Methods, codes, and preservatives required for the testing of these samples are listed in Table 1-1.

The geotechnical analyses for these samples will be performed by the laboratory analysis subcontractor, the University of Cincinnati. The archive samples will be stored on property and will be available to CRU1, should further evaluation be required.

# TABLE 1-1

## CHAIN OF CUSTODY INFORMATION

| ANALYSIS | SAMPLE TYPE | MEDIA | ASL | TEST METHOD | CONTAINER | REQUIRED MASS OF SAMPLE | HOLD TIME | PRESERVATIVE |
|---|---|---|---|---|---|---|---|---|
| **6-INCH UNDISTURBED SAMPLE** | | | | | | | | |
| Moisture | grab | waste pit material M1063 | B | ASTM D2216-92 | 6-inch tube | 150 g | 24 hour | Sample temperatures between 3°C and 30°C, prevent direct contact with sunlight |
| Unit Weight | grab | waste pit material M1063 | B | EM 1100-2-1096 | | N/A | N/A | NONE |
| Specific Gravity * | grab | waste pit material M1063 | B | ASTM D854 | | 25 g | N/A | NONE |
| Grain Size Analysis * | grab | waste pit material M1063 | B | ASTM D422-63 D1140-92 | | 1000 g | N/A | NONE |
| Liquid Limit * Plastic Limit Plasticity Index | grab | waste pit material M1063 | B | ASTM D4318 | | 200 g | N/A | NONE |
| Classification of Soils | grab | waste pit material M1063 | B | ASTM D2487 | | N/A | N/A | NONE |
| **5-FOOT SEGMENT COMPOSITE** | | | | | | | | |
| Standard Proctor | composite | waste pit material M1063 | B | ASTM D698 | 5-gallon steel bucket | 15 lbs | N/A | NONE |
| **TOTAL CORE COMPOSITE** | | | | | | | | |
| Standard Proctor | composite | waste pit material M1063 | B | ASTM D698 | 5-gallon steel bucket | 15 lbs | N/A | NONE |
| Minimum Index Density * | composite | waste pit material M1063 | B | ASTM D4254 | | 10 lbs | N/A | NONE |

* Performed upon request

Note: Historical data will be use in place of Alpha/Beta Screen.

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## 2.0 PROJECT ORGANIZATION

An Environmental Restoration Management Contract (ERMC) has been implemented at the Fernald Environmental Management Project (FEMP) site to manage the restoration activities, with FERMCO, a wholly-owned subsidiary of Fluor Daniel, Inc., currently serving as the ERMC Contractor. FERMCO, reporting directly to the Department of Energy (DOE) Fernald Field Office (DOE-FN), is the main contractor for FEMP activities and coordinator of technical support and remediation subcontractors. Primary FERMCO organizational responsibility for implementation of this plan abides with Operable Unit 1.

Additional support on this project will be provided by the Site Restoration Services Department. The Environmental Program Development Section will provide assistance in planning and preparation of a PSP and the Environmental Field Operations Section will provide field support. Subcontractor personnel will provide operational support for equipment used to collect the samples during this project. Guidance for safe procedures and hazard prevention will be provided by the CRU1 Safety Officer and Safety Analyst. Radiation Control requirements will be set out in the Radiation Work Permit and compliance will be insured with support of Radiological Control Technicians. The FERMCO onsite Sample Processing Lab will manage the off-site transport of samples.

PROJECT PERSONNEL

Key positions involved in the sampling of Waste Pit 5 and Waste Pit 6 specifically are presented as follows:

CRU1 Deputy Director

The CRU1 Deputy Director, William Benson, is responsible for coordinating assigned CRU1 activities including project performance, schedule, budget, and resources. He provides guidance and support to all CRU1 activities. Additionally, he provides project status information to senior management, client, and regulatory officials.

CRU1 Safety Analyst

The CRU1 Safety Analyst, Elaine Blakely, is responsible for implementation of requirements for safety analysis into this project via hazard identification and accident analysis in accordance with DOE Orders for hazard baseline documentation.

CRU1 Project Engineer

The CRU1 Project Engineer, Brad Catanach, will provide technical guidance in the planning of this project, technical consultation during sampling activities, and will serve as the point of contact for the University of Cincinnati. The project engineer for University of Cincinnati Contract Administration is Doug Wilson.

CRU1 Project Manager

The CRU1 Project Manager, Dan Stropes, will provide guidance in the planning, preparation and execution of this sampling event. Any and all proposed changes to this PSP must be cleared and approved by Mr. Stropes and Quality Assurance (QA) prior to the preparation and execution of a variance to this plan.

CRU1 Field Supervisor

The CRU1 Field Supervisor, Jim Hey, will direct the implementation of this plan by coordinating and supervising all field activities. He has the authority to order the halt of field sampling activities at any time, for any reason.

CRU1 Construction Manager

The CRU1 Construction Manager, Warren Hooper, or his designee, will oversee and direct all construction activities and heavy equipment use during this project. He is responsible for coordinating subcontractor involvement during this task and the integration of FERMCO and subcontractor employee activities undertaken to complete this project. He has the authority to order the halt of field sampling activities at any time, for any reason.

FERMCO Health and Safety Officer

The FERMCO Health and Safety Officer, Mike Davis or his designee, will ensure compliance of FERMCO specific and Occupational Safety and Health (OSHA) health and safety requirements. Mr. Davis has the authority to halt the field sampling activities at any time in the interest of safety considerations.

QA Project Manager

The Quality Assurance Manager, Reinhard Friske, is responsible for coordinating Quality Assurance (QA) activities for the geotechnical investigation outlined in this PSP. The QA Project Manager will perform or coordinate project audits and surveillance as required in cooperation with any FERMCO project quality oriented organization.

EFO Sampling Personnel

Under supervision of the Environmental Field Operations Section (EFO) Manager, Mike Frank, the EFO sampling technicians and Project Geologist are responsible for the documentation of all field activities and the labeling, transport, and delivery of the samples in accordance with this PSP. EFO sampling technicians will ensure that calibrated field screening equipment is available and will perform the actual screening of the samples. The sampling technicians shall be responsible for ensuring that the correct unique sample identifier is recorded on each sample label, Sample Collection Log (SCL), and Site Wide Analysis Request/Custody Record (SWAR/CR) (see Appendix E). EFO will complete field validation checklists.

## 3.0 SAMPLING METHODOLOGY

Due to the physical characteristics of the waste material in Waste Pit 5 and Waste Pit 6, and the layer of water on the pit surfaces, a Vibra-Corer® drilling device has been selected as an appropriate tool to collect the required sample cores. In the interest of safety, crane equipment will be used to maneuver the Vibra-Corer® device. Upon collection, sample cores will be hoisted and transferred to a sample receiving area set up for processing the samples in a safe manner. Location selection will follow a mapped grid design to be designated at the actual waste pit site by means of surveyed reference points on the berm.

To confirm the proposed homogeneous or heterogeneous characteristics of the waste a continuous core will be collected. This will provide a column representative of the post-depositional arrangement of the waste at each sample location to within 5 feet of the pit liner.

**WARNING!**

Under no circumstances will the Vibra-Corer® be extended into the 5-foot margin above the top of the pit liners. At all times, a 5-foot distance will be maintained between the total depth of boring and the bottom of the pit to preserve the integrity of the liner. Under no circumstances shall the Vibra-Corer® perforate the pit liners.

A core will be obtained from within each grid section that contains a designated sample point (see Figures 1 and 2 in Appendix A). Twenty sample areas (14 locations in Pit 5 and 6 locations in Pit 6) have been chosen for sampling to provide the additional data necessary for the treatability process and remedial design. The crane boom with attached Vibra-Corer® will be guided to each sample area by the application of survey techniques and the use of a geodimeter.

Following the collection of a sample core at each sample location an archive sample core will be taken approximately 10 feet in any direction away from the first core. The collection of two cores will ensure that there is an adequate volume of material for testing and archive purposes. The first core will provide the material for the geotechnical testing; grab and composite samples will be collected from this core and containerized according to the laboratory requirements. The second core is designated for archive storage and will be sectioned into more manageable lengths based upon the dimensions of the archive storage area. In the event there is poor recovery on the first core, sampling personnel may collect samples from the second core.

Upon collection of the sample and transfer to the receiving station by crane and construction personnel, EFO Sample Technicians will section the cores according to laboratory requirements (see Section 3.1.3 Sample Processing). The physical characteristics of the waste material will be described in a Lithologic Log to be completed by the Project Geologist. The open ends of the liner tube sections will be sealed with plastic caps and taped. The composite samples will be placed in containers as designated in Table 1-1. The EFO Sample Technicians will prepare and affix the labels and complete the additional required field documentation forms (see Section 3.1.3). EFO Sample Technicians will oversee transport of the samples to the onsite laboratory or archive at a designated location in the laboratory building.

To confirm the strategies of the sampling operation and expose any potential problems, a test coring operation shall be performed prior to the actual sampling event. Following completion of the test coring, all borings shall be filled with bentonite pellets before abandonment. All sample procedure guidelines set out in this PSP shall be utilized in the test for an accurate simulation of the actual event. Safety considerations will not change during this activity; therefore, all equipment-use guidelines set out in this PSP and Health and Safety Plan (see Appendix F) requirements also apply during any test activity.

## 3.1 THE SAMPLE EVENT

### Overview

The complexity of accessing Waste Pits 5 and 6 will require the sampling activity to be accomplished in a series of stages. The first stage will involve set up of the crane equipment, assembly of the Vibra-Corer® and set up of a sample receiving station. The actual coring activity will take place during the second stage and processing the sample at the receiving station will complete the event. The crane set up stage will be eliminated during those times when the boom can access several sample areas with one mobilization.

Twenty sample locations have been randomly selected; fourteen locations are in Waste Pit 5 and six locations are in Waste Pit 6.

Any and all personnel involved in the use of the Vibra-Corer® or crane equipment shall become familiar with the direction provided in the Work Guide located in Appendix D. All equipment use methods as existing in the Work Guide will be utilized. Any deviation from the work guide methods may require the issuance of a variance.

### Identification of Sample Locations

Due to the water surface in the pits and accessibility restraints, project planners chose to sample a target area rather than a sample point. A grid design was plotted onto the sample location maps of Waste Pit 5 and 6 (See Figures 1 and 2 in Appendix F) in order to assist the surveyors in identifying the sample location areas. Each grid area contains a 20 foot X 20 foot space. The first sample core will be taken from within the designated grid area. An approximate distance of 10-feet in any direction will be maintained between the location of the first core and the second sample core designated for archive storage. Due to crane maneuverability, it is not required that the archive sample core be extracted from the same grid area as the first sample core.

The surveyors will identify the target grid with the use of a geodimeter reflector device affixed to the crane. The geodimeter will instantaneously provide survey coordinates of the reflector's location which will indicate the location of the core barrel. This information will be used to provide guidance in maneuvering the crane boom with the attached Vibra-Corer® into the sampling position.

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### Sequence of Sampling

The sequence of locations sampled will follow the pattern of the crane's capability to access the points. With every crane mobilization, all accessible sample areas within the reach of the boom will be cored in order to minimize movement of the entire crane apparatus.

Determination of Maximum Distance of Vibra-Corer® Advance

The edges of the waste pits are sloped down to the waste pit floor at a rate of 1-foot of drop for each 2.5 feet of length toward the pit floor (See Figures 3 and 4 in Appendix A). A margin of safety of 5 feet will be maintained to assure that the pit liners are not compromised. Pit 6 has a level floor while Pit 5 has a floor with a drop of 1.5 feet across its length from east to west. The average depth of Pit 5 [559.25 feet above mean sea level (AMSL)] will be used in the calculations and the slope will be considered negligible. Sample core depths have been calculated using the following formulas and the tabulated results are contained in Tables 3-1 and 3-2:

Variables:
WE5 - Pit 5 Water Elevation (feet), measured
WE6 - Pit 6 Water Elevation (feet), measured
DB - Distance from Berm (feet), measured
CA - Maximum Core Advance, calculated

Constants:
SS - Slope of Side Walls = 1-foot drop per 2.5 feet in distance = 2.5
TE5 - Top elevation of Pit 5 Berm = 590 feet AMSL
TE6 - Top elevation of Pit 6 Berm = 585 feet AMSL
FE5 - Floor elevation of Pit 5 = (560+558.5)/2 = 559.25 feet AMSL
FE6 - Floor elevation of Pit 6 = 560 feet AMSL
SM - Safety Margin = 5 feet

WASTE PIT 5

Slope Areas
Maximum core advances (CA) are calculated to provide true elevation of the bottom of the core and its distance below the surface water. Pit 5 has three sample points which lie on the slope of the side wall. These maximum core depths are calculated as follows:

**DB < 75 ft. ***

$$CA = TE5 - \frac{DB}{SS} + SM$$

$$CA = 595 - \frac{DB}{2.5}$$

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* This distance is not known at this time and is correctly being determined by a survey crew. This information will be supplied through controlled distribution.

Bottom Floor Areas

The remaining eleven sample points in Pit 5 are located in areas where the pit floor is level. Therefore, the maximum core depth for these sample points is the averaged floor elevation of 559.25 feet AMSL plus the 5-foot safety margin or 564.25 feet AMSL.

The maximum distance that the coring device will advance below the surface water is simply the difference between the water elevation (WE) and the maximum depth of CA. An estimated water elevation was used to complete the calculations in Tables 3-1 and 3-2. **It is important to note that an actual measurement of the water elevation must be taken at time of sampling so that current conditions may be reflected in the calculations.**

**DB > 75 ft. ***

$$CA=\frac{(560+558.5)}{2}+5=564.25$$

WASTE PIT 6

Slope Area

One sample point that lies on the sloped wall of Pit 6. The depth of core advance is calculated as above using the constants for Pit 6.

**DB < 60 ***

$$CA=TE6-\frac{DB}{SS}+SM$$

$$CA=590-\frac{DB}{2.5}$$

Bottom Floor Area

The remaining five sample points in Pit 6 are located in areas where the pit floor is level. Therefore, the maximum core depth for these sample points is the floor elevation of 560 feet plus the 5-foot safety margin or 565 feet.

**DB > 60 ft. ***

$$CA=560+5=565$$

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* This distance is not known at this time and is correctly being determined by a survey crew. This information will be supplied through controlled distribution.

# TABLE 3-1

## MAXIMUM DISTANCE OF VIBRA-CORER® ADVANCE WASTE PIT 5

| SAMPLE LOCATION | SAMPLE NUMBER | SAMPLE TYPE | PROPOSED SAMPLE LOCATION | | MAXIMUM DEPTH OF CORE | | MAXIMUM ADVANCE BELOW WATER LEVEL | |
|---|---|---|---|---|---|---|---|---|
| | | | East | North | DB (measured) | Max. CA (calculated) | WE estimated /actual | Max. Depth Below Surface Water (WE-CA) estimated / actual |
| WP5-1 | 405316 | Core | 117.00 | 141.92 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-1A | 405317 | Archive | | | | | 582.8 / | |
| WP5-2 | 405318 | Core | 117.39 | 96.97 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-2A | 405319 | Archive | | | | | 582.8 / | |
| WP5-3 | 405320 | Core | 227.90 | 141.86 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-3A | 405321 | Archive | | | | | 582.8 / | |
| WP5-4 | 405322 | Core | 252.90 | 95.4 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-4A | 405323 | Archive | | | | | 582.8 / | |
| WP5-5 | 405324 | Core | 317.00 | 122.81 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-5A | 405325 | Archive | | | | | 582.8 / | |
| WP5-6 | 405326 | Core | 357.97 | 97.53 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-6A | 405327 | Archive | | | | | 582.8 / | |
| WP5-7 | 405328 | Core | 417.36 | 147.01 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-7A | 405329 | Archive | | | | | 582.8 / | |
| WP5-8 | 405330 | Core | 422.96 | 103.16 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-8A | 405331 | Archive | | | | | 582.8 / | |
| WP5-9 | 405332 | Core | 482.54 | 86.56 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-9A | 405333 | Archive | | | | | 582.8 / | |

TABLE 3-1

MAXIMUM DISTANCE OF VIBRA-CORER® ADVANCE WASTE PIT 5

| SAMPLE LOCATION | SAMPLE NUMBER | SAMPLE TYPE | PROPOSED SAMPLE LOCATION | | MAXIMUM DEPTH OF CORE | | MAXIMUM ADVANCE BELOW WATER LEVEL | |
|---|---|---|---|---|---|---|---|---|
| | | | East | North | DB (measured) | Max. CA (calculated) | WE estimated /actual | Max. Depth Below Surface Water (WE-CA) estimated / actual |
| WP5-10 | 405334 | Core | 574.06 | 147.98 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-10A | 405335 | Archive | | | | | 582.8 / | |
| WP5-11 | 405336 | Core | 646.96 | 136.78 | N/A | 564.2 | 582.8 / | 18.6 / |
| WP5-11A | 405337 | Archive | | | | | 582.8 / | |
| WP5-12 | 405338 | Core | 685.50 | 171.76 | 57.73 | 571.9 | 582.8 / | 10.9 / |
| WP5-12A | 405339 | Archive | | | | | 582.8 / | |
| WP5-13 | 405340 | Core | 692.67 | 113.76 | 48.957 | 575.4 | 582.8 / | 7.4 / |
| WP5-13A | 405341 | Archive | | | | | 582.8 / | |
| WP5-14 | 405342 | Core | 751.52 | 156.59 | 60.55 | 570.8 | 582.8 / | 12 / |
| WP5-14A | 405343 | Archive | | | | | 582.8 / | |

# TABLE 3-2

## MAXIMUM DISTANCE OF VIBRA-CORER® ADVANCE WASTE PIT 6

| SAMPLE LOCATION | SAMPLE NUMBER | SAMPLE TYPE | PROPOSED SAMPLE LOCATION | | MAXIMUM DEPTH OF CORE | | MAXIMUM WATER LEVEL | ADVANCE BELOW |
|---|---|---|---|---|---|---|---|---|
| | | | East | North | DB (measured) | Max. CA (calculated) | WE estimated / actual | Max. Depth Below Surface Water (WE-CA) estimated / actual |
| WP6-1 | 405344 | Core | 98.518 | 169.363 | 40.62 | 573.8 | 588.71 / | 14.9 / |
| WP6-1A | 405345 | Archive | | | | | 588.71 / | |
| WP6-2 | 405346 | Core | 78.653 | 138.197 | N/A | 565 | 588.71 / | 23.7 / |
| WP6-2A | 405347 | Archive | | | | | 588.71 / | |
| WP6-3 | 405348 | Core | 116.556 | 134.228 | N/A | 565 | 588.71 / | 23.7 / |
| WP6-3A | 405349 | Archive | | | | | 588.71 / | |
| WP6-4 | 405350 | Core | 104.629 | 119.143 | N/A | 565 | 588.71 / | 23.7 / |
| WP6-4A | 405351 | Archive | | | | | 588.71 / | |
| WP6-5 | 405352 | Core | 77.931 | 102.872 | N/A | 565 | 588.71 / | 23.7 / |
| WP6-5A | 405353 | Archive | | | | | 588.71 / | |
| WP6-6 | 405354 | Core | 116.706 | 93.245 | N/A | 565 | 588.71 / | 23.7 / |
| WP6-6A | 405355 | Archive | | | | | 588.71 / | |

### 3.1.1 Set up Activities

A communication networking system will be established by the CRU1 Construction Manager and the CRU1 Field Supervisor to assist in direction and coordination of all activity during the sample event.

The set up process will serve as a readiness exercise and confirm the proposed strategy of the crane operation. Any deficiencies or problems with the sampling strategy should be addressed at this time by notification to either the CRU1 Construction Manager or CRU1 Field Supervisor. A variance approval, both verbal and written, must be obtained for the implementation of any field changes (see Section 4.2, "Field Changes to the Project Specific Plan").

Crane

Sampling operations are anticipated to require the use of a 125-ton hydraulic crane with a minimum of a 165-foot reach capability (2000-pound load capacity at 150 feet). Upon arrival, documentation of annual inspections and maintenance records on the crane will be submitted to the rigging engineer and reviewed for compliance with applicable operation, maintenance and safety standards. A safety inspection of the crane by a FERMCO Health and Safety Officer will be performed and documentation of inspection approval will be forwarded to the CRU1 Field Supervisor and then to CRU1 project files.

Prior to beginning the set up activities, operational planning for equipment use will take place. The Rigging Plan, a guidance document prepared by the FERMCO Construction Rigging Engineer, will be reviewed with the crane operator and rigger. In addition, the crane crew and construction crew operating the Vibra-Corer® will confer to coordinate the crane and vibra-coring operations.

Prior to crane assembly, the access roads around Waste Pits 5 and 6 will be upgraded or altered to accommodate the crane equipment. This work will be performed by the construction subcontractor under the direction of the CRU1 Construction Manager.

The crane will be moved into position with the subcontractor construction crew providing support and addressing the required accommodations necessary for crane stabilization. Any terrain modifications to insure a stable foundation for the outrigging configuration will be constructed during the set up phase of the project.

Vibra-Corer®

During this phase, the construction crew will assemble the Vibra-Corer® equipment. A system check of the equipment will be performed to ensure that all parts are present and that the equipment is in working order. Following set up of the crane, the Vibra-Corer® equipment will be attached to the crane by the construction crew.

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Sample Receiving Station

A sample receiving station will be set up by EFO Sample Technicians to receive and process the cores. The receiving station will be set up to preserve the integrity of the samples and provide environmental protection from radiological-contaminated materials. The receiving station will be moved each time the crane remobilizes to accommodate the swing of the boom. All sample processing activities will take place at the sample receiving station and be performed by EFO sample technicians. Except as otherwise noted in this PSP, sampling technicians will perform all sampling activities in accordance with the procedures set out in Appendix K, Section K.3 (Responsibilities) and K.5 (Solid Matrix Environmental Samples) of the Sitewide CERCLA Quality Assurance Project Plan (SCQ). EFO Sampling Technicians shall provide all equipment necessary to process and preserve the samples according to method requirements (see Table 1-1) and Site Restoration Services Department field documentation requirements (see Section 3.1.3 Sample Processing).

The radiologically-controlled zone surrounding the waste pits will be extended to and include the sample receiving station. The Construction Manager and Field Supervisor will concur with the Radiological Control Technician for placement of Herculite® plastic sheeting within the temporary controlled zone. The sheeting will serve to contain any excess waste pit material on the exterior surface of the core barrel that may be present during crane transport to the sample receiving station. Absorbent diking will be used to ensure the containment of any waste material upon the plastic sheeting.

EFO Sample Technicians will set up all equipment and supplies necessary for processing the samples in the sample receiving area. Wooden sample stands will be placed in the sample receiving area to hold the cores securely during processing activities. If the temperature is expected to exceed 80° F (30°C), coolers will be available at the station to provide sample preservative requirements (see Table 1-1, "Chain of Custody Information").

### 3.1.2 Coring Operation Activities

The coring operation will involve a coordinated effort by the crane operator, rigger, and EFO survey crew to place the Vibra-Corer® directly over the designated sample area point and, also, a coordinated effort from the crane operator, rigger, and subcontractor construction personnel to synchronize the crane and Vibra-Corer® coring activities.

Crane

The Crane operator and rigger will concur with the CRU1 Construction Manager and Field Supervisor to determine which locations will be accessed from the crane set up point and also the order in which the corings will be performed. The rigger will guide the crane operator through the use of standardized hand signals throughout the coring activities. Crane maneuvering to proposed sampling areas will involve the coordination of EFO survey personnel and the crane rigger. Step by step guidance for the coring operation is set out in the Work Guide located in Appendix D. Subcontractor construction personnel will be responsible for delivering the sample core to EFO personnel at the sample receiving station.

Vibra-Corer®

Subcontractor construction personnel will assemble the Vibra-Corer® and prepare it for crane attachment. The crane rigger shall be responsible for Vibra-Corer® attachment to and detachment from the crane hook. The air compressor that powers the Vibra-Corer® shall be engaged and disengaged by construction personnel under the direction of the CRU1 field supervisor.

A work guide that provides additional detail for coordination of crane and Vibra-Corer® activity and Vibra-Corer® operation is located in Appendix D.

### 3.1.3 Sample Processing

For every sample core taken an archive core will be obtained. The initial core will be the designated geotechnical sample material and the second core will be the designated archive storage sample.

The Vibra-Corer® core barrel will be received at the Sample Receiving Station. Subcontractor construction personnel shall extract the core liner and relinquish it to the custody of the EFO Sample Technicians who will process the samples and prepare the required field documentation.

One Environmental Program Development (EPD) sample number will be assigned to each core and each sample retrieved from a core will be labeled and documented for chain of custody control. Also, to provide sample tracking and control support, each core will also be assigned a database sample number from the Fernald Analytical Computerized Tracking System (FACTS).

Upon collection of the sample cores, any liquids contained in the liner/core barrel will be decanted at a location that is below the top of the berm to ensure flow containment within the boundaries of the pit liner. The decanting will be accomplished by crane manipulation of the core barrel.

Prior to the processing of the sample cores, the core will be screened using field meters, (i.e., photoionization detector and a pancake geiger muller detector) and the results noted on the Field Activity Log and all sample documentation forms (see Appendix E). Also, a Lithologic Log listing the physical characteristics of the waste will be completed by the Project Geologist.

Upon completion of sample processing, the testing method preservative requirements (see Table 1-1) shall be initiated and maintained until performance of the laboratory testing. EFO personnel will ensure that all equipment necessary to maintain sample preservative requirements will be present and available for use at the sample receiving station.

The Project Geologist shall complete the Field Activity Logs recorded on a daily basis. The EFO Sampling Technicians shall complete the Sample Collection Logs, and the Site Wide Analysis Request/Custody Record (Appendix E). The EFO Sampling Technicians are responsible for ensuring the correct sample number identifier is recorded on each sample label, chain of custody form and sample collection form.

Except as otherwise noted in this PSP, sampling technicians will perform all sampling activities in accordance with the procedures set out in Appendix K, Section K.3 (Responsibilities) and K.5 (Solid Matrix Environmental Samples) of the SCQ.

