144 1-401.5

TRANSMITTAL OF DEWATERING AND EXCAVATION EVALUATION PROJECT TREATABILITY STUDY ADDENDUM - PROJECT SPECIFIC PLAN FOR THE RAMP AND PAD EXCAVATION OF WASTE PITS 1 AND 3

09/25/95

DOE-1538-95
DOE-FN EPAS
~~85~~ 122
REPORT

Department of Energy
Fernald Environmental Management Project
P. O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 648-3155

SEP 25 1995

DOE-1538-95

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region V - 5HRE-8J
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, OH 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF DEWATERING AND EXCAVATION EVALUATION PROJECT TREATABILITY STUDY ADDENDUM - PROJECT SPECIFIC PLAN FOR THE RAMP AND PAD EXCAVATION OF WASTE PITS 1 AND 3

This letter formally transmits the Department of Energy, Fernald Area Office (DOE-FN) Treatability Study Addendum entitled "Project Specific Plan for the Ramp and Pad Excavation of Waste Pits 1 and 3". This Project Specific Plan (PSP) is an addendum to the Dewatering Excavation and Evaluation Project (DEEP) Treatability Study.

This letter and the enclosed plan formally advises The U.S. Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (OEPA) of the decision to proceed with the DEEP Phase 4 as enunciated in the DEEP Treatability Study Work Plan Addendum.

DEEP is a Post Record of Decision (ROD) Operable Unit (OU) Treatability Study designed to evaluate waste dewatering and excavation techniques that will be implemented during remediation of the OU1 waste pits. The DEEP project consists of four phases. In October 1994, geotechnical testing of soil borings and correlation of Standard Penetration Tests and Cone Pentrometer Tests (Phase 1), was completed. In March of 1995, the "wet excavation" (Phase 2) was completed. Phase 2 consisted of excavating a total of 7 test areas and removing 15 cubic yards of waste from each of Waste Pits 1, 2, and 3. A portion of the excavated material was archived for future treatability investigations; the remaining waste was returned to the pit of origin. Following Phase 2, "Dewatering"

Recycled and Recyclable

(Phase 3) was completed in August 1995. Phase 3 consisted of installing a series of wells in Waste Pits 1 and 3 and performing comparative well tests and pumping methods to determine if installing a well dewatering system is a cost effective way to improve excavation conditions.

DEEP has now reached a point where field mobilization for the "dry excavation" (Phase 4) is in the planning stages. DOE-FN intends to expand Phase 4 slightly to include a ramp and pad in Waste Pit 1, which is identified in the enclosure. The driving factor behind this expansion is the fact that OU1's full-scale remediation is set to begin in Waste Pit 1. It is therefore essential to construct this ramp and pad so that waste material conditions may be fully characterized and this subsequent information utilized during design and full-scale excavation.

In addition to the ramp and pad change, it has become apparent that due to the size of the Phase 4 excavations the lined containment berm as described in the original DEEP Treatability Study Work Plan, cannot be maintained. The labor and capital cost of constructing the outer berm is much greater than the silt fencing containment described in enclosure one. Also, the size of stockpile would necessitate operating the tracked equipment on top of the plastic sheeting thereby eliminating its containment value. Instead, the above mentioned silt fencing will be used in support of the excavation grade to maintain run-off within the waste pit's contamination boundary.

While these berm containment and excavation methods were not in the original plan for the DEEP program, the DOE-FN believes that this approach represents the safest, most prudent, and cost-effective way to obtain the required design information.

If you have any questions regarding this submittal, please contact John Hall at (513) 648-3118.

Sincerely,

Johnny Reising

FN:Hall

Johnny W. Reising
Fernald Remedial Action
Project Manager

Enclosure: As Stated

cc w/enc:

G. Jablonowski, USEPA-V, 5HRE-8J
D. S. Ward, GeoTrans
S. McClellan, PRC
AR Coordinator, FERMCO

cc w/o enc:

K. Chaney, EM-423/GTN
B. Skokan, EM-423/GTN
Manager, TSPP/DERR, OEPA- COLUMBUS
F. Bell, ATSDR
R. Vandegrift, ODOH
R.D. George, FERMCO/52-2
T. Hagen, FERMCO/65-2
C. Little, FERMCO/2
M. Yates, FERMCO/9

PROJECT SPECIFIC PLAN

FOR THE

RAMP AND PAD EXCAVATION

OF WASTE PITS 1 AND 3

RI/FS WBS# 10.03.12

REVISION 0

SEPTEMBER 13, 1995

CRU1-HSP-~~1007~~ 1003.3

Fernald Environmental

FERMCO

Restoration Management Corporation

UNCONTROLLED

144

FERNALD ENVIRONMENTAL

RESTORATION MANAGEMENT CORPORATION

CERCLA/RCRA UNIT 1 (CRU1)

PROJECT SPECIFIC HEALTH AND SAFETY PLAN FOR DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)

SEPTEMBER 1995

REVISION 3

EMERGENCY PHONE NUMBER ON-SITE 648-6511
RADIO: "CONTROL"

APPROVALS:

Robert Fellman 9/11/95

Robert Fellman, CRU1 Director — Date

Daryl Mills, Construction Safety and Health Manager — Date

Mike Davis 09-11-95

Mike Davis, FERMCO Health and Safety Officer — Date

PROJECT SPECIFIC PLAN

FOR THE

RAMP AND PAD EXCAVATION

OF WASTE PITS 1 AND 3

RI/FS WBS# 10.03.12

REVISION 0

SEPTEMBER 13, 1995

APPROVALS:

W. M. Benson 9/13/95
William A. Benson, Deputy Director

Michael B. Hoge
Michael B. Hoge, Quality Assurance

Danny F. Stropes
Danny F. Stropes, Project Manager

TABLE OF CONTENTS

Section	Title	Page
1.0	INTRODUCTION	1
2.0	PROJECT ORGANIZATION	2
3.0	RAMP AND PAD EXCAVATIONS	5
3.1	Excavation - Pit 1	5
3.2	Excavation - Pit 3	6
3.3	Stockpiles	6
3.4	Pit Water Handling	7
3.5	Pit Water Sampling	7
3.6	Equipment and Ancillary Items	8
3.7	Decontamination	9
4.0	PIT RECLAMATION	10
5.0	SUPPORTING DOCUMENTATION	10
5.1	DEEP Treatability Study Work Plan	11
5.2	Project Specific Health and Safety Plan	11
5.3	System Safety	11
5.4	Radiological Safety	12
5.5	Data Management	12

TABLE OF CONTENTS (Continued)

Section	Title	Page
5.6	Environmental Media Evaluation	12
6.0	**QUALITY ASSURANCE**	12
6.1	Quality Assurance Requirements	13

LIST OF ATTACHMENTS

Attach.	Title
ATTACHMENT A	PROJECT SPECIFIC HEALTH AND SAFETY PLAN
ATTACHMENT B	PROJECT SAFETY ANALYSIS REQUIREMENTS
ATTACHMENT C	DATA QUALITY OBJECTIVE
ATTACHMENT D	WASTE PIT EXCAVATIONS MAP
ATTACHMENT E	ENVIRONMENTAL MEDIA SAMPLING PLAN

PROJECT SPECIFIC PLAN

FOR THE

RAMP AND PAD EXCAVATION

OF WASTE PITS 1 AND 3

RI/FS WBS# 10.03.12

REVISION 0

SEPTEMBER 13, 1995

APPROVALS:

W. M. Benson 9/13/95
William A. Benson, Deputy Director

Michael B. Hoge
Michael B. Hoge, Quality Assurance

Danny Stropes
Danny F. Stropes, Project Manager

TABLE OF CONTENTS

Section	Title	Page
1.0	INTRODUCTION	1
2.0	PROJECT ORGANIZATION	2
3.0	RAMP AND PAD EXCAVATIONS	5
3.1	Excavation - Pit 1	5
3.2	Excavation - Pit 3	6
3.3	Stockpiles	6
3.4	Pit Water Handling	7
3.5	Pit Water Sampling	7
3.6	Equipment and Ancillary Items	8
3.7	Decontamination	9
4.0	PIT RECLAMATION	10
5.0	SUPPORTING DOCUMENTATION	10
5.1	DEEP Treatability Study Work Plan	11
5.2	Project Specific Health and Safety Plan	11
5.3	System Safety	11
5.4	Radiological Safety	12
5.5	Data Management	12

TABLE OF CONTENTS (Continued)

Section	Title	Page
5.6	Environmental Media Evaluation	12
6.0	**QUALITY ASSURANCE**	**12**
6.1	Quality Assurance Requirements	13

LIST OF ATTACHMENTS

Attach.	Title
ATTACHMENT A	PROJECT SPECIFIC HEALTH AND SAFETY PLAN
ATTACHMENT B	PROJECT SAFETY ANALYSIS REQUIREMENTS
ATTACHMENT C	DATA QUALITY OBJECTIVE
ATTACHMENT D	WASTE PIT EXCAVATIONS MAP
ATTACHMENT E	ENVIRONMENTAL MEDIA SAMPLING PLAN

1.0 INTRODUCTION

As part of the continuing Operable Unit 1 (OU1) Dewatering Excavation Evaluation Program (DEEP) Treatability Study field activities, OU1 proposes to excavate a ramp and pad into each of Waste Pits 1 and 3. This excavation is an integral component of the DEEP. The purpose of this Project Specific Plan (PSP) is to provide detailed information to support the field and laboratory work associated with the DEEP project.

The project is divided into two separate ramp and pad excavations, one in Waste Pit 1, and one in Waste Pit 3. The purpose of these excavations is to determine if the pit waste can support tracked construction equipment and the stability of the excavation side slopes. This information will assist in the overall waste pit excavation plan for final remediation. The Waste Pit Excavations Map (Attachment D) shows the ramp and pad excavation locations. The ramp locations were chosen for excavation into waste pit areas where the waste has been shown by previous investigations to be weak (Cone Penetrometer Tests) and where ground water infiltration (Wet Excavation) is minimal.

Upon completion of the dewatering program for Waste Pits 1 and 3, the proposed ramps will be excavated in the same locations as the dewatering tests. The first ramp will be excavated in Pit 1, then completely backfilled before the Pit 3 ramp is started.

Each excavation will be initiated near the proposed location of the ramp. As excavation advances, the waste pit cap material will be segregated. Due to the variation in thickness of cap material, segregation and separate stockpiling may not be feasible for Waste Pit 1 material. Waste Pit 3 cap thickness is such that segregation of cap material will be possible. As each excavation is advanced into the waste, the waste will be stockpiled adjacent to the pit. Each excavation will be performed in such a manner that the approximate dimension and location of the ramp will be the focal point of the excavation.

Since a ramp which possesses sufficient strength to support heavy equipment is integral to this phase of DEEP, if it is determined that the ramp will not be strong enough to support heavy equipment, the ramp itself will be modified to support heavy equipment. Such modification may consist of, but is not limited to, emplacement of concrete onto the ramp surface, or the removal of ramp waste material, replacement and backfilling of that material with higher strength fill or aggregate.

Following completion of the ramp and pad excavations, and conclusion of the information to be gathered from the excavations, each pit excavation will be reclaimed in accordance with the requirements of Section 4 of this PSP.

2.0 PROJECT ORGANIZATION

An Environmental Restoration Management Contract (ERMC) has been implemented at the FEMP to manage the site restoration activities; with Fernald Environmental Restoration Management Corporation (FERMCO), a wholly-owned subsidiary of Fluor Daniel, Inc., presently serving as the ERMC contractor to DOE.

Primary FERMCO organizational responsibility for implementation of the OU1 DEEP Treatability Study is OU1. Additional support will be provided by matrixed personnel assigned to OU1, and other FERMCO groups, and subcontractors, who will provide personnel, expertise, and equipment to assist with performance of all aspects of the Ramp and Pad Excavation project.

PROJECT PERSONNEL

Those personnel who fill key positions in the performance of the DEEP Treatability Study Ramp and Pad Excavation are as follows:

Operable Unit 1 Deputy Director (William Benson)

The OU1 Deputy Director is responsible for coordinating assigned OU1 activities including project performance, schedule, budget and resources. The OU1 Deputy Director provides guidance and support to all OU1 activities. Additionally, the Deputy Director provides project status information to senior management, client, and regulatory officials.

Operable Unit 1 Project Manager (Dan Stropes)

The OU1 Project Manager will provide guidance in the planning, preparation, and execution of this sampling and excavation event. Any and all proposed changes to this PSP must be cleared and approved by the OU1 Project Manager and Quality Assurance (QA) prior to the preparation and execution of a variance to this plan.

Operable Unit 1 Project Engineer (Brad Catanach)

Responsible for ensuring that all field data quality objectives associated with the excavation field work are performed in a satisfactory manner. The Project Engineer will also be responsible for preparing and maintaining all field data documentation that provides a written record of excavation activities and measurements in the field.

Operable Unit 1 Construction Manager (Greg Stephens)

Responsible for ensuring that all field work is initiated, performed and concluded in accordance with all applicable permits, DEEP project documents, and the PSP. Also responsible, in coordination with the Field Operations Lead, for the supervision of construction subcontractor personnel, and timely acquisition of all necessary field excavation equipment, and support items related to performance of the excavation and reclamation. Responsible for transmitting construction-related changes in scope to the OU1 Safety Analyst for review against the established safety basis. Responsible for implementation of construction-related safety analysis commitments.

Operable Unit 1 Field Operations Lead (James T. Hey)

Responsible for ensuring the PSP is implemented correctly and efficiently in the field. Coordinates, with the OU1 Construction Manager, all excavation, soil and waste stockpiling and any required sampling activities in the field. Also obtains, in coordination with other support groups, all necessary work permits, and provides technical oversight of field personnel and subcontractors. Responsible for transmitting operations-related changes in scope to the OU1 Safety Analyst for review against the established safety basis. Responsible for implementation of operations-related safety analysis commitments.

Operable Unit 1 Health and Safety Officer (Jack Craighead)

The Health and Safety Officer is responsible for the comprehensive OU1 Health and Safety Program. The Health and Safety Officer reviews and approves the DEEP Health and Safety Plan, which is specific to the proposed field activities, in accordance with FEMP policy, proper health and safety practices, and the SCQ. The OU1 Health and Safety Officer will coordinate with the Field Health and Safety Officer to assess unforeseen circumstances, from a health and safety perspective, and issue addenda to the Health and Safety Plan, as necessary. Responsible for transmitting programmatic safety-related changes in scope to the OU1 Safety Analyst for review against the established safety basis. Responsible for implementation of safety-related safety analysis commitments.

Operable Unit 1 Field Health and Safety Officer (Mike Davis)

The Field Health and Safety Officer ensures that the Project Specific Health and Safety Plan is fully implemented during all field activities. The Field Health and Safety Officer will coordinate with the Project Manager to ensure that field activities are conducted in a manner which is consistent with the Project Health and Safety Plan. The Field Health and Safety Officer can request, verbally or in writing, that individual personnel be relieved of field duties for specific violations to the Project Health and Safety Plan. The Field Health and Safety Officer will coordinate with the OU1 Health and Safety Officer to assess unforeseen circumstances, from a health and safety perspective, and implement addenda to the Project Health and Safety Plan issued by the OU1 Health and Safety Officer. Responsible for transmitting field safety-related changes in scope to the OU1 Safety Analyst for review against the established safety basis. Responsible for implementation of safety-related safety analysis commitments.

Operable Unit 1 Safety Analyst (Elaine Blakely)

The OU1 Safety Analyst is responsible for implementation of requirements for safety analysis into this project via hazard identification and accident analysis in accordance with all project safety-related documents, DOE Orders and FERMCO procedures.

Operable Unit 1 Quality Assurance Officer (Mike Hoge)

The QA Officer is responsible for establishing and preparing QA requirements for the DEEP program, and ensuring that project QA requirements are met by field personnel. The QA Officer will perform or coordinate project audits and surveillance, as required.

Radiological Technicians (Raymond Roseberry)

Under supervision of Radiological Engineering and the Lead Radiological Technician, Radiological Technicians are responsible for the collection of radiological samples, verification of possible radiological contamination and decontamination of equipment, control of personnel ingress and egress to radiologically contaminated areas, documentation of radiological measurement results, and the provision of radiological monitoring equipment, in accordance with the approved Radiological Work Permit, and the PSP.

Environmental Field Operations Sampling Personnel

Under supervision of the Environmental Field Operations (EFO) Section Manager, Mike Frank, or a designee, the sampling personnel are responsible for the collection, documentation, labeling, transport, and delivery of the environmental media samples to be collected during this project. EFO sampling personnel 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 and Site Wide Analysis Request/Custody Record. EFO will complete field validation checklists.

3.0 RAMP AND PAD EXCAVATIONS

Upon completion of dewatering activities in Waste Pits 1 and 3, Ramp and Pad Excavations will commence in the areas shown on the attached map. Excavation criteria shall be in accordance with OSHA Standard 29 CFR 1926, Subpart P.

3.1 Excavation - Pit 1

A trackhoe and tracked loader shall be used for the excavation into Pit 1. The first cut will be with the loader at approximately 6 inches in an attempt to segregate the cover material from the waste material. Due to the thin layer of cover material on Pit 1, segregation of the cover material from the waste material may not be possible. The Construction Manager shall make a determination as to the advisability of segregating and stockpiling the cover material.

The following cuts will be at the discretion of the equipment operator since they will probably be into the waste. The depth of the excavation will be approximately 8 feet with 2H to 1V side slopes, if the slopes are not stable then they will be excavated to stable slopes. The ramp width will be 20 feet with a slope of 15%, these parameters may be adjusted depending on field conditions. The bottom pad will be approximately 30 feet in diameter.

Four deactivated dewatering wells are in the area of the excavation, these wells have PVC casing and will be excavated with the waste material.

Before the loader moves onto the waste, the hoe will perform a qualitative test by placing the bucket on the waste and applying downward pressure. The OU1 Field Health and Safety Officer, Construction Manager, Project Manager, and equipment operators will then assess the situation as to the safety of driving the loader on the exposed waste surface. Following this assessment, a determination will be made as to the advisability of driving the loader onto the exposed waste surface.

If it is determined that the surface is unstable, then excavation will be limited to the material which the equipment can reach from the ground surface. In this instance excavation will proceed around the perimeter of the opening using a track hoe.

3.2 Excavation - Pit 3

The excavation of Pit 3 shall be identical to Pit 1 with the following exceptions:

- The excavation will be 12 feet in depth
- The waste will have 2.5H to 1V slopes
- The cover material in Pit 3 is approximately 8 feet in thickness; thus it should be easier to segregate than the 6 inch cover material in Pit 1

Approximately the top 5 feet of material in Pit 3 will be segregated from the remaining cover and waste material. When the excavation reaches a depth of approximately 8 feet, the trackhoe will perform a qualitative bearing test, as discussed in Section 3.1, with assessments being made as to the viability of the loader driving on the waste surface.

3.3 Stockpiles

Stockpiles will include two types, these being cap material stockpiles, and waste material stockpiles. Project Safety Analysis Requirements (Attachment B) limit waste stockpiles to a maximum volume of 535 cubic yards (yd^3).

Stockpiles will be set back a minimum of 20 feet from the edges of the excavation. This 20 feet set back distance shall be maintained at all times. Stockpiles may need to be pushed back as the excavation proceeds. This will be accomplished with a tracked loader.

The stockpiles may be covered by tarpaulin and/or dust suppressants may be used to control windborne emissions. These measures will be at the discretion of the Construction Manager, Health and Safety Manager, and Field Operations Lead.

If tarpaulin is used, the tarpaulins will be placed onto the stockpiles in such a manner that the stockpile is totally covered. Tarpaulin sides, ends and corners will be anchored in place with locally derived materials to control possible waste particulate movement by wind.

If manufactured dust suppressants are used, the dust suppressant will be mixed in accordance with the manufacturer's recommendations for product use. Suppressant mixing will be done in a 3000 gallon fiberglass tank, and application will consist of spraying the suppressant onto the stockpile with a 2-inch water pump equipped with a hose and distribution nozzle. If water is used as a dust suppressant, the water source will be FEMP process water. The method of application will be the same as with the manufactured dust suppressant.

In order to control potential waste contaminated surface water runoff resulting from precipitation, silt fencing will be placed at the perimeter of the stockpiles where runoff is most likely to occur. If a significant accumulation of waste material behind the silt fencing takes place, this waste material will be removed and placed back into the excavation.

3.4 Pit Water Handling

Surface water and near surface ground water which enters the pit excavations will be removed from the pit by the use of a sump pump which will be lowered in the excavation by the use of a trackhoe boom. At the discretion of the Construction Manager, and Field Operations Lead, the temporary excavation of water management diversions may be required. Also, at the discretion of the Construction Manager, in coordination with other project staff, small amounts of water in the excavation may not be removed, if the amount or location of the water is determined to not hinder the excavation field activities or safety of field personnel.

Water removed from the excavation(s) will be temporarily stored in designated water storage tanks made available adjacent to the excavation. Upon completion of excavation activities, at the discretion of the Project Manager, in coordination with other project staff, the stored water may either be removed and sent to the Plant 8 water treatment system or else reintroduced back into the excavation of origin.

3.5 Pit Water Sampling

A total of twenty (20) water samples will be collected during the project. Water samples are necessary in order to adequately characterize the water quality of the pit water for future treatability purposes at the FEMP Advanced Waste Water Treatment (AWWT) plant. Water samples are to be analyzed for the following parameters:

- Chromium - hexavalent
- Nitrates as Nitrogen

- Chromium - total
- Copper
- Nickel
- Total Suspended Solids
- Total Thorium
- Total Uranium

Water samples will be obtained from the designated water storage tank in which the pit water has been removed. A total of ten (10) water samples will be collected from each excavation, unless lack of water precludes the collection of all proposed samples. If there is a lack of water the Project Manager, in coordination with other project staff, may direct that a greater or lessor number of samples be taken, or any necessary changes to the laboratory analysis parameters.

All water samples will be collected by FERMCO Environmental Division, EFO staff technicians. Sample analyses will be performed at the FERMCO Analytical Laboratory, unless otherwise directed by OU1 Project Management staff. Sample collection, handling, documentation, chain of custody, and analyses will be conducted in accordance with applicable sections of the FEMP Sitewide CERCLA Quality Assurance Project Plan (SCQ). The Environmental Media Sampling Plan (Attachment E) provides further information about the sampling activities.

3.6 Equipment and Ancillary Items

The following equipment and other ancillary items will be used to perform the field activities associated with the performance and completion of this project:

Equipment

- tracked loader
- trackhoe
- water pump
- JLG manlift
- generator
- dust suppressant and 3000 gallon fiberglass tank
- electrical cable
- video camera
- TV monitor
- water storage tanks
- plastic tarpaulin

000013

- orange plastic hazard fencing and fence posts
- silt fencing

Ancillary Items

- Vehicles
- Sampling equipment
- Sampling containers
- Sample preservatives
- Sampling coolers
- Temperature/pH/Conductivity meters (if needed)
- Radiological meters
- Photoionization detectors
- Surveying instruments (if needed)
- Decontamination equipment

3.7 Decontamination

When salvageable equipment and ancillary items are no longer needed for DEEP, they will be cleaned to remove excess visible waste. Any gross contamination will be removed on site prior to full decontamination at the FEMP Decontamination Facility, where the equipment/items will be cleaned to be authorized for free release off site.

All equipment that goes to the FEMP Decontamination Facility from the Contamination Areas surrounding Waste Pits 1 and/or 3 shall be labeled in such a way as to indicate to the employees at the Decontamination Facility that Thorium-230 is the isotope of concern when surveying the equipment for free-release.

The FEMP will utilize a high-pressure steam and detergent mixture illustrated in FEMP SOP 55-C-101, "Operation of Steam Detergent Cleaner in the Decontamination and Decommissioning Building".

Following decontamination, an evaluation of the potential for internal contamination of salvageable equipment will be made and the equipment will be radiologically surveyed to determine whether it can be authorized for free release off site. Equipment/items which cannot be decontaminated to the free release criteria will be containerized, labeled, and stored temporarily in the OU1 Waste Pit Area, or at some other designated location at the FEMP.

4.0 PIT RECLAMATION

The sequence of reclamation will be the reclamation of Waste Pit 1, followed by Waste Pit 3. As specified in this PSP, only one pit will be excavated, tested, and reclaimed at a time.

Following ramp and pad excavations the waste will be backfilled. The sludge may need to be compacted with the tracked loader as it is backfilled, this will be at the discretion of the Construction Manager. During reclamation it may be necessary to reintroduce pit pumpage water back into the excavation from the water storage tanks. If water is reintroduced into the pits, approximately one half of the water requiring disposal will be placed back into the pit after total depth in the excavation has been achieved, and the remaining water will be placed back into the pit after approximately one half of the excavated waste has been backfilled into the pit.

After waste backfilling, the cap soil material will be backfilled onto the waste surface, with the possible exception of Waste Pit 1, where segregation and stockpiling of the cap soil material may not be feasible. Once approximately one half of the cap soil material has been placed onto the waste surface, and it has been determined that the surface is sufficiently stable to support heavy equipment, the tracked loader will be used to evenly distribute the cap material. Following this, backfilling of the cap soil material will continue until all stockpiled cap material has been backfilled. Then the excavation surface will be graded as necessary to fill/grade any topographic low/high areas. The completed surface will be graded to conform to the approximate original surface contours of the excavation location prior to surface disturbance.

The graded surface will be reseeded and straw mulch will be used to control erosion and assist with seed germination.

If, after a period of time, subsidence depressions which are determined to be sufficiently severe enough to warrant a safety hazard are noted, these depressions will be backfilled using locally derived uncontaminated soil material, and the surface reseeded and mulched.

5.0 SUPPORTING DOCUMENTATION

Ramp and Pad Excavation project supporting documents provide the basis for safely and efficiently performing the necessary work. Specific requirements which govern performance of the work are addressed in the following documents:

5.1 DEEP Treatability Study Work Plan

OU1 DEEP activities are addressed in the treatability study work plan for the project. This document, titled "Operable Unit 1 Dewatering Excavation Evaluation Program (DEEP) Treatability Study Work Plan, Revision 0", is dated April 1995.

Specific information about the ramp and pad excavation phase of DEEP is presented in Section 5 of this PSP. This document is available for review in OU1.

5.2 Project Specific Health and Safety Plan

The Project Specific Health and Safety Plan (PSHSP) defines and provides detailed information about the following:

- Levels of Protection
- Personal Protective Equipment/Clothing
- Personal Air Monitoring
- Excavation "Competent Person" requirements
- Industrial Hygiene related issues
- Radiological Exposure related issues
- Control Zones
- Exposure Guidelines
- Hazard Recognition
- Emergency Response Procedures

The PSHSP for this project is included as Attachment A of this PSP.

5.3 Systems Safety

Systems Safety aspects of the DEEP Ramp and Pad Excavation activities are addressed in the Auditable Safety Record (ASR) 93-0024, Addendum 2, and Integrated Preliminary Hazard Assessment, titled "Dewatering Excavation Evaluation Program (DEEP) Phases 2, 3, and 4. A copy of this document is on file within OU1.

The ASR for the ramp and pad excavation assigns a Hazard Category of 3 to the project. Specific safety analysis related requirements of the project are presented in Attachment B of this PSP.

5.4 Radiological Safety

A Radiological Work Permit will be obtained prior to initiation of field work. This permit will be obtained from the FERMCO Radiological Engineering group. The permit will provide specific information about the personal protective, radiological monitoring, and radiation work related requirements of the project.

5.5 Data Management

Data collected for this project shall consist of qualitative observations, quantitative laboratory water sample analysis results, and visual observations. All data obtained are to be used by OU1 for the purposes of treatability study and remedial design planning.

All excavations will be video recorded in order to document a permanent record of the project activities. The video camera used shall have the capability of presenting the date and time on the video image. Measuring scales (survey rod, rule) shall be available to provide a scale while video recording various characteristics of the excavation and materials encountered. Additionally, still photographs of some project activities may be taken. A manlift will be at times to properly photograph and create video records of the excavations and other project activities.

5.6 Environmental Media Evaluation

Due to the relatively short term duration and extent of these excavations, minimal potential degradation of environmental media is anticipated. The ASR directs that perimeter air monitoring for particulate emissions from the excavations and adjacent stockpiles be performed for the duration of the field activities. Also, excavation and stockpile(s) perimeter air monitoring for radon will be conducted during the duration of the project.

Perimeter air monitoring of the areas to be excavated and the excavations themselves will be performed by FERMCO Environmental Media monitoring personnel, using mobile continuous air monitoring instruments.

6.0 QUALITY ASSURANCE

The primary objectives of the Quality Assurance/Quality Control (QA/QC) section of this plan relate to the collection of field information and data sufficient to evaluate the waste pit excavation testing to occur during the DEEP. Specific objectives of this field sampling effort

shall be designed, organized, and implemented in a manner which will optimize the collection of information which meets the DQO (Attachment C) specified in this PSP. To ensure information is gathered in such a manner that DQO goals are met, QA/QC measures will be used to determine conformance with overall OU1 objectives.

The fundamental mechanisms used to achieve these quality goals can be characterized as planning, prevention, assessment, and correction. These components are further described as follows:

- Comprehensive up front planning, prior to project start, which provides sufficient details of the project work scope and planning to successfully achieve the project goals.

- Prevention of defects in the data quality through planning and design, documented instruction and procedures, and careful selection and training of skilled, qualified personnel.

- Quality assessment through program or regular audits and surveillance to supplement continual informal review.

- Permanent correction of conditions adverse to quality objectives through a close-looped corrective action system.

6.1 QUALITY ASSURANCE REQUIREMENTS

Surveillances of work processes and operations shall be undertaken to assure quality of performance. Surveillances shall be performed by the Quality Assurance Officer assigned to the DEEP Treatability Study. Surveillance activities shall encompass technical and procedure requirements, and may be conducted at any point in the project.

At a minimum, one surveillance shall be conducted, consisting of monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillance shall be planned and documented in accordance with Section 12.3 of the SCQ.

ATTACHMENT A

PROJECT SPECIFIC HEALTH AND SAFETY PLAN

CRU1-HSP-~~1007~~ 1003.3

Fernald Environmental

FERMCO

Restoration Management Corporation

UNCONTROLLED

144

FERNALD ENVIRONMENTAL

RESTORATION MANAGEMENT CORPORATION

CERCLA/RCRA UNIT 1 (CRU1)

PROJECT SPECIFIC HEALTH AND SAFETY PLAN FOR DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)

SEPTEMBER 1995

REVISION 3

EMERGENCY PHONE NUMBER ON-SITE 648-6511
RADIO: "CONTROL"

APPROVALS:

Robert Fellman — 9/11/95

Robert Fellman, CRU1 Director — Date

9/11/95

Daryl Mills, Construction Safety and Health Manager — Date

09-11-95

Mike Davis, FERMCO Health and Safety Officer — Date

UNCONTROLLED

TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	1-1
1.1 WORK AREA CHARACTERIZATION	1-1
1.2 WORK DESCRIPTION	1-1
2.0 ORGANIZATION STRUCTURE AND KEY PERSONNEL RESPONSIBILITIES	2-1
2.1 MANAGER, CONSTRUCTION SAFETY & HEALTH	2-1
2.2 DEEP HEALTH AND SAFETY OFFICER	2-1
2.3 CRU1 PROJECT DIRECTOR	2-1
2.4 DEEP PROJECT MANAGER	2-1
2.5 DEEP ASSISTANT PROJECT MANAGER	2-1
2.6 FIELD OPERATIONS LEAD	2-1
3.0 SITE CONTROL	3-1
3.1 Radiological Areas	3-1
3.2 Exclusion Zones	3-1
4.0 TRAINING	4-1
4.1 HAZARD COMMUNICATION	4-1
4.2 RECORDS	4-1
4.3 VISITORS	4-1
5.0 MEDICAL MONITORING AND SURVEILLANCE	5-1
5.1 REQUIREMENTS	5-1
5.2 RECORDS	5-2
6.0 HAZARD ASSESSMENT	6-1
6.1 RADIOLOGICAL ISSUES	6-1
6.2 INDUSTRIAL HYGIENE ISSUES	6-1
6.3 SAFETY ISSUES	6-4
6.4 NUCLEAR SAFETY	6-6

TABLE OF CONTENTS

Section	Page
7.0 HAZARD CONTROL	7-1
7.1 ADMINISTRATIVE/ENGINEERING CONTROLS	7-1
7.2 PERSONAL PROTECTIVE EQUIPMENT/RESPIRATORY PROTECTION	7-1
8.0 DECONTAMINATION	8-1
8.1 SITE DECONTAMINATION REQUIREMENTS	8-1
8.2 CHEMICAL DECONTAMINATION REQUIREMENTS	8-1
9.0 EMERGENCY/CONTINGENCY PLANS	9-1
9.1 REPORTING	9-1
9.2 EVACUATION ROUTES/ACCOUNTABILITY	9-2
9.3 EMERGENCY EQUIPMENT	9-2
9.4 EMERGENCY RESPONSE	9-2
10.0 CHANGES TO THE PSHSP	10-1

Attachments:

Attachment A. Project Specific Health and Safety Requirements Matrix	A-1
Attachment B. Personnel and Environmental Monitoring and Action Levels	B-1
Attachment C. FEMP Rally Points	C-1
Attachment D. Location of FEMP Medical Facility	D-1
Attachment E. Work Area Material Safety Data Sheets (MSDSs)	E-1
Attachment F. Work Area Map	F-1
Attachment G. OSHA and DOE Employees Rights Poster	G-1
Attachment H. Acknowledgement Form	H-1

1.0 INTRODUCTION

The provisions of this Project Specific Health and Safety Plan (PSHSP) are to be used during the dry excavations CERCLA/RCRA Unit 1 (CRU1) Dewatering, Excavation Evaluation Program (DEEP). Compliance with this plan is required of all personnel who enter the work area associated with this project.

All personnel entering the work area (Waste Pits 1and 3) will be required to be oriented on the requirements of this PSHSP and the Project Specific Health and Safety Requirements Matrix (PSHSRM) (Attachment A). All personnel must sign an Acknowledgement Form (Attachment H) stating they have been oriented on the requirements of this plan, understand, and will abide by the provisions of this plan. The form will be controlled by the Health and Safety Officer during the work and then forwarded to CRU1 document control as part of the project files.

1.1 WORK AREA CHARACTERIZATION

The Waste Pits were remote dumping sites. When active written procedures controlled input into the pits but it is acknowledge that uncontrolled material was put into the pits. Uncontrolled material reported to be put into the pits are forktruck, uranium derbys, and out dated lab chemicals.

A map of the DEEP work area is shown in Attachment F.

1.1.1 Waste Pit 1

The majority of materials placed in Waste Pit 1 were dry solids, including general sump sludge, depleted slag, trailer cake, depleted residues, graphite/ceramics, thorium waste, and uranyl ammonium phosphate (UAP) filtrate. Drums, some containing material, are known to be in the pit.

1.1.2 Waste Pit 3

The materials placed in Waste Pit 3 consisted of general sump sludge, raffinate, trailer cake, slag leach, water treatment sludge, and thorium wastes.

1.1.3 Sampling Data

General and personnel air monitoring for volatile organic compounds (VOCs) has been conducted during DEEP activities. During the dewatering phase of DEEP, a spot measurement of a well casing in waste pit 3 showed the presence of ammonia, but levels were below detection outside the casing. No concentrations of VOCs approaching regulatory limits has been found.

Airborne contamination and radon monitoring conducted during DEEP activities has shown no employee exposures above regulatory limits. Radon limits above 2000 pCI/L were detected during the slurry testing activity on pit 2. The radon level was found inside the slurry tank.

1.2 WORK DESCRIPTION

1.2.1 Excavation at Pit 1

A trackhoe and tracked loader shall be used for the excavation into Pit 1. The first cut will be with the loader at approximately 6 inches in an attempt to segregate the cover material from the waste material. Due to the thin thickness of cover material on Pit 1, segregation of the cover material from

UNGOIN MULLER

the waste material may not be attempted. The Construction Manager shall make a determination as to the advisability of segregating and stockpiling the cover material.

The following cuts will be at the discretion of the equipment operator since they will probably be into the waste. The depth of the excavation will be approximately 8 feet with 2H to 1V side slopes, if the slopes are not stable then they will be excavated to stable slopes. The ramp width will be 20 feet with a slope of 15%, these parameters may be adjusted depending on field conditions. The bottom pad will be approximately 30 feet in diameter.

Four deactivated dewatering wells are in the area of the excavation, these wells have PVC casing and will be excavated with the waste material.

Before the loader moves onto the waste, the hoe will perform a qualitative test by placing the bucket on the waste and applying downward pressure. The OU1 Field Health and Safety Officer, Construction Manager, Project Manager, and equipment operators will then assess the situation as to the safety of driving the loader on the exposed waste surface. Following this assessment, a determination will be made as to the advisability of driving the loader onto the exposed waste surface.

If it is determined that the surface is unstable, the excavation will proceed around the perimeter of the excavation using a track hoe.

1.2.2 Excavation at Pit 3

The excavation of Pit 3 shall be identical to Pit 1 with the following exceptions:

- The excavation will be 12 feet in depth
- The waste will have 2.5H to 1V slopes
- The cover material in Pit 3 is approximately 8 feet in thickness; thus it should be easier to segregate than the 6 inch cover material in Pit 1

Approximately the top 5 feet of material in Pit 3 will be segregated from the remaining cover and waste material. When the excavation reaches a depth of approximately 8 feet, the trackhoe will perform a qualitative bearing test, as discussed in Section 3.1, with assessments being made as to the viability of the loader driving on the waste surface.

1.2.3 Stockpiles

Stockpiles will be set back a minimum of 20 feet from the edges of the excavation. This 20 feet set back distance shall be maintained at all times. Stockpiles may need to be pushed back as the excavation proceeds.

The stockpiles may be covered by tarpaulin and/or dust suppressants may be used to control windborne emissions. These measures will be at the discretion of the Construction Manager, Health and Safety Manager, and Field Operations Lead.

000030

If tarpaulin is used, the tarpaulins will be placed onto the stockpiles in such a manner that the stockpile is totally covered. Tarpaulin sides, ends and corners will be anchored in place with locally derived materials to control possible waste particulate movement by wind.

If manufactured dust suppressants are used, the dust suppressant will be mixed in accordance with the manufacturer's recommendations for product use. Suppressant mixing will be done in a 3000 gallon fiberglass tank, and application will consist of spraying the suppressant onto the stockpile with a 2-inch water pump equipped with a hose and distribution nozzle. If water is used as a dust suppressant, the water source will be the FEMP potable water supply. The method of application will be the same as with the manufactured dust suppressant.

In order to control potential waste contaminated surface water runoff resulting from precipitation, silt fencing will be placed at the perimeter of the stockpiles where runoff is most likely to occur. If a significant accumulation of waste material behind the silt fencing takes place, this waste material will be removed and placed back into the excavation.

1.2.4 Pit Water Sampling

Surface water and near surface ground water which enters the pit excavations will be removed from the pit by the use of a sump pump which will be placed in the excavation. At the discretion of the Construction Manager, and Field Operations Lead, the temporary excavation of water management diversions may be required. Also, at the discretion of the Construction Manager, in coordination with other project staff, small amounts of water in the excavation may not be removed, if the amount or location of the water is determined to not hinder the excavation field activities or safety of field personnel.

All excavation water removed from the excavation(s) will be temporarily stored in designated water storage tanks made available adjacent to the excavation. Upon completion of excavation activities, at the discretion of the Project Manager, in coordination with other project staff, the tanked water may either be removed and sent to the Plant 8 water treatment system or else reintroduced back into the excavation of origin.

1.2.3 Entering excavation for data collection

After completion of the excavation, monitoring for volatile organic compounds, radon and radiation may be conducted. Entry into the excavations would be based on stability of the excavation floor and walls. Final approval for personnel entering into the excavation is up to the HSO.

UNCONTROLLED

2.0 ORGANIZATION STRUCTURE AND KEY PERSONNEL RESPONSIBILITIES

2.1 MANAGER, CONSTRUCTION SAFETY & HEALTH - Daryl Mills.
Responsible for the oversight of activities in construction safety and health. Jack Craighead is the alternate for Daryl Mills for this project.

2.2 DEEP HEALTH AND SAFETY OFFICER - Mike Davis. Responsible for maintaining DEEP health and safety programs. Acts as the single point of contact for all environmental, safety, industrial hygiene, fire and radiological issues/concerns. Jack Craighead is the alternate for Mike Davis for this project.

2.3 CRU1 PROJECT DIRECTOR - Robert T. Fellman. Responsible for providing direction toward the development of the PSHSP and for providing signature approval to the final document. William Benson is the alternate for Robert Fellman for this project.

2.4 DEEP PROJECT MANAGER - William M. Benson. Responsible for overall project performance. Reviews project plans, evaluates project against budget and schedule, and coordinates activities with the client. Dan Stropes is the alternate for William Benson for this project.