Handling of First Core

The first core will provide the samples for the geotechnical analysis. The core will be divided into 5-foot sections. A pipe-cutter or small saw will be used to section the cores. Each 5-foot section will provide a 6-inch segment of undisturbed sample and the additional material necessary for composite samples. The 6-inch interval will be cut from each 5-foot section and left undisturbed within the liner; the open ends of the liner will be sealed with fitted plastic caps and taped. A composite sample of the entire core will then be collected from the remaining sample core. The remaining sample material within each 5-foot section will be containerized as a separate composite. Each sample (i.e., tubes and containers) shall be labeled with, at a minimum, project name, RI/FS WBS Number, location, date, time of collection, field screen results, and depth interval.

The 6-inch undisturbed samples will be extracted first from the core and then the total core composite sample will be compiled by removing one-quarter of the entire length of core. The 5-foot interval composite sample will comprise the remaining sample material following the collection of the 6-inch undisturbed and total core composite.

Handling of Second Core

The EFO Sample Technician crew will receive the second sample core at the Sample Receiving Station. The waste material in the second core will be sectioned into more manageable lengths, should dimensions of the archive storage area require it. Each end will be capped and tagged. Each tube shall be marked with an arrow to indicate the top of each segment. The core shall also be labeled with, at a minimum, project name, RI/FS WBS Number, location, date, time of collection, field screen results, and depth interval.

## 3.2 SAMPLE TRANSPORT

Sample packaging and transport will be conducted as specified in Section 6.7 of the SCQ, and sample tracking and control documentation will be conducted in accordance with Section 7.1 of the SCQ.

EFO Sampling Technicians shall deliver samples directly to University of Cincinnati personnel in Room C-15 or C-19 of the FEMP Laboratory Building. All samples shall be accompanied by radiological survey forms containing both sample and container screening results. Chain of custody forms shall also accompany the samples. A copy of the chain of custody forms and radiological survey forms shall be submitted to the SPL no later than 12:00 p.m. the following day for assignment of release numbers. If University of Cincinnati personnel are not available, the samples can be delivered to the SPL during normal sample receiving hours (7:30 to 9:30 a.m. and 1:00 to 3:00 p.m.) or temporarily stored in Room W-4 of the Laboratory Building until University of Cincinnati personnel are available for delivery.

All packaging and transport of hazardous materials (both on-site and off-site) will comply with DOE Order 5480.3 (Safety Requirements for Packaging and Transportation of Hazardous Materials) and FEMP Procedure PP-0314 (Procedures for Packaging and Transportation of Hazardous Materials) in accordance with 49 CFR Subchapter C Hazardous Materials Regulations. Also, all applicable 49 CFR Department of Transportation Regulations for shipping hazardous mixed waste will be complied with when shipping the waste pit materials.

## 3.3 LABORATORY TESTING

Immediately following sample containerization, the designated moisture content and unit weight sample fraction will be delivered to the designated onsite laboratory analysis location. At that time, the laboratory services contractor shall perform the moisture content and unit weight testing in accordance with all project and FEMP requirements. Data reporting of these tests shall be performed and reported to the designated CRU1 Project Engineer as soon as practicable following the completed testing. Table 3-3 summarizes laboratory testing information.

Geotechnical testing of the Pit 5 and 6 waste shall provide data on solids and water volumes in the pits through the unit weight, moisture content, and specific gravity test results. The Atterberg Limits and sieve test results shall provide information on dewatering the wastes and the excavation method of choice. Standard proctor tests will provide compaction information of the waste if construction equipment is driven on the waste, and the dry unit weight of the waste as it is compacted in Envirocare's Disposal Cell. The minimum bulk densities shall provide information on the density of waste as it is loaded in the rail cars.

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## TABLE 3-3

## LABORATORY TESTING INFORMATION

| ANALYSIS | ASL | TEST METHOD | TESTING LOCATION | APPROXIMATE NUMBER OF TIMES TESTS ARE TO BE PERFORMED |
|---|---|---|---|---|
| **6-INCH UNDISTURBED SAMPLE** | | | | |
| Moisture | B | ASTM D2216-92 | FEMP | 80 |
| Unit Weight | B | EM 1100-2-1096 | FEMP | 80 |
| Specific Gravity * | B | ASTM D854 | UC | 30 |
| Grain Size Analysis * | B | ASTM D422-63 D1140-92 | UC | 30 |
| Liquid Limit * Plastic Limit* Plasticity Index* | B | ASTM D4318 | UC | 30 |
| Classification of Soils | B | ASTM D2487 | UC | 30 |
| **5-FOOT SEGMENT COMPOSITE** | | | | |
| Standard Proctor | B | ASTM D698 | UC or FEMP | 30 |
| **TOTAL CORE COMPOSITE** | | | | |
| Standard Proctor | B | ASTM D698 | UC or FEMP | 20 |
| Minimum Index Density | B | ASTM D4254 | UC or FEMP | 20 |

* Performed on request
UC - University of Cincinnati
ASTM - American Society of Testing Materials

## 3.4 WASTE DISPOSITION

### 3.4.1 Contact Waste

During the performance of sample activities, all personnel coming in contact with the waste pit material will generate contact wastes. Following completion of the sampling, personnel shall place contact wastes into plastic bags labeled "Radiological Waste", and these bags shall be clearly labeled with the words, "Waste Pit Sampling Event" and the date. The materials shall then be turned over to the assigned Radiological Control Technician for appropriate disposal if the waste originated in Pit 6. The contact waste generated in Pit 5 will remain in the controlled area surrounding the pit.

### 3.4.2 Investigative Derived Waste

During the retrieval of samples for the geotechnical investigation, investigative derived waste will be generated from the cores. All waste pit material retrieved by the Vibra-Corer® and not designated as a laboratory sample or an archive sample will be returned to the respective pit from which it was received.

## 3.5 DECONTAMINATION

In the event that Waste Pit 5 is sampled first, the Vibra-Corer® core barrel, cutting shoe and basket will undergo a power rinse due to thorium contamination concerns. In addition, any crane parts, equipment or tools that come into contact with the waste material in Waste Pit 5 will be decontaminated. Radiation Control personnel shall screen the equipment to ensure that adequate decontamination has been completed. If Waste Pit 6 is sampled first, only a gross decontamination on the sampling equipment will be performed before sampling Waste Pit 5.

Due to the nature of the waste material containment in Waste Pits 5 and 6 it will not be necessary to perform any decontamination of equipment, parts or tools between the corings performed within each respective pit. Any rinsate created during decontamination performed between pits will be returned to the waste pit in which it originated.

Upon completion of all sampling Radiological Control Personnel will determine the method of decontamination to be utilized on the sampling equipment. Free release of any equipment used in the pits will be dependent upon the surveys performed by Radiological Control following decontamination procedures.

## 4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Sampling events follow Quality Assurance/Quality Control (QA/QC) protocol established in Section 4 and Appendix K of the SCQ.

### 4.1 PROJECT REQUIREMENTS FOR SELF-ASSESSMENTS, SURVEILLANCES

Self-assessment and independent assessments of work processes and operations shall be undertaken to assure quality of performance. Self-assessment shall be performed by the Environmental Division, shall encompass technical and procedure requirements, and may be conducted at any point in the project.

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances or inspections. Surveillances shall be coordinated by the CRU1 Quality Assurance Representative. As a minimum, one surveillance shall be conducted, consisting of monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillances shall be planned and documented in accordance with Section 12.3 of the SCQ and QP-701, Administration and Conduct of Surveillance Activities.

### 4.2 FIELD CHANGES TO THE PROJECT-SPECIFIC PLAN

Prior to the implementation of field changes, the CRU1 Project Manager and Environmental Program Development Manager shall be informed of the proposed field changes. Once the EPD Project Coordinator has obtained approval (verbal or written) from the CRU1 Project Manager and QA representative for the field changes to the PSP, the field changes may be implemented. Field changes to the PSP shall be noted in the applicable project field activity log and on a Variance Request form. QA must receive the completed Variance Request form, which includes the signatures of the EPD Project Manager and CRU1 Project Manager, within one week of the granting of the verbal approval.

## 5.0 HEALTH AND SAFETY

The Project-Specific Health and Safety Plan (PSHSP) for the task outlined in this PSP is contained in Appendix F. All project personnel shall be briefed on the PSHSP guidelines prior to project implementation and should become familiar with the health and safety guidelines contained therein. Project personnel signatures, indicating orientation to the plan, are required on the PSHSP Acknowledgement Form of the controlled copy.

All FERMCO and subcontractor personnel participating in the project fieldwork shall conform to precautionary surveys performed by the personnel representing site Safety, Industrial Hygiene, Radiological Control, and Health Physics. Concurrence to all applicable safety permits by FERMCO and subcontractor project personnel shall be expected in the performance of their assigned duties.

## 6.0 DATA MANAGEMENT PLAN

This data management plan will be implemented so that information collected during the investigation will be properly managed following completion of the field activities. As specified in Section 5.1 of the SCQ, sampling technicians shall describe daily activities on the Field Activity Log (FAL) sufficient for the sampling team to reconstruct a particular situation without reliance on memory. Sample collection logs shall be completed according to instructions specified in Appendix K of the SCQ.

### 6.1 VERIFICATION

To assure appropriate documentation was completed during field activities and that documentation was completed correctly, field documentation shall be verified by EFO.

Data shall be verified by the Project Manager upon receipt.

### 6.2 DATA ENTRY

Tracking information on the geotechnical samples will be entered into FACTS by Analytical Data Management. The actual data results will be entered into the Sitewide Environmental Database which is equipped to store the geotechnical data. The analytical data stored in the SED shall be referenced by the EPD sample number. Manual data entry shall be performed and the entered data shall be compared to the original data sheets; corrections shall be initialed and dated, and made as necessary. Hard-copies of the analytical data will be organized by Laboratory Release Number and stored according to requirements of the Analytical Laboratory System and FERMCO document control procedures.

## 7.0 PROJECT SCHEDULE

The proposed project schedule for field and laboratory activities is summarized in Appendix G.

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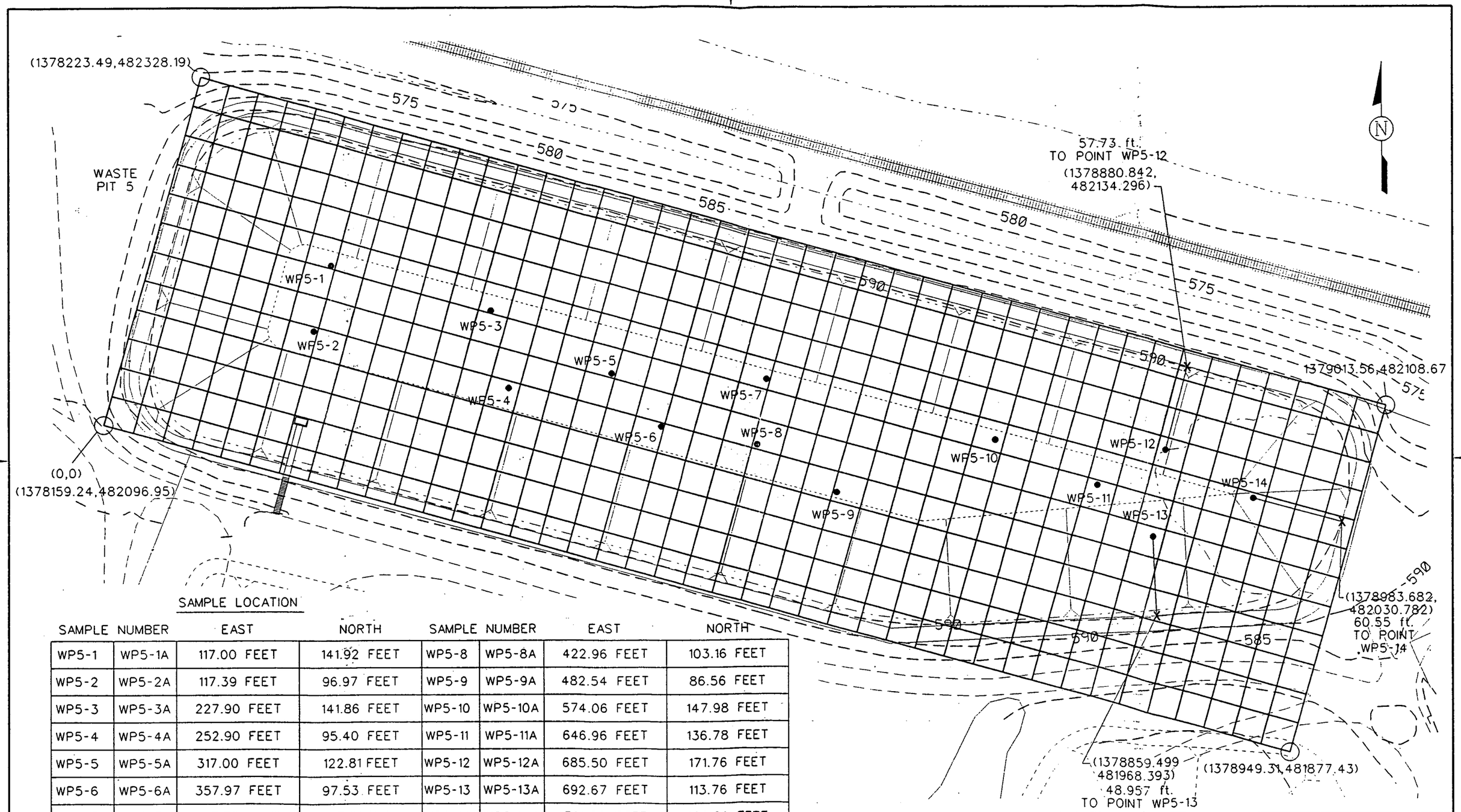
# APPENDIX A

# FIGURES




SAMPLE LOCATION

| SAMPLE NUMBER | | EAST | NORTH | SAMPLE NUMBER | | EAST | NORTH |
|---|---|---|---|---|---|---|---|
| WP5-1 | WP5-1A | 117.00 FEET | 141.92 FEET | WP5-8 | WP5-8A | 422.96 FEET | 103.16 FEET |
| WP5-2 | WP5-2A | 117.39 FEET | 96.97 FEET | WP5-9 | WP5-9A | 482.54 FEET | 86.56 FEET |
| WP5-3 | WP5-3A | 227.90 FEET | 141.86 FEET | WP5-10 | WP5-10A | 574.06 FEET | 147.98 FEET |
| WP5-4 | WP5-4A | 252.90 FEET | 95.40 FEET | WP5-11 | WP5-11A | 646.96 FEET | 136.78 FEET |
| WP5-5 | WP5-5A | 317.00 FEET | 122.81 FEET | WP5-12 | WP5-12A | 685.50 FEET | 171.76 FEET |
| WP5-6 | WP5-6A | 357.97 FEET | 97.53 FEET | WP5-13 | WP5-13A | 692.67 FEET | 113.76 FEET |
| WP5-7 | WP5-7A | 417.36 FEET | 147.01 FEET | WP5-14 | WP5-14A | 751.52 FEET | 156.59 FEET |

NOTE: EAST AND NORTH ARE DISTANCES FROM GRID MARK (0,0) OR (1378159.24,482096.95).

SCALE
0 30 60 120 FEET

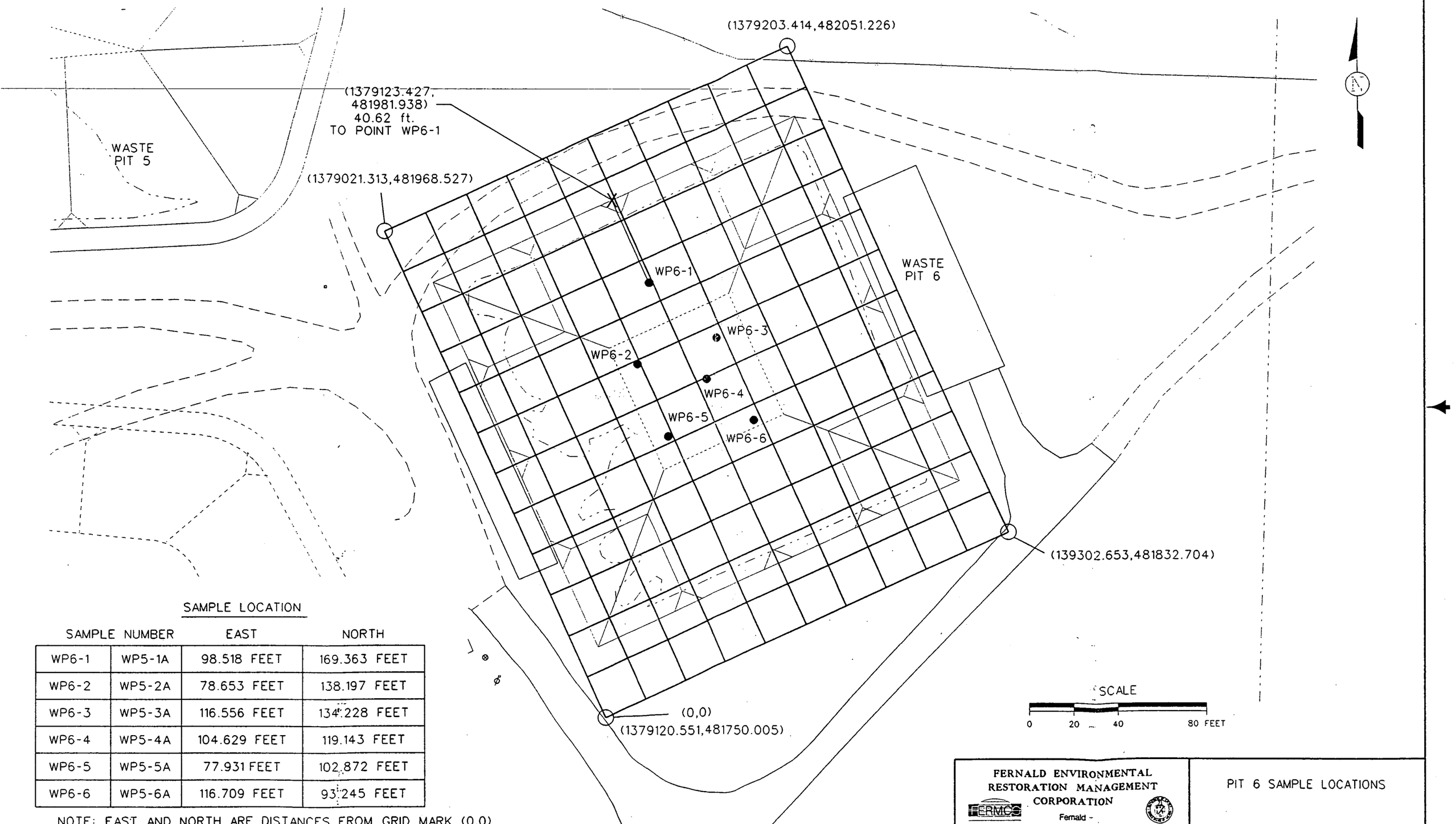
FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION
FERMCO
Fernald Environmental Management Project
U.S. DEPARTMENT OF ENERGY

PIT 5 SAMPLE LOCATIONS

DATE 5-2-95
DRAWN

FIGURE 1

FILE NAME: PIT5SAMLOC




SAMPLE LOCATION

| SAMPLE NUMBER | | EAST | NORTH |
|---|---|---|---|
| WP6-1 | WP5-1A | 98.518 FEET | 169.363 FEET |
| WP6-2 | WP5-2A | 78.653 FEET | 138.197 FEET |
| WP6-3 | WP5-3A | 116.556 FEET | 134.228 FEET |
| WP6-4 | WP5-4A | 104.629 FEET | 119.143 FEET |
| WP6-5 | WP5-5A | 77.931 FEET | 102.872 FEET |
| WP6-6 | WP5-6A | 116.709 FEET | 93.245 FEET |

NOTE: EAST AND NORTH ARE DISTANCES FROM GRID MARK (0,0) OR (1379120.551,481750.005).

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION
FERMCO
Fernald - Environmental Management Project
U.S. DEPARTMENT OF ENERGY

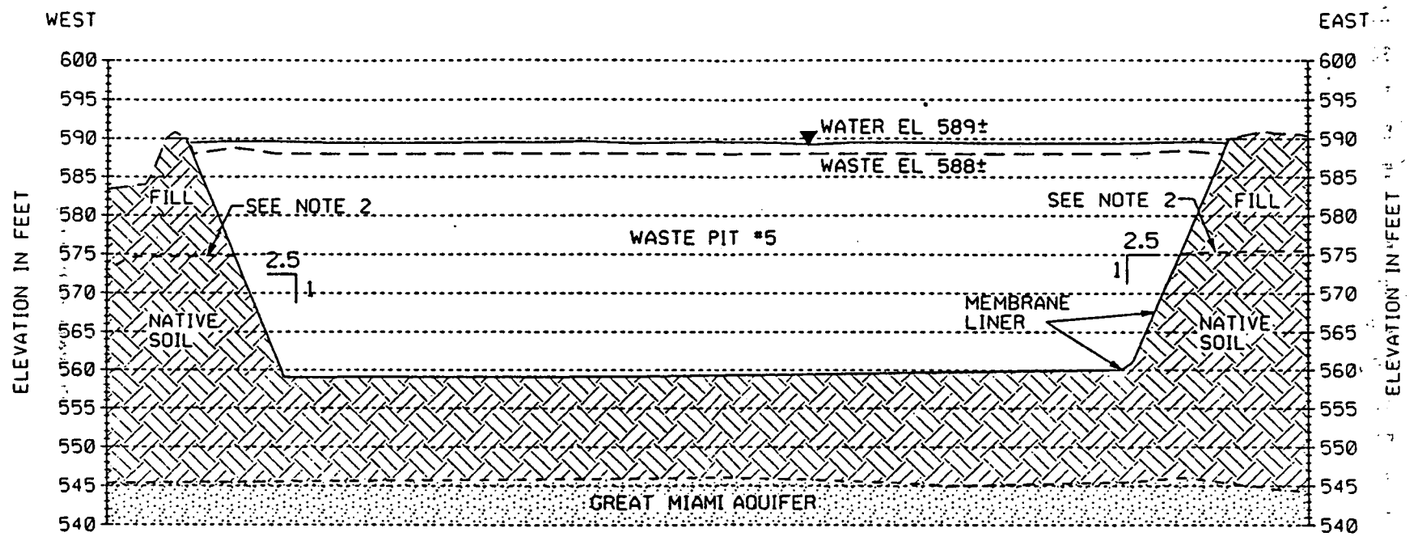
PIT 6 SAMPLE LOCATIONS

DATE 5-2-95
DRAWN

FIGURE 2

FILE NAME: PIT6SAM.DGN

ikg01855.m(2365.ws316) po10@ws316. Thu Sep 9 09:46:56 CDT 1993




SECTION E (G06) REF G01

HORIZONTAL SCALE: 1"=120'
VERTICAL SCALE: 1"=40'

NOTES

1. TOP OF WASTE ASSUMED TO BE ELEVATION 589±.
2. APPROXIMATE LOCATION OF NATIVE SOIL.
3. THIS SUBMITTAL SHOWS THE TOP OF THE AQUIFER AS LOCATED BY CERCLA/RCRA UNIT 5 (CRU-5). THE LOCATION WAS APPROVED ON JUNE 1, 1993 CRU1 PROJECT MEETING AND RECORDED IN MEETING MINUTES MEMO DATED JUNE 3, 1993.

LEGEND

- EXISTING SOIL
- LOW PERMEABILITY MATERIAL (CLAY)
- SAND AND/OR GRAVEL
- WASTE

| REF SHEET NO. | DRAWING TITLE |
|---|---|
| G01 | SITE PLAN |

PRELIMINARY
NOT FOR CONSTRUCTION

| REV NO. | REVISION PURPOSE - DESCRIPTION | BY | CHECKED | APPROVALS AND DATE |
|---|---|---|---|---|
| 0 | WASTE PIT CONTENT STUDY | | | |

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

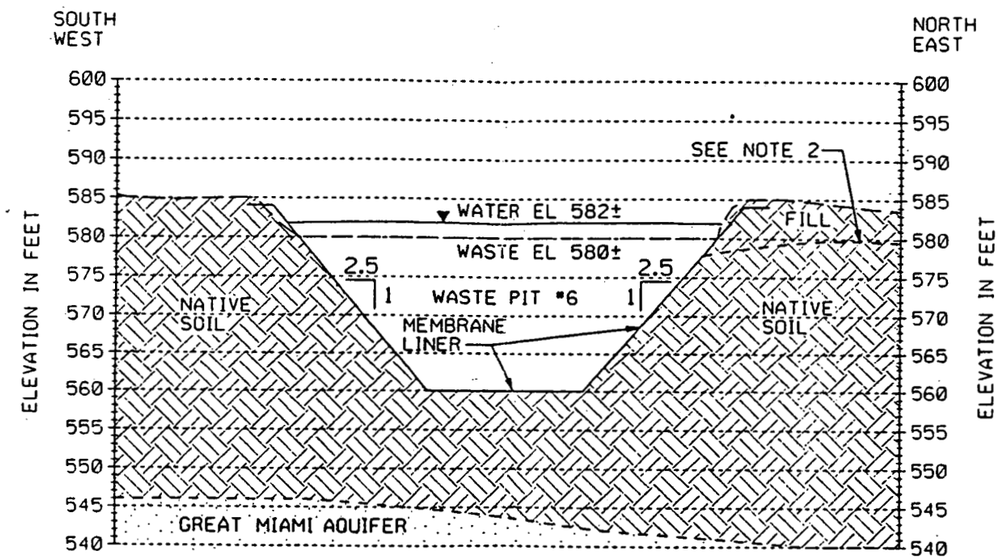
PROJECT NAME
SITE RESTORATION REPORT
CRU1/PO10

DRAWING TITLE
WASTE PIT #5 SECTION

DRAWN BY L.J.GEORGE DATE 04/19/93 | SCIENCE CHECKED BY | DATE | CHECKED BY | DATE
PLANT/BLDG NO. | FILE NO. | SCALE 1"=120' | CLASS
SUBMITTED FOR APPROVAL | APPROVAL RECOMMENDED
DOE PROJECT NO. | DOE DRAWING NO. WBS 1.1.1.1.1.1.1 00-90701 | DRAWING NO. SK-G-01855 | SHEET NO. G06 | REV NO. 0

FIGURE 3 - WASTE PIT 5 CROSS SECTION

skg01856.m(1126.ws317) po10@ws317. Thu Sep 9 09:39:25 CDT 1993




SECTION F REF
HORIZONTAL SCALE: 1"=60' G07 G01
VERTICAL SCALE: 1"=20'

NOTES

1. TOP OF WASTE ASSUMED TO BE ELEVATION 580±.
2. APPROXIMATE LOCATION OF NATIVE SOIL.
3. THIS SUBMITTAL SHOWS THE TOP OF THE AQUIFER AS LOCATED BY CERCLA/RCRA UNIT 5 (CRU-5). THE LOCATION WAS APPROVED ON JUNE 1, 1993 CRU1 PROJECT MEETING AND RECORDED IN MEETING MINUTES MEMO DATED JUNE 3, 1993.

LEGEND

- EXISTING SOIL
- LOW PERMEABILITY MATERIAL (CLAY)
- SAND AND/OR GRAVEL
- WASTE

| REF DWG NO. | DRAWING TITLE |
|---|---|
| G01 | SITE PLAN |

PRELIMINARY
NOT FOR CONSTRUCTION

| REV NO. | REASON FOR REVISION - DESCRIPTION | DRAWN | CHECKED |
|---|---|---|---|
| 0 | WASTE PIT CONTENT STUDY | | |

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - CHAS. T. MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE RESTORATION REPORT
CRU1/PO10

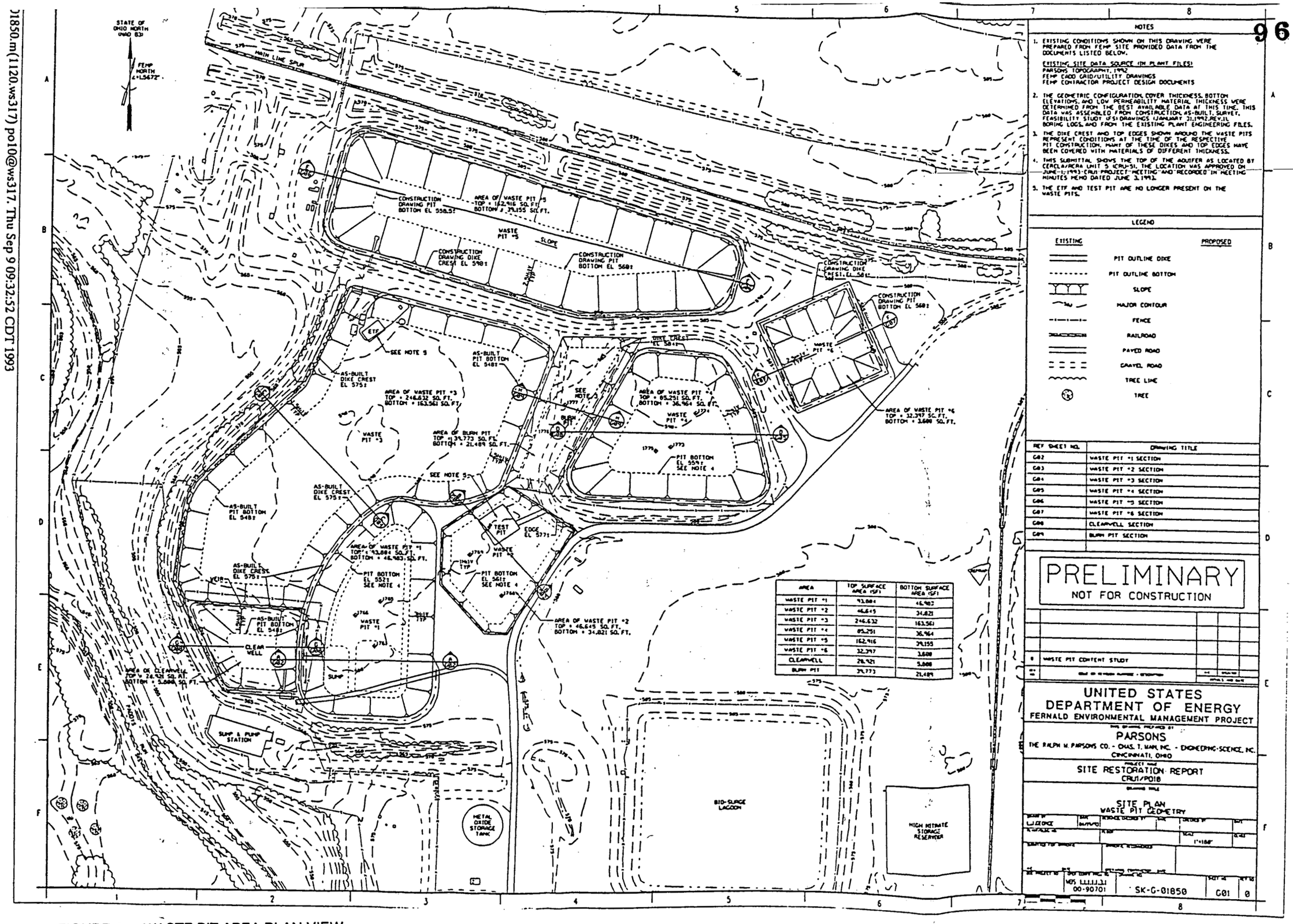
DRAWING TITLE
WASTE PIT #6 SECTION

DRAWN BY L.J.LEDUC DATE 04/14/93 | SCHEDULE CHECKED BY | DATE | CHECKED BY | DATE
SCALE 1"=60'

WBS 1.1.1.1.3.1 00-90701 | DRAWING NO. SK-G-01856 | SHEET NO. G07 | REV. NO. 0

FIGURE 4 - WASTE PIT 6 CROSS SECTION

)1850.m(1120.ws317) po10@ws317. Thu Sep 9 09:32:52 CDT 1993




| AREA | TOP SURFACE AREA (SF) | BOTTOM SURFACE AREA (SF) |
|---|---|---|
| WASTE PIT #1 | 93,884 | 46,983 |
| WASTE PIT #2 | 46,645 | 34,821 |
| WASTE PIT #3 | 246,632 | 163,561 |
| WASTE PIT #4 | 85,251 | 36,964 |
| WASTE PIT #5 | 162,916 | 39,155 |
| WASTE PIT #6 | 32,397 | 3,600 |
| CLEARWELL | 26,921 | 5,888 |
| BURN PIT | 39,773 | 21,489 |

FIGURE 5 - WASTE PIT AREA PLAN VIEW

# APPENDIX B

# DEFINED WASTE IN WASTE PIT 6

## DEFINED WASTE IN WASTE PIT 6

Slag - The molten covering on a pool of molten metal consisting of oxidized impurities in a metal, fluxing substances, ash, and anhydrous compounds entering into the process.

Depleted Magnesium Fluoride ($MgF_2$) Slag - The reduction of $UF_4$ (green salt) to produce depleted uranium metal generates $MgF_2$ slag. The composition of this waste stream was 95 to 98 percent $MgF_2$, 2 to 5 percent uranium in various oxidation states, .2 percent U-235, and trace amounts of elemental magnesium. These depleted slags were stored in Waste Pits 1, 2, and 6.

Slag Leach Filter Cake - The reduction of $UF_4$ in the production of enriched or normal uranium metal generates $MgF_2$ slag; however, because of the U-235 content of the enriched uranium, the slag was acid-leached to dissolve and recover the uranium, then neutralized with calcium oxide. The composition of this waste stream was 94 percent $MgF_2$, 3 percent filter aid (diatomaceous earth), 3 percent calcium nitrate, and .05 percent total uranium (of which U-235 was 1 percent). These depleted slags were stored in Waste Pits 1, 2, 4, and 6.

Neutralized Raffinate - In the refinery operation, uranium-bearing feed materials were digested in nitric acid to solubilize the uranium, leaving the impurities in a waste "raffinate" solution. The aqueous raffinate, containing most of the nitric acid and impurities, and some very small quantities of insoluble nonextractable uranium were then neutralized with lime. The amount and characteristics of the refinery feed material. During the first two decades of operation, refinery feeds included uranium ore concentrates and the waste raffinates contained nitrates of a different mix of metal impurities (aluminum, copper, and iron). The waste stream was composed of metal nitrates, silicon, filter aid, and .05 percent total uranium (of which U-235 was 1.1 percent). Raffinates were placed in Waste Pits 3, 4, and 5.

Depleted Sump Cake - Liquid waste was processed through pre-treatment facilities to filter insoluble uranium compounds for recovery. Depleted U-235 uranium was not economically feasible to recover. The depleted sump cake was considered a waste. Composition of the sump cakes varied in accordance with the plant of origin, but in general they consisted of 80 percent uranium oxides and hydroxides, 12 to 15 percent calcium, and .2 percent U-235. These depleted sump cakes were stored in Waste Pits 1, 2, and 6.

General Sump Sludge - After sampling and analyses were performed to ascertain that the uranium content was within preset allowable discard limits, the filtrate from filtering plant sump sludges was pumped to the general sump. It was then adjusted for pH with calcium oxide to obtain maximum precipitation of radioactive materials, settled, and the supernatant liquid discharged to the river. In accordance with the NPDES permit, the settled solids, containing small amounts of uranium, were collectively termed general sump sludge. This waste stream was composed of excess lime and acid neutralization products. These sludges were stored in Waste Pits 1, 2, and 6.

Dust Collector Residues - Operations within the chemical and metallurgical plants involved the handling of materials and required capture of airborne particulates generated residues in the dust collectors. These were considered waste if the uranium content was depleted in U-235 Composition varied according to the operation generating the collected material. Principal constituents were $UF_4$, $UO_3$, $U_3O_8$, and $MgF_2$. RCRA waste characterization identified heavy metals in these residues including arsenic, cadmium, chromium, and silver. These residues were stored in Waste Pits 1, 2, 4, and 6.

# APPENDIX C

# DATA QUALITY OBJECTIVE

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

DATA QUALITY OBJECTIVES

Title: Solids Sampling - Waste Pits 5 and 6

Number: TS-022

Effective Date: June 5, 1995

Contact Name: Dan Stropes

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Approval: Richard Fiske Date: 5/5/1995
DQO Coordinator

| | | | | | |
|---|---|---|---|---|---|
| Rev. # | 0 | | | | |
| Date | June 5, 1995 | | | | |

## 1. State the Problem or the Situation to be Resolved

CRU1 has a need to perform sampling of solid waste media within Waste Pits 5 and 6. The purpose of the sampling is to obtain geotechnical information about the physical properties of the media to plan engineering treatability design criteria for remediation of the waste pit materials. Also, sampled waste from Pit 6 will be analyzed for Uranium oxidation states, for the purpose of qualitatively identifying the oxidation state(s) of the Uranium present in that pit.

Additional information about geotechnical properties of Waste Pits 5 and 6 materials is necessary to supplement the relatively small amount of existing data available for these pits. Existing geotechnical information, particularly for pit waste density, demonstrates a wide range of density variation. The new data will yield a more precise density value and reduce the density range. This information is vital to more accurately determine the thermal drying system design criteria, as well as to provide more accurate baseline information for the purpose of determining waste transportation requirements such as shipping costs, handling characteristics and scheduling.

Oxidation states data for Pit 6 Uranium will be used to infer the possible presence or absence of Uranium products from past production disposal activities. There is no existing information to address this issue. The Uranium oxidation state analysis results will provide a useful predictive tool about the potential presence of Uranium products which may be encountered during pit waste excavation. This information is important for both waste excavation method and thermal drying system design considerations.

Waste Pits 5 and 6 data gathering will be performed as an amendment to the Operable Unit 1, Dewatering Excavation Evaluation Program (DEEP), Treatability Study Work Plan. The DEEP Treatability Study is driven by the terms of Section XII.D.1 and D.2 of the Amended Consent Agreement between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA). The Waste Pits 5 and 6 studies proposed, and the information required under this investigation, are driven by Remedial Design/Remedial Action activities.

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## 2. Identify the Decisions to be Made that Affect the Situation

The decision is to obtain samples of the waste material contained in Waste Pits 5 and 6. Since the waste material in Pit 5 is known to be heterogeneous and the waste material in Pit 6 is known to be heterogeneous, the goal of this part of the investigation will be to obtain representative samples of the waste material as is necessary and practical for the thermal dryer system treatability study and transportation investigations. This will be accomplished by obtaining a relatively large number of samples from each pit, compiling a composite sample of the core recovered at each sampling location, and geotechnical analysis.

Sampling horizontal locations are specified on the attached map. Pits 5 and 6 will be divided into square grids, 20 feet on a side, with one sampling location within a grid. The samples (one for analysis and one for archive) will be collected in each sampled grid. Core samples 3 inches in diameter will be collected.

A total of 20 in-situ samples (14 from Pit 5, and 6 from Pit 6) will be obtained. Sampling will be performed by the use of a Vibra-Corer. Archive samples will be obtained at each of the 20 sampling locations in addition to the samples to be analyzed. A total of 40 samples, 20 for analysis, and 20 archive samples, will be obtained.

The sampling sequence is highly dependent on the length of crane boom, and the relative accessibility of each pit. The proposed crane boom length is 150 feet. Sampling will begin with the crane set up east of Pit 5. This will allow sampling of all Pit 6 samples and Pit 5 east end samples. The crane will advance west along the pit access road on the south side of Pit 5 to obtain the remaining samples.

The Vibra-Corer will be suspended from the crane boom situated over the proposed sampling location. The Vibra-Corer will be lowered to the surface of the pit waste, started, and advanced to the pre-determined maximum depth, shut off, then removed from the sampled hole. The recovered core will then be separated into manageable lengths, as specified in the Project Specific Plan (PSP), containerized, and sent to the laboratory. The archived sample will be collected by the same methodology, except the Vibra-Corer will be located approximately 5 feet horizontally from the first sampling location, yet within the same grid.

To ensure that sampling equipment will not be advanced closer than within 5 feet of the pit liner, the following method will be used for sample locations above the flat bottom of each pit:

The as built elevation of each pits' liner will be compared to the pits' water surface elevation. The water surface elevation, minus the as built elevation of the pit liner, less 5 feet, will yield the distance the Vibra-Corer can safely be advanced into the pit. This relationship is represented as follows:

$$D = (W_{ss} - E_{pl}) - 5$$

Where:
$D$ = maximum distance Vibra-Corer can be advanced (feet)
$W_{ss}$ = pit water surface elevation (feet)
$E_{pl}$ = pit liner elevation (feet)

For those sample locations above the side slopes of each pit, to ensure that sampling equipment will not be advanced closer than within 5 feet of the pit liner, the following method will be used:

$$SE = TE - D/SS + SM$$

Where:
SS = Slope of pit side wall = 1 foot vertical drop per 2.5 feet of horizontal distance from the pit berm crest
TE = Top elevation of berm; estimated to be 590 feet
SM = Safety Margin = 5 feet
SE = Safe elevation for maximum Vibra-Corer advance

Then the sampling device will be marked to show project field staff the maximum allowable depth to advance. A redundant measuring system, consisting of marking the crane boom cable

will also be used, when logistically possible, to show the crane operator the maximum cable length at each location.

**3. Identify Inputs that Affect the Decision(s)**

Inputs which affect the decisions include:

- Accessibility of sample locations
- Pit water elevation at sample locations
- Thickness of waste at sample locations
- Time required to move the crane between sample locations
- Laboratory analysis time requirements
- Sample collection and handling methods
- Pit liner elevation and grid locations
- Health and safety and weather related issues

Samples will be analyzed for:

- Moisture Content (ASTM D 2216-92)
- In-situ Density (Undisturbed) (EM-1100-2-1906)
- Test Method for Specific Gravity of Soils (ASTM D 854)
- Laboratory Compaction Characteristics of Soil Using Standard Effort (ASTM D 698)
- Classification of Soils for Engineering Purposes (ASTM D 2487)
- Practice for Description and Identification of Soils for Engineering Purposes (ASTM D 2488)
- Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils (ASTM D 4318)
- Grain Size Analysis (ASTM D 422-63/ASTM D 1140-92)
- Minimum Index Density (ASTM D 4254)
- Uranium oxidation states (Method developed by laboratory services contractor, University of Cincinnati)

**4. Define the Boundaries of the Situation**

Physical boundaries include the vertical and horizontal dimensions of Waste Pits 5 and 6. Pit 5 has a surface area of 3.74 acres. Its depth is approximately 29 feet, at its deepest point. Pit 6 has a surface area of 0.74 acres. Its depth is approximately 20 feet at its deepest point. Both pits' sides and bottoms are lined with a 60-mil thick ethylene propylene diene monomer (EPDM) elastomeric membrane liner. The perimeter of Pit 5 consists of an earthen berm approximately 10 feet high.

Temporal boundaries for this project include weather and access. Performance of the Waste Pits 5 and 6 project tasks during inclement weather can cause numerous logistical problems related to sampling, support equipment and personnel access. Access may be limited by the dimensions

of the berm of Pit 5, the location of the perimeter road south of Pit 5, and the crane boom length and angle.

To a lesser extent, access may be limited by the ambient air temperature and amount of precipitation. Project field activities may occur when air temperature is relatively high, which may create a heat stress problem for project staff. Precipitation could change the height of the water in the pits; this could result in loss of control of Vibra-Corer maximum safe advance relative to the EPDM liner in each pit.

**5. Develop a Logic Statement that Applies to the Decision**

DEEP Waste Pits 5 and 6 sampling will be performed in order to provide a sufficient volume and number of representative waste samples in order to obtain pit waste geotechnical information for remedial design purposes. Also, Uranium oxidation states analysis will be performed on Pit 6 samples to provide insight into the possibility of encountering unoxidized Uranium production materials during pit excavation, and the possible thermal drying system design-related implications.

**6. Establish Constraints on the Uncertainty of the Decision**

Individual errors will be controlled by performing a thorough review of the Waste Pits 5 and 6 PSP with all project personnel. Technical guidance will be provided by OU1 management, engineering, geology, and health and safety staffs during the performance of all field work.

A project "false positive" is defined as a set of three possible scenarios, these being:

- Enough waste material sample from each pit has been obtained for treatability study purposes, when actually an insufficient volume has been collected.
- Waste material samples from Pits 5 and 6 are sufficiently heterogeneous to be representative samples, when actually the samples are not heterogeneous enough.
- Uranium analysis results from Pit 6 infer the presence of solid Uranium production materials in the pit, when actually no solid Uranium products are present.

Scenario #1 does not represent a difficulty as a complete core of sampled waste material will be obtained at each sampling location. This sample will be archived for the express purpose of fulfilling future additional data or volumetric needs.

Scenario #2 will be addressed by providing composite samples of the different core intervals for laboratory analysis purposes.

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Scenario #3 would have no major impacts on proposed pit-excavation methods, as contingencies for encountering Uranium products are already in place. However, the scenario could have major impacts to thermal drying system design, and could result in overdesign of the system.

A project "false negative" is defined as a set of three possible scenarios, these being:

- An insufficient volume of waste material sample from each pit has been obtained, when actually enough material has been obtained.
- Waste material samples from Pits 5 and 6 do not seem to be sufficiently heterogeneous, when actually the samples are heterogeneous enough.
- Uranium analysis results from Pit 6 infer the absence of solid Uranium production materials in the pit, when actually solid Uranium products are present.

Scenario #1 will not present a major difficulty; should too much waste material be collected, the excess will be placed back into the pit of origin.

Scenario #2 will be addressed by the use of composite samples for analysis purposes.

Scenario #3 could have impacts on proposed pit remediation (excavation and drying) methods. Although both waste excavation and drying activities have been prepared for the contingency of encountering Uranium, a qualitative assessment of the possible presence of unoxidized Uranium will provide confirmation, and may prompt additional sampling of Pit 6 waste.

While OU1 has a goal of avoiding either "false positive" or "false negative" errors, for the purposes of this DQO, neither type of error is critical to the Waste Pits 5 and 6 sampling project investigation, or to remedial design. Project cost and schedule impacts could potentially be most affected, however, by many other statistically possible factors (beyond the scope of this DQO and the control of OU1) which could have much greater cost and schedule impact on the project than obtaining more waste samples, preparing composite samples, or placing excess waste back into the pits.

**7. Optimize a Design for Obtaining Quality Data**

Data quality will be optimized by performing field activities in accordance with a PSP prepared in accordance with the Sitewide CERCLA Quality Assurance Project Plan (SCQ), established FEMP procedures, and the DEEP Treatability Study Work Plan.

The Waste Pits 5 and 6 PSP addresses all pertinent aspects of the field sampling effort which could impact the integrity of the waste material samples collected. Additionally, all waste sample laboratory analyses will be performed using existing American Society for Testing and Materials (ASTM) and SCQ standards, where SCQ standards exist.

The geotechnical data to be obtained supports OU1 Remedial Design. This data is for treatability purposes to evaluate physical and analytical properties of the waste. There are no applicable SCQ standards which comprehensively address geotechnical sampling and laboratory analyses or thermal dryer and waste transportation systems design. Analytical Support Level B (ASL B) has been selected as appropriate for this project.

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The Uranium oxidation state data to be obtained supports OU1 Remedial Design, and DEEP Safety Assessment objectives. Depending on the Uranium oxidation state(s) identified, more sampling and analysis, of a quantitative nature, may be required. ASL E has been selected as appropriate for this project, as the Uranium oxidation state analysis is a method which must be developed specifically to meet project requirements.

Physical and chemical data will be verified by CRU1 project personnel and entered into the FACTS Sitewide Environmental Database. CRU1 personnel will also perform data assessment for quality, useability, and meeting DQO and project requirements.

# DQO SUMMARY FORM



**1.A. Task/Description:** Sampling of solid waste media **CRU #:** 1
from Waste Pits 5 and 6. Obtain a total of 20 in-situ samples from bottom pit sediments and obtain 20 archive samples for geotechnical analysis. Analyze Pit 6 samples for Uranium oxidation states.

**1.B. Project Phase:** (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☒ RA ☐ R,A ☐ OTHER ☐ Specify:

1.C. DQO No.: TS-022 DQO Reference No.: _____

---

2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐ Soil ☐

Waste ☒ Wastewater ☐ Surface water ☐ Other (specify) _____

---

**3. Data Use with Analytical Support Level (A-E):** (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A ☐ B ☐ C ☐ D ☐ E ☐

Risk Assessment
A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives
A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design
A ☐ B ☒ C ☐ D ☐ E ☐

Monitoring during remediation activities
A ☐ B ☐ C ☐ D ☐ E ☐

Other (Explain) _____
A ☐ B ☐ C ☐ D ☐ E ☒

---

**4.A. Drivers:**
Amended Consent Agreement, Section XII.D.1 and D.2

**4.B Objective:**
Solids sampling of Waste Pits 5 and 6 is designed to provide additional information about Pits 5 and 6 waste characteristics for the purposes of remedial design. Geotechnical parameters, particularly density, Standard Proctor, and moisture content will provide additional information about the waste which is not known. Uranium oxidation state analyses will be used to infer the possible presence of unoxidized Uranium production products in Pit 6. Archived samples are a resource for future information, if necessary, without remobilizing to obtain more samples.

**5. Site Information (Description):**
All proposed project sampling field work will be performed within the OU1 Waste Pit Area, specifically, Waste Pits 5 and 6. Geotechnical and Uranium oxidation states analyses will be performed by qualified laboratories.

# DQO SUMMARY FORM



DQO Number: TS-022

**6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference:** (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

| | | | | | |
|---|---|---|---|---|---|
| 1. pH | ☐ | 2. Uranium | ☐ | 3. BTX | ☐ |
| Temperature | ☐ | Full Radiologic | ☐ | TPH | ☐ |
| Specific Conductance | ☐ | Metals | ☐ | Oil/Grease | ☐ |
| Dissolved Oxygen | ☐ | Cyanide | ☐ | | |
| | | Silica | ☐ | | |
| 4. Cations | ☐ | 5. VOA | ☐ | 6. Other (specify) | |
| Anions | ☐ | ABN | ☐ | Geotechnical Parameters (see Section 9 for List) | |
| | | | | Uranium Oxidation States | |
| TOC | ☐ | Pesticides | ☐ | | |
| TCLP | ☐ | PCB | ☐ | | |
| CEC | ☐ | | | | |
| COD | ☐ | | | | |

**6.B. Equipment Selection and SCQ Reference:**

| Equipment Selection | | Refer to SCQ Section |
|---|---|---|
| ASL A | | SCQ Section: |
| ASL B | Laboratory Instrumentation | SCQ Section: 5.3.3 |
| ASL C | | SCQ Section: |
| ASL D | | SCQ Section: |
| ASL E | Laboratory Instrumentation | SCQ Section: |

**7.A. Sampling Methods:** (Put an X in the appropriate selection.)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Biased | ☐ | Composite | ☒ | Environmental | ☐ | Grab | ☐ | Grid | ☐ |
| Intrusive | ☒ | Non-Intrusive | ☐ | Phased | ☐ | Source | ☒ | | |

Other (specify): _____

DQO Number: TS-022

7.B. Sample Work Plan Reference: (List the samples required. Reference the work plan or sampling plan guiding the sampling activity, as appropriate.)
DEEP Treatability Study Work Plan, Revision 0, April 1995
Background samples: N/A

7.C. Sample Collection Reference: (Please provide a specific reference to the SCQ Section and subsection guiding sampling collection procedures.)