2.5 DEEP ASSISTANT PROJECT MANAGER - Gregory W. Stephens. Responsible for assisting the project manager with project reviews, budgets, and schedules. Provides technical oversight of field operations and will direct excavation activities. William Benson is the alternate for Greg Stephens for this project.

2.6 FIELD OPERATIONS LEAD - James T. Hey. Coordinates field activities, obtains work permits, and provides oversight of field personnel. Greg Stephens is the alternate for James Hey.

3.0 SITE CONTROL

The following work areas will be established or encountered during the activities associated with DEEP.

3.1 Radiological Areas

Excavations will be performed inside a Radiological Contamination Area. Entrances to and perimeters of radiological areas will be defined by yellow snow fencing. All radiological areas will be identified by signs having the standard radiological symbol, the trifoil, on a yellow background.

The following areas will be encountered:

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

The following areas may be created during excavation:

- Airborne Radioactivity Area

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

3.2 Exclusion Zones

An exclusion zone is any area, room or enclosure where the activities being conducted present an additional safety hazard and requires additional PPE or training. The Exclusion Zone for excavation will be the radiological controlled area.

4.0 TRAINING

All personnel conducting work associated with DEEP, inside the Rad Contamination Area, are to be Radiological Worker II (Rad II) trained.

Additional training requirements specific to each task to be performed are outlined in the PSHSRM (see Attachment A).

4.1 HAZARD COMMUNICATION

4.1.1 Material Safety Data Sheets

MSDSs for site materials determined to present a hazard for work covered by this PSHSP are included in Attachment E. Additional MSDSs are available through the FERMCO HSO.

4.1.2 Job Briefings/Safety Meetings

A pre-work/kick off safety meeting will be conducted by the FERMCO HSO with the DEEP Project Manager and project participants. This meeting will satisfy the requirements for the PSHSP safety briefing.

All personnel involved in this project shall be given a PSHSP safety briefing prior to receiving authorization to begin work. This PSHSP safety briefing shall include review of this PSHSP and PSHSRM.

As a minimum, safety meetings shall be held weekly. The safety meetings will be conducted by the Field Operations Lead or designee. Written documentation detailing the briefings and attendance sheets will be maintained as part of the project. File copies shall be forwarded to the FERMCO HSO for review.

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

Documentation of training classes, craft/operator certifications, and equipment operator experience records from sources other than the FEMP shall be submitted to the FERMCO HSO for review and approval.

4.3 VISITORS

A visitor to the work site covered by this PSHSP is defined as anyone coming to the work site with the sole purpose of observation or viewing the activity in progress (hands-off inspection). Visitors are not allowed to operate equipment, perform manual labor or supervise work activity.

Visitors that are Radiological Worker II trained are to be oriented to the work site by:

Briefing on this PSHSP and active permits

Shall contact the site supervisor for briefing on the current site activities and the associated hazards
Wear a Thermoluminescent Dosimeter (TLD) radiation badge and view the Visitor Orientation Video.
Wear the required PPE specified on the posted FERMCO Work Permit.

Visitors (not Rad II trained) entering radiological contamination area shall:

Receive authorization from the Manager of Radiological Control and the FERMCO HSO.
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.
Briefing on this PSHSP and active permits
Shall contact the site supervisor for briefing on the current site activities and the associated hazards
Wear the required PPE specified on the posted FERMCO Work Permit.

5.0 MEDICAL MONITORING AND SURVEILLANCE

5.1 REQUIREMENTS

All personnel will be required to participate in the FEMP medical monitoring program, except for visitors and vendor services representatives on site for short durations. If examinations are to be conducted by medical personnel other than FEMP personnel, prior authorization relative to protocols and a list of providers must be obtained from the FEMP Medical Department.

Medical monitoring requirements specific to each task to be performed are included in Attachment A.

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
- Respirator user
- Forklift operator
- Heavy Equipment operator

5.1.1 Bioassay Requirements

Personnel who must enter the work area for DEEP are required to participate in the FEMP bioassay program.

The following outlines the bioassay requirements for this project action.

- Baseline urine samples will be required for all support personnel who are not active participants in the FEMP bioassay program.

- Baseline fecal sampling is required for all project personnel who must access the posted Contamination/Airborne Radioactivity Area at Waste Pits 1 and 3.

- Follow-up fecal samples from all field personnel will be required for radiological incidents involving personnel contaminations, or when radiological conditions indicate a potential for inhalation or ingestion of thorium-bearing residues.

- All personnel will be required to participate in the periodic urine sampling program, submit incident urine samples, and report to the In-vivo facility for whole-body counting when directed by the Medical Department and/or Radiological Control personnel.

- All participants will submit a final "completion of campaign" urine sample after the project is finished.

- Incident initial (end of shift) and post (start of next shift) urine samples will be required upon the occurrence of any airborne or personnel contamination event.

- If any confirmed positive results occur, a 24-hour follow-up sample will be initiated by Dosimetry for the affected individual.

5.1.2 Invivo Requirements

Personnel who must enter the work area for DEEP are required to participate in the FEMP invivo program. Requirements of the program are an initial, annual and termination counts.

5.2 RECORDS

The FERMCO Medical Services Department shall maintain a copy of all medical records.

UNCONTROLLED

6.0 HAZARD ASSESSMENT

This section addresses the potential health, safety, and environmental hazards associated with the conduct of the activities covered by this PSHSP.

Potential hazards to workers may originate form the chemical, physical, radiological, and safety hazards present in the project area.

6.1 RADIOLOGICAL ISSUES

Radiological analyses of the Wastes Pits indicate that the following radioisotopes are of primary concern:

- Uranium and its daughters
- Thorium 230 (limiting isotope)
- Radon

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 tetrafluoride (green salt), and uranium trioxide (orange oxide) are not absorbed through the skin, but constitute a radioactive inhalation hazard to the lungs. Most of the uranium compounds found in the Waste Pits 1, 2, and 3 are of the non-soluble type.

Thorium is also a radioactive material which was deposited in the Waste Pits as mixed oxide (cold) raffinates. These raffinates are residues of the refinery processes and contain high levels of Thorium-230. Thorium-230 is the main isotope of concern because of the ratio of thorium activity as compared to the uranium activity in this area.

Radon is a colorless, odorless, and very dense gas. It is formed during the uranium and thorium decay chain. Radon is an inhalation hazard because it decays by alpha emissions. Radon deposited in human lungs and has been linked to increased incidence of lung cancers.

6.2 INDUSTRIAL HYGIENE ISSUES

6.2.1 Chemical Hazards

Chemical hazards associated with waste pit 1 and waste pit 3 resulted from the waste streams which were dumped into these pits.

Chemicals in waste pit 1 include:

magnesium fluoride
uranium compounds
dewatered sludges with trace amounts of metal compounds including beryllium, cadmium and sliver
organics in trace amounts including dichlorodifluoromethane, tirbutyl phosphate, and PCBs

Ammonium, calcium, potassium and sodium carbonates as well as calcium and magnesium oxides were used in the waste treatment process to neutralize acid solutions (e.g. nitric acid) and the resulting solids are present in the pit.

Skin or eye contact with the material and ingestion or inhalation of the dust is to be avoided. Inhalation of gases or organic vapors is not expected to be an issue due to their very low concentrations in the pit material however, brief, localized concentrations could be encountered.

Chemicals in waste pit 3 include:

Filter cake, sludges and wet slurries contaminated by arsenic, magnesium fluoride and uranium compounds
Trace amounts of metal compounds: barium, lead, beryllium, cadmium, copper, and silver
Trace amounts of organics: pentachlorophenol and PCBs

Ammonium, calcium, potassium and sodium carbonates as well as calcium and magnesium oxides were used in the waste treatment process to neutralize acid solutions (e.g. nitric acid) and the resulting solids are present in the pit.

Skin or eye contact with the material and ingestion or inhalation of the dust is to be avoided. Inhalation of gases or organic vapors is not expected to be an issue due to their very low concentrations in the pit material however, brief, localized concentrations could be encountered.

Hazards associated with these chemicals are discussed below.

6.2.1.1 Arsenic, Inorganic

Arsenic is a shell gray metal in its pure form. It 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.

6.2.1.2 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.

6.2.1.3 Uranium

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 tetrafluoride (green salt), and uranium trioxide (orange oxide) are not

000039

absorbed through the skin, but constitute a radioactive inhalation hazard to the lungs. Most of the uranium compounds found in the waste pits 1 and 3 are of the non-soluble type.

6.2.1.4 Other Metals

Other toxic metals present in the pit wastes included beryllium, cadmium, copper, lead and silver. These, and other metals present in lesser amounts from a toxicity standpoint, are not expected to present significant hazards as long as established controls measures for the other chemicals and radionuclides are followed.

Beryllium is a suspected human carcinogen. Acute inhalation exposure to beryllium may cause a nonproductive cough, shortness of breath and some weight loss. Chronic inhalation exposure to beryllium may lead to respiratory symptoms, weakness, fatigue, and weight loss.

Cadmium is a suspected human carcinogen. Acute inhalation exposure to cadmium may include symptoms of irritation of the nose and throat, delayed cough, chest pain, weakness and shortness of breath. Chronic inhalation exposure may cause ulceration of the nose, emphysema and kidney damage. Ingestion of cadmium causes nausea, vomiting, diarrhea and abdominal cramps.

Contact with copper dusts can produce symptoms of irritation of the eyes, nose and pharynx and can effect the skin, liver, respiratory system and kidneys.

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 as a possible human carcinogen of the lungs and kidneys. Routes of entry of lead are inhalation and ingestion.

Symptoms of exposure to silver may include grey pigmentation of the skin and eyes. Also, exposure to silver may lead to skin irritation and ulceration.

6.2.1.5 Fluoride

Magnesium fluoride is a grayish white fine particulate material which was produced as a by-product in the production of uranium metal. Fluorides may cause irritation to the eyes, skin or respiratory tract upon exposure. Symptoms of acute exposure may include salivation, nausea, vomiting, abdominal pain, fever, and labored breathing. Prolonged exposure may result in perforation of the nasal septum. Chronic effects include excessive calcification of the bones, ligaments and tendons.

6.2.1.6 Nuisance Particulates

Much of the material in the pits (e.g. calcium, magnesium, potassium sodium compounds, soils, ect.) are classified as 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.

6.2.1.7 Organics

Organic compounds are a health concern because they are absorbed by the body and may cause tissue damage, nausea, dizziness and other central nervous system effects. Some are carcinogens. The

hazard associated with organic compounds varies based on the type of compound, the level of exposure, the length of exposure, and the route of exposure.

6.2.1.8 Ammonia

Ammonia is an easily detectable pungent gas which is created by protein decomposition or reaction of a strong base with an ammonium salt. Ammonia forms a strong alkali solution in water, in mucous membranes, or on wet skin, and is highly irritating to the eyes, nose and upper respiratory tract. If irritation is ignored or elevated exposure persists, skin and eye burns and pulmonary edema may occur.

6.2.3 Temperature Extremes

6.2.3.1 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.

The FERMCO HSO or designee shall review heat stress recognition and prevention at a regularly scheduled safety meeting.

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

6.2.3.2 Cold Stress

Tasks may be conducted when temperatures could present a potential cold stress hazard. Personnel shall become aware of symptoms of cold stress and be able to recognize these symptoms in oneself and in other workers. The FERMCO HSO or designee, shall review the recognition and prevention of cold stress at a regularly scheduled safety meeting. A cold weather safety briefing will be required of all workers on this project.

During cold weather, special care should be taken to dress appropriately for anticipated weather conditions. Specific attention will be given to the hands and feet to prevent frostbite. Medicated skin lotions are provided in all restrooms at the FEMP and should be applied to face and hands to reduce changes of windburn and frostbite. Chap-stick or protective creams should be applied to lips to avoid chapping. When equivalent chill temperature drops below 0^0 F, FERMCO IH shall be contacted to review and/or add control measures to minimize cold stress.

6.3 SAFETY ISSUES

Safety is a top priority at the FEMP; accordingly, all employees are advised of their rights and responsibilities under the U.S. Department of Energy (DOE) Order 5483.1A and the Occupational Safety and Health Act. These rights and responsibilities are included as Attachment G.

6.3.1 Physical Hazards

6.3.1.1 Noise

000041

Personnel in areas where noise levels exceed 85 dBA are required to utilize hearing protection provided by their supervisor.

Noise levels exceeding 85 dBA may be created during operation of heavy equipment and portable power tools. If workers have to raise their voice to be heard, noise levels may have exceeded 85 dBA level.

6.3.1.2 Lifting

All personnel should know their lifting limits and the proper way(s) to lift. 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.

A worker shall not lift more than 50 pounds without assistance from another person or mechanical help.

6.3.1.3 Equipment Operation Safety

The use of heavy equipment (drilling rig, backhoe, front end loader) on the Waste Pits may cause a possible sinking hazard due to the soft sub-surface conditions. A pre-placement inspection along the anticipated route of travel shall be performed prior to movement to locate soft areas. It may be necessary to use a material such as "Unimat," timbers, or other similar material.

Follow these basic safety practices when working around heavy equipment.

- Minimize personnel working around operating heavy equipment.
- All mobile equipment shall be supplied with an electronic back-up alarm.
- All operators will be qualified to operate their machines.
- Equipment will be inspected at the beginning of each shift, prior to use, and the inspection results will be recorded on a daily check sheet to ensure that all safety equipment and devices are fully operational.

6.3.1.5 Excavation Activities

Due to the inherent instability of land fills and given the wide variety of buried waste, special consideration must be given to operations requiring excavations in the Waste Pits. The possibility of encountering soft, unstable contents is high; therefore, certain precautions must be taken. No personnel shall be allowed closer than 10 feet to the trench/excavation edge unless they are adequately tied off or positioned on a boom-type manlift or the excavation is sloped in accordance with 1926 Subpart P.

Personnel will not be allowed to enter the pit until the excavation is completed, standing water removed and the pit floor determined to be stable. Stability of the pit floor will be determined by ability of excavation equipment to move about the pit.

Vibration of support equipment (portable lighting, generators) could contribute to the collapse of pit walls. Location of this equipment is to be kept at least 10 feet away from the trench walls.

6.3.1.7 Sanitation

An adequate supply of potable water shall be provided on the site. The containers used to dispense drinking water are to be capable of being tightly closed and equipped with a tap. Containers used to distribute drinking water are to be clearly marked and not used for any other purpose. All drinking

water locations within a radiological controlled area are to be reviewed by FERMCO Radiological Control and IH personnel prior to use.

Adequate washing facilities shall be provided to employees engaged in operations where hazardous substances are encountered.

6.3.2 Fire Protection

Excavations will be monitored by FERMCO for volatile compounds. Should an explosive atmosphere be detected, all work will stop and FERMCO Fire and Safety be contacted.

6.3.3 Drum and cylinder handling

The potential exist that intact containers (drums, cylinders) will be found during excavation of the Waste Pits. Should this occur, the Field Operations Lead and the FERMCO HSO shall be contacted. Unless orientation of the container does not allow safe removal, the container will be removed from the excavation and over-packed.

6.4 NUCLEAR SAFETY

No criticality safety concerns exist with disturbance of the pit material because of the low uranium concentration in the Waste Pits.

For pumping activities, it is not credible that water removed from these pits during the dewatering activities could contain enough U235 to cause an inadvertent nuclear criticality during precipitation of the heavy metals prior to processing the water.

The gravitational settling done as part of the waste reslurry and pumping test may lead to an increase in concentration of uranium in the settled sludge. Sludge samples will be collected from the tank and analyzed for uranium to determine if a hazard exist.

UNCONTROLLED

7.0 HAZARD CONTROL

7.1 ADMINISTRATIVE/ENGINEERING CONTROLS

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

- Containment of radiologically contaminated equipment
- Control of trench exposures by use of manlift and distance limitations.
- Control of environmental insults by the use of wetting agents, tarps, drainage control and area monitoring.

The following administrative controls shall be used to control physical, chemical and radiological hazards during project activities:

- PSHSP for CRU1 DEEP
- FERMCO Work Permits.
- FERMCO Auditable Safety Record
- FERMCO Integrated Preliminary Hazard Assessment

7.2 PERSONAL PROTECTIVE EQUIPMENT/RESPIRATORY PROTECTION

The level of personal protective equipment (PPE) and respiratory protection to be worn by field personnel involved with task activities is defined on an activity basis in Attachment A. When the PPE required by the matrix states that anti-Cs are required for work in contamination areas, anti-Cs include: disposable protective clothing with booties, rubber shoe covers and hood for dry work, disposable water resistant protective clothing with shoe covers and hood (i.e., Durafab Comfort Guard 200, Frham Cool Suit or other approved materials) for wet work conditions, knee high rubber boots and latex or vinyl surgical gloves. Wrists and ankles shall be taped. The Field Operations Lead will be responsible for ensuring that all personnel are wearing the required PPE as specified by this PSHSP.

The levels of PPE and respiratory protection (PPE/RP) in the PSHSRM and the FERMCO Work Permits have been based on characterization data and regulatory requirements. Modification to the level of PPE/RP may be required based on field monitoring of conditions or changes to regulatory requirements.

The modification of PPE/RP level due to changes in safety or chemical hazards (non-radiological) may be conducted by the FERMCO HSO or IH Technician, for the hazard being controlled. When changes are required, the following steps will 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 FERMCO 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 FERMCO HSO will change the PPE section of the PSHSRM.

All personnel working under this PSHSP are responsible for reviewing currently posted PPE/RP requirements and adhering to those requirements. All personnel must stay abreast of changing work area conditions and requirements. This will be facilitated by pre-job briefings, daily tailgate safety briefings, and weekly safety meetings.

8.0 DECONTAMINATION

8.1 SITE DECONTAMINATION REQUIREMENTS

FERMCO will provide instructions for decontamination which may consist of steam cleaning, dry brushing or washing with appropriate liquids.

Area decontamination of chemical and radioactive materials should be done with a combination of scraping to remove the gross contamination at the control point to Waste Pits and the pressure spraying of the heavy equipment at the Waste Pit 6 concrete decontamination pad.

8.1.1 Personal Decontamination Requirements

Upon leaving the work area, workers will be instructed by the Radiological Control Technicians (RCTs) and/or Industrial Hygiene (IH) technicians on how to frisk, in which containers to place disposable and launderable PPE, and what to do if personal radioactive contamination is detected.

Personal contamination on the skin, or on the inner personal company-issued clothing, shall require contact with Radiological Control Technician immediately. Detection of a count rate above background with an appropriate field portable monitoring instrument "frisker" should alert personnel of possible contamination.

Contaminated personnel may have to initiate a bioassay analysis for assessing internal radiation dose from possible inhalation, ingestion, or absorption of radioactive materials. The need to initiate a bioassay analysis and the scope of the analysis, will be determined by the FERMCO HSO with input from Radiological Engineering.

8.1.2 Equipment Decontamination Requirements

Equipment for the decontamination of radiological hazards shall be kept available in the area surrounding the controlled areas (Contamination Reduction Zone). Equipment must be monitored by a RCT prior to its removal from a radiologically controlled area.

Thorium-230 is a pure alpha particle emitter; therefore, each piece of equipment must be smeared and counted on a special instrument before it can be "free released."

8.2 CHEMICAL DECONTAMINATION REQUIREMENTS

In case of body contact with a hazardous material, PPE should be doffed with extreme caution to prevent cross contamination of the skin. Contaminated inner clothing shall be removed and the affected body area shall be washed thoroughly (15 minutes minimum) in a safety shower or eye bubbler. Involved personnel shall report immediately to Medical Services or summon aid (phone 648-6511 or radio Control) as needed. Notification shall be made to the appropriate supervisor as soon as possible.

Questions concerning chemical contamination and potential exposure should be directed to FERMCO Industrial Hygiene at 648-5851.

9.0 EMERGENCY/CONTINGENCY PLANS

9.1 REPORTING

9.1.1 EMERGENCY NUMBERS- ON-SITE EMERGENCIES

NAME	FEMP TELEPHONE NO.	RADIO	
		Construction	Site
Ambulance	**648-6511**	**Control Ch7**	**Control**
Hospital			
Fire			
Security			
Emergency Response			
Assistant Emergency Duty Officer (AEDO)	648-4749/4444	Control Ch7	202

9.1.2 SITE NOTIFICATION PROCEDURES

All emergencies shall be reported to the Communications 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"

Any injury, no matter how minor, shall be reported to Medical Department for evaluation and treatment. The injured employee shall be accompanied to the Medical Department by the supervisor in charge or designee. The CRU1 Project Director and the FERMCO HSO shall be notified as soon as possible after the injury has occurred.

Employees working on-site will be notified of emergency conditions by the plantwide alarm system and by radio announcements. This announcement follows the sounding of the site alarm horn signal, 3-3.

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)
- Any Fire
- Major Property Damage
- Unusual Occurrence(s)

When an emergency or abnormal condition is observed, personnel shall contact the Communications Center at extension 6511 or via radio (CONTROL) for on-site emergencies. **You are to stay on the phone line until the dispatcher hangs up.**

The following information **must** be given to the Communication Center operator:

Name
Badge number
Location where emergency has occurred
Nature of the emergency
Unusual conditions (smoke, vapors, odors)
Current status of the emergency

9.2 EVACUATION ROUTES/ACCOUNTABILITY

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. On-site personnel should immediately proceed to the nearest established Rally Point (Rally Point #6 for waste pit area) as identified on the map found in Attachment C.

9.3 EMERGENCY EQUIPMENT

The Medical Department is staffed and equipped to handle most types of medical emergencies that would occur during a task. The medical facility is staffed with Emergency Medical Technicians (EMTs) and is equipped with an ambulance to transport the injured person to the nearest off-site hospital should extended or specialized treatment be necessary.

The Medical Department is located at the east end of the first floor of the ES&H Building (Building 53). The location of the Medical Department and the most direct path to the facility from the work area can be seen in Attachment D.

A eyewash station with a drench hose for flushing the body is to be located at the work site.

9.4 EMERGENCY RESPONSE

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

9.4.1 Medical Emergencies

The Medical Department and emergency site ambulance shall serve as the first-aid person.

9.4.2 Fire Emergencies

During excavation in the Waste Pits, the potential exist that adverse chemical reactions could occur (i.e., fumes, smoke, fire, etc.). Should this occur, the operator will, backfill the excavation to stop

000048

the reaction. If the operator judges that s/he is in imminent danger from fumes, smoke, or spreading fire, s/he shall immediately vacate the equipment.

In either case, the operator shall proceed to notify both the Field Operations Lead and the FERMCO HSO. The FERMCO HSO will contact the Assistant Emergency Duty Officer (AEDO) and Emergency Response Team (ERT) (if necessary). Re-entry requirements will be determined by a joint decision of the CRU1 Project Director and Health and Safety representatives.

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.

Only trained personnel shall attempt to operate any fire fighting equipment and only when the fire is clearly within the capability of the fire fighting equipment. A fire extinguisher is to be located at the waste pit control point.

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

9.4.3 Explosion Emergency
When an explosion has occurred the following actions are to be taken:

- Evacuate work area
- Proceed to the nearest rally point
- Render first aid to any injured personnel (if qualified)
- Instruct all persons in transit to avoid the work area and surrounding area
- Contact CONTROL by radio or phone (6511)
- Call for medical assistance if necessary
- Report to supervisor for accountability

9.4.4 Chemical Emergency

When contaminated with a corrosive or caustic material, flush the affected area with clean water for 15 minutes. Report to the Medical Department.

All instances of personnel chemical contamination shall be reported to Industrial Hygiene, the FERMCO HSO, Field Operations Lead and the AEDO.

9.4.5 Radiological Emergencies

9.4.5.1 Releases
Evacuate the release area. The supervisor in charge, AEDO, Radiological Control Technicians, and FERMCO HSO shall be notified of the release.

9.4.5.2 Personal Contamination
Contamination should be avoided where possible by making minimum contact with the contaminant. All instances of personnel radiological contamination must be reported to Radiological Control, FERMCO HSO, Field Operations Lead and the AEDO.

9.4.6 Weather Limitations/Adverse Conditions
Any outside work will be suspended if warnings for high winds, lightning or tornados are sounded.

9.4.7 Accident Investigation
Any injury or accident shall require the supervisor to complete an accident report. For injuries and illness, a "Supervisors Report of Injury" shall be completed within 24 hours of the event and forwarded to the Medical Department services and to the Construction Contract Manager. Should a serious accident/injury occur, the involved area should not be disturbed until approved by the FERMCO HSO.

9.4.8 Uncover of unidentifiable iteams

If an unidentifiable item is uncovered and appears to be leaking, off-gassing, or creating an immediately unsafe condition, personnel are to backfill the excavation to stop the reaction. If the operator judges that s/he is in imminent danger from fumes, smoke, or spreading fire, s/he shall immediately vacate the equipment and contact site supervisor.

If an unidentifiable item is uncovered during any of the DEEP activities, and it appears to be in a stable condition, then an attempt will be made to identify it. An item will be considered identified when the OU1 Field Operations Lead, Health and Safety Lead for Field Operations, and the Radiological Control Field Lead Technician supporting DEEP agree on what it is.

If it cannot be identified, then work will stop and the Assistant Emergency Duty Officer (AEDO) will be called in.

If the item is identified a an intact drum or cylinder, then the item will be removed, overpacked, and set aside. The AEDO will be contacted to determine final disposition of the overpacked item.

If the item is identified as a solid metal item, then it may be removed, placed on the material stockpile, and covered with more material so it is not exposed to air, wind, or water. If an item is placed on the material stockpile, it will be noted in the off-shift inspection schedule, and the inspector will document during the inspections that it remains covered.

000050

UNCONTROLLED

10.0 CHANGES 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. PPE requirements,including respiratory protection requirements, will be reevaluated when air sampling data are available, and changing trends in airborne levels are observed. Amendments/revisions of this PSHSP must go through formal review and approval by all departments included in the original review cycle.

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.

CRU1 Project Director, Robert T. Fellman
FERMCO Health and Safety Officer, Michael S. Davis
DEEP Project Manager, William M. Benson
Industrial Hygiene, Dave Jackson
Industrial Hygiene Technicians, Jack Patrick
Medical Department, Doran Christensen
Fire Protection Manager, Steve Wentzel
Radiological Permitting, Judy Hitt
Work Site Copy, Jim Hey

ATTACHMENT A
PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

Project: **DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)**

The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY AND TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONNEL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING AND SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE AND ENGINEERING CONTROL MEASURES	PERMITS	DECONTAMINATION AND DISPOSAL PROCEDURE
1. GENERAL PROJECT MINIMUM REQUIREMENTS A. ACCESS WASTE PITS 1, 2 AND 3 NOTE: THESE GENERAL REQUIREMENTS APPLY TO ALL SECTIONS OF THIS MATRIX.	Personal injury Uranium contamination Thorium contamination Not all hazards are specified on this matrix	Thermoluminescent Dosimeter (TLD) 100% of personnel entering area to wear breathing zone (lapel) air samplers	The minimum protection required Safety glasses with rigid side shields (ANSI Z87.1 listed) Steel toed, leather safety shoes (ANSI Z41 listed) Anti-C's (wet or dry) with taped openings Disposable boot covers and rubber shoe covers Hood or skull cap Disposable gloves	• Site GET • Site Worker • Rad Worker II • 24 Hrs. Supervised Field Experience • OSHA Out Reach training for supervisors • Respirator training and fit test • Orientation of PSHSP and Requirements Matrix • Orientation on Project Specific MSDSs	Medical surveillance exam: baseline, annual and termination Initial, annual and termination in-vivo exam (whole body count) Initial, every 60 days, and termination urinalysis. Initial fecal sample	Personnel shall be required to attend a pre work kickoff/safety meeting, including a complete review of the PSHSP and this matrix. Daily specific task review of matrix Weekly safety meeting	FERMCO Work Permit General area Radiological Work Permit (RWP)	Personnel and material monitoring required to exit Contamination area FERMCO supplies bags and containers for disposition of contaminated waste
B. ACCESS TO WASTE PITS 1, 2 AND 3 DURING WORK ACTIVITIES NOTE: THESE GENERAL REQUIREMENTS APPLY TO ALL SECTIONS OF THIS MATRIX.	Airborne radiological hazard (uranium, thorium)	General Area air sampling	FERMCO issued clothing Anti-Cs (wet or dry) with taped openings Full face respirator with combination cartridge (magenta and yellow) Disposable boot covers and rubber shoe covers Hood Surgical gloves and rubber or work gloves					Shower at lunchtime and end of day
	Exposure to heavy metals (arsenic, barium, beryllium, cobalt, lead)	Personal and area sampling will be conducted by FERMCO IH if material found in dry condition.						
	Exposure to volatile organic compounds (benzene, toluene and methyl methacrylate)	Personal monitoring by FERMCO IH						

000053

144

PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX
Project: **DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)**
The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY AND TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONNEL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING AND SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE AND ENGINEERING CONTROL MEASURES	PERMITS	DECONTAMINATION AND DISPOSAL PROCEDURE
B. ACCESS TO WASTE PITS 1, 2 AND 3 DURING WORK ACTIVITIES (continued) NOTE: THESE GENERAL REQUIREMENTS APPLY TO ALL SECTIONS OF THIS MATRIX.	Heat stress	Contact FERMCO IH when ambient temperature reaches 80°F Physiological monitoring of workers	Cool (ice) vest	Hot Weather Safety Briefing	Medically approved to work in high heat areas	Work/rest regimen Cool break area Drinking water supply at work site (approval required by FERMCO IH and Red Engineering)		
	Cold stress	Contact FERMCO IH when ambient temperature reaches 0°F	Medicated skin barrier creams for skin and lips	Cold Weather Safety Briefing		Work/rest regimen Heated break areas Change out of wet gloves or cloths		
	Biological hazards (ticks, chiggers, poison ivy)				Notify medical of sensitivity to insect bites Report stings and bites to FERMCO medical	Keep grass mowed Insect repellent Tape openings of pants and shirt		
	Exposure to radon	FERMCO has conducted monitoring in the area and results are well below exposure limits During excavations radon monitoring will be conducted. Direct reading instrumentation will be place in the general work area and grab samples will be collect during the excavations				Environmental monitoring station has visible alarm (yellow flashing light) if activated leave area and contact CRU1 HSO or Project Supervisor		

000054

PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

Project: **DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)**

The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY AND TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONNEL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING AND SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE AND ENGINEERING CONTROL MEASURES	PERMITS	DECONTAMINATION AND DISPOSAL PROCEDURE
B. ACCESS TO WASTE PITS 1, 2 AND 3 DURING WORK ACTIVITIES (continued) NOTE: THESE GENERAL REQUIREMENTS APPLY TO ALL SECTIONS OF THIS MATRIX.	Working in a remote location			All personnel shall know the cal 648 6511 or "Control" on the radio for emergency assistance		Radio communication or cellular phone available at all times during work hours Buddy system Personnel notified of emergency conditions by plant alarm system and radio announcements		
	Night work	FERMCO IH will measure light levels				Provide adequate auxiliary lighting		
	Use of portable generators and gas powered equipment			Operator familiar with owners manual		Use GFCI on all electrical systems Refuel only when cool Fire extinguisher in area		
2. SITE MOBILIZATION A. OPERATION of HEAVY EQUIPMENT	Driving on Waste Pits (sinking into pit)			Qualified operator		Pre survey of route to be driven (radiological and surface stability) Spotter Use of Unimat		
	Personal injury					Back up alarm		
B. SET UP OF WORK AREA	Personal injury		Leather gloves			Personnel shall not lift more than 50 lbs. without assistance		

000055

144

PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX
Project: **DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)**
The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY AND TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONNEL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING AND SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE AND ENGINEERING CONTROL MEASURES	PERMITS	DECONTAMINATION AND DISPOSAL PROCEDURE
3. EXCAVATIONS	Operation of heavy equipment			Qualified operator		Back up alarm Daily safety inspection Barricade swing radius Use of seat belts		
	Excavation collapse			Competent person		Sloping of excavations (at least 2:1) No vibrating equipment located within 10 ft of trench (generators, light toweres)		
	Operation/use of man lift to observe trench		Safety harness and lanyard	Qualified operator		100 % tie off in manlift Inspection of harness and lanyard before use		
	Elevated noise levels	FERMCO IH will conducted monitoring as required	Hearing Protection	Workers exposed to noise levels greater than 85 dBA 8 Hr TWA shall have hearing conservation training	Workers exposed to noise levels greater than 85 dBA 8 Hr TWA shall be in Hearing Conservation Program	Post areas where noise levels are 85 dBA or greater		
	Unearth derby or ingot					Put in waste stockpile and cover with pit material. Return to pit when close trench Inform project management of finding		
	Unearth intact drum					Leave drum in place and contact project management.		
	Unearth intact cylinder					Contact project management and AEDO.		

The requirements of this document are based upon current conditions and/or planned or current operations in areas near the planned construction zone. 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. This PSH&S Plan will provide more detail for certain aspects of this document. This document does not relieve the contractor from recognizing and complying with all appropriate Local, State and Federal regulations. This document does not relieve the contractor of planning for or providing a safe work site.

PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX
Project: **DEWATERING EXCAVATION EVALUATION PROGRAM (DRY EXCAVATIONS)**
The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY AND TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONNEL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING AND SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE AND ENGINEERING CONTROL MEASURES	PERMITS	DECONTAMINATION AND DISPOSAL PROCEDURE
3. EXCAVATIONS (continued)	Adverse chemical reaction or fire in trench					Backfill trench if no imminent danger. If imminent danger alert effected personnel and leave area Contact AEDO and CRU1 Project Management.		
	Collection of water samples		Water proof gloves (rubber)					
	Use of surfactant	FERMCO may conduct exposure monitoring based on material used		Review MSDS Operatro trained in operation of Hydro-seeder		FERMCO CRU1 HSM review of MSDS Contact CRU1 HSM prior to use of material		
4. COLLECTION OF VOC, RADON AND RADIATION DATA INSIDE OF EXCAVATION	Entering of excavation	Confined space evaluation (air monitoring) prior to entry Monitoring for VOCs (area) Monitoring for radon (area) Monitoring for radiation	Double anti c's (paper and water proof) PAPR with combination cartridges	PAPR training		Excavation not to be entered until completed and stability of floor is determined Excavation to be inspected and approved for entry by excavation competent person Permission to enter excavation must be obtained from HSO	Confined Space Evaluation / Permit	
5. RECLAMATION	Operation of heavy equipment			Qualified operator		Back up alarm Barricade swing radius Use of seat belts		
6. DECONTAMINATION AND DEMOBILIZATION	Use of high pressure washer		Face shield Leather palm or rubber gloves					

The requirements of this document are based upon current conditions and/or planned or current operations in areas near the planned construction zone. 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. This PSH&S Plan 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 all appropriate Local, State and Federal regulations.
September, 1995 REV 0

ATTACHMENT B
PERSONNEL AND ENVIRONMENTAL MONITORING AND ACTION LEVELS

Reprinted from DOE RADIOLOGICAL CONTROL MANUAL

Table 2-2 Summary of Contamination Values

NUCLIDE (See Note 1)	REMOVABLE (dpm/100 cm^2) (See Note 2)	TOTAL (FIXED + REMOVABLE) (dpm/100 cm2) (See Note 3)
U-natural, U-235, U-238 and associated decay products	1,000 alpha	5,000 alpha
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-129	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-125, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90.	1,000 beta-gamma	5,000 beta-gamma
Tritium organic compounds, surfaces contaminated by HT, HTO and metal tritide aerosols	10,000	10,000

Notes:

1. The values in this Table apply to radioactive contamination deposited on, but not incorporated into the interior of the contaminated item. Where contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for the alpha-and beta-gamma-emitting nuclides apply independently.

2. The amount of removable radioactive material per 100 cm2 of surface area should be determined by swiping the area with dry filter or soft absorbent paper while applying moderate pressure and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. For objects with a surface area less than 100 cm2, the entire surface should be swiped, and the activity per unit area should be based on the actual surface area. Except for transuranics, Ra-228, Ac-227, Th-228, Th-230, Pa-231 and alpha emitters, it is not necessary to use swiping techniques to measure removable.contamination levels if direct scan surveys indicate that the total residual contamination levels are below the values for removable contamination.

3. The levels may be averaged over 1 square meter provided the maximum activity in any area of 100 cm2 is less than three times the values in Table 2-2.

Reprinted from DOE RADIOLOGICAL CONTROL MANUAL
Table 2-4 Criteria for Posting Contamination, High Contamination and Airborne Radioactivity Areas

AREA	CRITERIA	POSTING
Contamination	Contamination levels (dpm/100 cm2) > 1 time but < 100 times Table 2-2 values	"CAUTION, CONTAMINATION AREA"
High Contamination	Contamination levels (dpm/100 cm2) >100 times Table 2-2 values	"DANGER, HIGH CONTAMINATION AREA" "RWP Required for Entry"
Fixed Contamination	Removable contamination levels < Table 2-2 removable values and total contamination levels > Table 2-2 total values	"CAUTION, FIXED CONTAMINATION"
Soil Contamination	Contaminated soil not releasable in accordance with DOE 5400.5	"CAUTION, SOIL CONTAMINATION AREA"
Airborne Radioactivity	Concentrations (μCi/cc) > 10% of any DAC value (see note 1 below)	"CAUTION, AIRBORNE RADIOACTIVITY AREA" "RWP Required for Entry"

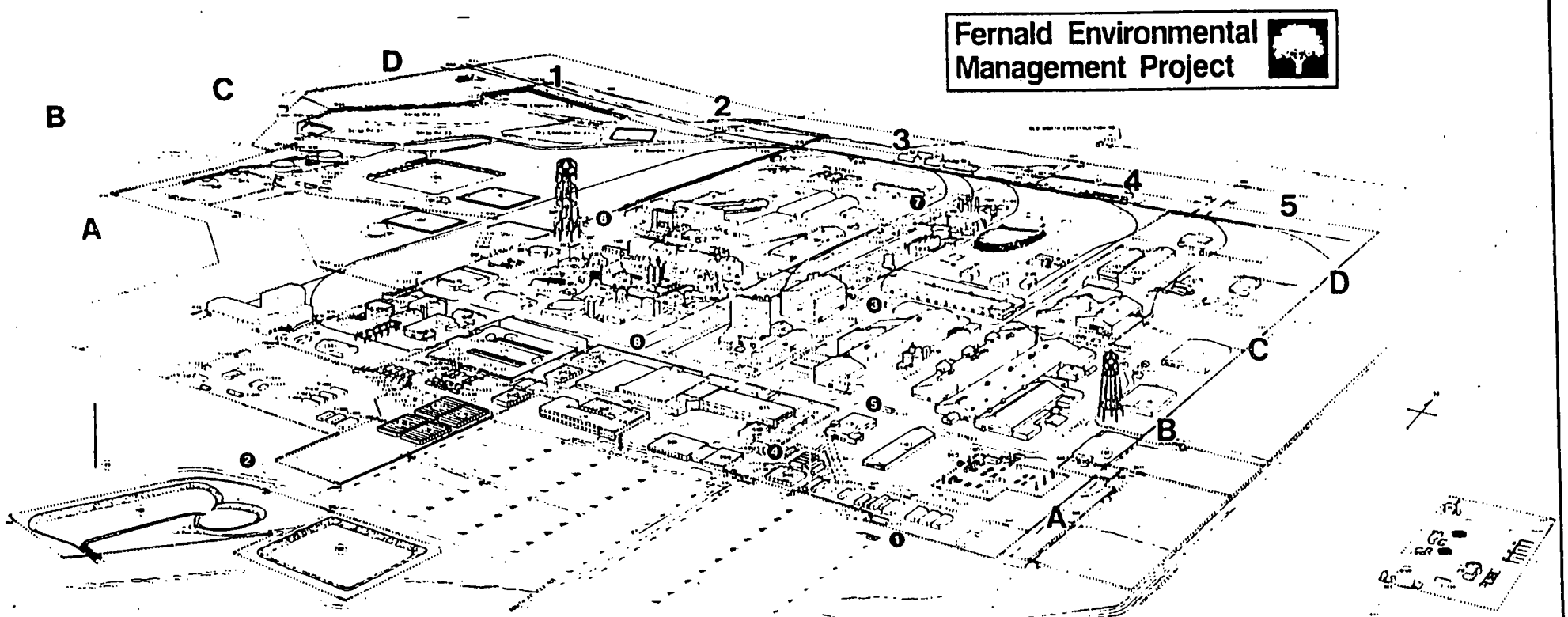
Note 1: Derived Air Concentration (DAC) values for use with Table 2-4 are found in 10 CFR 835.