Sample Collection Reference: Appendix K, Sections 2.3, and 5

---

8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

| | | | |
|---|---|---|---|
| Trip Blanks | ☐ | Container Blanks | ☐ |
| Field Blanks | ☐ | Duplicate Samples | ☒ |
| Equipment Rinsate Samples | ☐ | Split Samples | ☐ |
| Preservative Blanks | ☐ | Performance Evaluation Samples | ☐ |

Other (specify) _____

8.B. Laboratory Quality Control Samples:

| | | | |
|---|---|---|---|
| Method Blank | ☒ | Matrix Duplicate/Replicate | ☐ |
| Matrix Spike | ☐ | Surrogate Spikes | ☐ |

Other (specify)

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use. Related OU1 Treatability Study Data Quality Objectives include:

- TS-007, Cooperative Remedy Screening Program
- TS-009, Crusher/Shredder Test
- TS-011, Waste Drying Test
- TS-015, Settling Filtration
- TS-016, Free Liquid

Geotechnical Analysis Parameters (Section 6.A "Other") Include:

- Moisture Content (ASTM D 2216-92)
- In-situ Density (Undisturbed) (EM-1100-2-1906)

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- Test Method for Specific Gravity of Soils (ASTM D 854)
- Laboratory Compaction Characteristics of Soil Using standard Effort (ASTM D 698)
- Classification of Soils for Engineering Purposes (ASTM D 2487)
- Practice for Description and Identification of Soils for Engineering Purposes (ASTM D 2488)
- Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils (ASTM D 4318)
- Grain Size Analysis (ASTM D 422-63/ASTM D 1140-92)
- Minimum Index Density (ASTM D 4254)
- Uranium oxidation states (Method developed by laboratory services contractor, University of Cincinnati)

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# APPENDIX D

# WORK GUIDE

# WORK GUIDE

# FOR

# THE GEOTECHNICAL INVESTIGATION OF

# WASTE PITS 5 AND 6

## PURPOSE

The purpose of this work guide is to provide direction for the sampling operations during the Geotechnical Investigation of Waste Pit 5 and Waste Pit 6. This Work Guide is a support document and is designed to be used in conjunction with the Project Specific Plan prepared for this project.

## APPLICABILITY

This work guide is applicable to the Geotechnical Investigation of Waste Pit 5 and Waste Pit 6.

## REQUIREMENTS

### ALL FIELD PERSONNEL

All personnel performing the field work for this project shall conform to the precautionary surveys performed by the personnel representing site Safety, Industrial Hygiene, Radiological Control, and Health Physics. Concurrence to applicable safety permits and the Project-Specific Health and Safety Plan (indicated by signature) shall be expected in the performance of their assigned duties. All applicable FERMCO standard procedures shall be followed during sampling activities unless a variance has been issued.

### CRANE OPERATION

The crane operator must be qualified in the operation of crane equipment and comply with Occupational Safety and Health Administration (OSHA) Regulations pertaining to the operation of crane equipment set out in 29 Code of Federal Regulations Part 1926, DOE/ID-10500 DOE Hoisting and Rigging Manual, and FERMCO RM-0030 FEMP Supplement to the Department of Energy Hoisting and Rigging Manual.

The crane rigger must be qualified and trained hand signaler.

### CONSTRUCTION CREW

The Wise Construction crew shall be familiar with the logistics of the Vibra-Corer® equipment operation and shall have been briefed on the crane operations prior to commencement of the sample event.

Construction personnel shall comply with all applicable FERMCO Construction procedures.

### SAMPLE TECHNICIANS

The Sample Technicians shall be trained in all applicable sampling procedures as set out in the SCQ, Appendix K, Section K.3 (Responsibilities) and K.5 (Solid Matrix Environmental Samples).

## PRE-OPERATIONAL START-UP

### CRANE OPERATION

Setup, inspection, and operation of the crane shall be per OSHA standards set out in the Code of Federal Regulations 29 Part 1910.180 and 1926.550, DOE/ID-10500 Hoisting and Rigging Manual, FERMCO RM-0030 FEMP Supplement to the Department of Energy Hoisting and Rigging Manual and all relevant national consensus standards (i.e., American National Standards Institute).

Accessible areas within the swing radius of the rotating superstructure of the crane will be barricaded and/or partitioned off with caution tape to reduce the possibility of employee injury.

Crane clearance from any electrical distribution or transmission lines will be maintained in accordance with DOE/ID-10500 Hoisting and Rigging Manual, FERMCO RM-0030 FEMP Supplement to the Department of Energy Hoisting and Rigging Manual.

An inspection of the crane equipment, machinery and cable will be completed prior to use by Mike Davis, FERMCO Health and Safety Officer. Necessary repairs and/or part replacements mandated by the inspector will be completed prior to use.

The Wise Construction Field Crew will assess the crane's anticipated pattern of movement during the mobilization, sampling and de-mobilizing activities and will prepare the terrain as necessary (i.e., upgrading or construction of a roadway which can accommodate the crane's movement). Also, the construction crew will inspect the crane's anticipated location for each sampling location and will prepare the terrain for the crane set up and outrigger placement.

### VIBRA-CORER® OPERATION

1. The Wise Construction Field Crew will take inventory of the Vibra-Corer® parts to insure all parts are present and will also check the equipment and parts for any damage or wear. If any parts are missing or damaged, the Construction Manager will be notified immediately.

## OPERATIONAL EQUIPMENT SET UP

### VIBRA-CORER® OPERATION

The Wise Construction Field Crew will assemble the sampling barrels of the Vibra-Corer® following the directions set out below:

1. Insert liner into the sampling barrel casing.
2. Attach Vibra-Corer® onto core barrel.
3. Mark depth intervals on core barrel.
4. Attach drive shoe with catch basket to the end of the core barrel.
5. Attach drive cable to Vibra-Corer® assembly.

CRANE OPERATION

1. The crane operator and rigger shall move the crane into position. Stabilization of the crane structure will be accomplished by the placement of the outriggers. The crane operator and rigger will insure that the outriggers are fully extended and that crane mats are used.

## EQUIPMENT OPERATION

CRANE AND VIBRA-CORER® OPERATION

Due to the required coordination of equipment use, the crane and Vibra-Corer® equipment operation guidelines are set out below in the order of occurrence.

1. The Construction Manager will direct the rigger to have the crane operator move the crane hook into position for attaching the Vibra-Corer® sampling device.

2. The rigger shall attach the crane lines to the Vibra-Corer® sampling device.

3. The rigger shall signal the crane operator to slowly raise the sampling device to a vertical position.

4. With the Construction Manager's concurrence, the rigger shall signal the crane operator to slowly raise the sampling device and move it so that it is directly over the sampling area designated by the surveyor's reflector device.

5. The rigger will direct the crane operator to lower the sampling device, maintaining a vertical position, into the water until the drive shoe is in contact with the surface of the waste material.

6. With the drive shoe resting at the surface of the waste material, the air compressor will be engaged by Wise Construction personnel.

7. Upon engagement of the air compressor, the rigger will direct the crane operator to lower the Vibra-Corer® into the waste material for the designated number of feet specified for that sample location area (See Section 3.1 of the PSP).

8. Upon reaching target depth, the rigger will signal the Wise Construction Field Crew to disengage the air compressor.

9. The rigger will signal the crane operator to raise the Vibra-Corer® from the waste pit and direct the crane operator to transport the sampling device to the sample receiving station.

10. The rigger will remove the crane line attachment to the Vibra-Corer® assembly.

11. The Wise Construction Field Crew will disassemble the sampling device and remove the liner with the sample material from the core barrel.

12. Environmental Field Operations Sampling Technicians will receive the sample material contained in the liner for sample processing.

# APPENDIX E

# FIELD DOCUMENTATION FORMS

FEMP
RSO - ANALYTICAL

Form Number: ____ - ____ - ____

# SITE-WIDE ANALYSIS REQUEST/CUSTODY RECORD

Page ____ of ____

| | |
|---|---|
| PROJECT: | FOR SAMPLE RELATED PROBLEMS, CONTACT: |
| ☐ PLAN NO.: OR ☐ PROJECT NO.: | ORGANIZATION: |
| PROJECT MANAGER/ENGINEER: | NAME: PHONE: |
| SAMPLER: PHONE: | SAMPLER REMARKS: |
| CHARGE NUMBER: LOT MARKING CODE: | |
| SAMPLER SIGNATURE(S): | |
| SEND RESULTS TO: | |

CHECK FOR: ☐ S R LAB ☐ BIO LAB ☐ WTP LAB

SAMPLE SOURCE, DESCRIPTION/IDENTIFICATION, ANALYSIS REGIMEN

| ITEM NO. | SAMPLE NUMBER | CUSTOMER NUMBER | SAMPLE POINT | MATRIX CODE | COLLECTED DATE | COLLECTED TIME | CONTAINER/ VOLUME | COMPOSITE | GRAB | NO. OF CONTAINERS | ANALYTES CODE - (UNITS CODE) | | | | | | | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
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FEMP

# SAMPLE COLLECTION LOG

CONTROL NUMBER:

Page _____ of _____

SAMPLE LOCATION:

PROJECT NAME:

PROJECT NUMBER:

SAMPLE TEAM LEADER:

SAMPLE TEAM:

RELATED FAL NUMBER(S):

| UNIQUE SAMPLE NUMBER | SAMPLE TYPE CODE | SAMPLE SCREEN RESULTS (PID) | SAMPLE SCREEN RESULTS (RAD) | COLLECTION START | | COLLECTION STOP | | SAMPLE DEPTH INTERVAL | PRESERVATIVE CODE | NUMBER OF CONTAINERS | SAMPLE CONTAINER TYPE & SIZE | ANALYTICAL PARAMETERS (OR TARGET ANALYTE LIST) | VISUAL DESCRIPTION OF SAMPLE | DUPLICATE OF SAMPLE NUMBER | QA/QC SAMPLE DESIGNATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | DATE | TIME | DATE | TIME | | | | | | | | |
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REMARKS:

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FEMP

# SAMPLE COLLECTION LOG - SAMPLE CODES

| PRESERVATIVES CODE | |
|---|---|
| P00 | None Required |
| P01 | Cool, 4° C |
| P02 | Freeze, <0° C |
| P03 | Filter on site |
| P04 | Filter on site/$HNO_3$ to pH<2 |
| P05 | Filter on site/Cool, 4° C |
| P06 | Filter on site/Cool, 4° C/$H_2SO_4$ to pH < 2 |
| P07 | $H_2SO_4$ to pH < 2 |
| P08 | $H_2SO_4$ to pH < 2/Cool, 4° C |
| P09 | HCl to pH <2 |
| P10 | HCl to 1% |
| P11 | $HNO_3$ to pH <2 |
| P12 | $HNO_3$ to 1% |
| P13 | $HNO_3$ to pH <2/Cool, 4° C |
| P14 | NaOH to pH >12/Cool, 4° C |
| P15 | $Na_2S_2O_3$ (10% soln) to 1% |
| P16 | $Na_2S_2O_3$ 100 mg/L |
| P17 | Cool, 4° C/2mL ZnOAc + NaOH to pH>9 |

| QA/QC SAMPLE DESIGNATION CODE | |
|---|---|
| Q01 | Preservation Blank |
| Q02 | Container Blank |
| Q03 | Temperature Blank |
| Q04 | Trip Blank |
| Q05 | Field Blank |
| Q06 | Rinsate |
| Q07 | Duplicate Sample |
| Q08 | Split Sample |
| Q09 | Deionized Water Blank |
| Q10 | Matrix Spike |
| Q11 | Matrix Spike/Matrix Spike Duplicate |

| SAMPLE TYPE CODE | |
|---|---|
| M100 | Ground Water |
| M101 | Surface Water |
| M102 | Milk |
| M103 | Soil |
| M104 | Sediment |
| M105 | Vegetation |
| M107 | Algae |
| M108 | Meat |
| M109 | Fish (total) |
| M110 | Fish (edible fillets) |
| M111 | Sludge |
| M112 | Air Filter |
| M118 | Miscellaneous (specific description addressed in remark field) |
| M300 | Tank Contents (water) |
| M301 | Tank Contents (organic) |
| M302 | Tank Contents (unknown) |
| M305 | Concrete |
| M310 | Liquid (unknown) |
| M314 | Oils |
| M317 | Rocks/Bricks |
| M322 | Solid (unknown) |
| M333 | Deionized Water |
| M334 | Drill Cuttings |

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# LITHOLOGIC LOG

| CONTROL NO.: | PAGE _____ OF _____ |
|---|---|

| PROJECT NAME: | PROJECT NO.: |
|---|---|

| BORING NUMBER: | COORDINATES: | RELATED FAL NO.s: |
|---|---|---|

| SURFACE ELEVATION: | GROUNDWATER LEVEL: | DATE: | TIME: | DATE STARTED: |
|---|---|---|---|---|
| GEOLOGIST: | GROUNDWATER LEVEL: | DATE: | TIME: | DATE COMPLETED: |

| WATER USED DURING DRILLING: | DRILLING CONTRACTOR: | DRILLING EQUIPMENT: | DRILLER / HELPER: |
|---|---|---|---|

| DEPTH (FEET) | SAMPLE TIME, DATE, AND NUMBER | BLOWS (per 6 inch) | RECOVERY (inches) | DESCRIPTION (Colors identified per Munsell Color Chart) | USCS SYMBOL | MEASURED CONSISTENCY (TSF) | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

| INSTRUMENT | BACKGROUND | DATE | TIME |
|---|---|---|---|
| PID | | | |
| ALPHA | | | |
| BETA / GAMMA | | | |

NOTES:

* SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681

G: / WPSC / 94-776.DRW (11-23-94)

FEMP
RSO - ANALYTICAL

Form Number: ____ - ____ - ____

# SITE-WIDE ANALYSIS REQUEST/CUSTODY RECORD

Page ____ of ____

| | |
|---|---|
| PROJECT: | FOR SAMPLE RELATED PROBLEMS, CONTACT: |
| ☐ PLAN NO.: OR ☐ PROJECT NO.: | ORGANIZATION: |
| PROJECT MANAGER/ENGINEER: | NAME: PHONE: |
| SAMPLER: PHONE: | SAMPLER REMARKS: |
| CHARGE NUMBER: LOT MARKING CODE: | |
| SAMPLER SIGNATURE(S): | |
| SEND RESULTS TO: | |

CHECK FOR: ☐ S R LAB ☐ BIO LAB ☐ WTP LAB

SAMPLE SOURCE, DESCRIPTION/IDENTIFICATION, ANALYSIS REGIMEN

| ITEM NO. | CUSTOMER NUMBER | SAMPLE POINT | MATRIX CODE | COLLECTED DATE | COLLECTED TIME | CONTAINER/ VOLUME | COMPOSITE | GRAB | NO. OF CONTAINERS | ANALYTES CODE - (UNITS CODE) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
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# FIELD ACTIVITY LOG

| CONTROL NO.: | PROJECT NAME / NO.: | PAGE ____ OF ____ |
|---|---|---|
| PREPARED BY (NAME): | BADGE NO.: | DATE: |

| FIELD ACTIVITY SUBJECT: | GENERAL LOCATION / FACILITY DESCRIPTION: | |
|---|---|---|
| WEATHER CONDITIONS: | AIR TEMPERATURE: | BAROMETRIC PRESSURE (In Hg): |

| TIME | DESCRIPTION OF ACTIVITY |
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## METER CALIBRATION

**WATER QUALITY METER**

| MFR. NAME: | SERIAL NO.: | INITIALS: | DATE: | TIME: | STD. SOLN. MFR.: | STD. SOLN. LOT NO.: | STD. SOLN. EXP. DATE: |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

**PHOTOIONIZATION DETECTOR**

| MFR. NAME: | SERIAL NO.: | INITIALS: | DATE: | TIME: | CAL. GAS MFR.: | CAL. GAS TYPE: | CAL. GAS CONC.: | ppm: | PROBE eV: |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| ALPHA METER | | BETA GAMMA METER | | CALIBRATION PROBLEMS: |
|---|---|---|---|---|
| MFR. NAME: | SERIAL NO.: | MFR. NAME: | SERIAL NO.: | |

| VISITORS | | TIME | |
|---|---|---|---|
| NAME(S) | ORGANIZATION(S) | ARRIVED | DEPARTED |
| | | | |
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# FIELD ACTIVITY LOG
## (CONTINUATION PAGE)

| CONTROL NO.: | PROJECT NAME / NO.: | PAGE _____ OF _____ |
|---|---|---|
| PREPARED BY (NAME): | BADGE NO.: | DATE: |

| FIELD ACTIVITY SUBJECT: | GENERAL LOCATION / FACILITY DESCRIPTION: |
|---|---|

| TIME | DESCRIPTION OF ACTIVITY |
|---|---|

FS-F-3682-1 (05-08-95)

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# APPENDIX F

# PROJECT-SPECIFIC HEALTH AND SAFETY PLAN

UNCONTROLLED

Fernald Environmental
FERMCO
Restoration Management Corporation

FERNALD ENVIRONMENTAL

RESTORATION MANAGEMENT CORPORATION

# CERCLA / RCRA UNIT #1 (CRU1)

# PROJECT SPECIFIC HEALTH & SAFETY PLAN FOR GEOTECHNICAL INVESTIGATION OF WASTE PIT 5 AND WASTE PIT 6

JUNE 1995

REV 0

EMERGENCY PHONE NUMBER 648-6511
RADIO: "CONTROL"

APPROVALS:

Robert Fellman 6/6/95
Bob Fellman, Director CRU1 Date

Daryl C. Mills 6/06/95
Daryl Mills, Construction Safety & Health Manager Date

Michael S. Davis 06-06-95
Mike Davis, FERMCO Health & Safety Officer Date

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- 1.2 WORK DESCRIPTION . . . . . 1 of 16

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- 2.2 HEALTH AND SAFETY OFFICER . . . . . 2 of 16
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## LIST OF ATTACHMENTS


| ATTACHMENT | TITLE |
|---|---|
| A | Project Specific Health and Safety Requirements Matrix |
| B | Personnel & Environmental Monitoring Action Levels |
| C | FEMP Rally Points |
| D | Location of FEMP Medical Facility |
| E | Work Area Material Safety Data Sheets (MSDSs) |
| F | Work Area Maps |
| G | OSHA and DOE Employee Rights Poster |
| H | Acknowledgement Form |

# 1.0 INTRODUCTION

This Project Specific Health and Safety Plan (PSHSP) is for the Geotechnical Investigation of Waste Pits 5 and 6.

Before entering the project work area, all personnel shall be oriented on this PSHSP and the Project Specific Health and Safety Requirements Matrix (PSHSRM) (Attachment A). After orientation, personnel must sign an Acknowledgement Form (Attachment H) stating they understand and will abide by the conditions of this plan. The Fernald Environmental Restoration Management Corporation (FERMCO) Health and Safety Officer shall control the Acknowledgement Form.

## 1.1 WORK AREA CHARACTERIZATION

The Waste Pits were constructed to receive and contain process wastes during the production activities of the former Feed Materials Production Center (FMPC). Waste Pits 5 and 6 were constructed in the later production years, 1968 and 1979, respectively; they were constructed in the same manner (cut and fill) and both have a 60 mm thick Royal-Seal ethylene propylene diene monomer (EPDM) elastomeric membrane liner. The pits differ in size, shape and berm configuration.

Waste Pit 5 was constructed in 1968 and is approximately 29 feet deep with sloped sides. The waste pit berm extends about 10 feet above grade on the south side and 14 to 20 feet above grade on the north side. The process waste which entered into Waste Pit 5 was neutralized raffinate, a by-product of the ore extraction process. The raffinate (a nitric acid solution) held metal nitrates, silicon, filter aid and 0.05 percent total uranium in solution. Upon neutralization, these materials dropped out of solution to create a "slurry" which was then pumped to the pit.

Waste Pit 6 was constructed in 1979 and is approximately 24 feet deep with sloped sides. The berm exists around all sides with the exception of the west side which is adjacent to Waste Pit 4. The berm varies in height from approximately 4 to 8 feet above grade. Waste Pit 6 received a variety of waste materials, principally: depleted magnesium fluoride ($MgF_2$) slag, slag leach filter cake, depleted sump cake, general sump sludge, dust collector residues.

## 1.2 WORK DESCRIPTION

Samples will be taken from fourteen (14) locations in Waste Pit 5 and six (6) locations in Waste Pit 6. The samples will be taken with a Vibra-Corer® drilling device suspended from a crane. The Vibra-Corer® will produce a sample core between 5-25 feet long. The core will be separated into manageable sections.

## 2.0 ORGANIZATION STRUCTURE AND KEY PERSONNEL RESPONSIBILITIES

2.1 MANAGER, CONSTRUCTION SAFETY & HEALTH - Daryl Mills (Phone 648-4253)
Responsible for the oversight of work activities in construction safety and health compliance. Laurie Hagen is Daryl Mills' alternate.

2.2 HEALTH AND SAFETY OFFICER - Mike Davis (Phone 648-4773)
Responsible for ensuring that all programs and compliance issues are addressed in the field. Laurie Hagen is Mike Davis' alternate for this project.

2.3 PROJECT DIRECTOR, CRU1 - Bob Fellman (Phone 648-4755)
Responsible for direction toward the development of the PSHSP and for providing signature approval to the final document. Willy Benson is Bob Fellman's alternate.

2.4 FERMCO PROJECT MANAGER - Dan Stropes (Phone 648-4766)
Responsible for the safe and prompt completion of project activities. Greg Stephens is Dan Stropes' alternate for this project.

2.5 ASSISTANT PROJECT MANAGER - Greg Stephens (648-5220)
Responsible for assisting the project manager with project reviews, budgets and schedules. Provides technical oversight of field operations and will direct construction activities. Jim Hey is Greg Stephens' alternate

2.6 FIELD SUPERVISOR - Jim Hey (Phone 648-4765)
Responsible for the supervision and oversight of field activities. Greg Stephens is Jim Hey's alternate.

# 3.0 SITE CONTROL

## 3.1 WORK AREA REQUIREMENTS

### 3.1.1 Radiological Concerns

All work involving potential contact with waste pit material will be performed inside a radiological Contamination Area. Controlled perimeters of radiological areas are defined by yellow and magenta rope or yellow snow fence. All radiological areas will be identified by signs having the standard radiation symbol, the trefoil, on a yellow background.

The following areas may/will be encountered in the performance of the work in or around the waste pits:

- -Controlled Area
- -Radioactive Material Area
- -Fixed Contamination Area
- -Soil Contamination Area
- -Contamination Area
- -Airborne Radioactivity Area
- -High Contamination Area

Radiological areas are established based on the contamination levels in Attachment B.

### 3.1.2 Exclusion Zones

An Exclusion Zone (EZ) will be established around the crane and sample handling location established during field activities. The EZ shall have one ingress and egress point with access limited to crane operator, sampling personal, project field management staff, FERMCO Safety personnel, and personnel authorized to enter per Project Field Supervisor. EZ barricades will consist of yellow caution tape unless it contains radiological contamination, then zone will be controlled as a radiological "controlled" area with yellow and magenta rope. The hazard in the area must be posted. Activities, not directly related to the sampling, will be performed outside the EZ boundary.

Whether it be for radiological control or to enter/exit a work area, at no time will employees cross over or under a barricade which is around an exclusion zone. The entrance/exit point is the only access to this area.

## 4.0 TRAINING

There are three categories of training on site. The type of work to be conducted and the location of the work will determine the category of training the employee requires. Most training requires an annual refresher course.

Training requirements for each task to be performed are outlined in the attached PSHSRM.

### 4.1 HAZARD COMMUNICATION

#### 4.1.1 Material Safety Data Sheets (MSDSs)

Employees are required to review the MSDSs for products they are using. They are to follow the health and safety requirements on the MSDS.

A complete set of MSDSs for all chemicals used on this project shall be maintained in a central location on the FEMP property. The employees are responsible for knowing this location.

MSDSs for Pit 5 & 6 material are included in Attachment E. The central location for all MSDSs is located in the Health and Safety Building Rm 248 or can be obtained by calling (648)-4000.

#### 4.1.2 Job Briefings/Safety Meetings

All personnel are to attend a prework/kick off safety meeting prior to starting work on this project. At the prework/kickoff safety meeting this PSHSP, PSHSRM, and FERMCO work permits will be discussed.
Management is to review work tasks with project workers daily and when new tasks are started. The worker is to be informed of the hazards and safety controls for the work being performed.

Workers are to attend weekly safety meetings conducted by their supervisors or HSO. Written documentation of the briefings and attendance sheets will be maintained as part of the project.

Whenever a revision or change is made to the PSHSP, or a change is made to existing work activities, the change shall be reviewed with project workers at a job briefing and documentation of the briefing and attendance shall be maintained as part of the project file.

### 4.2 RECORDS

The Acknowledgement Form, (Attachment H), will be signed by all persons working on this project. This form will be kept with the Field Copy of the PSHSP and at the end of the project will be turned in to the FERMCO HSO and filed with the project records.

Employees are to keep their respirator fit test card and training verification card (pink) with them at all times.

### 4.3 VISITORS

A visitor to the work site covered by this PSHSP will be defined as anyone coming to the work site with the sole purpose of observation or viewing the activity in progress (hands-off inspections). Visitors cannot operate any equipment, perform manual labor or supervise/oversee any work activity.

4.3.1 Visitors who have been trained per this section shall be orientated to the hazards of the site and the control measures through:

- Briefing on this PSHSP
- Shall contact the site supervisor for briefing on the current site activities and the associated hazards

4.3.2 Visitors entering construction/work sites or a Controlled Area, but not entering a posted Contamination, Radiation or Airborne Area or Exclusion Zone, shall meet the following requirements:

- Meet the requirements of 4.3.1
- Be escorted by a person who has all the required training for the area to be toured
- Wear a Thermoluminescent Dosimeter (TLD) radiation badge and view the Visitor Orientation Video (for Controlled Area entry only).

4.3.3 Visitors entering Contamination, Radiation or Airborne Radioactivity Areas shall meet the following requirements:

- Meet the requirements of 4.3.2
- Receive authorization from the Manager of Radiological Control.
- Wear the required PPE specified on the posted FERMCO Work Permit

4.3.4 Visitors entering an Exclusion Zone shall meet the following requirements:

- Meet the requirements of 4.3.2
- Receive authorization from the HSO
- Wear the required PPE specified on the posted FERMCO Work Permit

# 5.0 MEDICAL MONITORING AND SURVEILLANCE

## 5.1 REQUIREMENTS

All personnel engaged in the performance of project field activities and on site more than five days, are required to participate in the FEMP medical monitoring program. This program shall include in-vivo whole body monitoring and the routine urine monitoring program. Baseline fecal sampling is also required for those personnel required to work inside the Waste Pit 5 boundary. Incident bioassay samples, initial (end of shift) and post (start of next shift) urine samples for uranium concerns and/or follow up fecal samples for thorium concerns, will be required if radiological conditions indicate potential exposures to personnel during the performance of the project. If any confirmed positive results occur, a 24-hour follow-up sample will be initiated by Dosimetry for the affected individual. All personnel entering the Waste Pit 5 contamination area will be required to wear Breathing Zone Air sampling pumps in accordance with Dosimetry requirements for Thorium area entry.