INDUSTRIAL HYGIENE PERSONNEL AND ENVIRONMENTAL MONITORING ACTION LIMITS		
MEASUREMENT	**LEVEL**	**ACTION**
Organic vapors	Detection to 25 ppm	Use air purifying respirator Contact FERMCO IH if >10 ppm
	>25 ppm	Contact FERMCO IH Use air supplied respirator Check engineering and administrative controls Obtain personal samples to characterize contaminant and concentration. Establish measurement methods, action levels, and actions for the contaminant
Total dust	>0.02 mg/m^3	Contact FERMCO IH Use air purifying respirator Check engineering and administrative controls Obtain personal samples to characterize contaminant and concentration. Establish measurement methods, action levels, and actions for the contaminant
Explosive gases	>10% LEL	Contact FERMCO Fire and Safety
Ammonia	>10 ppm	Use air purifying respirator Contact FERMCO IH Check engineering and administrative controls
	>25 ppm	Withdraw and re-evaluate activities

INDUSTRIAL HYGIENE PERSONNEL AND ENVIRONMENTAL MONITORING ACTION LIMITS		
MEASUREMENT	**LEVEL**	**ACTION**
Arsenic	>0.005 mg/m³	Use air purifying respirator Implement required training and medical surveillance, engineering, administrative and PPE requirements
Carbon monoxide	Detection to 10 ppm	Contact FERMCO IH Check engineering and administrative controls
	>25 ppm	Withdraw and re-evaluate activities
Magnesium fluoride	>1.25 mg/m³	Use air purifying respirator Check engineering and administrative controls
Oxygen	<20.5 or >21.5 %	Contact Industrial Hygiene Check engineering and administrative controls
	<20 or >22%	Withdraw and re-evaluate

ATTACHMENT C
FEMP RALLY POINTS

Fernald Environmental Management Project



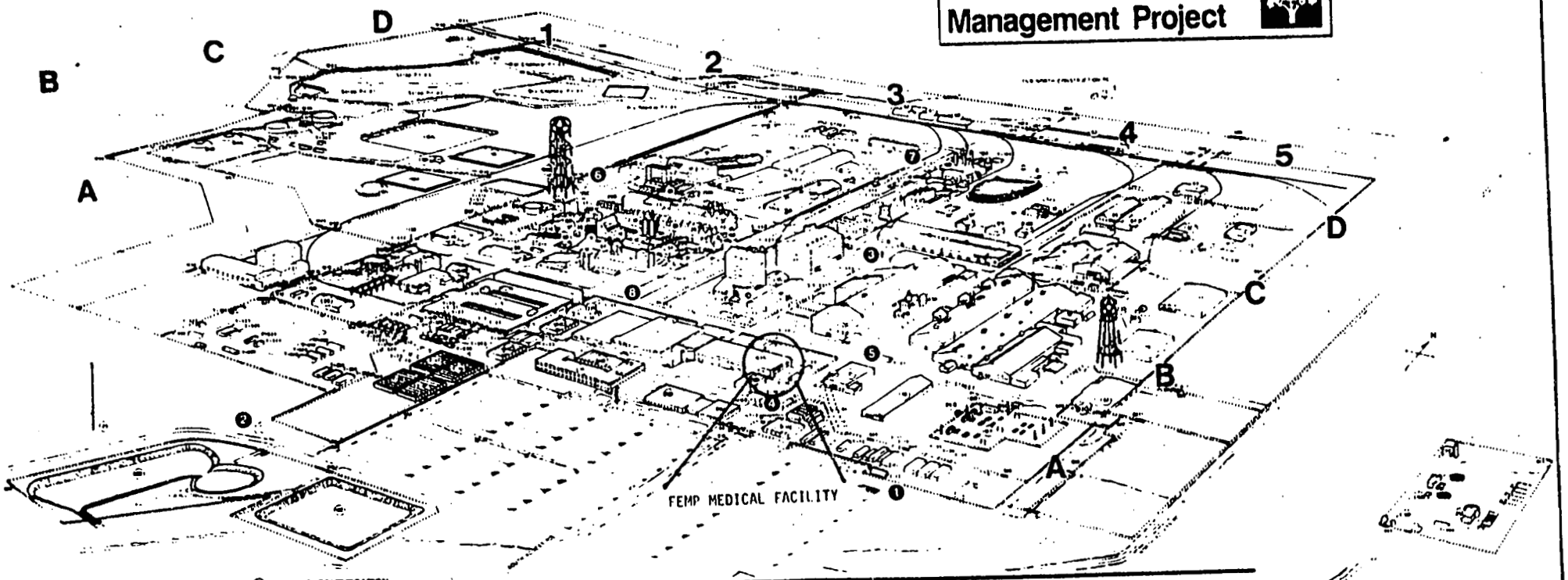
May 1992

000004

Recycled and Recyclable

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]

May 1997

Recycled and Recyclable

000056

ATTACHMENT E
WORK AREA MATERIAL SAFETY DATA SHEETS (MSDSs)

chemists helping chemists in research & industry
aldrich chemical co.
P.O. Box 355, Milwaukee, Wisconsin 53201 USA

Telephone: (414) 273-3850
TWX: (910) 262-3052 Aldrichem MI
Telex: 26 843 Aldrich MI
FAX: (414) 273-4979

Encl Dec 1993

144

APR 10 1992

11304

ATTN: SAFETY DIRECTOR
WESTINGHOUSE MATERIALS CO OF OHIO
7400 WILLEY ROAD
FERNALD OH 45030
4 06117

CUST # 939768

DATE: 12/02/88
P.O. # 4-06117

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

PRODUCT # 20368-8 NAME: MAGNESIUM FLUORIDE, 99.95%
CAS # 7783-40-6
MF: F2MG

SYNONYMS
AFLUON * IRTRAN 1 * MAGNESIUM FLUORURE (FRENCH) * SELLAITE *

TOXICITY HAZARDS

RTECS - OM3325000
MAGNESIUM FLUORIDE

REVIEWS, STANDARDS, AND REGULATIONS
ACGIH TLV-TWA 2.5 MG(F)/M3 85INA8 5,272,86
MSHA STANDARD-AIR:TWA 2.5 MG(F)/M3 DTLVS* 3,116,71
OSHA STANDARD-AIR:TWA 2.5 MG(F)/M3 FEREAC 39,23540,74
NIOSH REL TO INORGANIC FLUORIDES-AIR:TWA 2.5 MG(F)/M3 MMWR** 34(1S), 17S,85
EPA TSCA CHEMICAL INVENTORY, 1986

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATIC

HEALTH HAZARD DATA

ACUTE EFFECTS
MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION.
MAY CAUSE IRRITATION.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES.
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS AMOUNTS OF WATER.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

ADDITIONAL INFORMATION
SYMPTOMS OF FLUORIDE OVEREXPOSURE MAY INCLUDE SALIVATION, NAUSEA, VOMITING, ABDOMINAL PAIN, FEVER, LABORED BREATHING. FLUORIDE ION CAN REDUCE SERUM CALCIUM LEVELS POSSIBLY CAUSING FATAL HYPOCALCEMIA. PROLONGED EXPOSURE TO FLUORIDE DUSTS, VAPORS OR MISTS RESULTS IN PERFORATION OF THE NASAL SEPTUM. CHRONIC EFFECTS INCLUDE EXCESSIVE CALCIFICATION OF THE BONES, LIGAMENTS AND TENDONS.

PHYSICAL DATA

NO PHYSICAL DATA AVAILABLE

Belgium
Aldrich Chemie N.V./S.A.
Bd. Lambermontlaan 140 b 6
B-1030 Brussels
Telephone [illegible]
Telex 62302 Alchem B
FAX [illegible]

France
Aldrich-Chimie S.a.r.l.
27, Fosse des Tireurs
F-67000 Strasbourg
Telephone (88) 327010
Telex 880078 Alchem F
FAX [illegible]

Japan
Aldrich Japan
Kyodo Bldg. Shinkanda
10 Kanda-Mawaicho
Chiyoda-Ku, Tokyo
Telephone (03) 258-0156
FAX (03) 258-0157

United Kingdom
Aldrich Chemical Co. Ltd.
The Old Brickyard, New Road
Gillingham, Dorset SP8 4JL
Telephone (07476) 2711
Telex 417238 Aldrich G
FAX [illegible]

West Germany
Aldrich-Chemie GmbH & Co. KG
D-7924 Steinheim
Telephone (07329) 87-0
Telex 714838 Aldri D
FAX [illegible]

chemists helping chemists in research & industry
aldrich chemical co.
P.O. Box 355, Milwaukee, Wisconsin 53201 USA

Telephone: (414) 273-3850
TWX: (910) 262-3052 Aldrichem MI
Telex: 26 843 Aldrich MI
FAX: (414) 273-4979

MATERIAL SAFETY DATA SHEET

CATALOG # 20368-8 NAME: MAGNESIUM FLUORIDE, 99.95%

FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA
WATER SPRAY.
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

REACTIVITY DATA

INCOMPATIBILITIES
STRONG OXIDIZING AGENTS
STRONG ACIDS
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
HYDROGEN FLUORIDE

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.
AVOID RAISING DUST.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
WASTE DISPOSAL METHOD
CAUTIOUSLY DISSOLVE THE MATERIAL IN WATER. NEUTRALIZE IMMEDIATELY WITH SODIUM CARBONATE, OR FIRST ADD A LITTLE HYDROCHLORIC ACID FOLLOWED BY SODIUM CARBONATE IF MATERIAL DOES NOT DISSOLVE COMPLETELY.
ADD CALCIUM CHLORIDE IN EXCESS OF THE AMOUNT NEEDED TO PRECIPITATE THE FLOURIDE AND/OR CARBONATE. SEPARATE THE INSOLUBLES AND BURY IN A LANDFILL SITE APPROVED FOR HAZARDOUS-WASTE DISPOSAL.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

CHEMICAL SAFETY GOGGLES.
RUBBER GLOVES.
NIOSH/MSHA-APPROVED RESPIRATOR.
SAFETY SHOWER AND EYE BATH.
USE ONLY IN A CHEMICAL FUME HOOD.
AVOID CONTACT AND INHALATION.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
WASH THOROUGHLY AFTER HANDLING.
HARMFUL SOLID.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.

ADDITIONAL PRECAUTIONS AND COMMENTS

NOT APPLICABLE

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

Belgium: Aldrich Chemie N.V./S.A. Bd. Lambermontlaan 140 b 6 B-1030 Brussels Telephone (02) 2426750 Telex 62302 Aldrich B FAX (02) 242 62 16

France: Aldrich-Chimie S.a.r.l. 27, Fosse des Treve F-67000 Strasbourg Telephone (88) 327010 Telex 880076 Aldrich F FAX (88) 75 12 83

Japan: Aldrich Japan Kyodo Bldg. Shinkawa 13 Kanda-Ekimachi Chiyoda-ku Tokyo Telephone (03) 258-0155 FAX (03) 258-0157

United Kingdom: Aldrich Chemical Co., Ltd. The Old Brickyard, Rise Road Gillingham, Dorset SP8 4JL Telephone (07476) 3911 Telex 417238 Aldrich G FAX (07476) 3779

West Germany: Aldrich-Chemie GmbH & Co. KG D-7924 Steinheim Telephone (07329) 67-0 Telex 714836 Aldr D FAX (07329) 67-555

J.T. Baker Inc.
222 Red School Lane
Phillipsburg, NJ 08865

24-Hour Emergency Telephone 908-859-2151
National Response Center 800-424-8802
Chemtrec 800-424-9300

MATERIAL SAFETY DATA SHEET

FICHE SIGNALÉTIQUE — HOJAS DE DATOS DE SEGURIDAD

National Response in Canada CANUTEC 613-996-6666
Outside U.S. and Canada Chemtrec 202-483-7616

144

J.T.BAKER INC., 222 Red School Lane, Phillipsburg, NJ 08865 13096

SECTION I - PRODUCT IDENTIFICATION

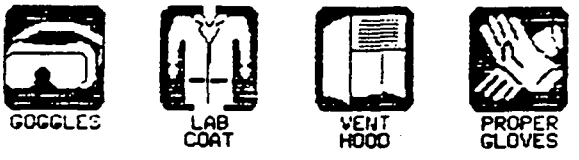
Product Name: Arsenic Trioxide
Common Synonyms: Arsenic Oxide; Arsenic (III) Oxide; Arsenous Trioxide; Arsenous Acid
Chemical Family: Arsenic Compounds
Formula: As_2O_3
Formula Wt.: 197.84
CAS No.: 1327-53-3
NIOSH/RTECS No.: CG3325000
Product Use: Laboratory Reagent
Product Codes: 0062,0061

PRECAUTIONARY LABELING

ER SAF-T-DATA* System

HEALTH	FLAMMABILITY	REACTIVITY	CONTACT
* 4 CANCER	0	1	1
EXTREME	NONE	SLIGHT	SLIGHT

Laboratory Protective Equipment



U.S. Precautionary Labeling

POISON! DANGER!
CAUSES IRRITATION. HARMFUL IF ABSORBED THROUGH SKIN. MAY BE FATAL IF SWALLOWED OR INHALED. CAUTION: CONTAINS INORGANIC ARSENIC, CANCER HAZARD.
Do not get in eyes, on skin, on clothing. Do not breathe dust. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.

Continued on Page: 2

PRECAUTIONARY LABELING (CONTINUED)

International Labeling

Toxic by inhalation and if swallowed. May cause cancer.
Keep locked up and out of reach of children. When using do not eat, drink or smoke. After contact with skin, wash immediately with plenty of soap and water. If you feel unwell, seek medical advice (show the label where possible). Avoid exposure - obtain special instructions before use.

PAF-T-DATA* Storage Color Code: Blue (health)

SECTION II - COMPONENTS

Component	CAS No.	Weight %	OSHA/PEL	ACGIH/TLV
Arsenic Trioxide	1327-53-3	99-100	0.01 mg/m³	N/E

PEL is for Arsenic and compounds, as As.

SECTION III - PHYSICAL DATA

Boiling Point: N/A

Vapor Pressure (mmHg): N/A

Melting Point: 193°C (379°F) (at 760 mm Hg)

Vapor Density (air=1): N/A

Specific Gravity: 3.87 (H_2O=1)

Evaporation Rate: N/A

Solubility(H_2O): Slight (0.1-1%)

% Volatiles by Volume: 0 (21°C)

pH: N/A

Odor Threshold (ppm): N/A

Physical State: Solid

Coefficient Water/Oil Distribution: N/A

Appearance & Odor: White powder. Odorless.

Continued on Page: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): N/A

Autoignition Temperature: N/A

Flammable Limits: Upper - N/A Lower - N/A

Fire Extinguishing Media
Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

Unusual Fire & Explosion Hazards
None identified.

Toxic Gases Produced
arsine

Explosion Data-Sensitivity to Mechanical Impact
None identified.

Explosion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): Not Established

Short-Term Exposure Limit (STEL): Not Established.

Permissible Exposure Limit (PEL): 0.01 mg/m³

PEL is for Arsenic and compounds, as As.

Toxicity of components

Oral Rat LD_{50} for Arsenic Trioxide 15.1 mg/kg
Oral Mouse LD_{50} for Arsenic Trioxide 39.4 mg/kg

Carcinogenicity: NTP: Yes IARC: Yes Z List: Yes OSHA Reg: Yes

Continued on Page: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

Carcinogenicity

This substance is listed as a NTP human carcinogen and an IARC human carcinogen (Group 1).

Reproductive Effects

None identified.

Effects of Overexposure

INHALATION:	headache, coughing, difficult breathing, chest pains, severe lung irritation, pulmonary edema, and may be fatal
SKIN CONTACT:	irritation, prolonged contact may cause dermatitis
EYE CONTACT:	irritation
SKIN ABSORPTION:	none identified
INGESTION:	nausea, vomiting, gastrointestinal irritation, convulsions, paralysis, burns to mouth and throat, and may be fatal
CHRONIC EFFECTS:	damage to liver, kidneys, lungs, blood, central nervous system

Target Organs

liver, kidneys, skin, respiratory system, lungs, central nervous system, lymphatic system, blood

Medical Conditions Generally Aggravated by Exposure

none identified

Primary Routes of Entry

inhalation, absorption, eye contact, skin contact, ingestion

Emergency and First Aid Procedures

INGESTION:	CALL A PHYSICIAN. If swallowed, if conscious, immediately induce vomiting.
INHALATION:	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Continued on Page: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

SKIN CONTACT: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use.

EYE CONTACT: In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

SARA/TITLE III HAZARD CATEGORIES and LISTS

Acute: Yes Chronic: Yes Flammability: No Pressure: No Reactivity: No

Extremely Hazardous Substance:	Yes	Contains Arsenous Oxide (RQ = 5,000 LBS, TPQ = 100/10,000 LBS)
CERCLA Hazardous Substance:	Yes	Contains Arsenous Trioxide (RQ = 5000 LBS)
SARA 313 Toxic Chemicals:	Yes	Contains Arsenic
Generic Class:		C15
TSCA Inventory:	Yes	

State Lists: For products sold in the state of California, the state requires that we provide to users and their employees the following message: WARNING: THIS PRODUCT IS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: none documented

Incompatibles: strong oxidizing agents, chemically active metals, aluminum, strong acids, strong bases

Decomposition Products: arsine

SECTION VII - SPILL & DISPOSAL PROCEDURES

Steps to be Taken in the Event of a Spill or Discharge

Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Continued on Page: 6

SECTION VII - SPILL & DISPOSAL PROCEDURES (CONTINUED)

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: P012 (Acute Hazardous Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use adequate general or local exhaust ventilation to keep fume or dust levels as low as possible.

Respiratory Protection: None required where adequate ventilation conditions exist. If airborne concentration is high, a high-efficiency particulate respirator is recommended. If concentration exceeds capacity of respirator, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety goggles, uniform, apron, proper gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SHE -DATA* Storage Color Code: Blue (health)

Storage Requirements

Keep container tightly closed. Store in secure poison area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Domestic (D.O.T.)

Proper Shipping Name: Arsenic trioxide, solid
Hazard Class: Poison B
UN/NA: UN1561 Reportable Quantity: 5000 LBS.
Labels: POISON
Regulatory References: 49CFR 172.101; 173.366; 173.368

Continued on Page: 7

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

International (I.M.O.)

Proper Shipping Name: Arsenic trioxide
Hazard Class: 6.1 I.M.O. Page: 6072
UN: UN1561 Marine Pollutants: No Packaging Group: II
Labels: POISON
Regulatory References: 49CFR 172.102; Part 176; IMO

AIR (I.C.A.O.)

Proper Shipping Name: Arsenic trioxide
Hazard Class: 6.1
UN: UN1561 Packaging Group: II
Labels: POISON
Regulatory References: 49CFR 172.101; 173.6; Part 175; ICAO/IATA

U.S. Customs Harmonization Number: 28259000000

N/A = Not Applicable or Not Available
N/E = Not Established

The information in this Material Safety Data Sheet meets the requirements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the Canadian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in, or supervised by a person trained in, chemical handling. The user is responsible for determining the precautions and dangers of this chemical for his or her particular application. Depending on usage, protective clothing including eye and face guards and respirators must be used to avoid contact with material or breathing chemical vapors/fumes.
Exposure to this product may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, Baker cannot warn of all of the potential dangers of use or interaction with other chemicals or materials. Baker warrants that the chemical meets the specifications set forth on the label.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
The user should recognize that this product can cause severe injury and even death, especially if improperly handled or the known dangers of use are not heeded. READ ALL PRECAUTIONARY INFORMATION. As new documented

Continued on Page: 8

==========

general safety information becomes available, Baker will periodically revise this Material Safety Data Sheet. If you have any questions, please call Customer Service (1-800-JTBAKER) for assistance.

COPYRIGHT 1990 J.T.BAKER INC.
TRADEMARKS OF J.T.BAKER INC.

==

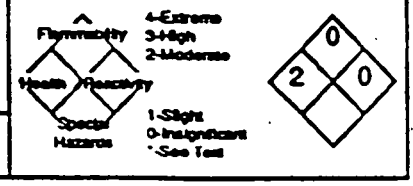
pproved by Quality Assurance Department.