Employees who receive radiopharmaceuticals or become pregnant are to report this information to the FERMCO Medical Services Department.

Employees in the following certification programs are required to have medical certification to perform their duties:

- DOT driver
- Heavy equipment operator
- Respirator user
- Rigger
- Crane operator

## 5.2 RECORDS

The FERMCO Medical Services Department maintains copies of all employee medical records which employees have access to.

# 6.0 HAZARD ASSESSMENT

This section addresses the identified health and safety hazards associated with field activities covered by this PSHSP. Hazards may originate from the chemical, physical, radiological, biological, and safety hazards known or suspected to be present.

## 6.1 RADIOLOGICAL ISSUES

Radiological analyses of Waste Pit 5 and Waste pit 6 indicate that the following isotopes are of primary concern:

-Uranium compounds
-Thorium-230
-Radon

Thorium-230 is the primary isotope of concern for Waste Pit 5 and uranium-238 is the primary isotope of concern for Waste Pit 6 based on the ratio of concentrations in each pit.

Uranium is a radioactive material, and in its soluble forms, is highly toxic to the kidneys. Soluble uranium compounds such as uranyl nitrate, uranyl fluoride and uranyl acetate are absorbed through the skin. Non-soluble forms of uranium, such as uranium octaoxide (black oxide), uranium dioxide (brown oxide), uranium tetraflouride (green salt) and uranium trioxide (orange oxide) are not absorbed through the skin, but constitute a radioactive inhalation hazard to the lungs.

Thorium is also a silvery-white, soft, ductile, radioactive metal which was deposited in the waste pits as mixed oxide (cold) raffinates. These raffinates are residues of the refinery process and contain high levels of thorium-230. Thorium is principally an inhalation and external radiation hazard. When equal amounts of activity are inhaled, thorium will deliver more radiation dose than uranium. Because of this, the limit for airborne thorium activity is approximately 40 times less than that of uranium. Personal air monitoring and respiratory protection are required everywhere airborne thorium may exist.

Radon ($Rn^{222}$) is a decay product of uranium ($U^{238}$). It is an inert gas that decays to a series of radioactive particulate products. The gas diffuses in air and tends to concentrate in areas of poor ventilation. It has a half-life of 3.8 days. Since it is an inert gas, it is unaffected by HEPA filters. The particulate products will exist anywhere radon gas exists and have an effective half-life of about 30 minutes. HEPA filters are nearly 100% effective in removing the decay products. The principle hazard of Radon (and its decay products) is inhalation.

Due to their short half-life, a relatively high concentration is necessary to produce a significant dose concern. Since approximately 98% of the dose delivered by radon comes from the decay products, HEPA filtered respiratory protection is an effective means of controlling radiation exposure from it.

## 6.2 INDUSTRIAL HYGIENE ISSUES

### 6.2.1 Chemical Contaminants

There are two types of chemical hazards potentially associated with Waste Pits 5 and 6: particulates and slurries. These are described below:

6.2.1.1 Waste Pit 5

Metals / nuisance particulates
Inhalation and ingestion are the primary routes entry for metals and nuisance particulates. The material in the Waste Pits is known to be saturated with water (sludge). As long as the Waste Pit material is not allowed to dry, inhalation is not a concern. Ingestion of pit material is the primary concern. A description of the known metals and their effects on humans are discussed below.

Nuisance Particulates
Nuisance particulates are inert dusts considered to be relatively harmless unless exposure is severe; therefore, nuisance particulates are not regulated by their chemical composition. Excessive exposure to even low toxicity dusts may cause skin, eye and upper respiratory tract irritation.

Arsenic, Inorganic
Arsenic is a shell gray metal in its pure form. Arsenic is a human carcinogen and an acutely toxic poison if ingested. Soluble trivalent forms, such as arsenic trioxide, may cause skin and mucous membrane irritation. Acute inhalation effects are rare and chiefly inflammation. Chronic inhalation effects may include perforation of the nasal septum, weight loss, nausea, diarrhea, hair loss, skin discoloration/lesions, and loss of sensation from peripheral nerves.

Barium, Soluble
Barium is a silver-white malleable metal in its pure form. Alkaline barium compounds may cause local irritation to the eyes, nose, throat and skin. Barium presents a hazard when ingested or inhaled. Acute exposure symptoms may include vomiting, diarrhea, irregular pulse and muscular paralysis. Chronic exposure to barium sulfate may lead to a benign pneumoconiosis.

Copper
Copper is a reddish colored metal. It is a questionable carcinogen and may effect reproduction.

Lead, Inorganic
Lead is a bluish-gray metal when pure and may be brightly colored yellow or orange when present in its various oxides. Lead is a toxin to the blood-forming organs. Early symptoms of exposure may include loss of appetite, insomnia, irritability and muscle/joint pains, followed by anemia. Lead is also listed a possible human carcinogen of the lungs and kidneys. Routes of entry are inhalation and ingestion.

Lime
Large quantities of lime (calcium oxide) were used for neutralization of wastes sent to Pit 5. Lime and hydrated lime are caustic materials which may be corrosive to skin and eyes.

6.2.1.2 Waste Pit 6

ASBESTOS

Asbestos is a naturally occurring fibrous mineral ranging from long flexible fiber to dust-like filler powder. Asbestos can be white, gray, brown, or blue in color. It is resistant to acids and heat, and does not conduct electricity or heat well. Asbestos may be found in cement products, acoustical plaster, fireproofing, wallboard, ceiling tiles, vinyl floor tiles, thermal insulation and other materials. Asbestos is a human carcinogen which mainly affects the respiratory system. Acute exposure may cause irritation and coughing. Chronic exposure to levels of airborne asbestos has been linked with a debilitating lung disease called asbestosis; a rare cancer of the chest and abdominal lining called mesothelioma; and cancers of the lung, esophagus, stomach, colon, and other organs. When working with asbestos containing material, trained personnel, personal protective equipment (PPE), respiratory protection and an Asbestos Work Permit will be required.

Asbestos which was removed from various facilities on-site was bagged and disposed of in Pit 6. This material is mostly in the form of pipe insulation.

Magnesium fluoride slag
Magnesium fluoride is colorless that is very soluble in water. It is moderately toxic by ingestion and if heated will emit toxic fumes of fluoride.

### 6.2.2 Heat Stress

Heat stress may affect personnel performing activities with or without protective clothing when working in high ambient temperatures. Plenty of water, use of cooling devices, rest breaks and careful attention by the supervisor shall be used as control measures. Personnel shall become aware of symptoms of heat stress and be able to recognize these symptoms in oneself and in other workers. Symptoms of heat stress include: muscle cramps, fatigue, weakness, loss of coordination, nausea and in the later stages, hot dry skin (absence of sweating), delirium and seizures.

Heat stress recognition and prevention is to be reviewed at regularly scheduled safety meetings.

When ambient temperatures exceed 80°F, FERMCO IH shall be contacted to review and/or make changes to control measures to minimize heat stress (i.e., cool vests).

### 6.2.3 Biological Hazards

**Plants** - Plant life which has the highest potential for affecting project field workers includes poison ivy, poison oak, and poison sumac. The workers are to be briefed on how to identify and avoid these plants.

Any skin exposed to poisonous plants shall be washed as soon as possible following exposure. Should the employee show sensitivity to the exposure, the employee is to go to the FERMCO Medical Services Department for treatment.

**Insects/Animals** - A variety of insects, including ticks, mosquitos, bees, wasps, and chiggers are of concern at the project area. Should the employee show sensitivity to an insect bite, the employee is to go to the FERMCO Medical Services for treatment.

Workers are free to use insect repellents, which are available through FERMCO Medical Services, and will be provided upon request.

## 6.3 SAFETY ISSUES

### 6.3.1 Physical Hazards

#### 6.3.1.1 Lifting

Lifting is the most common task associated with lower back injury. Many of the injuries do not result from a single incident, but develop over a period of time. This type of injury may result from repetitive lifting. Personnel should know their lifting limits, and the object to be lifted should be limited by factors such as the route and distance to be traveled, the amount of time required, and the center of gravity necessary to handle the load safely.

At no time will an employee lift more than 50 pounds without assistance from another employee or mechanical device.

6.3.1.2 Noise

Hazardous noise levels may be created during operation of heavy equipment and portable power tools. Monitoring for hazardous noise levels may be conducted by FERMCO Industrial Hygiene. Generally, if you have to raise your voice to be heard over the noise then you may have exceeded the 85 dBA limit.

6.3.2 Fire Protection

A fire hazard caused by this activity is unlikely.

Any burning, welding, or open flame will require an open flame permit.

# 7.0 HAZARD CONTROL

## 7.1 ENGINEERING CONTROLS

When needed, engineering controls will be used to control physical, chemical, and radiological hazards. Engineering controls anticipated to be used during the work, covered under this PSHSP, shall include:

- Establishment of work zones surrounding the work sites with entrance/exit points

## 7.2 ADMINISTRATIVE CONTROLS

Administrative controls shall be the primary means of hazard control. Administrative controls shall include, but not be limited to:

- Project Specific Health and Safety Plan and matrix
- Project Specific Plan
- Qualified Operators
- FERMCO Permits

## 7.3 PERSONAL PROTECTIVE EQUIPMENT/RESPIRATORY PROTECTION

The levels of PPE and respiratory protection (PPE/RP) in the PSHSRM (Attachment A) and the FERMCO Work Permits have been based upon characterization data and regulatory requirements at the time of writing. Modification to the level of PPE/RP may be required based upon field monitoring and conditions.

The modification of PPE/RP level due to changes in safety or chemical hazards (Non-radiological) may be conducted by the Subject Matter Expert (SME) (HSO OR IH Technician) for the hazard being controlled. When changes are required the following steps shall be taken:

1. Contact the HSO and all other affected S&H Departments (Industrial Hygienists and IH Technicians, Radiological Engineering and Control) to determine if the change affects their controls.

2. IH Technicians will complete a new PPE page of the FERMCO Work Permit and inform the FERMCO Permit Group.

3. The HSO will change the PPE section of the PSHSRM.

The modification of the PPE/RP level due to changes in radiological hazards requires the following steps be taken:

1. Consult with the Industrial Hygienist, Radiological Engineer, and the HSO.

2. Radiological Control shall document the changes by rewriting and reissuing the affected field FERMCO Work Permits.

3. The HSO will change the PPE section of the PSHSRM.

All personnel working under this PSHSP are responsible for reviewing the posted PPE/RP requirements and adhering to those requirements. All personnel must stay abreast of potentially changing work area conditions and requirements. This should be accomplished during pre-job briefings and safety meetings.

# 8.0 DECONTAMINATION

## 8.1 RADIOLOGICAL DECONTAMINATION REQUIREMENTS

Upon leaving a radiologically controlled area, workers are to monitor for radiological contamination by performing a direct "frisk" (alpha frisk required in addition to beta-gamma frisk when exiting the pit 5 area). Detection of a count rate above background should alert personnel of possible contamination. Personal contamination on the skin, or on the inner personal company-issued clothing, shall require contact with a RCT immediately.

Any circumstance which could have resulted in an intake of radioactive materials by inhalation, ingestion, or absorption shall be immediately reported to a supervisor. The supervisor shall immediately report the circumstance of possible radioactive materials intake to S&H Radiological Control Department for evaluation. When the suspect isotope is uranium, the involved employee(s) shall also report to the Urine Sampling Station at the start of their next shift to submit a followup urine sample. When the suspect isotope is other than uranium the involved employee(s) shall report to the Radiological Control Department for further determination of actions. Employees are responsible for complying with additional requirements as specified by the Radiological Control Department.

### 8.1.2 Equipment Decontamination Requirements

Equipment must be monitored by a RCT prior to removal from a radiologically controlled area or release off site. Tools, materials or equipment that become contaminated, either radiologically or chemically, will be decontaminated by the subcontractor.

Waste pit 5 thorium controls (thorium-230 is a pure alpha particle emitter) will require each piece of equipment to be smeared and counted on a low background counting instrument and surveyed with an alpha frisking instrument (in addition to the beta-gamma survey requirements) before releasing the item from the Waste Pit 5 area.

## 8.2 CHEMICAL DECONTAMINATION REQUIREMENTS

Questions concerning chemical contamination and potential exposure should be directed to FERMCO IH at 648-4000.

# 9.0 EMERGENCY/CONTINGENCY PLANS

## 9.1 REPORTING

### 9.1.1 Emergency Numbers

Report all accidents and injuries to the AEDO.

| NAME | FEMP TELEPHONE NUMBER | RADIO CONSTRUCTION |
|---|---|---|
| Ambulance | 648-6511 | CH 7: CONTROL |
| Hospital | | |
| Fire | | |
| Security | | |
| Emergency Response | | |
| FERMCO HSO | 648-4773 | CH 1: 538 |
| Assistant Emergency - Duty Officer (AEDO) | 648-4749/4444 | 202 |
| Accountability | 648-4111 | CONTROL |

### 9.1.2 Site Notification Procedures

All FEMP emergencies shall be reported to the FERMCO Communication Center to ensure rapid response. A means to report an emergency shall be available at all work locations whenever personnel are working. This may be accomplished by one of the following methods:

- Phone 648-6511
- Radio to "Control"

Employees working will be notified of emergency or abnormal conditions by the plant wide alarm system and radio announcements. This announcement follows the sounding of the site alarm horn signal (3-3s).

### 9.1.3 What to Report

The following are examples of emergencies that would justify calling and reporting an emergency:

- Serious injury
- Injury complicated by contamination
- Chemical/radiation release
- Chemical splash (eye and skin)
- Fire
- Major property damage
- Unusual occurrence(s)

When an emergency or abnormal condition is observed, personnel shall contact the FERMCO Communications Center at extension 6511 or via radio (CONTROL) for emergencies. Stay on the phone line until the dispatcher hangs up.

The following information must be given to the FERMCO Communications Center operator:

- Name and badge number
- Location where emergency has occurred
- Nature of the emergency
- Number of personnel with injuries
- Unusual conditions (odors, symptoms, vapors, smoke)
- Current status of the emergency

## 9.2 EVACUATION ROUTES/ACCOUNTABILITY

### 9.2.1 Rally Point Accountability

Should a situation require an emergency evacuation of the work area, all equipment should be turned off (if possible) and left in place. All personnel are to proceed to Rally Point 6 located at the entrance to the Waste Pit area (See Attachment C).

## 9.3 EMERGENCY EQUIPMENT

### 9.3.1 FEMP Site Equipment

The FEMP site has the capability and equipment to respond to medical, fire, chemical and radiological emergencies.

## 9.4 EMERGENCY RESPONSE

The FEMP Emergency Services will handle all on-site emergencies. Any request for emergency help should be requested by telephone at (648-) 6511 or on any FEMP radio frequency by calling "CONTROL."

### 9.4.1 Medical Emergencies

Any injury, no matter how minor, shall be reported immediately to the FERMCO Medical Department for evaluation or treatment. The injured employee shall be accompanied to medical for evaluation and treatment by the employees supervisor.

The FERMCO Medical Department is located at the east end of the first floor of the S&H Building (Building 53), see Attachment D.

The FERMCO Medical department and emergency site ambulance shall serve as the first-aid responder.

### 9.4.2 Fire Emergencies

All work sites shall maintain effective communication to summon fire fighting assistance. Access to the work area shall be maintained at all times to permit fire trucks and fire fighting crews to safely approach the fire emergency.

Only trained personnel shall attempt to operate fire fighting equipment and only when the fire is clearly within the capability of the fire fighting equipment.

The FEMP Emergency Response Team (ERT) will also respond to all on-site fire emergencies. For any fire emergency at the FEMP, call (648-) 6511 or radio "CONTROL".

### 9.4.3 Explosion Emergencies

Based on the scope of work, the potential for explosion is low.

### 9.4.4 Chemical Emergencies

#### 9.4.4.1 Personal Contamination

Due to the limited nature of project field activities, equipment, and materials involved, personal contamination from either caustic or corrosive materials is highly unlikely.

9.4.5 Radiological Emergencies

9.4.5.1 Releases

The Supervisor-in-charge, Assistant Emergency Duty Officer (AEDO), Radiological Control Technicians (RCT), and the FERMCO HSO shall be notified of the release.

9.4.6 Weather Limitations/Adverse Conditions

Weather affected work will be stopped if lightning, heavy persistent rain, wind, or other adverse weather conditions are in the area. This includes any weather conditions whose impact is judged to be detrimental to safety by FERMCO. Cost of work stoppage for adverse weather conditions shall be borne by the subcontractor. Any operations utilizing cranes, drill rigs or personnel working on elevated steel type work will be suspended if any wind velocity reaches 25 MPH.

## 10.0 CHANGES/AMENDMENTS TO THE PSHSP

This PSHSP for field activities is based on information available at the time of preparation. Provisions of this plan are to be reassessed quarterly by the FERMCO HSO or when conditions/events arise that require reassessment of health and safety issues. Amendments/revisions of this PSHSP must go through formal review and approval by all departments included in the original review cycle.

### 10.1 CONTROL OF HEALTH AND SAFETY PLAN

For the purpose of ensuring that all personnel are informed of any changes in the scope of this PSHSP, CONTROLLED copies of this document shall be maintained by ES&H Document Control. Only essential personnel shall maintain controlled copies of this document. The following table is the list of personnel with the controlled copies of this PSHSP.

| TITLE | INDIVIDUAL |
|---|---|
| Field Copy | Michael S. Davis |
| Project Director, CRU1 | Bob Fellman |
| Manager, EFO | Mike Frank |
| FERMCO Health and Safety Officer | Michael S. Davis |
| Radiological Control Technicians | Dan Thiel |
| Radiological Engineering | Dan Stempfley |
| Director FERMCO Medical Department | Doran Christensen |
| Supervisor, Industrial Hygiene Technicians | Jack Patrick |
| Manager, Industrial Hygiene | Dave Jackson |
| Project Manager | Dan Stropes |

Changes, corrections, and/or additions not directed through S&H Document Control will not be considered "controlled and approved." Operations conducted under such plans will be subject to work stoppage until control numbers are assigned.

# ATTACHMENT A

## PROJECT-SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

# HEALTH AND SAFETY REQUIREMENTS MATRIX

**PROJECT: THE GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 & 6**

*The requirements listed in Section 1 of this matrix apply to all activities addressed on this matrix*

| ACTIVITY (TASKS) | HAZARD IDENTIFICATION | FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED | PERSONAL PROTECTIVE EQUIPMENT | TRAINING REQUIREMENTS | MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS | ADMINISTRATIVE & ENGINEERING CONTROL MEASURES | PERMIT(S) | DECONTAMINATION & DISPOSAL PROCEDURES |
|---|---|---|---|---|---|---|---|---|
| 1. General Project minimum requirements to access work site | • Work on a CERCLA\RCRA site<br>• Work in radiologically controlled area (uranium contamination)<br>Not all hazards are specified on this matrix. | • Thermoluminescent Dosimeter (TLD) | • Steel toed safety shoes<br>• Safety glasses w/rigid side shields | • Site GET Training<br>• Site Worker Training<br>• Rad Worker II Training<br>• 24 Hr. Supervised Field Experience<br>• Respirator training and fit test<br>• Orientation on PSHSP AND PSHSRM<br>• Orientation on Project Specific MSDSs<br>Additional for Supervisors:<br>• OSHA Construction Outreach | • Medical surveillance exam: baseline, annual, and termination<br>• Initial, annual and termination in-vivo exam (whole body count)<br>• Initial, annual and termination urinalysis<br>• Report all injuries to FERMCO Medical Department<br>• Medically approved for respirator use | • Attend a pre-work kickoff/safety meeting<br>• Daily specific task review of matrix | FERMCO Work Permit | • Personnel and material monitoring required to exit controlled area. |
| | • Heat Stress | • FERMCO to conduct ambient temperature monitoring | • Ice vest may be used | • Safety briefing on heat stress | • FERMCO Medical approval for working in hot environments | • Contact FERMCO IH when ambient temperature exceeds 80°F<br>• Work\rest regimen may be used | | |
| | • Cuts, abrasions, puncture wounds | | • Leather gloves | | | | | |

The requirements of this document are based upon current conditions and/or operations in areas near the planned work area. This document is to be used as an aid in conjunction with the Project Specific Health and Safety Plan and assist the contractor in understanding the requirements of the project. The PSHSP will provide more detail for certain aspects of this document. This document does not relieve the contractor of planning for or providing a safe work site. This document does not relieve the contractor from recognizing and complying with other appropriate state, federal and FEMP regulations.

# HEALTH AND SAFETY REQUIREMENTS MATRIX

**PROJECT: THE GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 & 6**

*The requirements listed in Section 1 of this matrix apply to all activities addressed on this matrix*

| ACTIVITY (TASKS) | HAZARD IDENTIFICATION | FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED | PERSONAL PROTECTIVE EQUIPMENT | TRAINING REQUIREMENTS | MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS | ADMINISTRATIVE & ENGINEERING CONTROL MEASURES | PERMIT(S) | DECONTAMINATION & DISPOSAL PROCEDURES |
|---|---|---|---|---|---|---|---|---|
| 1. General Project minimum requirements to access work site (continued) | • Working near water (work on berm of pits) | | • Approved flotation device | | | • Ring buoys on perimeter of pit | | |
| | • Lifting injuries | | | • Safety meeting on proper lifting | • Report back problems to FERMCO Medical Department | • Loads weighing more than 50 lbs. to be moved by more than one person<br>• Use mechanical assistance to move heavy loads | | |
| 2. Survey the Waste Pits (5 & 6) | • Work in radiological contamination area<br>Waste Pit 5 (thorium)<br>Waste Pit 4 (uranium) | • 100% BZ sampling when working in Waste Pit 5 | • Company issued clothing<br>• Anti-C's<br>• Surgical gloves<br>• Rubber booties | | | | Radiological Work Permit (RWP) | |
| 3. Sampling of Pit 6 | • Work in radiological contamination area (uranium) | • BZ sampling on 25% of personnel in respiratory protection | • Company issued clothing<br>• Water proof protective clothing<br>• surgical & rubber gloves<br>• Rubber booties<br>• Full face respirator (as required) | | | | RWP | • Personnel and material monitoring required to exit contamination area. |

The requirements of this document are based upon current conditions and/or operations in areas near the planned work area. This document is to be used as an aid in conjunction with the Project Specific Health and Safety Plan and assist the contractor in understanding the requirements of the project. The PSHSP will provide more detail for certain aspects of this document. This document does not relieve the contractor of planning for or providing a safe work site. This document does not relieve the contractor from recognizing and complying with other appropriate state, federal and FEMP regulations.

June 6, 1995, Rev 0

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# HEALTH AND SAFETY REQUIREMENTS MATRIX

**PROJECT: THE GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 & 6**

*The requirements listed in Section 1 of this matrix apply to all activities addressed on this matrix*

| ACTIVITY (TASKS) | HAZARD IDENTIFICATION | FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED | PERSONAL PROTECTIVE EQUIPMENT | TRAINING REQUIREMENTS | MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS | ADMINISTRATIVE & ENGINEERING CONTROL MEASURES | PERMIT(S) | DECONTAMINATION & DISPOSAL PROCEDURES |
|---|---|---|---|---|---|---|---|---|
| 3. Sampling of Pit 6 (continued) | • Handling liquids | | • Goggles or face shield if full face respirator not worn | | | | | |
| | • Hoisting and rigging | | | | | • Comply with DOE Hoisting and Rigging Manual<br>• Lift plan<br>• Barricade the swing radius of the crane<br>• Do not walk under load | Hazardous Work Permit (Crane Work) | |
| | • Handling of the sample | | | | | | | |
| | • Handling of dry pit material | • Direct reading air monitoring for particulates | • Full face respirator with HEPA cartridges (magenta) | | | • Keep pit material wet | | |
| | • Sealing sample tubes with wax | | • Leather palm gloves | | | | Open flame and welding permit | |

The requirements of this document are based upon current conditions and/or operations in areas near the planned work area. This document is to be used as an aid in conjunction with the Project Specific Health and Safety Plan and assist the contractor in understanding the requirements of the project. The PSHSP will provide more detail for certain aspects of this document. This document does not relieve the contractor of planning for or providing a safe work site. This document does not relieve the contractor from recognizing and complying with other appropriate state, federal and FEMP regulations.

# HEALTH AND SAFETY REQUIREMENTS MATRIX

**PROJECT: THE GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 & 6**

***The requirements listed in Section 1 of this matrix apply to all activities addressed on this matrix***

| ACTIVITY (TASKS) | HAZARD IDENTIFICATION | FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED | PERSONAL PROTECTIVE EQUIPMENT | TRAINING REQUIREMENTS | MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS | ADMINISTRATIVE & ENGINEERING CONTROL MEASURES | PERMIT(S) | DECONTAMINATION & DISPOSAL PROCEDURES |
|---|---|---|---|---|---|---|---|---|
| 4. Sampling of Pit 5 | • Work in a radiological contamination area (thorium) | • 100% BZ personnel sampling for thorium | • Company issued clothing<br>• Water proof protective clothing<br>• surgical & rubber gloves<br>• Rubber booties<br>• Full Face respirator (as required) | | • Baseline fecal sample (required for work in thorium areas) | | RWP | • Personnel and material monitoring required to exit contamination area |
| | • Handling liquids | | • Goggles or face shield if full face respirator not worn | | | | | |
| | • Road closure | | | | | | Facility Outage Permit | |
| | • Hoisting and rigging | | | | | • Comply with DOE Hoisting and Rigging Manual<br>• Lift plan<br>• Barricade the swing radius of the crane<br>• Do not walk under load | Hazardous Work Permit (Crane Work) | |
| | • Handling of dry pit material | • Direct reading air monitoring for particulates | • Full face respirator with HEPA cartridges (magenta) | | | • Keep pit material wet | | |

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The requirements of this document are based upon current conditions and/or operations in areas near the planned work area. This document is to be used as an aid in conjunction with the Project Specific Health and Safety Plan and assist the contractor in understanding the requirements of the project. The PSHSP will provide more detail for certain aspects of this document. This document does not relieve the contractor of planning for or providing a safe work site. This document does not relieve the contractor from recognizing and complying with other appropriate state, federal and FEMP regulations.