-- LAST PAGE --

BP CHEMICALS

MATERIAL SAFETY DATA SHEET

14787

24-HOUR EMERGENCY ASSISTANCE	GENERAL ASSISTANCE	NFPA FIRE HAZARD SYMBOL*
BP America (In Ohio): 800-362-8059 (Outside Ohio): 800-321-8642 CHEMTREC Assist: 800-424-9300	Outside Ohio - 800-537-9720 Inside Ohio - 800-472-9922	
MSDS Number > 1389		

MANUFACTURER: BP Chemicals
ADDRESS: 200 Public Square, Cleveland, OH 44114-2375

PRODUCT IDENTIFICATION

TRADE NAME:

AQUA AMMONIA

CAS NUMBER:	1336-21-6
SYNONYM(S):	AMMONIUM HYDROXIDE SOLUTION
CHEMICAL FAMILY:	AMMONIA
MOLECULAR FORMULA:	NH4OH in water
MOLECULAR WEIGHT:	35.05
PRODUCT CODE:	V 6457

HIERARCHY: 230.050

PRODUCT HAZARD SUMMARY

HEALTH

DANGER!
HARMFUL OR FATAL IF SWALLOWED OR INHALED
CAUSES BURNS TO SKIN AND EYES
MAY CAUSE RESPIRATORY TRACT IRRITATION
MAY CAUSE BLINDNESS

FLAMMABILITY NON-COMBUSTIBLE

REACTIVITY STABLE

PRODUCT HEALTH HAZARD INFORMATION

INGESTION:
May cause burning pain of the mouth, throat and abdomen and coughing and constriction of the throat, followed by nausea, vomiting and diarrhea.

*Copyright © 1980, National Fire Protection Assoc., MA 02269.
This reprinted material is not the complete and official position of the NFPA on the referenced subject, which is represented only by the standard in its entirety.

SKIN:
EXTREMELY IRRITATING AND CORROSIVE. Contact may cause reddening, itching, inflammation, blistering and tissue damage. Contact with liquefied material may cause frostbite.

EYE:
EXTREMELY IRRITATING AND CORROSIVE. Direct contact may cause irritation, corneal edema and temporary corneal opacity. Severe exposure may produce permanent damage.

INHALATION:
SLIGHTLY TOXIC. May cause respiratory tract irritation, coughing, difficulty in breathing and pulmonary edema. Severe exposure may cause swelling of mouth and throat to the point which prevents breathing. May also damage the heart, liver and kidney.

SPECIAL TOXIC EFFECTS:
Excess ammonia in man is detoxified in the liver by conversion to urea. Those with a history of reduced liver function should avoid exposure to ammonia.

FIRST AID

INGESTION:
DO NOT INDUCE VOMITING. If victim is conscious, give 1-3 glasses of water or milk to dilute stomach contents. Keep affected person warm and at rest. Get immediate medical attention.

SKIN CONTACT:
Wash area of contact thoroughly with soap and water. Remove contaminated clothing immediately. Launder clothing before reuse. Get medical attention if irritation persists. Contact with liquefied gas may cause frostbite. Get immediate medical attention.

EYE CONTACT:
Flush immediately with large amounts of water for at least 15 minutes. Eyelids should held away from the eyeball to ensure thorough rinsing. Get immediate medical attentio

INHALATION:
Remove affected person from source of exposure. If not breathing, ensure open airway and institute cardiopulmonary resuscitation (CPR). If breathing is difficult, administer oxygen if available. Keep affected person warm and at rest. Get immediate medical attention.

NOTES TO PHYSICIAN

Patients who survive 48 hours are likely to recover. Eye injury may be delayed and is frequently followed by permanent blindness. Immediate eye treatment by an ophthalmologist often improves the prognosis.

PERSONAL PROTECTION INFORMATION

EYE PROTECTION:
Wear chemical safety goggles and face shield. Have eye washing facilities readily available where eye contact can occur. Do not wear contact lenses when working with this substance.

ND = No Data
NA = Not Applicable

SKIN PROTECTION:
Wear impervious gloves and protective clothing to prevent skin contact. Suggested protective materials are: Butyl rubber, Neoprene, Nitrile rubber and Polyvinyl chloride. Provide safety showers at any location where skin contact can occur.

RESPIRATORY PROTECTION:
Use NIOSH or MSHA approved equipment when airborne exposure limits are exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine emergency use.

PHYSICAL PROPERTIES

BOILING POINT: ND
SPECIFIC GRAVITY: 0.89
MELTING POINT: -78.0 C (-108 F)
% VOLATILE: 100.0
VAPOR PRESSURE: 420.00 - 475.00 MM HG @ 15.5 C
EVAPORATION RATE (WATER=1): SIMILAR
VAPOR DENSITY (AIR=1): < 1.0
VISCOSITY: ND
% SOLUBILITY IN WATER: 100.0
POUR POINT: NA
pH: ND
APPEARANCE/ODOR: COLORLESS LIQUID WITH STRONG AMMONIA ODOR.

FIRE AND EXPLOSION DATA

FLASH POINT: NA
AUTOIGNITION TEMPERATURE: 651.00 C (1204 F) (AMMONIA)
FLAMMABILITY LIMITS IN AIR (% BY VOL.) LOWER: 16.0 UPPER: 27.0

BASIC FIREFIGHTING PROCEDURES:
Use a water spray to cool fire-exposed containers and structures, disperse vapors and to protect personnel. Shut off source of flow if possible. Do not attempt to extinguish fire if gas source cannot be shut off.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Fire may produce poisonous or irritating gas, fumes or vapor. Containers may explode in heat of fire. Exposed firefighters should wear self-contained breathing apparatus with full face mask.

REACTIVITY DATA

STABILITY/INCOMPATIBILTY:
Stable under normal conditions of use. Subject to exothermic reaction with acids. Incompatible with acids, hypochlorites (bleach), and sodium hydroxide. Avoid contact with iron, galvanized surfaces, copper, brass, bronze, aluminum alloys, mercury, gold and silver.

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS:
Decomposes to ammonia gas, and above 450 C (842 F), to hydrogen and nitrogen gases.

ND = No Data
NA = Not Applicable

ENVIRONMENTAL INFORMATION

SPILL OR RELEASE TO THE ENVIRONMENT:

If your facility or operation has an "Oil or Hazardous Substance Contingency Plan", activate its procedures.

-- Take immediate steps to stop and contain the spill. Caution should be exercised regarding personnel safety and exposure to the spilled material.

-- For technical advise and assistance related to chemicals, contact CHEMTREC (800/424-9300) and your local fire department.

-- Notify the National Response Center, if required.

Emergency Action:

Keep unnecessary people away. Isolate hazard area and deny entry. (Also see Personal Protection Information section.)

Spill or Leak Procedure:

Do not touch spilled material. Stop leak if you can do it without risk. Small Spills: Take up with sand or other noncombustible absorbent material or other sorbent known to be compatible, then flush area with water. Small Dry Spills: Shovel into dry containers and cover: move containers: then flush area with water. Large Spills: Dike far ahead of spill for later disposal.

Notification:

The reportable quantity for this material is 1,000 pound(s).

Any spill or other release, or substantial threat of release, of this material to the air, water, or land (unless entirely contained in the workplace) equal to or in excess of the reportable quantity must be reported immediately to the National Response Center (800/424-8802) as required by U.S. Federal Law. Failure to report may result in substantial civil and criminal penalties.

WASTE DISPOSAL:

This substance, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however it could be hazardous if it is considered toxic, corrosive, ignitable, or reactive according to Federal definitions (40 CFR 261). Additionally, it could be designated as hazardous according to state regulations. This substance could also become a hazardous waste if it is mixed with or comes in contact with a hazardous waste. If such contact or mixing may have occurred, check 40 CFR 261 to determine whether it is a hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262, 263, and 264 apply.

The transportation, storage, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, state, and local regulations.

SARA TITLE III INFORMATION:

Listed below are the hazard categories for the Superfund Amendments and Reauthorization Act (SARA) Section 311/312 (40 CFR 370):

Immediate Hazard: X Delayed Hazard: X Fire Hazard: - Pressure Hazard: - Reactivity Hazard: -

The product contains the following toxic chemical(s) subject to the reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) Section 313 (40 CFR 372):

ND = No Data
NA = Not Applicable

Component:	CAS Number:	Maximum %
Ammonia	7664-41-7	30.0

ADDITIONAL ENVIRONMENTAL REGULATORY INFORMATION:
There may be specific regulations at the local, regional or state level that pertain to this material.

SPECIAL PRECAUTIONS/SUPPLEMENTAL INFORMATION

HANDLING/STORAGE:
Store in tightly closed containers in cool, dry, isolated, well-ventilated area away from heat, sources of ignition and incompatibles.

Empty containers may contain toxic, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld or reuse containers unless adequate precautions are taken against these hazards.

TRANSPORTATION REQUIREMENTS

D.O.T. HAZARD CLASS (49 CFR 172.101): CORROSIVE
D.O.T. PROPER SHIPPING NAME (49 CFR 172.101): AMMONIA HYDROXIDE (AQUA AMMONIA)
D.O.T. LABELS REQUIRED (49 CFR 172.101): CORROSIVE
D.O.T. PLACARDS REQUIRED: CORROSIVE
BILL OF LADING DESCRIPTION: AMMONIUM HYDROXIDE, CONTAINS 12-44% AMMONIA, CORROSIVE MATERIAL NA-2672 "RQ"
UN/NA CODE: NA 2672

INGREDIENTS/HEALTH HAZARD INFORMATION

COMPONENT	CAS NO.	%	EXPOSURE LIMITS - REFERENCE
Ammonia	7664-41-7	29-30	25 ppm (17 mg/M3) TLV; 35 ppm (24 mg/M3) STEL (ACGIH 1989-90) 35 ppm (27 mg/M3) STEL (OSHA)
Water	7732-18-5	70-71	None established
Remaining components not determined hazardous and/or hazardous components present at less than 1.0% (0.1% for carcinogens).	NA	Trace	NA

ND = No Data
NA = Not Applicable

NOTICE: "Information contained in this publication, while accurate to the best of the knowledge and belief of the British Petroleum Company p.l.c and its subsidiary companies ("BP"), is not intended and should not be construed as a warranty or representation for which BP assumes any legal responsibility.

Any information or advice obtained from BP otherwise than by means of this publication and whether relating to BP materials or other materials, is also given in good faith. However, it remains at all times the responsibility of the customer to ensure that BP materials are suitable for the particular purpose intended.

Insofar as materials not manufactured or supplied by BP are used in conjunction with or instead of BP materials, the customer should ensure that he has received from the manufacturer or supplier all technical data and other information relating to such materials.

BP accepts no liability whatsoever (except otherwise provided by law) arising out of the use of information supplied, the application, adaptation or processing of the products described herein, the use of other materials in lieu of BP materials or the use of BP materials in conjunction with such other materials."

144

11186

Occupational Health Guideline for Soluble Barium Compounds (as Barium)

INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

APPLICABILITY

The general guidelines contained in this document apply to all soluble barium compounds. Physical and chemical properties of several specific compounds are provided for illustrative purposes.

SUBSTANCE IDENTIFICATION

Barium nitrate

- Formula: $Ba(NO_3)_2$
- Synonyms: None
- Appearance and odor: Odorless white solid.

Barium oxide

- Formula: BaO
- Synonyms: None
- Appearance and odor: Odorless white solid.

Barium carbonate

- Formula: $BaCO_3$
- Synonyms: None
- Appearance and odor: Odorless white solid.

Barium chloride

- Formula: $BaCl_2$
- Synonyms: None
- Appearance and odor: Odorless white solid.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for soluble barium compounds is 0.5 milligram of soluble barium compounds per cubic meter of air (mg/m³) averaged over an eight-hour work shift. ACGIH TLV is 0.5 mg/m³

HEALTH HAZARD INFORMATION

- **Routes of exposure**

Soluble barium compounds can affect the body if they are inhaled or if they come in contact with the eyes or skin. They can also affect the body if they are swallowed.

- **Effects of overexposure**

1. Short-term Exposure: Soluble barium compounds may cause local irritation of the eyes, nose, throat, bronchial tubes, and skin. Soluble barium compounds may also cause severe stomach pains, slow pulse rate, irregular heart beat, ringing of the ears, dizziness, convulsions, and muscle spasms. Death may occur.

2. Long-term Exposure: None known

3. Reporting Signs and Symptoms: A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to soluble barium compounds.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to soluble barium compounds at potentially hazardous levels:

1. Initial Medical Examination:

—A complete history and physical examination: The purpose is to detect pre-existing conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of the heart, lungs, and nervous system should be stressed. The skin should be examined for evidence of chronic disorders.

—14" x 17" chest roentgenogram: Soluble barium compounds cause human lung damage. Surveillance of the lungs is indicated.

These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

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

—FVC and FEV (1 sec): Soluble barium compounds are respiratory irritants. Persons with impaired pulmonary function may be at increased risk from exposure. Periodic surveillance is indicated.

—Electrocardiogram: Barium compounds may cause cardiac arrhythmias and may have a direct effect on the cardiac muscle. Periodic surveillance of the heart is indicated.

2. Periodic Medical Examination: The aforementioned medical examinations should be repeated on an annual basis, except that an x-ray is necessary only when indicated by the results of pulmonary function testing, or by signs and symptoms of respiratory disease.

- **Summary of toxicology**

Soluble barium salts cause severe gastroenteritis and systemic effects by ingestion. Intravenous injection of barium compounds in animals causes a strong, prolonged stimulation of muscle resulting in hyperperistalsis, bladder contraction, vasoconstriction, and irregular contraction of the heart followed by arrest in systole. Animals also exhibit stimulation of the central nervous system followed by paralysis. Ingestion of barium carbonate by humans causes gastroenteritis, muscular paralysis, slow pulse rate, extrasystoles, and hypokalemia. Heavy industrial exposure to dusts of barium sulfate or barium oxides may produce a benign pneumoconiosis, termed baritosis. It results in no impairment of ventilatory function, although signs of mild bronchial irritation may occur. Characteristic x-ray changes are those of small, dense, circumscribed nodules evenly distributed throughout the lung fields, reflecting the radio-opacity of the barium dust. Bronchial irritation has been reported from the inhalation of barium carbonate dust. Barium hydroxide and barium oxide are strongly alkaline in aqueous solution, causing severe burns of the eye and irritation of the skin.

CHEMICAL AND PHYSICAL PROPERTIES

- **Physical data—Barium nitrate**

1. Molecular weight: 261.4
2. Boiling point (760 mm Hg): Greater than 592 C (greater than 1098 F) (decomposes)
3. Specific gravity (water = 1): 3.24
4. Vapor density (air = 1 at boiling point of barium nitrate): Not applicable
5. Melting point: 592 C (1098 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 9.2
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Barium oxide**

1. Molecular weight: 153.3
2. Boiling point (760 mm Hg): 2000 C (3632 F)
3. Specific gravity (water = 1): 5.72
4. Vapor density (air = 1 at boiling point of barium oxide): Not applicable
5. Melting point: 1921 C (3490 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): Reacts
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Barium carbonate**

1. Molecular weight: 197.3
2. Boiling point (760 mm Hg): 1300 C (2372 F) (decomposes)
3. Specific gravity (water = 1): 4.25
4. Vapor density (air = 1 at boiling point of barium carbonate): Not applicable
5. Melting point: Decomposes at 1300 C (2372 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 0.0022
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Physical data—Barium chloride**

1. Molecular weight: 208.3
2. Boiling point (760 mm Hg): 1560 C (2840 F)
3. Specific gravity (water = 1): 3.86
4. Vapor density (air = 1 at boiling point of barium chloride): Not applicable
5. Melting point: 963 C (1765 F)
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F): 36
8. Evaporation rate (butyl acetate = 1): Not applicable

- **Reactivity**

1. Conditions contributing to instability: For barium nitrate, elevated temperatures may cause melting and decomposition; for the other compounds, none hazardous.
2. Incompatibilities: Contact of barium oxide with water, carbon dioxide, or hydrogen sulfide may cause fires and explosions. Contact of barium carbonate with acids causes formation of carbon dioxide gas that may cause suffocation in enclosed spaces. Contact of barium nitrate with organic matter and combustible materials may cause fires and explosions.
3. Hazardous decomposition products: Toxic gases and vapors (such as oxides of nitrogen and carbon monoxide) may be released in a fire involving barium nitrate.
4. Special precautions: None

- **Flammability**

1. Flash point: Not applicable
2. Autoignition temperature: For barium nitrate, data not available; for the the other compounds, not applicable.
3. Flammable limits in air, % by volume: Not applicable
4. Extinguishant: Large amounts of water should be used on adjacent fires.

- **Warning properties**

According to Grant, barium chloride causes "considerable iritis, which subsides in a few days" when "tested

in neutral 0.08 to 0.1 M solution on rabbit eyes by injection into the cornea or by dropping for 10 minutes on the eye after the corneal epithelium was removed to facilitate penetration." Grant states that "both the oxide and hydroxide are capable of causing severe alkali burns of the eye, similar to those produced by calcium hydroxide."

MONITORING AND MEASUREMENT PROCEDURES

• **General**

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

• **Method**

Sampling and analyses may be performed by collection on a cellulose membrane filter followed by leaching in hot water, solution of sample in acid, and analysis in an atomic absorption spectrophotometer. An analytical method for soluble barium compounds is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 3, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00261-4).

RESPIRATORS

• Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

• In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

PERSONAL PROTECTIVE EQUIPMENT

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with barium carbonate, barium chloride, barium nitrate, or liquids containing these compounds.

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with barium oxide or liquids containing barium oxide, where skin contact may occur.

• If employees' clothing has had any possibility of being contaminated with barium carbonate, barium chloride, barium nitrate, barium oxide, or liquids containing these compounds, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing contaminated with barium carbonate, barium chloride, barium nitrate, or barium oxide should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of contaminant from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the contaminant, the person performing the operation should be informed of contaminant's hazardous properties.

• Where exposure of an employee's body to barium oxide or liquids containing barium oxide may occur, facilities for quick drenching of the body should be provided within the immediate work area for emergency use.

• Non-impervious clothing which becomes contaminated with barium carbonate, barium chloride, barium nitrate, or barium oxide should be removed promptly and not reworn until the contaminant is removed from the clothing.

• Employees should be provided with and required to use dust- and splash-proof safety goggles where there is any possibility of barium oxide or liquids containing barium oxide contacting the eyes.

• Employees should be provided with and required to use dust- and splash-proof safety goggles where barium carbonate, barium chloride, barium nitrate, or liquids containing these compounds may contact the eyes.

• Where there is any possibility that employees' eyes may be exposed to barium oxide or liquids containing barium oxide, an eye-wash fountain should be provided within the immediate work area for emergency use.

SANITATION

• Workers subject to skin contact with barium oxide or liquids containing barium oxide should wash any areas of the body which may have contacted barium oxide at the end of each work day.

• Skin that becomes contaminated with barium carbonate, barium chloride, or barium nitrate should be promptly washed or showered to remove any contaminant. In the case of barium carbonate, employees should use soap or mild detergent and water for washing purposes.

• Skin that becomes contaminated with barium oxide should be promptly washed or showered to remove any barium oxide from the skin after all obvious amounts of barium oxide have been removed by other means (e.g., by use of oil or vaseline). Employees who are being burned by barium oxide should immediately utilize quick drenching facilities without first removing barium oxide by other means.

• Eating and smoking should not be permitted in areas where solid barium carbonate, barium chloride, barium nitrate, or barium oxide, or liquids containing these compounds are handled, processed, or stored.

• Employees who handle barium carbonate, barium chloride, barium nitrate, barium oxide, or liquids containing these compounds should wash their hands thoroughly before eating, smoking, or using toilet facilities. In the case of barium carbonate, employees should use soap or mild detergent and water for washing purposes.

COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to soluble barium compounds may occur and control methods which may be effective in each case:

Operation	Controls
Manufacture and distribution of soluble barium compounds	Process enclosure; local exhaust ventilation
Use in manufacture of pressed and blown glasssware and flint and crown optical glass; manufacture of ceramic products; use in electronics industry in manufacture of magnets, vacuum tubes, cathodes, x-ray fluorescent screens, TV picture tubes, and dry cell depolarizers	Process enclosure; local exhaust ventilation
Use in manufacture of photographic papers, dyes, and chemicals	Process enclosure; local exhaust ventilation
Use as pesticides, rodenticides, and disinfectants; use in manufacture of explosives, matches, and pyrotechnics as igniter compositions and fireworks	Process enclosure; local exhaust ventilation
Use as an additive in manufacture of grease, and manufacture of lubricating oils; use in refining of vegetable and animal oils	Process enclosure; local exhaust ventilation
Use in case-hardening of steel; in metallurgy; in welding aluminum; in electroplating; and in aluminum and sodium refining	Process enclosure; local exhaust ventilation
Use in water treatment and boiler compounds for softening water; use as catalysts, analytical reagents, and purifying agents	Process enclosure; local exhaust ventilation
Use for treatment of textiles, leather, and rubber; use in manufacture of paper and cellulose as a bleaching agent; use in manufacture of pigments, colors, and lakes	Process enclosure; local exhaust ventilation
Use as a depilatory in processing of hides; as a fire-proof and extinguishing agent; in embalming; in sugar refining; in gas and solvent drying; in marble substitutes; in valve manufacture; and as a smoke suppressant in diesel fuels	Process enclosure; local exhaust ventilation
Use in manufacture of pigments, paints, enamels, and printing inks	Process enclosure; local exhaust ventilation

EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

• **Eye Exposure**

If solutions of barium compounds get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with these chemicals.