June 6, 1995, Rev 0

# HEALTH AND SAFETY REQUIREMENTS MATRIX

**PROJECT: THE GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 & 6**

***The requirements listed in Section 1 of this matrix apply to all activities addressed on this matrix***

| ACTIVITY (TASKS) | HAZARD IDENTIFICATION | FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED | PERSONAL PROTECTIVE EQUIPMENT | TRAINING REQUIREMENTS | MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS | ADMINISTRATIVE & ENGINEERING CONTROL MEASURES | PERMIT(S) | DECONTAMINATION & DISPOSAL PROCEDURES |
|---|---|---|---|---|---|---|---|---|
| 4. Sampling of Pit 5 (continued) | • Sealing sample tubes with wax | | • Leather palm gloves | | | | Open Flame and Welding Permit | |
| 5. Decontamination and Demobilization | | | | | | | | • Personnel and material monitoring required to exit contamination and controlled areas |

# ATTACHMENT B

## PERSONNEL & ENVIRONMENTAL MONITORING ACTION LEVELS

## RADIOLOGICAL CONTROL ACTION LEVEL

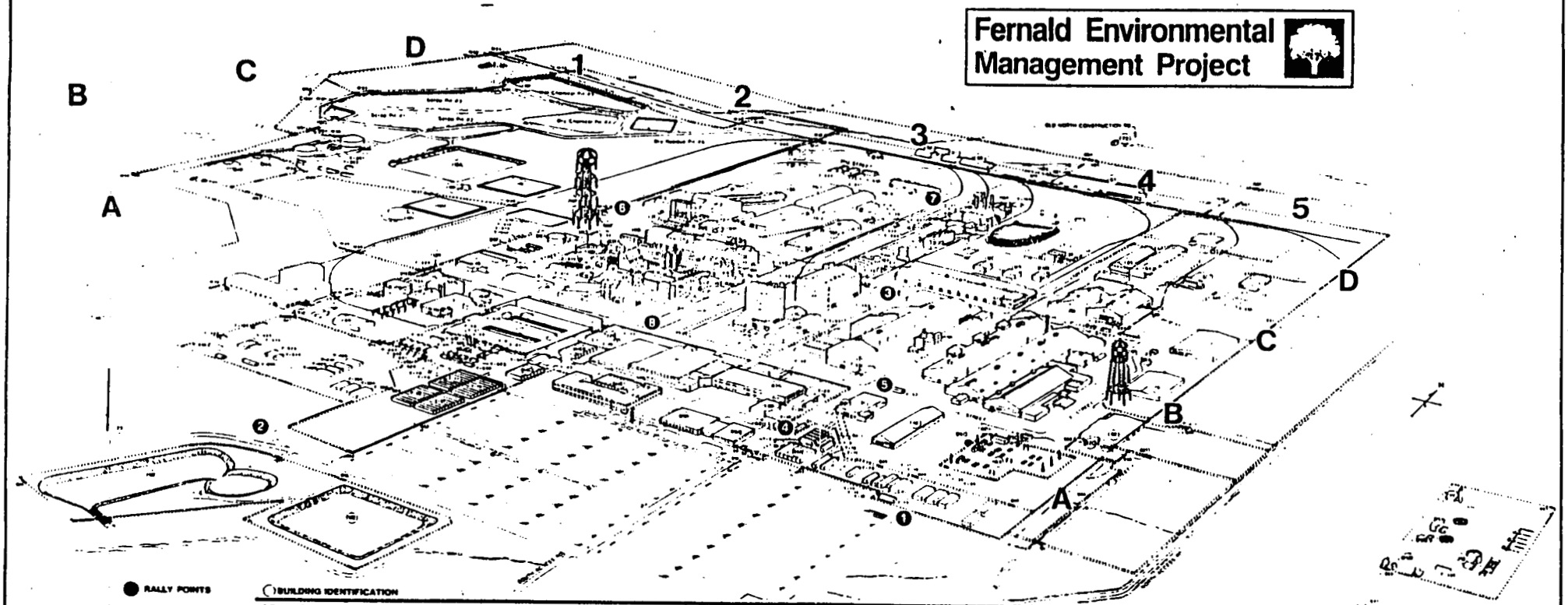
| MEASUREMENT | LEVEL | ACTION/RESPIRATORY PROTECTION NOTE 1,2,3 |
|---|---|---|
| Alpha Probe | 1000 dpm/100cm$^2$ (Uranium loose limit) 20 dpm/100cm$^2$ (Thorium loose limit) | Contact Radiological Control Technician @ ext. 9244. |
| Beta/Gamma Probe | 1,000dpm/100cm$^2$ | Contact Radiological Control Technician @ ext. 9244. |
| U-238, Th-230, and Th-232 | > 0.10 x DAC note 4 | Area posted as "Airborne Radioactivity Area" |
| U-238, Th-230, and Th-232 | > 1.0 x DAC | Full-faced air purifying respirator with anti-C hood |
| U-238, Th-230, and Th-232 | > 5.0 x DAC | Hooded air-supplied respirator |
| U-238, Th-230, and Th-232 | > 10.0 x DAC | Contact Radiological Engineering |
| U-238, Th-230, and Th-232 | > 40.0 x DAC | Invivo and/or Invitro sampling required by RC Dosimetry. |
| Rn-220 | > 0.1 WL | Area posted as "Airborne Radioactivity Area" |
| Rn-220 daughters | < 0.25 Work Level (WL) | None |
| Rn-220 daughters | 0.25 - 5.0 WL | Full-faced air purifying respirator (Hood required) |
| Rn-220 daughters | > 5.0 WL | Hooded air supplied respirator |
| Rn-222 daughters | > .033 WL | Area posted as "Airborne Radioactivity Area" |
| Rn-222 daughters | < 0.075 WL | None |
| Rn-222 daughters | 0.075 - 1.65 WL | Full-faced air purifying respirator (Hood required) |
| Rn-222 daughters | > 1.65 - 33.0 WL | Hooded air-supplied respirator |
| Rn-222 daughters | > 33.0 WL | SCBA or air-supplied bubble suit |

1. Area shall be posted as an "Airborne Radioactivity Area", based on air sample results, by the Radiological Control Technician.
2. Air sample results which indicate that individuals may have been exposed to 4 DAC-hours or more per week shall trigger internal dosimetry assessment (e.g. invitro and/or invivo assessments).
3. Invitro and/or invivo assessments may be required at levels less than 4 DAC-hours per week, if deemed necessary by the Radiological Control department.
4. Respiratory requirements will be established based on air sample results, protection factors of the respiratory protection and stay time in the affected area as determined by Radiological Engineering.
5. Derived Air Concentrations (DAC) for radionuclide(s) of interest.

# ATTACHMENT C

## FEMP RALLY POINTS

# Fernald Environmental Management Project

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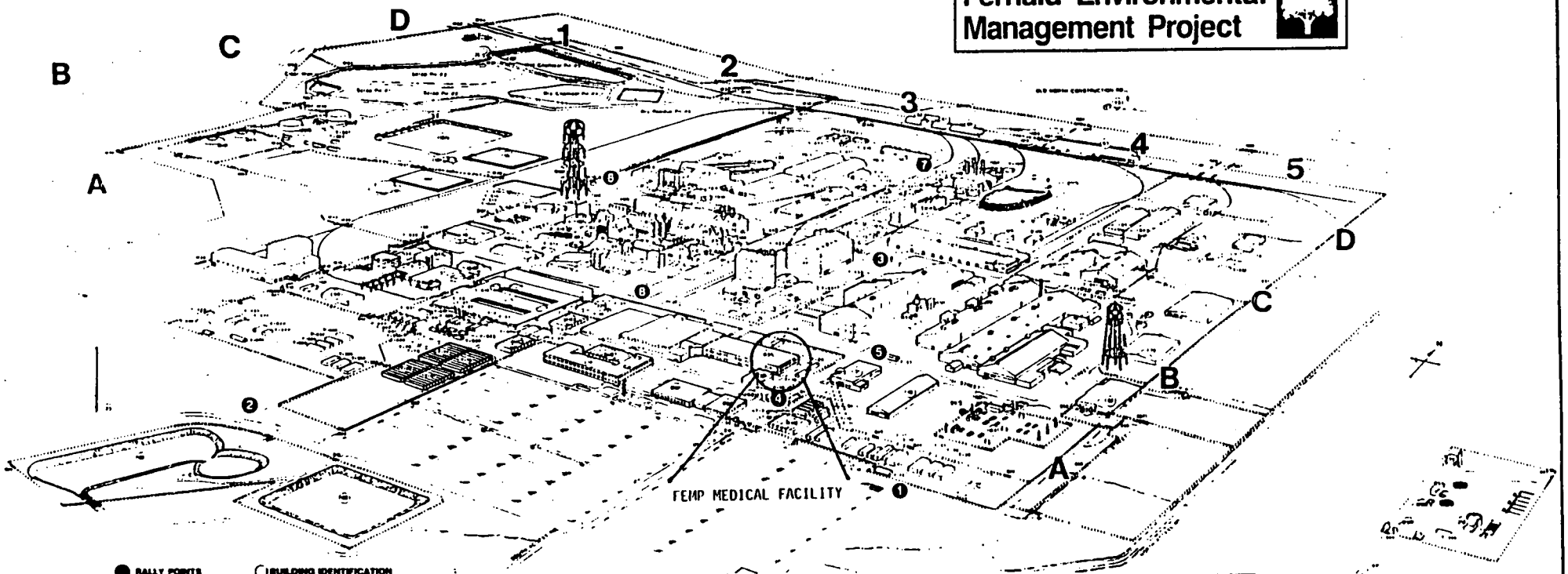
# ATTACHMENT D

## LOCATION OF FEMP MEDICAL FACILITY

# Fernald Environmental Management Project




RALLY POINTS

BUILDING IDENTIFICATION

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

May 1992

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# ATTACHMENT E

## WORK AREA MATERIAL SAFETY DATA SHEETS (MSDSs)

UNITED STATES DEPARTMENT OF ENERGY
MATERIAL SAFETY DATA SHEET

Entry Date: 01/01/1981 Revised Date: 01/01/1981

## SECTION I -- IDENTIFICATION

Chem. Name: ARSENIC
Chem. Id: 007440-38-2 DOT Class/#: No Info.
Formula: No Info. Chem. Family: No Info.
Hazard Rating (Scale: 0-4): HEALTH-(3); FIRE-(2)
Molecular Weight: No Info.

Synonyms: ARSENIC
ARSENIC,SOLID
ARSENIC COLLOIDAL
METALLIC ARSENIC
ARSENIC BLOCK
GREY ARSENIC
ARSENIC METAL
7440-38-2

## SECTION II -- HAZARDOUS INGREDIENTS

| Components | CAS # | PEL/TLV | Percentage |
|---|---|---|---|

NO COMPONENT INFORMATION ENTERED FOR THIS MATERIAL.

## SECTION III -- PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: No Info. Specific Gravity: No Info.
Vapor Pressure: No Info. Melting Point: No Info.
Vapor Density: No Info. Solubility: No Info.
Evaporation Rate: No Info. Volatiles by Vol.%: No Info.

Physical Description:

GRAY, SHINY, BRITTLE, METALLIC-LOOKING POWDER.

## SECTION IV -- FIRE AND EXPLOSION HAZARD INFORMATION

| Flash Point | Auto-Ignition Temp. | Flammable Limits |
|---|---|---|
| No Info. | No Info. | LEL: No Info. UEL: No Info. |

Special Hazards:

FIRE MAY OCCUR WHEN IN THE FORM OF DUST AND EXPOSED TO HEAT OR FLAME OR BY CHEMICAL REACTION WITH POWERFUL OXIDIZERS.

## SECTION V -- REACTIVITY INFORMATION

Conditions to Avoid:

ARSENIC REACTS TO, BROMENE, AZIDE, DIRUBIDIUMACEYLIDE, BROMINETRIFLOURIDE, BROMINE PENTAFLORIDE, CHLORINE TRIFLOURIDE, IODINE PENTAFLOURIDE, ZINC, PALLADIUM,



ALUMINIUM, NITROGEN TRICHLORIDE AND OXIDANTS SUCH AS, SILVER NITRATE, DICHLORINE TRIOXIDE, NITROSYL FLOURIDE, POTASSIUM PERMANGANATE POTASSIUM DIOXIDE AND SODIUM PEROXIDE.

## SECTION VI -- HEALTH HAZARD INFORMATION

Toxicity and Exposure Limits:

Inhal. Toxicity: No Info. Dermal Toxicity: No Info.
Oral Toxicity: No Info. Eye Toxicity: No Info.
Exp. Limit: No Info. Exp. Limit Max.: No Info.

Health Effects and Symptoms:

TRIVALENT ARSENIC COMPOUNDS ARE CORROSIVE TO THE SKIN. BRIEF CONTACT HAS NO EFFECT, BUT PROLONGED CONTACT RESULTS IN A LOCAL HYPEREMIA AND LATER VESICULAR OR PUSTULAR ERUPTION. THE MOIST MUCOUS MEMBRANES ARE MOST SENSITIVE TO THE IRRITANT ACTION. CONJUNCTIVA, MOIST AND MACERATED AREAS OF SKIN, THE EYELIDS, THE ANGLES OF THE EARS, NOSE, MOUTH, AND RESPIRATORY MUCOSA ARE ALSO VULNERABLE TO THE IRRITANT EFFECTS. THE WRISTS ARE COMMON SITES OF DERMATITIS, AS ARE THE GENITALIA IF PERSONAL HYGIENE IS POOR. PERFORATION OF THE NASAL SEPTUM MAY OCCUR. ARSENIC TRIOXIDE AND PENTOXIDE ARE CAPABLE OF PRODUCING SKIN SENSITIZATION AND CONTACT DERMATITIS. ARSENIC IS ALSO CAPABLE OF PRODUCING KERATOSES, ESPECIALLY OF THE PALMS AND SOLES. ARSENIC HAS BEEN CITED AS A CAUSE OF SKIN CANCER, BUT THE INCIDENCE IS LOW. THE ACUTE TOXIC EFFECTS OF ARSENIC ARE GENERALLY SEEN FOLLOWING INGESTION OF INORGANIC ARSENICAL COMPOUNDS. THIS RARELY OCCURS IN AN INDUSTRIAL SETTING. SYMPTOMS DEVELOP WITHIN ONE HALF TO 4 HOURS FOLLOWING INGESTION AND ARE USUALLY CHARACTERIZED BY CONSTRICTION OF THE THROAT FOLLOWED BY DYSPHAGIA, EPICASTRIC PAIN, VOMITING, WATERY DIRRHEA, AND BLOOD IN STOOLS AND VOMITUS. INHALATION OF INORGANIC ARSENIC COMPOUNDS IS THE MOST COMMON CAUSE OF CHRONIC POISONING IN THE INDUSTRIAL SITUATION. THIS CONDITION IS DIVIDED INTO THREE PHASES BASED ON SIGNS AND SYMPTOMS. FIRST PHASE, THE WORKER COMPLAINS OF WEAKNESS, LOSS OF APPETITE, SOME NAUSEA, OCCASIONAL VOMITING, A SENSE OF HEAVINESS IN THE STOMACH, AND SOME DIARRHEA. SECOND PHASE, THE WORKER COM- PLAINS OF CONJUNCTIVITIS, A CATARRHAL STATE OF THE MUCOUS MEMBRANES OF THE NOSE, LARYNX, AND RESPIRATORY PASSAGE. CORYZA, HOARSENESS, AND MILD TRACHEOBRONCHITIS MAY OCCUR. PERFORATION OF THE NASAL SEPTUM IS COMMON, AND IS PROBABLY THE MOST TYPICAL LESION OF THE UPPER RESPIRATORY TRACT IN OCCUPATIONAL EXPOSURE TO ARSENICAL DUST. SKIN LESIONS, ECZEMATOID AND ALLERGIC IN TYPE, ARE COMMON. THIRD PHASE, THE WORKER COMPLAINS OF SYMPTOMS OF PERIPHERAL NEURITIS, INITIALLY OF HANDS AND FEET, WHICH IS ESSENTIALLY SENSORY. IN MORE SEVERE CASES, MOTOR PARALYSES OCCUR, THE FIRST MUSCLES AFFECTED ARE USUALLY THE TOE EXTENSORS AND THE PERONEI. IN ONLY THE MOST SEVERE CASES WILL PARALYSIS OF FLEXOR MUSLES OF THE FEET OR OF THE EXTENSOR MUSCLES OF HANDS OCCUR. LIVER DAMAGE FROM CHRONIC ARSENICAL POISONING IS STILL DEBATED, AND AS YET THE QUESTION IS UNANSWERED. IN CASES OF CHRONIC AND ACUTE ARSENICAL POISONING, TOXIC EFFECTS TO THE MYOCARDIUM HAVE BEEN REPORTED BASED ON EKG CHANGES. THESE FINDINGS, HOWEVER, ARE NOW LARGELY LARGELY DISCOUNTED AND THE EKG CHANGES ARE ASCRIBED TO ELECTROLYTE DISTURBANCES CONCOMITANT WITH ARSENICALISM. INHALATION OF ARSENIC TROXIDE AND OTHER INOR- GANIC ARSENICAL DUSTS DOES NOT GIVE RISE TO RADIOLOGICAL EVIDENCE OF PNEU- MOCONIOSIS. ARSENIC DOES HAVE A DEPRESSANT EFFECT UPON THE BONE MARROW, WITH DISTURBANCES OF BOTH ERYTHROPOIESIS AND MYELOPOIESIS. EVIDENCE IS NOW AVAIL- ABLE INCRIMINATING ARSENIC COMPOUNDS AS A CAUSE OF LUNG CANCER AS WELL AS SKIN

000096

CANCER. THE FEDERAL STANDARD FOR ARSENIC AND ITS COMPOUNDS IS 0.5 MG/M3 OF AIR AS AS. NIOSH HAS RECOMMENDED 0.002 MG/M3 OF AIR AS AS BASED ON ITS CARCINOGENIC EFFECTS. THIS SUBSTANCE WAS FOUND TO BE TERATOGENIC IN MICE. CONSULT THE BNL CARCINOGEN, MUTAGEN, TERATOGEN GUIDE 2.2.1 FOR INFORMATION ON PROPER HANDLING PROCEDURES.

**Emergency and First Aid Procedures:**

INCASE OF EXPOSURE TO ARSENIC, REMOVE INDIVIDUAL FROM EXPOSURE AND SEEK IMMEDIATE MEDICAL ATTENTION. IF ARSENIC COMES IN CONTACT WITH SKIN, WASH AREA IMMEDIATELY, AND SEEK MEDICAL HELP AT ONCE.

## SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE

**Shipping and Transportation:**

THIS IS A D.O.T REGULATED MOTINAL.
CONSULT SHIPPING DEPARTMENT FOR SHIPPING AND LABELING REQUIREMENTS.

**Precautions to be taken in Handling and Storing:**

ARSENIC SHOULD BE KEPT IN LOCKED CABINETS.

## SECTION VIII -- CONTROL MEASURES

NO CONTROL MEASURES ENTERED FOR THIS MATERIAL.

MSDS

10974

# Asbestos

## SECTION I MATERIAL IDENTIFICATION

**Chemical Name** Asbestos

**CAS#** 1332-21-4

**Synonyms**

Amosite, Anthrophyllite, Actinolite, Tremolite, Chrysotile, UN 2212 (DOT), Crocidolite, UN 2509 (DOT)

**Possible Occupational Exposure**

Miners and millers of ore
Manufacturers and users of asbestos-containing products such as brake shoes
Repairers and demolishers of structures containing asbestos

Manufacturer: available from several sources.

## SECTION II INGREDIENTS AND HAZARDS

**Permissible Exposure Limit**

0.1 ~~0.2~~ fiber/cc — OSHA TWA (all forms)
0.5 fiber/cc — ACGIH TWA (Amosite)
2.0 fibers/cc — ACGIH TWA (Chrysotile)
0.2 fiber/cc — ACGIH TWA (Crocidolite)
2.0 fibers/cc — ACGIH TWA (other forms)
0.1 fiber/cc — NIOSH-recommended TWA (all forms)
0.5 fiber/cc — NIOSH-recommended 15-minute ceiling (all forms)
Human Carcinogen (IARC, NTP, ACGIH); Animal Carcinogen (IARC)

CERCLA Hazard Rating — Toxicity 3 - Ignitability 0 - Persistence 3.

**Immediately Dangerous to Life and Health Concentration** — none specified

## SECTION III PHYSICAL DESCRIPTION

Fibrous solid, ranging from long flexible fiber down to dust-like filler powder.
Asbestos can be white, gray, brown or blue in color.

Molecular Weight: Varies
Specific Gravity: 2.5
Melting Point: Decomposes
Flash Point: Nonflammable
Solubility in Water: Insoluble (breaks down slowly in hot water)
Upper Explosive Limit in Air, % by volume: nonflammable
Lower Explosive Limit in Air, % by volume: nonflammable

## SECTION IV INCOMPATIBILITIES AND STORAGE

Incompatibilities: None

Store asbestos in closed containers (dust-tight) in a clean, secure area. Protect containers from damage. Do not open without proper control measures. Ensure containers are properly labeled.

## SECTION V HEALTH HAZARD AND PROTECTION DATA

**Target Organs**
Lungs
Respiratory System
Gastrointestinal

**Route of Entry into Body**
Inhalation
Ingestion
Skin or Eye Contact

**Symptoms**

| | | | | |
|---|---|---|---|---|
| Coughing | Asbestosis | Mesothelioma | Respiratory Irritation | Pneumoconiosis |
| Cyanosis | Pleuritic Pain | Respiratory Cancer | Pleural Thickening | Finger Clubbing |
| Dyspnea | Skin Irritation | Respiratory Distress | Pulmonary Fibrosis | Weight Loss |

NOTE: Acute exposure may cause irritation and coughing. Chronic exposure may cause pulmonary fibrosis, a terminal pneumoconiosis called asbestosis which may appear as early as 13 years after exposure, but typically develops over 20-40 years. The incidence of pulmonary fibrosis and lung cancer in asbestos-exposed workers is synergistically increased by smoking.

**Protective Equipment Requirements**

29 CFR 1910.1001 Asbestos

Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole-body clothing, head coverings, gloves and foot coverings for any employee exposed to airborne concentrations of asbestos fibers.

Medical examinations are required for asbestos workers (preplacement, periodic and termination examinations), 20-year recordkeeping required.

Employers are required to provide and ensure that employees use and/or follow these protective devices and measures; employees are required to use and/or follow them:

- Posted warning signs.
- Face shields, vented goggles or other appropriate protective equipment that complies with 1910.133 of this part.
- Change rooms with two separate lockers or containers.
- Routine changing of work clothing if there is a possibility that clothing may be contaminated.*

**Protective Equipment Requirements (continued)**

Employees who are required to shower do so before breaks, lunch or leaving the contaminated area.
Showering after each shift prior to leaving premises.
Not smoking, eating or drinking in the work area.
*Contaminated clothing should be sealed in a labeled plastic bag and laundered. Commerical laundries should be notified of the asbestos contamination.

Employers are required to provide engineering controls, i.e., negative-pressure ventilation with high-efficiency particulate air (HEPA) filtration, sealed enclosures for removal projects. (See EPA requlations for guidance.)

**Respirator Selection**

| | |
|---|---|
| 2 fibers/cc | Half-mask air-purifying respirator with a high-efficiency filter. |
| 10 fibers/cc | Full face-piece air-purifying respirator with a high-efficiency filter. |
| 20 fibers/cc | Air-purifying respirators with a high-efficiency filter. Supplied-air respirator operated in continuous-flow mode. |
| 200 fibers/cc | Supplied-air respirator with a full face-piece operated in pressure-demand mode. |
| Greater than 200 fibers/cc | Supplied-air respirator with a full face-piece operated in pressure-demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus. |

**Firefighting**

Self-contained breathing apparatus with a full face-piece operated in pressure-demand or other positive-pressure mode.

Supplied-air respirator with full face-piece and operated in pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

**First Aid**

Skin Contact: Remove contaminated clothing and shoes immediately. Wash affected area with soap and water until no evidence of the substance remains. Get medical attention at once.

Eye Contact: Wash eyes immediately with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention at once.

Inhalation: Remove from area at once to fresh air. If breathing has stopped, perform artificial respiration. Get medical attention at once.

Ingestion: Get medical attention at once.

## SECTION VI REGULATIONS/OSHA

| | |
|---|---|
| OSHA Standard 29CFR1910.1200 | Hazard Communication |
| OSHA Standard 29CFR1910.1001 | Asbestos |
| OSHA Standard 29CFR1910.94 | Ventilation |
| OSHA Standard 29CFR1910.134 | Respiratory Protection |
| OSHA Standard 29CFR1910.20 | Access to Employee Exposure and Medical Records |
| OSHA Standard 29CFR1910.132 | Personal Protective Equipment |
| OSHA Standard 29CFR1910.141 | Sanitation |
| OSHA Standard 29CFR1910.151 | Medical Services and First Aid |
| OSHA Standard 29CFR1910.133 | Eye and Face Protection |

## SECTION VII EMERGENCY HANDLING OF HAZARDOUS MATERIALS

**If Material Is On Fire or Involved in Fire:**

Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty).

**If Material Is Not on Fire and Is Not Involved in Fire:**

Keep material out of water sources and sewers. Build dikes to contain flow as necessary.