RESPIRATORY PROTECTION FOR SOLUBLE BARIUM COMPOUNDS (AS BARIUM)

Condition	Minimum Respiratory Protection* Required Above 0.5 mg/m³
Particulate Concentration	
2.5 mg/m³ or less	Any dust and mist respirator, except single-use.**
5 mg/m³ or less	Any dust and mist respirator, except single-use or quarter-mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
25 mg/m³ or less	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
250 mg/m³ or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. A powered air-purifying respirator with a high efficiency particulate filter.
Greater than 250 mg/m³ or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	A high efficiency particulate filter respirator. Any escape self-contained breathing apparatus.

*Only NIOSH-approved or MSHA-approved equipment should be used.

**If eye irritation occurs, full-facepiece respiratory protective equipment should be used.

11252

CHEM REPORT
05/23/1986

CHEM ID	CHEM NAME
***	
* G034-86-0	URANIUM COMPOUNDS

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 COMPOUNDS
* URANIUM INSOLUBLE COMPOUNDS
* URANIUM SOLUBLE COMPOUNDS
* G034-86-0

DISPOSAL

RECOVERY FOR REPROCESSING URANIUM IS THE PREFERRED METHOD FOR HANDLING WASTE URANIUM COMPOUNDS. SHIP TO LISCENCED RECOVERY FACILITY. UNRECOVERED MATERIAL SHOULD BE HANDLED AND PACKAGED AS RADIOACTIVE WASTE SHIPPED TO AN APPROVED SITE BY AN APRROVED DISPOSAL FIRM.

DECOMPOSITION PRODUCTS

TOXIC GASES AND VAPORS (SUCH AS HYDROGEN FLUORIDE, NITROGEN OXIDES, AND CARBON MONOXIDE) MAY BE RELEASED WHEN URANIUM COMPOUNDS DECOMPOSE. SEE SPECIFIC COMPOUND.

ENVIRONMENTAL EFFECTS

NO CRITERIA SET, BUT EPA SUGGEST 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 COMPOUNDS ARE SPILLED, 1. VENTILATE AREA OF SPILL. 2. COLLECT SPILLED MATERIAL IN THE 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. SPILL AREAS MAY BE DECONTAMINATED USING A SOLUTION WITH A CHELATING AGENT SUCH AS EDTA.

FIRST AID

IF MATERIAL GET INTO THE EYES, WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER. GET MEDICAL AID. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THESE CHEMICALS.
SKIN EXPOSURE - IF COMPOUND GET ON THE SKIN, PROMPTLY WASH THE CONTAMINATED SKIN USING SOAP AND MILD DETERGENT AND WATER. IF THEY PENETRATE THROUGH THE CLOTHING, REMOVE THE CLOTHING IMMEDIATELY AND WASH THE SKIN USING SOAP OR MILD DETERGENT AND WATER. IF IRRITATION IS PRESENT AFTER WASHING, GET MEDICAL ATTENTION.
BREATHING - IF A PERSON BREATHES IN LARGE AMOUNTS OF URANIUM COMPOUND, 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 AS SOON AS POSSILBE.
SWALLOWING - WHEN SOLIDS OR LIQUIDS CONTAINING URANIUM OR INSOLUBLE COMPOUNDS HAVE BEEN SWALLOWED, 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.

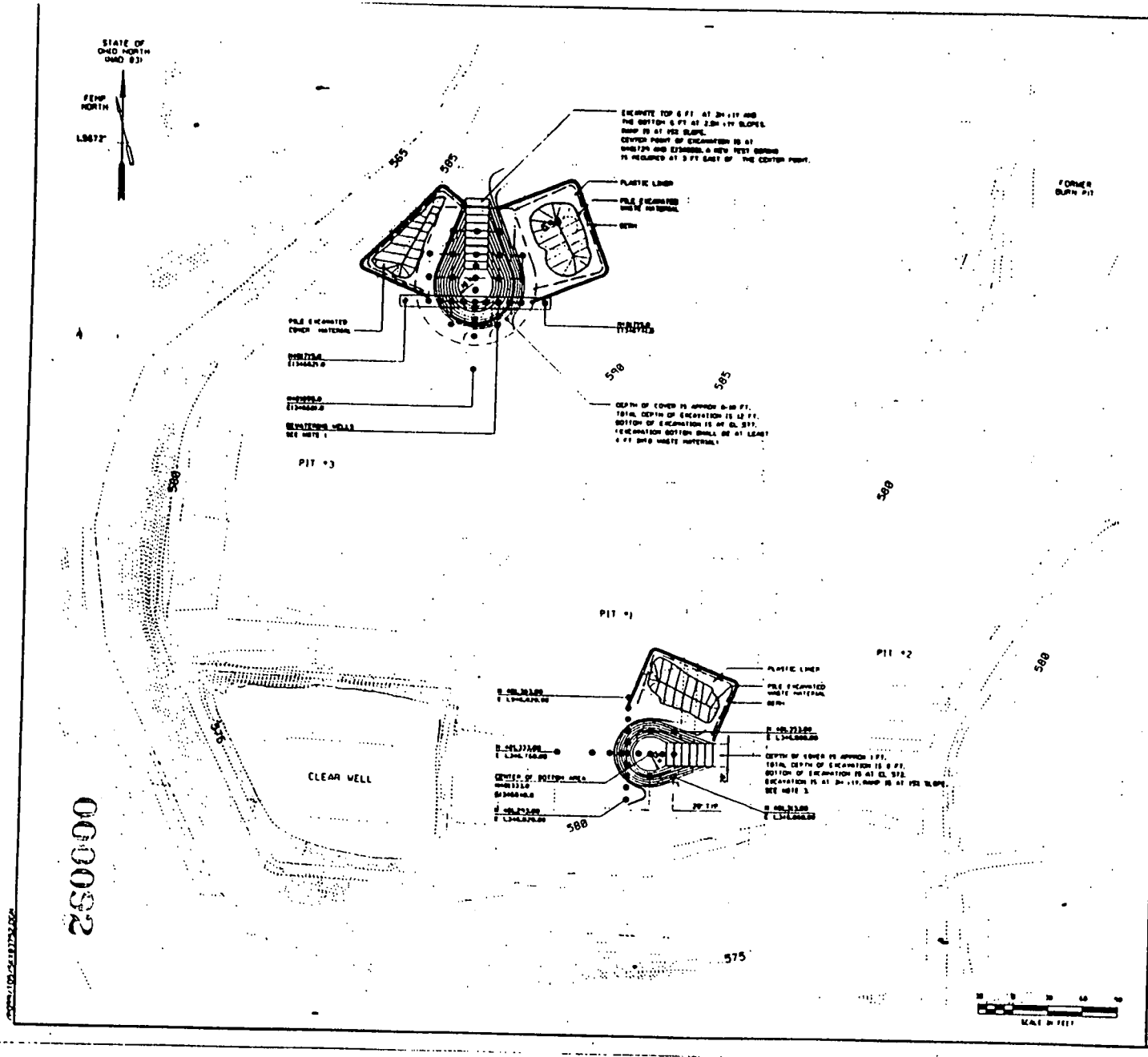
ATTRIBUTE	VALUE	UNITS	QUALITY	COMMENTS
***				
* HALF LIFE	4.500	10E9 YEARS		
* EXPOSURE LIMIT	0.050	MG/CU.M	PEL	SOLUBLE U
* EXPOSURE LIMIT	0.200	MG/CU.M	TLV	AS U
* EXPOSURE LIMIT	0.250	MG/CU.M	PEL	AS INSOLUBLE

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

CHEM NAME* URANIUM COMPOUNDS

***
* URANIUM
* URANIUM DICARBIDE
* URANIUM DIOXIDE
* URANIUM HEXAFLUORIDE
* URANIUM HYDRIDE
* URANIUM TETRAFLUORIDE
* URANYL NITRATE

ATTACHMENT F
WORK AREA MAP



1. LARGE DIAMETER DEWATERING WELLS WITHIN THE LIMIT OF EXCAVATION SHALL BE REMOVED PRIOR TO THE START OF EXCAVATION. THE OUTER MOST RING OF WELLS TO REMAIN IN PLACE DURING EXCAVATION.
2. SAND PACK WELL POINTS WITHIN THE LIMIT OF EXCAVATION SHALL BE REMOVED PRIOR TO THE START OF EXCAVATION.
3. ADDITIONAL DEWATERING WELLS MAY BE USED IN PIT 1 FOR RECONFIGURED RAMP EXCAVATION.

LEGEND

- LARGE DIAMETER DEWATERING WELL
- SAND PACK WELL POINT
- PLASTIC LINER
- DEWATERING TEST AREA

LOCATION MAP
DRY EXCAVATION
(AT CPT PROBE NO. C3-12 IN PIT 3)
(AT CPT PROBE NO. C1-6 IN PIT 1)

000082

144

ATTACHMENT G
OSHA AND DOE 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 91)

000094

ATTACHMENT H
ACKNOWLEDGEMENT FORM

ACKNOWLEDGEMENT LOG
PROJECT SPECIFIC HEALTH AND SAFETY PLAN
CRU1 DEWATERING EXCAVATION EVALUATION PROGRAM (DEEP) (DRY EXCAVATION)
REV 3

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.

ATTACHMENT B

PROJECT SAFETY ANALYSIS REQUIREMENTS

DEEP RAMP AND PAD EXCAVATION PROJECT
SAFETY ANALYSIS REQUIREMENTS

The following commitments listed in ASR 93-0024, Addendum 2 (Issued December 21, 1994), which are applicable to the DEEP ramp and pad excavations in OU1 Waste Pits 1 and 3.

1. **Material loss from the exposed stockpile(s) will be controlled to as low as reasonably possible.**

   This will be accomplished by limiting the duration of the open excavations, controlling the size of the stockpile(s), and protecting the stockpile surface(s) from wind erosion. Specific steps taken are:

   - One excavation will be open at any time. Only one Pit will be worked on at one time.
   - The ramp and pad excavation will be open no longer than 288 hours.
   - The stockpile(s) for ramp and pad excavation will not exceed 535 yd^3. The OU1 Field Operations Lead will document the stockpile size and how it was determined (e.g. direct measurement; estimated size of backhoe bucket times the number of bucket loads). *(The 535 yd^3 refers to waste material only. The soil cap will be removed first and placed on a separate stockpile. However, due to the gross-scale removal techniques used, some soil will be removed with waste material and placed on the waste stockpile. Therefore, it is possible for this stockpile to be larger than 535 yd^3. The field representatives are to include in their log book how much of the waste stockpile includes soil and how much is actual pit waste. The pit waste portion will not exceed 535 yd^3.*
   - Surfactants will be used to stabilize the stockpile surface for resistance to wind erosion.
   - Tarpaulins will be staged in the DEEP construction area to be used to cover the stockpiles if the surfactants prove less than adequate.

- In the event of adverse weather conditions (e.g. wind gusts or prolonged high wind conditions of 30 miles per hour or greater, heavy rain), the Field Operations Lead may direct the following:

  - Additional protective covering over or around the material stockpiles.

  - Closing (reclaiming) an excavation.

2. **The non-dispersible condition of the stockpiles will be verified.**

Verification will consist of a combination of area monitoring and visual inspection. Airborne concentrations greater than 10% Derived Air Concentration (DAC) will be investigated by Radiological Control. However, airborne monitoring results will not be available until 24 to 48 hours after the monitoring period. Therefore, visual inspection is also required.

- Radiological Control Technicians (RCTs) will provide mobile area air monitors. The location of these monitors will vary with stockpile location and prevailing wind direction.

- Breathing zone monitoring of workers will be provided by Radiological Control and Industrial Hygiene.

- Area monitoring for radon will be provided by Environmental Monitoring.

- The work area will be inspected periodically during the off-shift to verify that the stockpile(s) condition has not changed. These inspections will be the responsibility of the OU1 Field Operations Lead. He may delegate this action to other qualified personnel.

  <u>Inspector Qualifications</u>

  - Functional knowledge of the DEEP project objectives.

  - Functional knowledge of the DEEP Health and safety Plan with particular emphasis on who to contact in the event of an emergency.

  - Functional knowledge of the DEEP Auditable Safety Record.

- Meets access requirements to the DEEP project area as stated in the Health and Safety Plan.

- The OU1 Field Operations Lead will provide training to selected personnel on the inspection requirements. A list of qualified off-shift inspectors will be maintained in the DEEP project fields.

Inspection Frequency

- The purpose of these inspections is to verify condition of the material stockpiles, therefore, frequency of inspection will depend upon current weather conditions and the geotechnical characteristics of the stockpiled material. The OU1 Field Operations Lead with concurrence from the OU1 Health and Safety Manager and OU1 Systems Safety Analyst, will determine the off-shift inspection schedule. The qualified inspectors have the option to inspect the area more frequently if conditions indicate the need, however, they may not decrease the number of inspections scheduled. The OU1 Field Operations Lead may provide supplemental direction or actions to be taken if certain conditions arise (e.g. if the surfactant does not appear to be effective, then cover the stockpile with the tarpaulin staged in the area for this purpose) with the inspection scheduled. Copies of the inspection schedules will be maintained in the DEEP project files.

Inspection Requirements

- Performance of these inspections will be accomplished without entering the posted exclusion area.

- Document that the weather conditions have not changed since the previous inspection.

- Document that the condition of the material stockpile has not changed. Has the stockpile configuration changed (height, width, length). If a surfactant has been used and if the surfactant has a visual indicator such as color, sheen, or texture, has that color, sheen, or texture diminished since the previous inspection. If a tarpaulin has been use, has the tarpaulin position shifted.

- Document that the berms and liners used to contain the stockpile(s) remain intact.

- Document that the open excavation has not collapsed.

- If field conditions of the stockpile(s), berms and liners, or open excavation has changed, then the inspector will contact the OU1 Field Operations Lead for further action.

- The adequacy of area lighting for inspection will be documented. The condition of the excavation barricades and exclusion zone barrier will be documented.

- Copies of the inspection documentation will be kept in the DEEP project files.

Additional Project Requirements Resulting from this Commitment

- Adequate lighting will be provided during the off-shift so that the inspectors have adequate illumination with which to verify the condition of the stockpiles and open excavation.

- The open excavation will be barricaded at the end of shift. The exclusion zone will be clearly indicated so that inspectors do not enter it.

3. **Actions will be taken if an unidentifiable item is uncovered during excavation.**

- If an unidentifiable item is uncovered and appears to be leaking, off-gassing, or creating an immediately unsafe condition, personnel are to respond as directed in Section 9, Emergency/Contingency Plans of the project Health and Safety Plan.

- If an unidentifiable item is uncovered during any of the DEEP activities, and it appears to be in a stable condition, then an attempt will be made to identify it. An item will be considered identified when the OU1 Field Operations Lead, Health and Safety Lead for Field Operations, and the Radiological Control Field Lead Technician supporting DEEP agree on what it is.

- If it cannot be identified, then work will stop and the Assistant Emergency Duty Officer (AEDO) will be called in.

- If the item is identified a an intact drum or cylinder, then the item will be removed, overpacked, and set aside. The AEDO will be contacted to determine final disposition of the overpacked item.

- If the item is identified as a solid metal item, then it may be removed, placed on the material stockpile, and covered with more material so it is not exposed to air, wind, or water. If an item is placed on the material stockpile, it will be noted in the off-shift inspection schedule, and the inspector will document during the inspections that it remains covered.

Additional Project Requirements Resulting from this Commitment

- Drums for overpacking will be staged in the DEEP project area.

4. **Lessons learned from each test will be distributed to the workers and project support personnel.**

- Tail-gate safety meetings will include lessons learned from previous excavations when the work is moved from one pit to another.

- Lessons learned from excavations in each pit will be documented in the project logbook. A final report will be issued at the completion of DEEP.

- The OU1 System Safety Analyst will be informed of any accidents or reportable events prior to the event critique.

5. **Bags of contact waste will be labeled with the isotope of concern.**

- The isotope of concern is Thorium-230 unless directed otherwise by Radiological Control. The OU1 Field Operations Lead will verify that the isotope of concern has not changed when work moves from one pit to another.

6. All contractors shall be held responsible for adhering to assumptions and commitments set forth in the project safety assessment documents. Any changes to the scope of

work are to be reviewed by the FERMCO Safety Analyst to determine whether the proposed change is significant to the safety envelope established by those documents.

ATTACHMENT C

DATA QUALITY OBJECTIVE

Fernald Environmental Management Project

Data Quality Objectives

Title: DEEP Treatability Study - Waste Pits 1 and 3 Ramp and Pad Excavation

Number: GT-007

Revision: 0

Effective Date: September 12, 1995

Contact Name: Dan Stropes

Approval: Richard Fiske Date 9-12-95
DQO Coordinator

Rev. #	0				
Date	09/12/95				

Data Quality Objectives
DEEP Treatability Study - Waste Pits 1 and 3
Ramp and Pad Excavation

1. State the Problem or the Situation to be Resolved

The Operable Unit 1 (OU1) Dewatering Excavation Evaluation Program (DEEP) has been developed to investigate the ability to dewater the materials contained in Waste Pits 1, 2, and 3. The DEEP Treatability Study Waste Pits 1 and 3 Ramp and Pad Excavation will provide supporting data to evaluate the excavation technique proposed for the removal of Waste Pits 1, 2, and 3 waste materials. This will be achieved by excavation of a ramp and pad into Waste Pits 1 and 3. The ramp and pad excavations are designed to mimic the large-scale pit excavation to be performed during waste removal as part of remediation of OU1. The effectiveness of the excavation technique proposed will determine if removing the waste material by conventional surface mining methods is feasible. If the conventional surface mining excavation technique is shown to be ineffective, an alternative excavation method of waste removal will be evaluated. The DEEP Treatability Study is driven by the terms of Section XII.D.1 and D.2 of the Amended Consent Agreement between the Department of Energy and the U.S. Environmental Protection Agency.

During ramp and pad excavation inflow of pit water is expected to occur. This pit water will be pumped out of the excavation as necessary. Pit water quantity will be measured during pumpage and temporary storage. Pit water will be transported to the FEMP Advanced Waste Water Treatment Plant (AWWT) for treatment. For the purposes of determining the water quality characteristics of this pit water, a total of 20 water samples will be collected; 10 samples from each excavation. These water quality sample results will be used to determine the pollutant hydraulic loading characteristics in order to evaluate the impacts of the pit water to the AWWT during full scale excavation. These samples will be analyzed for the following parameters:

- chromium - total
- chromium - hexavalent
- copper
- nickel
- nitrates
- uranium - total
- thorium - total
- total suspended solids

These sample results will assist AWWT operations staff in the preparation and planning for the expected increase in water treatment capacity resulting from the pit water pumpage.

All aspects of the field work will be performed in accordance with the Project Specific Plan (PSP) titled "PSP for Operable Unit 1 Dewatering Excavation Evaluation Program - Waste Pits 1 and 3 Ramp and Pad Excavation, Rev. 0", September 13, 1995 (in preparation).

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

The DEEP Treatability Study ramp and pad excavation is designed to provide supporting data for the evaluation of the proposed excavation method for wastes from waste Pits 1, 2, and 3. The waste excavation method proposed is conventional surface area mining. Area excavation will be performed following waste pit dewatering. This technique consists of removal and segregation of the waste pit cap, followed by the construction of a ramp into the waste concurrent with area excavation of the waste from the surface downward. Decisions to be made are as follows:

- What geotechnical properties of the waste and excavation may impact the excavation method proposed?
- What type(s) of excavation heavy equipment are suitable for excavation?
- Will the ramp and pad support the excavation heavy equipment proposed to be used?
- What physical characteristics (cohesiveness, viscosity, slump, angle of repose) will the dewatered waste display when actual excavation is performed?
- What ramp, pad, and excavation dimensions are optimal designs for full scale waste excavation?

No excavation will be performed in Waste Pit 2. This is because previous intrusive investigation of Waste Pit 2 has shown much less amounts of water than Waste Pits 1 and 3. However, during waste pit excavation, the excavation technique proposed for Waste Pits 1, 2, and 3 will be the same.

For the AWWT hydraulic loading evaluation, the water quality laboratory analysis results will be used by AWWT operations personnel in combination with the anticipated hydraulic load (water quantity) from the pit excavations to determine the best method(s) to treat the pit water during full scale excavation.

3. Identify Inputs that Affect the Decision

The heterogeneity of the waste pit contents, relative success of dewatering, foundation and slope stability are key considerations in selecting the number and

locations of the ramp and pad excavation points. Points were selected based on the locations of the dewatering system wells, geotechnical investigation soil borings, and trench excavation sites. Also, locations of these points were based, in part, on the amount of historical geotechnical data from previous investigations performed in each waste pit, combined with the best engineering judgement of the factors involved, and to provide a maximum amount of data from a minimum number of excavation locations. The number and location of each ramp and pad excavation point was determined based on known and suspect pit contents, the approximate location of those contents, and interpretation of geotechnical information gathered to date.

Water sample inputs include the volume of water to be treated and the quality of that water. Water volume will be obtained by pumping the water at a known rate of time to a tank of known volume. Water quality will be obtained by laboratory analysis of the water samples collected.

4. Define the Boundaries of the Situation

Excavation boundaries specific to this project are all contained within the limits of Waste Pits 1 and 3.

Waste Pit 1 disturbance activity boundaries are limited to the surface excavation of a ramp and oval shaped excavation (pad) into the pit wastes. A temporary stockpile for the excavated waste and cover material will also be constructed. The stockpile will be placed adjacent to the excavation. Vertical boundaries of Waste Pit 1 are limited to the liner depth. At this excavation location the depth to the top of the liner is approximately 16 feet (ft).

The Waste Pit 1 excavation total depth will be 8 ft. The excavation will be performed at a ratio of 2 Horizontal to 1 Vertical slopes. Surface dimensions of the Waste Pit 1 excavation will be approximately 70 ft. (North-South axis) by 120 ft. (East-West axis). The excavation entrance ramp, located at the East end of the excavation, will be excavated at a -15° slope. The Waste Pit 1 stockpile is a rectangular feature with dimensions of approximately 75 ft. by 100 ft. A Location Map is attached to show the areas to be disturbed.

Waste Pit 3 disturbance activity boundaries are limited to the surface excavation of a ramp and oval shaped excavation (pad) into the pit wastes. A total of two temporary stockpiles for the excavated waste and cover material will also be constructed. The stockpiles will be placed adjacent to the excavation. Vertical boundaries of Waste Pit 3 are limited to the liner depth. At this excavation location the depth to the top of the liner is approximately 36 ft.

The Waste Pit 3 excavation total depth will be 12 ft. The excavation will be performed at a ratio of 2 Horizontal to 1 Vertical slopes. Surface dimensions of the Waste Pit 3 excavation will be approximately 130 ft. (North-South axis) by 90 ft. (East-West axis). The excavation entrance ramp, located at the North end of the excavation, will be excavated at a -15° slope. The Waste Pit 3 pads are rectangular features with

dimensions of approximately 110 ft. by 75 ft. (cover material stockpile), and 110 ft. by 100 ft. (waste material stockpile). A Location Map is attached to show the areas to be disturbed.

Other pertinent requirements which represent boundaries established for this project include the following:

- FERMCO Conduct of Operations Program
- DEEP Treatability Study Work Plan
- DEEP Auditable Safety Record
- Initiation of the project prior to the end of fiscal year 1995
- Estimated size and nature of the material excavated and stockpiled
- Control of stockpiles
- Airborne releases
- Radon issues

Water quality boundaries are ultimately those National Pollutant Discharge Elimination System (NPDES) permit limits for the FEMP. These limits are, however, those established for treated water discharged from the FEMP, and not for untreated pit pumpage. The water quality laboratory analyses for this project represent pretreatment information, and thus are not boundary conditions for the DEEP project.

5. Develop a Logic Statement

All information obtained from this investigation will be used to evaluate Waste Pit 1, and 3 remediation options. By conducting ramp and pad excavation after dewatering, the effectiveness of the dewatering program can be measured, and the physical properties of the waste material encountered during excavation will verify or refute the accuracy of the cone penetrometer testing, soil borings installation, wet excavation, dewatering, and waste reslurrying treatability study phases conducted to date. After each phase of DEEP has been completed, the resultant data is being reviewed by DEEP project staff. If the DEEP waste pit ramp and pad excavation phase indicates that the waste pit material can be dewatered and removed with conventional surface area excavation methods, then all other waste material removal options will be abandoned. If the waste pit ramp and pad excavation phase indicates that the material cannot be excavated more easily than another method, then alternate methods of waste removal and storage will be further evaluated.

In spite of dewatering, project staff anticipate a significant volume of surface and ground water to accumulate in the pits during excavation. This will occur both during the ramp and pad excavation and full scale waste pit excavation. In order to quantify the potential impacts of this pit water to the site AWWT, water quantity and quality of the pit water, relative to NPDES permit parameters (not limits) will be determined.

The data obtained from this program will be used primarily by OU1, but will be available for use by other interested parties at the FEMP.

6. Establish Constraints on the Uncertainty of the Decision

All aspects of the ramp and pad excavation phase will be controlled through the preparation of and adherence to a PSP. Dimensions of the ramp and pad excavations will be detailed in the PSP. Project technical guidance will be provided by OU1 staff during field and data analysis operations. All project staff will receive training prior to project start. Training will include all pertinent information from existing project documents as well as the PSP.

Ramp and pad excavation data errors could result in the misinterpretation of the best method of waste pit material excavation and temporary storage methods being made. A false positive error is an error in which the waste material is concluded to have been successfully excavated and stored using the methods proposed, when, in fact, neither the excavation or storage methods proposed are adequate. A false negative error is an error in which the waste pit material is concluded to not be successfully excavated or stored using the methods proposed, when, in fact, the excavation and storage methods proposed are adequate.

Consequences of a false positive error would be the development of a full scale waste excavation and storage plan, based on the presently proposed method, which would not be adequate. Consequences of a false negative error would be the development of an alternate method(s) of waste material excavation and storage being further investigated when, in fact, the proposed method of excavation and storage is adequate.

Pit pumpage water quantity and quality data errors could impact the treatment capacity of the AWWT. A false positive error is represented by an interpretation from project data that the quantity and quality of pit water is such that the AWWT treatment capability will not be exceeded, when in fact the pit water quantity and quality data is in error, and the AWWT treatment capability will be exceeded. A false negative error is represented by an interpretation from project data that the quantity and quality of pit water is such that the AWWT treatment capability will be exceeded, when in fact the pit water quantity and quality data is accurate and the AWWT treatment capability will not be exceeded.

Neither type of error is likely to occur during performance of this project. Success of the excavation method proposed will be confirmed or refuted based on visual observations by competent staff during actual excavation. Success of waste material

storage will be confirmed or refuted based on perimeter air monitoring instrumentation to be established around the excavation and storage pads. Additionally, the negative consequences of misinterpreting pit water quality and quantity accuracy is minimized by several factors, including:

- The relatively large number of samples to be taken
- The ability of the AWWT to accommodate specified water volumes and water quality loading amounts
- Extra water storage capacity (holding tanks) in OU1
- Holding pit water for treatment during times when the AWWT is more able to adequately treat the water

7. Optimize a Design for Obtaining Quality Data

Maximum benefit from the data is achieved by relying on historical information to avoid areas of known anomalies, concentrating on areas of specific concern to this phase of the Treatability Study, and building on the data base of previous knowledge gained from previous DEEP phases. Additionally, data quality will be optimized by following the Sitewide CERCLA Quality Assurance Project Plan (SCQ) where possible during this investigation.

Due to the unconventional nature of the ramp and pad excavation project data to be obtained, the fact that no soil or waste sampling will be performed, yet field observations will be made and interpreted, this field documentation shall be validated to Analytical Support Level (ASL) E as described in the SCQ, Section 2, subsection 2.3.3.

Water sampling and analysis of samples for total chromium, hexavalent chromium, copper, nickel, nitrates, total uranium, total thorium, and total suspended solids will be performed, field documented and validated to ASL B, as described in the SCQ, Section 2, subsection 2.3.3.

1.A. Task/Description: CRU #: 1

Operable Unit 1 - Dewatering Excavation Evaluation Program (DEEP) Treatability Study - Waste Pits 1 and 3 Ramp and Pad Excavation. Collection of pit water samples and laboratory analysis for total chromium, hexavalent chromium, copper, nickel, nitrates, total uranium, total thorium, and total suspended solids.

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

RI ☐ FS ☐ RD ☐ RA ☐ R A ☐ OTHER ☒ Specify: Treatability Study

1.C. DQO No.: GT-007 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: The DEEP Treatability Study is driven by the terms of Section XII.D.1 and D.2 of the Amended Consent Agreement between the Department of Energy and the U.S. Environmental Protection Agency.

4.B.Objective: The Operable Unit 1 - DEEP Treatability Study Waste Pits 1 and 3 Ramp and Pad Excavation will provide supporting data to evaluate the effectiveness of the excavation process proposed for removal and storage of the waste material contained in Waste Pits 1 and 3. This will be achieved by excavating the waste pit contents and providing a temporary storage location adjacent to the excavation. The effectiveness of the excavation and storage methods will be determined by visual observations and perimeter air monitoring of the excavation and stockpile areas. Full scale excavation planning considerations for water treatment and control will be addressed by collection water samples and laboratory analysis of water quality.

5. Site Information (Description):

Excavation will be conducted in Waste Pits 1, and 3, which are located northwest of the former process area of the FEMP. Specific locations are based on the position of previously dewatered areas.

DQO Number: GT-007

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	
TOC	☐	Pesticides	☐	Total Suspended Solids	
TCLP	☐	PCB	☐	Total Thorium	
CEC	☐			Total Chromium	
COD	☐			Hexavalent Chromium	
				Copper	
				Nickel	
				Nitrates	

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section
ASL A		SCQ Section:
ASL B	Described in SCQ, Appx. G	SCQ Section: Tables G-2 and G-3
ASL C		SCQ Section:
ASL D		SCQ Section:

ASL E Described in PSP SCQ Section: 2, 2.3.3

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

Biased ☐ Composite ☐ Environmental ☐ Grab ☒ Grid ☐

Intrusive ☐ Non-Intrusive ☐ Phased ☐ Source ☐

DQO Number: GT-007

7.B. Sample Work Plan Reference: (List the samples required. Reference the work plan or sampling plan guiding the sampling activity, as appropriate.)

Twenty samples of waste pit inflow water will be collected. Ten samples will be collected from the ramp and pad excavation in Waste Pit 1, and ten samples will be taken from the ramp and pad excavation in Waste Pit 3. All samples will be analyzed for total chromium, hexavalent chromium, copper, nickel, nitrates, total uranium, total thorium, and total suspended solids.

Reference sampling work plan is "Project Specific Plan for the Ramp and Pad Excavation of Waste Pits 1 and 3", RI/FS WBS#10.03.12, dated September 13, 1995 (in preparation).

Background samples: None

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

Sample Collection Reference: SCQ Appendix K, Section K.5.5, and EPA SW-846

---

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	☐

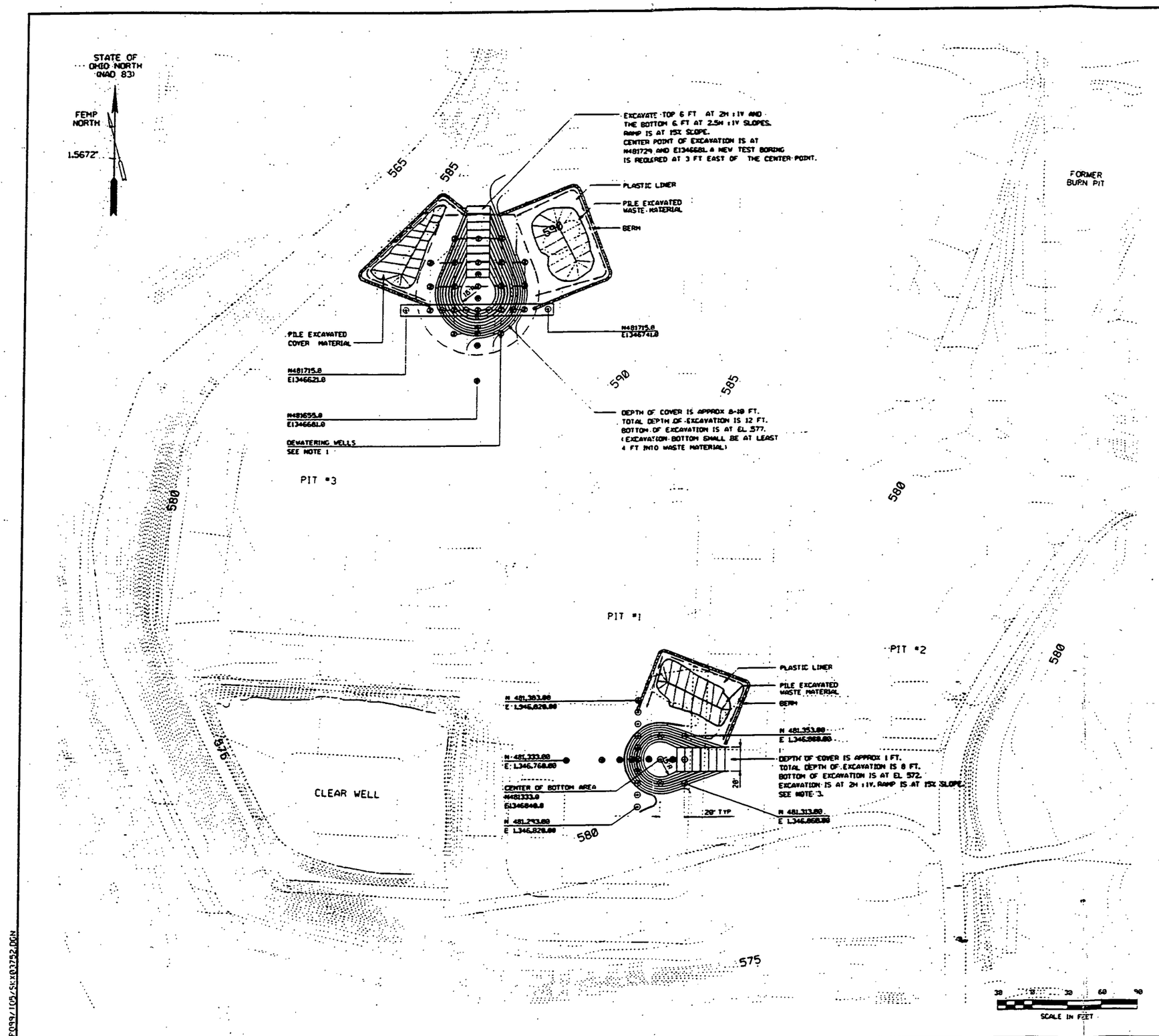
Other (specify) _____

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

ATTACHMENT D

WASTE PIT EXCAVATIONS MAP

skx03752.m(729.ws412) po99to5@ws412. Thu Jul 20 15:18:24 CDT 1995



1. LARGE DIAMETER DEWATERING WELLS WITHIN THE LIMIT OF EXCAVATION SHALL BE REMOVED PRIOR TO THE START OF EXCAVATION. THE OUTER MOST RING OF WELLS TO REMAIN IN PLACE DURING EXCAVATION.
2. SAND PACK WELL POINTS WITHIN THE LIMIT OF EXCAVATION SHALL BE REMOVED PRIOR TO THE START OF EXCAVATION.
3. ADDITIONAL DEWATERING WELLS MAY BE USED IN PIT 1 FOR RECONFIGURED RAMP EXCAVATION.

E 144

LEGEND

- LARGE DIAMETER DEWATERING WELL
- SAND PACK WELL POINT
- PLASTIC LINER
- DEWATERING TEST AREA

000117

LOCATION MAP
DRY EXCAVATION
(AT CPT PROBE NO. C3-12 IN PIT 3)
(AT CPT PROBE NO. C1-6 IN PIT 1)

/F099/IDV/SK:X03752.DGN

ATTACHMENT E

ENVIRONMENTAL MEDIA SAMPLING PLAN

DEWATERING EXCAVATION EVALUATION PROGRAM
RAMP AND PAD EXCAVATION OF WASTE PITS 1 AND 3 - SAMPLE COLLECTION AND SHIPMENT PREPARATION
10.03.12

A. Identifying Information

1) **Project Name:** DEEP RAMP AND PAD EXCAVATION OF WASTE PITS 1 AND 3
2) **Plan No.:** 10.03.12
3) **Material Description/Matrix Code(s):** Tank Contents (Water) (M300)
4) **Number of Sampling Containers:** 50
5) **Material Type:** water
6) **Source Code:** Waste Pits 1 and 3
7) **Material Evaluation Form #:** N/A
8) **Sampling Location:** Frac. Tanks holding pit pumpage from Waste Pits 1 and 3
9) **Process Knowledge:** Total uranium average from three Pit 1 monitoring wells is 5057 μg/l; total uranium average from three Pit 3 monitoring wells is 3139 μg/l, (source, Integrated Preliminary Hazard Assessment, Dewatering Excavation Evaluation Program (DEEP) Phases 2, 3, and 4", dated 12/1/94.

B. Sampling Information

1) **General:** Material collected will be transferred from a 55-gallon drum
2) **Preservation Method:** See Table 1
3) **Holding Times:** See Table 1
4) **Sample Technique:** Material will be collected from frac. tanks with a clean liquids container. An EFO Lead Technician may select an alternative sampling technique, if warranted.
5) **Number of Drums to be transferred:** N/A
6) **Composite Samples:** N/A
7) **Visual Inspection Performed?:** Yes
8) **Field Contact:** Jim Hey/Dan Stropes, 648-4765/648-3030
9) **Send Results to:** Jim Hey/Dan Stropes
10) **Charge No./Project Manager:** 1DCA2/Willy Benson
11) **Required QC Samples:** 1 duplicate sample every 10 samples, 1 matrix duplicate/replicate per 20 samples.
12) **Receiving Facility NRC License Number:** N/A

C. Sub-Waste Stream Description

The sub-waste stream consists of 2 frac. tanks which will receive pit pumpage from proposed excavations in Waste Pits 1 and 3. The material type is M300, and the source is Waste Pits 1 and 3.

D. Safety Concerns

See "CERCLA/RCRA Unit 1 (CRU1) Project-Specific Health and Safety Plan for Dewatering Excavation Evaluation Program (Dry Excavations), Revision 3", (CRU1-HSP-1003.3), dated September 1995.

E. Sampling Procedure

Waste Pit 1 Frac. Tank

1. Collect water from frac. tank, as directed by CRU1, using the container, preservative and hold time requirements specified in Table 1:

PARAMETER	CONTAINER TYPE	PRESERVATIVE	HOLD TIME	ANALYSIS MATRIX/ENV MATRIX
Chromium - hexavalent	1-liter polyethylene with polyethylene closure	Cool 2° to 6° C	24 hours	1048
Chromium - total	1-liter polyethylene with polyethylene lined closure	50% nitric acid, pH < 2	6 months	1047/2063
Copper	1-liter polyethylene with polyethylene lined closure	50% nitric acid, pH < 2	6 months	1049/2065

PARAMETER	CONTAINER TYPE	PRESERVATIVE	HOLD TIME	ANALYSIS MATRIX/ENV MATRIX
Nickel	1-liter polyethylene with polyethylene lined closure	50% nitric acid, pH <2	6 months	1050/2071
Nitrate	100 mL polyethylene with polyethylene lined closure	Cool 2° to 6° C	48 hours	1015
Suspended Solids - total	500 mL or 1-liter polyethylene with polyethylene lined closure	Cool 2° to 6° C	7 days	2037
Thorium - total	1-liter polyethylene with polyethylene lined closure	50% nitric acid, pH <2	6 months	2002
Uranium - total	1-liter polyethylene with polyethylene lined closure	50% nitric acid, pH <2	6 months	2001

Table 1. OU1 DEEP Ramp and Pad Excavation Water Sampling Information.

2. Mark the container(s).

3. Transfer preserved and closed sample containers to a cooler.

4. Dispose of sampling-related materials in polyethylene bag used for disposal of radiologically-contaminated materials.

Waste Pit 3 Frac. Tank

1. Collect water from frac. tank as directed by CRU1, using the container, preservative and hold time requirements specified in Table 1.

2. Mark the container(s).

3. Transfer preserved and closed sample containers to a cooler.

4. Dispose of sampling-related materials in polyethylene bag used for disposal of radiologically-contaminated materials.

F. Shipping Information

The water samples shall be delivered to the FERMCO Analytical Laboratory.

Dan Stroyt — Dan Stroyt 9/13/95

Authorized Signature/Date — Approved/Date