**Personal Danger Situation Protection:**

Keep upwind. Wear boots, protective gloves and gas-tight goggles. Avoid breathing dust/vapors/fumes from material. Wash away any materials which may have contacted the body with copious amounts of water or soap and water.

## SECTION VIII SPILL, LEAK AND DISPOSAL PROCEDURES

Adequately wet or mix with water to form a slurry. Seal material in a leak-tight container. Label containers as specified in 1910.1001. The SARA Act of 1986 requires that a release equal to or greater than the reportable quantity for this substance must be reported to the Local Planning Commission, the State Emergency Response Commission, and the National Response Center.

Contact the Ohio EPA for Emergency Spill Information: 1-800-282-9378.

*Effective 1/87. For further chemical information contact the Resource Center at 1-800-282-3045, Ext. 7388.*

ed. When heated to decomposition it emits toxic of $NO_x$. See also BARBITURATES. An hypnotic sedative.

*BAG250* CAS:144-02-5 *HR: 3*
*BARBITAL SODIUM*
mf: $C_8H_{12}N_2O_3 \cdot Na$ mw: 207.21

PROP: Bitter crystals or powder.

SYNS: BARBITAL Na ◇ BARBITAL SOLUBLE ◇ BARBITONE SODIUM ◇ DIETHYLBARBITURATE MONOSODIUM ◇ 5,5-DIETHYLBARBITURIC ACID SODIUM deriv. ◇ DIETHYLMALONYLUREA SODIUM ◇ EMBINAL ◇ MEDINAL ◇ NATRINAL ◇ NATRIUMBARBITALS (GERMAN) ◇ NERVOSETON ◇ 2,4,6(1H,3H,5H)-PYRIMIDINETRIONE, 5,5-DIETHYL-, MONOSODIUM SALT (9CI) ◇ SODIUM BARBITAL ◇ SODIUM BARBITONE ◇ SODIUM DIETHYLBARBITURATE ◇ SODIUM-5,5-DIETHYLBARBITURATE ◇ SODIUM ETHYLBARBITAL ◇ SODIUM MALONYLUREA ◇ SODIUM VERONAL ◇ SOLUBLE BARBITAL ◇ SOPRINAL ◇ THYALONE ◇ VERONAL SODIUM

TOXICITY DATA with REFERENCE
sce-ham:emb 100 μg/L IJCNAW 20,768,77
mmr-rat TDLo:125 mg/kg (female 19D post):REP JCPPAV 45,146,52
scu-rat TDLo:2400 mg/kg (8-19D preg):TER CUSCAM 36,3,67
orl-rat LD50:600 mg/kg ARTODN 54,275,83
ipr-rat LDLo:300 mg/kg 27ZWAY 2,-,36
scu-rat LDLo:300 mg/kg JPETAB 31,1,27
ivn-rat LD50:280 mg/kg JPETAB 135,213,62
scu-mus LD50:700 mg/kg JPETAB 109,268,53
ivn-mus LD50:830 mg/kg TXAPA9 27,70,74
orl-dog LDLo:350 mg/kg 27ZWAY 2,-,36
ivn-dog LDLo:300 mg/kg JPETAB 60,125,37
orl-cat LDLo:275 mg/kg 27ZWAY 2,-,36

SAFETY PROFILE: Poison by ingestion, subcutaneous, intravenous, and intraperitoneal routes. Large doses cause marked depression (sometimes preceded by excitation), prolonged coma, and death. Experimental teratogenic and reproductive effects. Allergic skin reactions may occur on contact. Implicated in development of aplastic anemia. A truly habit-forming drug. Other experimental reproductive effects. Mutation data reported. Combustible. When heated to decomposition it emits toxic fumes of $NO_x$ and $Na_2O$. See also BARBITURATES.

*BAG500* *HR: 3*
*BARBITURATES*

SYNS: BARBITAL ◇ BARBITAL SODIUM ◇ BARBITONE

SAFETY PROFILE: Salts or derivatives of barbituric acid are central nervous system depressants, and are used as hypnotics, sedatives, and anesthetics. Usually administered orally. They are strongly habit forming. Several compounds including amo-, seco-, and pentabarbital are restricted chemicals. Their use can cause a reaction called barbiturism which is marked by chills, headache, fever, and cutaneous eruptions. See BARBITAL SODIUM.

*BAG750* *HR: 1*
*BARBITURIC ACID*
mf: $C_4H_4O_3N_2$ mw: 128.1

PROP: Crystals or white to yellow-white powder, mp: 245°, bp: 260° (decomp).

SAFETY PROFILE: Mildly toxic. Irritating to skin, eyes, and mucous membranes. An allergen. Has no hypnotic properties. Combustible.

*BAH250* CAS:7440-39-3 *HR: 3*
*BARIUM*
DOT: UN 1399/UN 1400/UN 1854
af: Ba aw: 137.36

PROP: Silver-white, sltly lustrous, somewhat malleable metal. Mp: 725°, bp: 1640°, d: 3.5 @ 20°, vap press: 10 mm @ 1049°.

CONSENSUS REPORTS: Reported in EPA TSCA Inventory. Community Right-To-Know List.

OSHA PEL: TWA 0.5 mg(Ba)/$m^3$
ACGIH TLV: TWA 0.5 mg/$m^3$
DOT Classification: Flammable Solid; Label: Dangerous When Wet (UN1399, UN1400); Flammable Solid; Label: Spontaneously Combustible (UN1854).

SAFETY PROFILE: Water and stomach acids solubilize barium salts and can cause poisoning. Symptoms are vomiting, colic, diarrhea, slow irregular pulse, transient hypertension, and convulsive tremors and muscular paralysis. Death may occur from a few hours to a few days. Half-life of barium in bone has been estimated at 50 days. Dust is dangerous and explosive when exposed to heat, flame, or chemical reaction. Violent or explosive reaction with water, $CCl_4$, fluorotrichloromethane, trichloroethylene, and $C_2Cl_4$. Incompatible with acids, $C_2Cl_3F_3$, $C_2H_2FCl_3$, $C_2HCl_3$ and water, 1,1,2-trichloro trifluoro ethane, and fluorotrichloroethane. The powder may ignite or explode in air or other oxidizing gases. See also BARIUM COMPOUNDS.

*BAH500* CAS:543-80-6 *HR: 3*
*BARIUM ACETATE*
mf: $C_4H_6O_4 \cdot Ba$ mw: 255.44

PROP: White crystals. Water-sol.

SYNS: ACETIC ACID, BARIUM SALT ◇ BARIUM DIACETATE ◇ OCTAN BARNATY (CZECH)

15071

# Material Safety Data Sheet

Associated General Contractors of America
1957 E Street N.W.
Washington D.C. 20006
202-393-2040

**Product:** COPPER (SCRAP-GENERIC)

**MSDS No:** AGCA / AGCA 25
**Date:** March 29, 1989

## SECTION I. MATERIAL IDENTIFICATION

**Trade/Material Name:** COPPER (SCRAP-GENERIC)

**Description:** Copper or Copper Alloy.

**Other Designations:** Copper (Cu) Metal, Casting, Powder Scrap

**Available from several suppliers.**

## SECTION II. INGREDIENTS AND HAZARDS

| Ingredient Name: | CAS Number: | Percent: | Exposure Limits: |
|---|---|---|---|
| BASE METAL: Copper (Cu) | 7440 50 8 | 100% maximum | *PEL (OSHA): 0.1 mg/m3<br>**TLV (ACGIH): 0.2 mg/m3 (as copper fume)<br><br>*PEL (ACGIH): 1.0 mg/m3<br>**TLV (ACGIH): 1.0 mg/m3 (as copper dust or mist)<br><br>Rat, oral TDLo: 152 mg/kg<br><br>Human, oral TDLo: 120 mg/kg |

*OSHA Permissible Exposure Limit (PEL)
**American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV's) current as of revision date.

## SECTION III. PHYSICAL DATA

**Appearance & Odor:** Solid, various shapes, odorless, red/brown-colored metal or powder.

**Boiling point:** ~2500°C @ 1 atm
**Vapor pressure:** N/A @ 20°C (mmHg)
**Water solubility (%):** Insoluble
**Evaporation rate:** N/A
**Melting point:** Approx. 1100°C
**% volatile by volume:** N/A

## SECTION IV. FIRE AND EXPLOSION DATA

**Flash Point (method):** None
**Limits: LEL %:** NA
**UEL %:** NA

**Extinguishing Media:** Will not burn. Use water to cool.

**Autoignition Temp:** None

**Unusual fire or explosion hazards:** Fine metal particles produced when ground, sawed, etc., can burn. High concentration of fines (fine particles) in the air may present an explosion hazard. Good housekeeping and adequate ventilation is recommended. Use

 FIRE AND EXPLOSION DATA continues on page 2 

Associated General Contractors of America
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202-393-2040

**Product:** COPPER (SCRAP-GENERIC)

**MSDS No:** AGCA / AGCA 25
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## FIRE AND EXPLOSION DATA continued from page 1

air-supplied or self-contained breathing apparatus if fires are in enclosed areas.

## SECTION V. REACTIVITY DATA

Material is stable under most conditions. Hazardous polymerization cannot occur

**Chemical incompatibilities:** Strong acids

**Hazardous decomposition Products:** Metallic oxides (copper fumes)

No explosion conditions exist for the bulk metal.

## SECTION VI. HEALTH HAZARD INFORMATION

This product is not considered a carcinogen by NTP, IARC or OSHA.

**Summary of risks:** Copper scrap is poorly absorbed through the skin or alimentary tract, and while in the solid state it is not considered a hazard. Operations such as welding, dust generation, or fume generation could allow exposure to copper dusts and fumes. Therefore, it is important to maintain exposure levels below the regulated levels as noted in Section 2. Determine actual exposures by industrial hygiene monitoring. Short-term exposure to copper dusts or fumes may cause irritation of the upper respiratory tract and "metal fume fever," a transient condition with symptoms of fever and chills.

**Chronic effect(s):** Chronic or long-term exposure may result in lung X-ray changes not associated with harmful effects.

**First aid:**

**Eye contact:** Protect eyes from particles or fumes. Wash exposed eyes with copious amounts of water for at least 15 minutes.

**Skin contact:** Protect skin from molten metal and radiant heat when melting scrap. Skin contamination from powder may be cleaned with soap and water. Machine turnings may present a laceration hazard.

**Inhalation:** Move to fresh air, restore or support breathing as required.

**Ingestion:** NA

## SECTION VII. SPILL, LEAK AND DISPOSAL PROCEDURES

**Spill / Leak procedures:** Copper scrap is normally recycled or sold as scrap or landfilled if recycling cannot be justified. Cleanup dust/powder spills promptly by vacuum and wet cleaning methods. Treat as an inert solid.

**Waste management / Disposal:** Dispose of in accordance with OSHA, EPA, state or local regulations.

 MSDS AGCA 25 continues on page 3 

Material Safety Data Sheet

Associated General Contractors of America
1957 E Street N.W.
Washington D.C. 20006
202-393-2040

Product: COPPER (SCRAP-GENERIC)

MSDS No: AGCA / AGCA 25
Date: March 29, 1989

## SECTION VIII. SPECIAL PROTECTION INFORMATION

**Personal protective equipment:**

**Goggles:** Eye and face protection required when grinding, welding, cutting or remelting.

**Gloves:** When handling oil-contaminated copper, wear rubber gloves to prevent skin contact.

**Respirator:** Use NIOSH/MSHA-approved dust/fume respirator or air-supplied respirator if concentrations of copper in air exceed the regulated standards. Use air-supplied or self-contained breathing apparatus (SCBA) in confined spaces.

**Other:** Protect skin from cuts and from hot procedures and processes. Maintain good hygiene and safe work processes. Scrap from machining may be contaminated with cutting oils.

**Workplace considerations:**

**Ventilation:** Use only with adequate ventilation where respirable dusts/mists/fumes are possible. Use local exhaust ventilation when cutting, grinding, welding, or remelting.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

## SECTION IX. SPECIAL PRECAUTIONS

**Storage segregation:** Always maintain exposures below the PEL/TLV. Use industrial hygiene air monitoring to ensure that your use of this material does not create a hazard. Always use exhaust ventilation when feasible.

**Data source code(s):** 1-12,14,19,20,30,31,40,59. OW

AGCA provides this MSDS for reference purposes only, no warranty is expressed or implied. Data herein is taken from standard reference sources.

14801



U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved OMB No. 44-R1367

# MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

## SECTION I

| | |
|---|---|
| MANUFACTURER'S NAME: NUCLEAR LEAD COMPANY, INC. | EMERGENCY TELEPHONE NO.: (615) 483-8718 |
| ADDRESS (Number, Street, City, and Zip Code): P. O. Box 532, Oak Ridge, Tennessee 37831-0532 | |
| CHEMICAL NAME AND SYNONYMS: | TRADE NAME AND SYNONYMS: Lead (Fabrications/Forms) |
| CHEMICAL FAMILY: | FORMULA: 99.9+% |

## SECTION II - HAZARDOUS INGREDIENTS

| PAINTS, PRESERVATIVES, & SOLVENTS | % | TLV (Units) | ALLOYS AND METALLIC COATINGS | % | TLV (Units) |
|---|---|---|---|---|---|
| PIGMENTS | | | BASE METAL Lead PB | 99.9 | .05 mg/M3 |
| CATALYST | | | ALLOYS | | |
| VEHICLE | | | METALLIC COATINGS | | |
| SOLVENTS | | | FILLER METAL PLUS COATING OR CORE FLUX | | |
| ADDITIVES | | | OTHERS | | |
| OTHERS | | | | | |

| HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES | % | TLV (Units) |
|---|---|---|
| | | |
| | | |

## SECTION III - PHYSICAL DATA

| | | | |
|---|---|---|---|
| BOILING POINT (°F) | 2934 | SPECIFIC GRAVITY (H2O=1) | 11.35 |
| VAPOR PRESSURE (mm Hg.) | N/A | PERCENT, VOLATILE BY VOLUME (%) | N/A |
| VAPOR DENSITY (AIR=1) | N/A | EVAPORATION RATE (_____=1) | N/A |
| SOLUBILITY IN WATER | None | | |

APPEARANCE AND ODOR: Gray to Silver Metallic No Odor

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

| | | | |
|---|---|---|---|
| FLASH POINT (Method used): Non-Flammable | FLAMMABLE LIMITS: N/A | Lel | Uel |

EXTINGUISHING MEDIA: No specific agents recommended

SPECIAL FIRE FIGHTING PROCEDURES: If involved in fire, use NIOSH/MSHA approved self contained breathing apparatus and full protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

## SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

* Lead - .05mg/M$^3$

Effects of Overexposure: Prolonged excessive absorption of inorganic lead by ingestion or inhalation of dust and fume is characterized by abdominal pain or what is sometimes referred to as "lead colic", metallic taste in mouth, loss of weight, pain in muscles and muscular weakness. The similarity of symptoms with those of other illnesses require that excessive absorption of lead be verified by medical examination and analysis of biological specimens.

Emergency and First Aid Procedures: Skin: If molten, treat as burn. Eyes: Flush with clean water. If molten, treat as burn.

Inhalation: Remove patient from area to fresh air. Refer to physician.

Ingestion: Water, vomit. Refer to physician.

## SECTION VI - REACTIVITY DATA

| STABILITY | | | CONDITIONS TO AVOID |
|---|---|---|---|
| | UNSTABLE | | |
| | STABLE | X | |

INCOMPATABILITY (Materials to avoid)

Strong Oxidizers, Hydrogen Peroxide, Active Metals: Sodium, Potassium

HAZARDOUS DECOMPOSITION PRODUCTS

| HAZARDOUS POLYMERIZATION | | | CONDITIONS TO AVOID |
|---|---|---|---|
| | MAY OCCUR | | |
| | WILL NOT OCCUR | X | |

N/A

## SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

1) When molten, allow to cool (solidify) 2) Clean up using recommended dustless methods (i.e. vacuum, etc.) 3) Place in closed containers.

WASTE DISPOSAL METHOD

This material may have value on a recycled basis. Comply with applicable Federal, State & Local Regulations. If non-recyclable, and hazardous under 40 CFR 261, Subparts B & C, material must be treated or disposed in a facility meeting the requirements of 40 CFR 264 or 265. If recyclable or non-hazardous, material should be recycled or disposed in a facility meeting the requirements of 40 CFR 257.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) If TLV(s) exceeded, see OSHA 29 CFR 1910.1025 (lead) - Table II (ANSI Z88.2 - 1969 NIOSH-BOM approved respirators only).

| VENTILATION | LOCAL EXHAUST | SPECIAL |
|---|---|---|
| | ANSI Z9.2-1960 (Fume hood over melting area). | |
| | MECHANICAL (General) | OTHER |
| | ACGIH "Industrial Ventilation" 13th Edition. | |

| PROTECTIVE GLOVES | EYE PROTECTION |
|---|---|
| (Heat) protective | Goggles, Safety Glasses, &/Or Faceshield. |

OTHER PROTECTIVE EQUIPMENT

As required to meet applicable OSHA 1910.1025 when TLV(s) exceeded.

## SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Wash hands after handling. Practice good housekeeping procedures. Activities that generate dust or fume should be avoided.

OTHER PRECAUTIONS

Do not permit smoking, eating, or drinking while handling material. Practice good personal hygiene procedures. Keep melting temperatures as low as possible to minimize the generation of fumes. If TLV(s) exceeded, see OSHA 29CFR 1910-1025.



1) * Note: At or Above the "Action Level" (0.03 mg/M$^3$ 8 hr. TWA) refer to applicable requirements of OSHA 29CFR 1910.1025 (Lead).

BETZ LABORATORIES,INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19047
BETZ MATERIAL SAFETY DATA SHEET
24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 215/355-3300



PRODUCT : LIME

EFFECTIVE DATE 05-18-89
PRINTED: 9-Sep-1989
REV:SEC.3

PRODUCT APPLICATION : SUPPLIED MATERIAL.

-----SECTION 1----------HAZARDOUS INGREDIENTS----------

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

CALCIUM OXIDE***CAS#1305-78-8;EYE,SKIN,AND RESPIRATORY IRRITANT;POSSIBLY CORROSIVE TO EYES;PEL:5MG/M3;TLV:2MG/M3.

-----SECTION 2----------TYPICAL PHYSICAL DATA----------

PH: NO DATA
FL.PT.(DEG.F): NA
VAPOR PRESSURE(mmHG): NA
VISC cps70F: NA
EVAP.RATE: NA WATER=1
PHYSICAL STATE: POWDER

ODOR: NONE
SP.GR.(70F)OR DENSITY: ND
VAPOR DENSITY(AIR=1): NA
%SOLUBILITY(WATER): 100
APPEARANCE: COLORLESS
FREEZE POINT(DEG.F): NA

-----SECTION 3----------REACTIVITY DATA----------

STABLE. BETZ TANK CLEAN-OUT CATEGORY 'B'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

BETZ MATERIAL SAFETY DATA SHEET (PAGE 2 OF 3)

PRODUCT: LIME EFFECTIVE DATE 05-18-89

-----SECTION 4----------HEALTH HAZARD EFFECTS----------

ACUTE SKIN EFFECTS ***
MODERATELY IRRITATING TO THE SKIN.MAY CAUSE DERMATITIS.

ACUTE EYE EFFECTS ***
SEVERE IRRITANT TO THE EYES, POSSIBLY CORROSIVE

ACUTE RESPIRATORY EFFECTS *** PRIMARY ROUTE OF EXPOSURE
DUSTS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***
PROLONGED OR REPEATED CONTACT MAY CAUSE PRIMARY IRRITANT DERMATITIS.

MEDICAL CONDITIONS AGGRAVATED ***
NOT KNOWN

SYMPTOMS OF EXPOSURE ***
INHALATION OF DUST AND/OR VAPORS MAY CAUSE EYE,NOSE,THROAT AND RESPIRATORY TRACT IRRITATION.

-----SECTION 5----------FIRST AID INSTRUCTIONS----------

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***
DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DILUTE CONTENTS OF STOMACH.INDUCE VOMITING BY ONE OF THE STANDARD METHODS.IMMEDIATELY CONTACT A PHYSICIAN

-----SECTION 6----------SPILL,DISPOSAL AND FIRE INSTRUCTIONS---------

SPILL INSTRUCTIONS***
VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.SWEEP UP AND PLACE IN WASTE DISPOSAL CONTAINER.
FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***
WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
PRODUCT(AS IS)-
INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).
DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

PRODUCT: LIME EFFECTIVE DATE 05-18-89

-----SECTION 7----------SPECIAL PROTECTIVE EQUIPMENT----------

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

AIRTIGHT CHEMICAL GOGGLES

-----SECTION 8----------STORAGE AND HANDLING PRECAUTIONS----------

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

KEEP DRY

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING,WASH BEFORE REUSE

SPECIFIC- NORMAL CHEMICAL HANDLING

**********

THIS MSDS COMPLIES WITH THE OSHA HAZARD COMMUNICATION STANDARD

HAROLD M. HERSH (ENVIRONMENTAL INFORMATION COORDINATOR)

**********

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED IN THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: NOT APPLICABLE

...DOT HAZARD CLASSIFICATION: NOT APPLICABLE

...DOT SHIPPING DESIGNATION IS: NOT APPLICABLE

...THIS PRODUCT CONTAINS THESE CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER OR REPRODUCTIVE TOXICITY: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 302 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 313 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE) AND DELAYED(CHRONIC)

...MICHIGAN CRITICAL MATERIALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

NFPA/HMIS : HEALTH - 2 ; FIRE - 0 ; REACTIVITY - 0 ; SPECIAL - NONE ; PE - B

CHEM REPORT
05/27/1986

| CHEM ID | CHEM NAME |
|---|---|
| x 007783-40-6 | MAGNESIUM FLUORIDE |

ENTRY INFORMATION
05/27/1986

| PREPARER | REVIEWER | ENTRY DATE | REVISED |
|---|---|---|---|
| x J. BROWER | | 05/23/1986 | |

DOE CHEMICAL HAZARDS EMERGENCY MANAGEMENT SYSTEM
05/27/1986

HEALTH AND SAFETY INFORMATION AUTHORITY

CHEMICAL NAME OR SYNONYM
x MAGNESIUM FLUORIDE
x MAGNESIUM DIFLUORIDE
x 7783-40-6

DISPOSAL

DISSOLVE SOLIDS OR LIQUIDS IN WATER. NEUTRALIZE WITH SODIUM CARBONATE. ADD EXCESS CALCIUM CHLORIDE PAST THE POINT OF CALCIUM FLUORIDE PRECIPIATION. SEPARATE THE INSOLUBES FOR DISPOSAL IN A LISCENCED CHEMICAL LANDFILL.

DECOMPOSITION PRODUCTS

THERMAL DECOMPOSITION MAY INCLUDE HYDROGEN FLUORIDE.

EMERGENCY PROCEDURES

VENTILATE AREA OF SPILL. COLLECT SOLID FLUORIDES IN A NON-GLASS CONTAINER FOR DISPOSAL. LIQUID SPILLS ON VERMICULITE, DRY SAND OR OTHER ABSORBANTED OF PROPERLY. DO NOT CLEAN SPILL AREA WITHOUT RESPIRATOR, FACESHIELD OR PROTECTIVE CLOTHING. FLUSH CLEANED AREA WITH WATER.

FIRST AID

WASH EYES IMMEDIATELY WITH WATER. REMOVE CONTAMINATED CLOTHES AND WASH SKIN WITH WATER. FOR INHALATION - MOVE PERSON TO FRESH AIR. IF BREATHING HAS STOPPED PERFORM ARTIFICIAL RESPIRATION. IF INGESTED - GIVE LARGE QUANTITIES OF WATER TO DRINK. DO NOT INDUCE VOMITING. IN ALL CASES SEEK MEDICAL ATTENTION IMMEDIATELY.
VOMITING. IN ALL CASES SEEK MEDICAL ATTENTION IMMEDIATELY.

FIRE HAZARD

NONCOMBUSTIBLE. USE EXTINGUISHING MEDIA TO TREAT SURROUNDING FIRES. FIREFIGHTERS SHOULD WEAR SCBA.

HEALTH HAZARD

INORGANIC FLUORIDES ARE HIGHLY IRRITATING AND TOXIC. FLUORIDE POISONING RESULTS IN MOTTLING OF THE TEETH AND BONE DAMAGE. SYMPTOMS INCLUDE NAUSEA, VOMITING, ABDOMINAL PAINS, WEAKNESS AND CONVULSIONS. IRRITATING TO EYES AND SKIN. SKIN CONTACT MAY CAUSE SEVERE BURNS. ASTHMA ATTACKS MAY BE CAUSED OR AGGRAVATED UPON EXPOSURE.

CHEMICAL INCOMPATIBILITIES

FLUORIDES REACT WITH ACIDS, AND MAY RELEASE HYDROGEN FLUORIDE GAS.

PHYSICAL DESCRIPTION

WHITE OR PAINT VIOLET POWDER OR CRYSTALS. SPARINGLY SOLUBLE IN WATER.

PROTECTION MEASURES

WEAR RUBBER GLOVES, PROTECTIVE CLOTHING, GOGGLES OR A FACESHIELD. AVO
SKIN AND EYE CONTACT AND BREATHING DUST. DO NOT WEAR CONTACT LENSES W
WORKING WITH FLUORIDES. USE ONLY IN A WELL VENTILATED AREA.

SHIPPING INFORMATION

NOT SPECIFICALLY REGULATED.

STORAGE RECOMMENDATIONS

STORE IN PLASTIC OR GLASS SEALED CONTAINERS. PROTECT FORM HEAT, MOIST
AND PHYSICAL DAMAGES. SEPARATE FROM STRONG ACIDS. STORE IN DRY, WELL
VENTILATED PLACE.

CHEMICAL CATEGORIES
05/27/1986

| CATEGORY | CLASS NAME | CLASS CODE |
|---|---|---|
| *** | | |
| * CHEMICAL | METAL HALIDE | MGF2 |
| * HEALTH HAZARD | TOXIC | HIGH |
| * TRANSPORTATION | NOT LISTED | |
| * WASTE | TOXIC | |

CHEM NAME* MAGNESIUM FLUORIDE

CHEMICAL ATTRIBUTES
05/27/1986

| ATTRIBUTE | VALUE | UNITS | QUALITY | COMMENTS |
|---|---|---|---|---|
| *** | | | | |
| * DENSITY | 3.150 | GM/CC | | |
| * BOILING POINT | 2260.000 | C | | AT 760 MM |
| * SOLUBILITY | 87.000 | MG/L | SPARINGLY | IN WATER 18 C |
| * EXPOSURE LIMIT | 2.500 | MG/CU.M | TLV/OSHA PEL | INORGANIC FLUORIDE |
| * ORAL TOXICITY | 1.000 | G/KG | LD-50 | GUINEA PI |
| * MELTING POINT | 1248.000 | C | | |
| * FLAM LIMIT UP | | | NOT APPLICABLE | |
| * FLAM LIMIT LOW | | | NOT APPLICABLE | |
| * IGNITION TEMP | | | NOT APPLICABLE | |
| * FLASH POINT | | | NOT APPLICABLE | |
| * MOL WEIGHT | 62.320 | G/MOL | | |

SELECTED MATERIALS THAT ARE RELATED TO OR CONTAIN THE SUBSTANCE
05/27/1986

CHEM NAME* MAGNESIUM FLUORIDE

***
* FLUORIDES
* POTASSIUM FLUORIDE
* SODIUM FLUORIDE

10999

CHEM REPORT
05/23/1986

| CHEM ID | CHEM NAME |
|---|---|
| 007440-61-1 | URANIUM |

ENTRY INFORMATION
05/23/1986

| PREPARER | REVIEWER | ENTRY DATE | REVISED |
|---|---|---|---|
| D. AVERILL | J. BROWER | 02/13/1985 | 05/16/1986 |

DOE CHEMICAL HAZARDS EMERGENCY MANAGEMENT SYSTEM
05/23/1986

HEALTH AND SAFETY INFORMATION AUTHORITY

CHEMICAL NAME OR SYNONYM

URANIUM
URANIUM METAL
U238
URANIUM METAL PYROPHORIC
7440-61-1

TWA .2 mg/m3 Sa .6 STEL

DOT

DISPOSAL

RECOVERY FOR REPROCESSING IS THE PREFERRED METHOD FOR HANDLING WASTE URANIUM. SHIP TO LISCENCED RECOVERY FACILITY. SCRAP URANIUM SHOULD BE COVERED WITH OIL.

DECOMPOSITION PRODUCTS

THERMAL DECOMPOSITION - URANIUM OXIDES.

ENVIRONMENTAL EFFECTS

NO CRITERIA SET, BUT EPA HAS SUGGESTED A PERMISSIBLE CONCENTRATION IN WATER OF 3 UG/L BASED ON HEALTH EFFECTS.

EMERGENCY PROCEDURES

PERSONS NOT WEARING PROTECTIVE EQUIPMENT AND CLOTHING SHOULD BE RESTRICTED FROM AREAS OF SPILLS UNTIL CLEANUP HAS BEEN COMPLETED. IF URANIUM MATERIALS ARE SPILLED, 1. VENTILATE AREA OF SPILL. 2. COLLECT SPILLED MATERIAL IN MOST CONVENIENT AND SAFE MANNER AND DEPOSIT IN SEALED CONTAINERS FOR RECLAMATION. LIQUID CONTAINING URANIUM OR INSOLUBLE COMPOUNDS SHOULD BE ABSORBED IN VERMICULITE, DRY SAND, EARTH, OR A SIMILAR MATERIAL. URANIUM CHIPS OR TURNINGS WHICH ARE SPILLED SHOULD BE COVERED WITH OIL.

FIRST AID

WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL. SKIN EXPOSURE - PROMPTLY WASH CONTAMINATED SKIN USING SOAP OR MILD DETERGENT AND WATER. IF IRRITATION IS PRESENT AFTER WASHING, GET MEDICAL ATTENTION. INHALATION - IF A PERSON BREATHES IN LARGE AMOUNTS OF URANIUM MOVE THE EXPOSED PERSON TO FRESH AIR AT ONCE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP THE AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION IMMEDIATELY . SWALLOWING - GIVE THE PERSON LARGE QUANTITIES OF WATER IMMEDIATELY. AFTER THE WATER HAS BEEN SWALLOWED, TRY TO GET THE PERSON TO VOMIT BY TOUCHING THE BACK OF THE THROAT WITH A FINGER. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT. GET MEDICAL ATTENTION IMMEDIATELY.

FIRE HAZARD

URANIUM IS A DANGEROUS FIRE HAZARD IN THE FORM OF A SOLID OR DUST WHEN EXPOSED TO HEAT OR FLAME. IT IS A MODERATE EXPLOSION HAZARD IN THE FORM OF DUST WITH A MINIMUN EXPLOSIVE CONCENTRATION OF 60 GRAMS/CU.M. EXTINGUISH WITH DRY POWDER, DRY SAND, OR GRAPHITE. DONOT USE

CARBON DIOXIDE.

HEALTH HAZARD

HIGHLY TOXIC AND RADIOACTIVE.
URANIUM AND/OR IT INSOLUBLE COMPOUNDS ARE TOXIC IF THEY ARE INHALED SWALLOWED, OR IF THEY COME IN CONTACT WITH THE EYES OR SKIN. URANIU METAL AND ITS INSOLUBLE COMPOUNDS ARE LESS TOXIC THAN THE SOLUBLE COMPOUNDS. IT IS WEAKLY RADIOACTIVE AND IS PRINCIPALLY AND ALPHA PARTICLE EMITER. IT IS NOT A SIGNIFICANT EXTERNAL RADIATION HAZARD. IT POSES AN INTERNAL RADIATION AND CHEMICAL HAZARD. EXPOSURE MAY CAUSE AN INCREASE IN CANCER OF THE LYMPHATIC AND BLOOD-FORMING TISSUES IN MAN. PROLONGED CONTACT WITH THE SKIN MIGHT CAUSE RADIATION DAMAGE TO THE SKIN AND/OR SKIN RASH (DERMATITIS). PROLONGED INHALATION HAS CAUSED DAMAGE TO THE LUNGS OF ANIMALS. URANIUM IS HIGHLY TOXIC TO THE KIDNEYS AND LIVER.

CHEMICAL INCOMPATIBILITIES

CONTACT WITH CO2 MAY CAUSE FIRE.
URANIUM METAL IS INCOMPATIBLE WITH HALOGENS. U POWDER IGNITES IN FLORINE AT ROOM TEMPERATURE, IN CHLORINE AT 150-180 DEGREES C, AND IN IODINE VAPOR AT 260 DEGREE C. MAY EXPLODE OR IGNITE IN BRF3 AND CCL4. URANIUM REACTS EXPLOSIVELY WITH NITRIC ACID, AND DINITROGEN TETRAOXIDE. U METAL GLOWS AND PRODUCES HEAT IN AMMONIA, SULFUR VAPOR, AND IN CONTACT WITH SELENIUM.

MEDICAL RECCOMMENDATIONS

SPECIAL ATTENTION SHOULD BE GIVEN TO THE BLOOD, LUNGS, KIDNEY, AND LIVER IN PREEMPLOYMENT MEDICAL EXAMS. PERIODIC MEDICAL EXAM SHOULD INCLUDE A CHEST X-RAY, URINALYSIS, COMPLETE BLOOD COUNT AND CHEMISTRY.

PHYSICAL DESCRIPTION

A HARD, SILVERY WHITE RADIOACTIVE METAL

PROTECTION MEASURES

GOOD ENGINEERING CONTROLS SHOULD BE USED TO REDUCE ENVIRONMENTAL CONCENTRATIONS TO THE PERMISSIBLE EXPOSURE LEVEL (PEL). ABOVE THE PEL RESPIRATORY PROTECTION MUST BE WORN. AT A CONCENTRATION OF 2.5 MG/M3 OR LESS WEAR FUME RESPIRATOR OR HIGH EFFICENCY PARTICULATE RESPIRATOR APPROVED FOR RADIONUCLIDES. A SUPPLIED-AIR RESPIRATOR, OR A SCBA. EMPLOYEES SHOULD WEAR IMPERVIOUS CLOTHING, GLOVES, AND GOGGLES TO PREVENT SKIN CONTACT WITH URANIUM. EATING AND SMOKING SHOULD NOT BE PERMITTED IN AREAS WHERE SOLIDS OR LIQUIDS CONTAINING URANIUM OR INSOLUBLE COMPOUNDS ARE HANDLED, PROCESSED, OR STORED. EMPLOYEES WHO HANDLE URANIUM SHOULD WASH THEIR HANDS THOROUGHLY WITH SOAP OR MILD DETERGENT AND WATER BEFORE EATING, SMOKING OR USING TOILET FACILITIES.

SAMPLING METHODS

NO STANDARD MEASUREMENT METHODS FOR URANIUM OR INSOLUBLE COMPOUNDS HAV BEEN PUBLISHED BY NIOSH. MAY BE SAMPLED AND USING A CELLULOSE ESTER FILTER AND ANALYZED BY ATOMIC ABSORPTION.

SHIPPING INFORMATION

SHIP AS URANIUM METAL, PYROPHORIC. LABEL AS RADIOACTIVE AND FLAMMABLE SOLID.

STORAGE RECOMMENDATIONS

STORE AS RADIOACTIVE MATERIAL. KEEP FROM EXPOSURE TO AIR, MOISTURE, CO HALOGENS, ACIDS, AMMONIA, SULFUR. SCRAP URANIUM SHOULD BE COVERED WITH

USE

URANIUM METAL HAS LIMITED USES IN ALLOYS AND PHOTOELECTRIC TUBES. URAN COMPOUNDS ARE USED AS FUEL IN NUCLEAR REACTORS, IN PLUTONIUM PRODUCTIO IN THE ARE PRODUCTION OF OTHER RADIOACTIVE ISOTOPES, AND AS FEEDS F GASEOUS DIFFUSION PLANTS.

CHEMICAL CATEGORIES
05/23/1986

| CATEGORY | CLASS NAME | CLASS CODE |
|---|---|---|

| | | |
|---|---|---|
| *** | | |
| * CARCINOGEN | HUMAN | |
| * CHEMICAL | ACTINIDE METAL | U |
| * HAZARD CODE | REACTIVITY | 2 |
| * HAZARD CODE | HEALTH | 3 |
| * HAZARD CODE | FIRE | 3 |
| * HEALTH HAZARD | KIDNEY TOXIN | |
| * PHYSICAL HAZARD | PYROPHORIC | |
| * PHYSICAL HAZARD | RADIOACTIVE | |
| * TRANSPORTATION | RADIOACTIVE AND FLAMMABLE SOLID | UN2979 |

CHEM NAME* URANIUM

CHEMICAL ATTRIBUTES
05/23/1986

| ATTRIBUTE | VALUE | UNITS | QUALITY | COMMENTS |
|---|---|---|---|---|
| *** | | | | |
| * IGNITION TEMP | 150.000 | TO 175C | | SOLID |
| * CHEM FORMULA | | | U | |
| * MOL WEIGHT | 238.030 | G/MOL | | |
| * PHYSICAL STATE | | | SOLID | AT 20 - 25 C |
| * HALF LIFE | 4.500 | 10E9 YEARS | | |
| * IGNITION TEMP | 20.000 | C | MINIMUM | DUST CLOUD |
| * MELTING POINT | 1133.000 | C | | |
| * BOILING POINT | 3818.000 | C | | |
| * SPECIFIC GRAVITY | 19.050 | | WATER=1 | AT 25 C |
| * SOLUBILITY | | | INSOLUBLE | IN WATER |
| * EXPOSURE LIMIT | 0.250 | MG/CU.M | PEL | AS U |
| * EXPOSURE LIMIT | 0.200 | MG/CU.M | TLV | AS U |

SELECTED MATERIALS THAT ARE RELATED TO OR CONTAIN THE SUBSTANCE
05/23/1986

CHEM NAME* URANIUM

***
* URANIUM COMPOUNDS
* URANIUM DICARBIDE
* URANIUM DIOXIDE
* URANIUM HEXAFLUORIDE
* URANIUM HYDRIDE
* URANIUM OCTAOXIDE
* URANIUM OXYFLUORIDE
* URANIUM TETRAFLUORIDE
* URANYL FLUORIDE
* URANYL NITRATE
---

# ATTACHMENT F

# WORK AREA MAPS

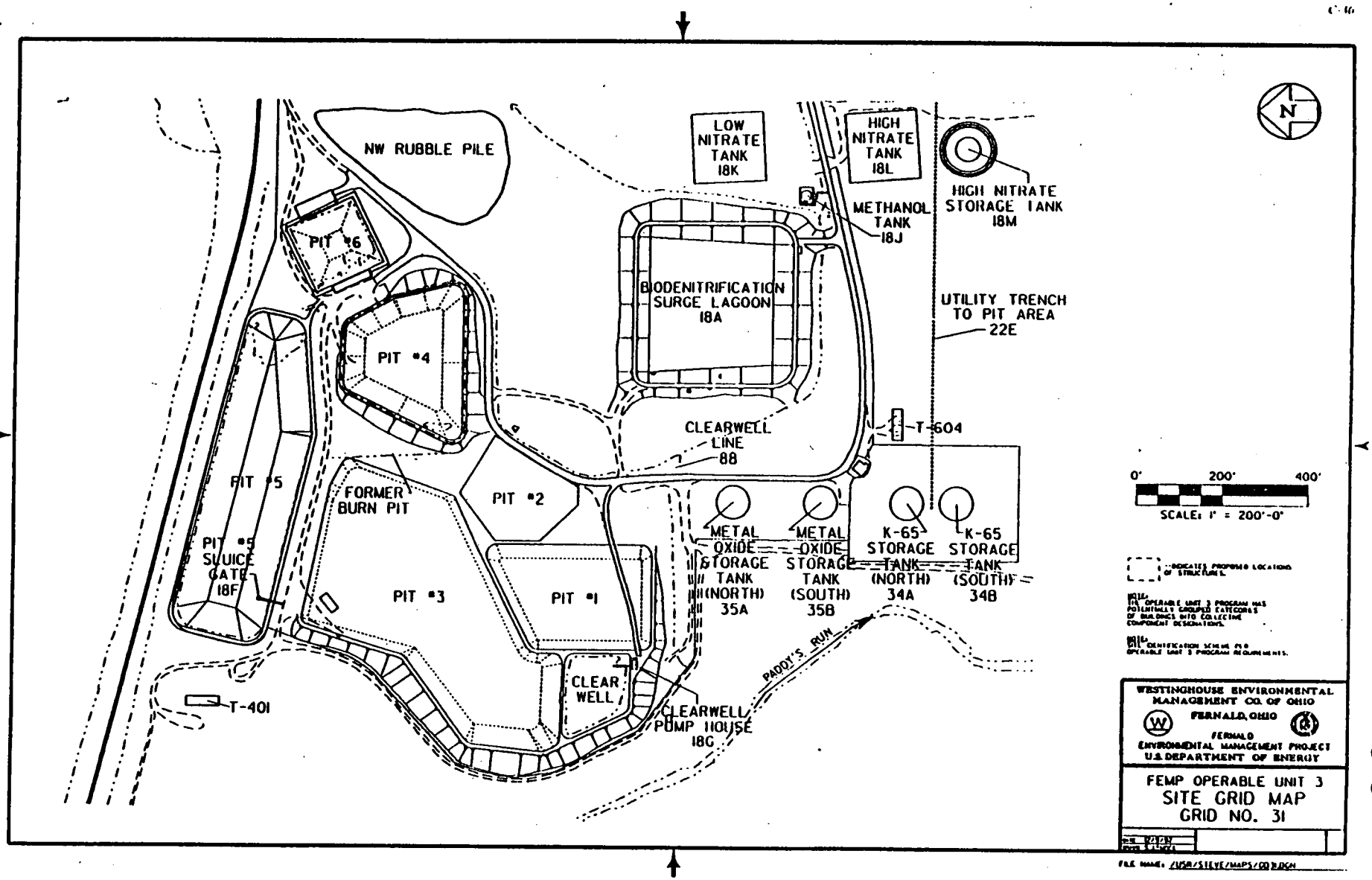


FIGURE C-12 Grid No. 31

# ATTACHMENT G

# OSHA AND DOE EMPLOYEE RIGHTS POSTER

# Occupational Safety and Health Protection for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities

## Policy:

U.S. Department of Energy (DOE) contractor employees shall be provided with safe and healthful working conditions in accordance with the standards prescribed pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, and the Department of Energy Organization Act of 1977; said standards shall be consistent with those promulgated under the Occupational Safety and Health Act of 1970, Public Law 91-596. Please refer to the Order DOE 5483.1A for details.

## DOE Contractors:

DOE has determined that _____
Fernald Environmental Restoration Management Corporation
is subject to DOE Acquisition Regulation (DEAR), Subpart 970.23, and is, therefore, required to comply with applicable DOE-prescribed Occupational Safety and Health Administration (OSHA) standards listed therein. This Order and the standards are available for employee review at _____
Safety & Health Building #53 _____.
As delineated by the Order DOE 5483.1A, the DOE contractor is required to:

1. Furnish to employees, employment and a place of employment which are as free from occupational safety and health hazards as possible.

2. Establish and implement programs and procedures to comply with the Order DOE 5483.1A. These shall include programs and procedures to monitor the workplace for known toxic materials and harmful physical agents which are used or produced at the facility, and maintain records of the data. As part of these programs and procedures:

(a) Advise employees or their representatives that they are to be provided with an opportunity to (1) observe monitoring or measuring for toxic materials or harmful physical agents, and (2) have access to the results thereof.

*(b) Provide to each employee, former employee, or designated representative, within 15 days of the receipt of a written request, access to or copies of any monitoring or bioassay records relevant to the employee's potential exposure to toxic materials or harmful physical agents during employment.

(c) Notify employees promptly of any information indicating that an exposure to toxic materials or harmful physical agents may have exceeded the limits specified by the DOE-prescribed OSHA standards.

*(d) Provide to each employee, former employee, or designated representative, within 15 days of the receipt of a written request, access to or copies of the employee's cumulative recorded occupational radiation dose during employment.

(e) Notify employees promptly of any information indicating that a radiation dose may have exceeded the limits specified by the DOE-prescribed OSHA standards.

*For purposes of access to an employee's monitoring, bioassay, or radiation exposure records, if the representative is not the recognized/certified collective bargaining agent, then he or she must have the employee's written authorization for such access.

## Employees:

All employees are required to:

1. Observe the DOE-prescribed OSHA standards applicable to their work.

2. Report promptly to the contractor any condition which may lead to a violation of these standards.

3. Respond to warning signals which may be activated in the event of fire, radiation, or other possible emergencies.

4. Report emergencies using established procedures.

## Inspections:

All activities under this contract are subject to inspection by DOE. When an inspection under the Order DOE 5483.1A is conducted, a contractor management representative and a representative authorized by the employees will be given an opportunity to accompany the DOE inspector.

Where there is no representative authorized by the employees, the DOE inspector will consult with a reasonable number of employees concerning safety and health conditions in the workplace.

## Complaints:

Employees may file a complaint with the contractor management or with the local DOE office using the form DOE F 5480.4 to request an inspection of the workplace. Complaints also may be filed by letter, telegram, or oral means. DOE F 5480.4 is available from _____
Near the south entrance of the cafeteria _____
_____

When an employee requests anonymity from the contractor, DOE shall honor this request.

## Imminent Danger

For any condition or practice which presents an immediate hazard that could reasonably be expected to cause death or serious physical harm (permanent or prolonged impairment of the body or temporary disablement requiring hospitalization), the contractor and/or DOE shall take immediate and effective remedial actions to remove employees from the hazard and/or eliminate the hazard. As soon as possible, an inspection shall be conducted by the contractor and/or DOE to assure that appropriate actions have been taken to preclude recurrence of the hazard.

## Nondiscrimination:

No contractor shall discharge or in any manner discriminate against any employee by virtue of the filing of a complaint, or in any other fashion exercising on behalf of himself or herself or others any action set forth in the Order DOE 5483.1A.

## Inquiries:

Inquiries should be addressed to the contractor; however, additional inquiries may be addressed to the following local DOE official.

_
Mr. Thomas J. Rowland, Acting Manager
DOE Field Office, Fernald
P. O. Box 398705
Cincinnati, OH 45239-8705

## Posting Requirements:

Copies of this notice must be posted in a sufficient number of places in Government-owned plants and facilities operated by DOE contractors subject to DOE Acquisition Regulation (DEAR), Subpart 970.23, to permit employees working in or frequenting any portion of the plant to observe a copy on the way to or from their workplace.

U.S. Department of Energy

EH F 5480.1(8-90)

# ATTACHMENT H
# ACKNOWLEDGEMENT FORM

# ACKNOWLEDGEMENT FORM
## PROJECT SPECIFIC HEALTH AND SAFETY PLAN
### for GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 & 6

The undersigned individuals have been oriented on the requirements of the attached Project Specific Health and Safety Plan and understand the provisions of the plan and agree to abide by each.

| Name | Signature | Date | Badge No. |
|---|---|---|---|
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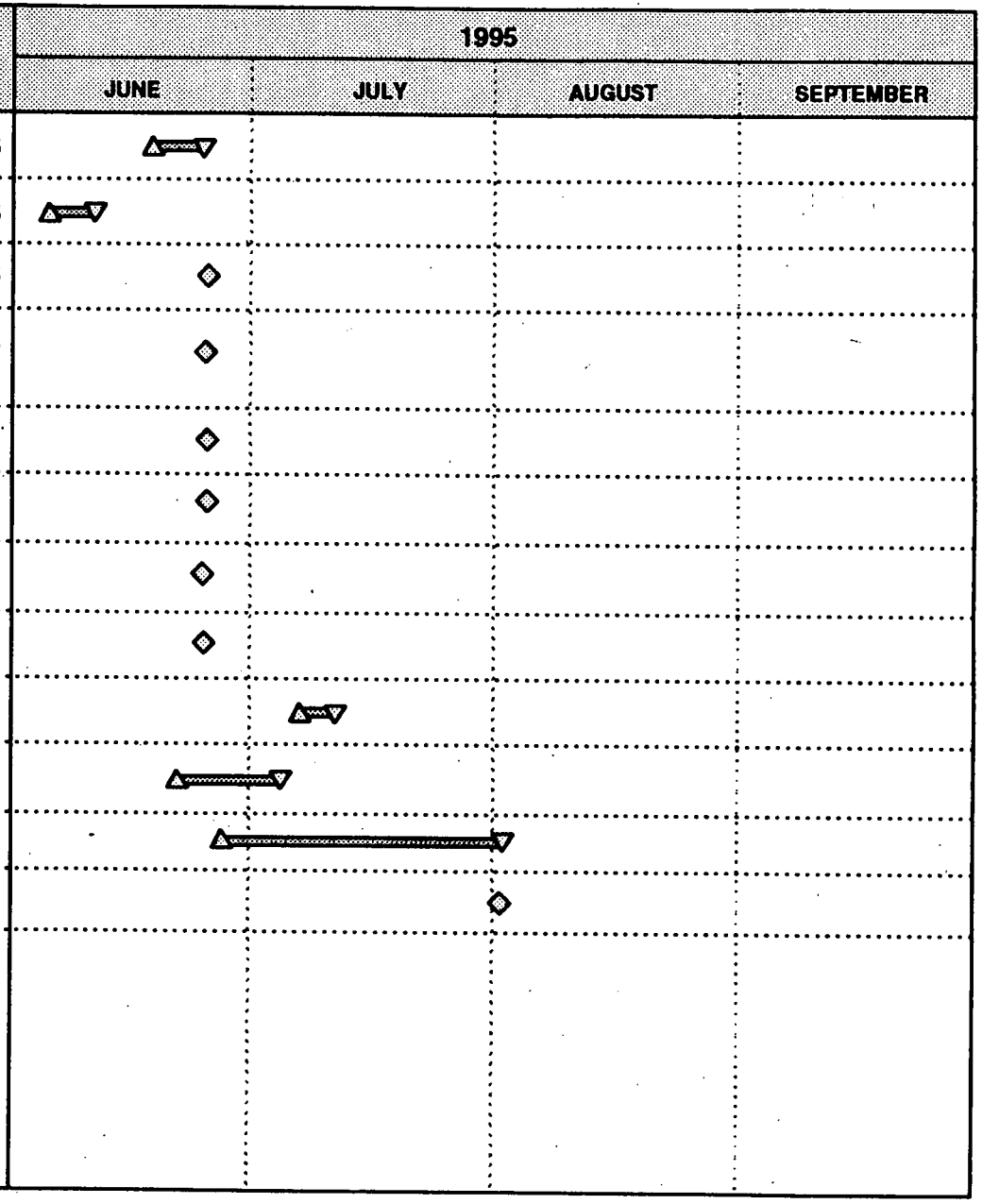
# APPENDIX G

# PROPOSED PROJECT SCHEDULE

# PROPOSED PLANNING SCHEDULE
# GEOTECHNICAL INVESTIGATION OF WASTE PITS 5 AND 6
# RI/FS WBS NUMBER 10.03.11

| ACTIVITY DESCRIPTION | EARLY START | EARLY FINISH |
|---|---|---|
| TEST REFLECTOR | 19JUN95 | 26JUN95 |
| LAY REFERENCE LINES FOR PITS 5 AND 6 | 8JUN95 | 12JUN95 |
| PROCURE VIBRA CORER LINERS / CASING | | 26JUN95 |
| PROCURE VIBRA CORER SUPPORT EQUIPMENT (AIR COMPRESSOR) | | 26JUN95 |
| TEST VIBRA CORE | | 26JUN95 |
| GET BIG CRANE ONSITE | | 26JUN95 |
| PERMITS | | 26JUN95 |
| IMPROVE CRANE ACCESS | | 26JUN95 |
| PIT 6 SAMPLING | 10JUL95 | 13JUL95 |
| PIT 5 SAMPLING | 27JUN95 | 7JUL95 |
| LABORATORY TESTING | 27JUN95 | 1AUG95 |
| FINAL LABORATORY REPORT | | 1AUG95 |

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