7168 R-020-204.19

MIXED WASTE STABILIZATION PROJECT - (2 VOLUME PSP FOR RA 9)

09/06/95

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DOE-FN EPAS
525
PSP

Department of Energy
Fernald Environmental Management Project
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SEP 0 6 1995
DOE-1449-95

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Mr. Tom Schneider, Project Manager
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Dear Mr. Saric and Mr. Schneider:

MIXED WASTE STABILIZATION PROJECT

The purpose of this letter is to transmit for your review and approval, the Department of Energy, Fernald Area Office (DOE-FN) Work Plan for the Mixed Waste Stabilization Project. The project will be implemented under the scope of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Removal Action No. 9 (Removal of Waste Inventories). The scope of this project involves the treatment of mixed waste by a mobile stabilization located at the Fernald Environmental Management Project (FEMP).

This project was described conceptually in the Proposed Site Treatment Plan submitted to the Ohio Environmental Protection Agency (OEPA) in March 1995. The Mixed Waste Stabilization Project shall be performed in two phases. Phase I of this project is the preparation of the enclosed work plan. Phase II will be the actual treatment of approximately 1,550 drums of mixed waste with an option to treat an additional 300 drums. Mixed waste that will be treated by this project contain waste constituents specified in OEPA waste codes D004 through D011. Utilizing the characterization analyses as well as process knowledge, the 1,550 drums have been divided into five general categories:

1. Grit blast residue	approximately 875 drums
2. Solidified furnace salts	approximately 145 drums
3. Sump cakes	approximately 465 drums
4. Construction rubble	approximately 40 drums
5. Miscellaneous trash	approximately 25 drums

Recycled and Recyclable

When the review is completed and approval to proceed with the project is granted, the FEMP will begin Phase II of the project. The stabilization process will be strictly monitored and controlled with procedures outlined in the project work plan to ensure the stabilized waste meets the NTS Waste Acceptance Criteria (WAC). After waste certification personnel verify the treated waste meets the NTS WAC, the wastes will be shipped from the FEMP to NTS.

If you have any questions or require further information, please contact John Sattler at (513) 648-3145.

Sincerely,

for Jack R. Craig
Director

FN:Sattler

Enclosure: As Stated

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FERNALD MIXED WASTE STABILIZATION PROJECT

PROJECT SPECIFIC PLAN AND PROCEDURES

VOLUME I

PROJECT SPECIFIC PLAN

DOCUMENT #8ADD5-2200-002

Rev. 0.5

August 1995

Prepared by
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Prepared for
U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE
Contract DE-AC24-92OR21972

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MIXED WASTE STABILIZATION PROJECT
OEPA RCRA PART B PERMIT
SUBSTANTIVE COMPLIANCE DEMONSTRATION

ITEM	CROSS REFERENCE INDEX
Hazardous Waste Determinations (OAC 3745-52-11) (40 CFR 262.11)	Section 2.0 & 5.0
Interim Status: Treatment, Storage, and Disposal General Facility Standards (OAC 3745-65-13 through 16) (40 CFR 265.13 through 265.16)	Section 2.0, 4.1.2, 4.5.4.1 4.6.1, 4.6.4, 7.0, & Appendix D
Interim Status: Treatment, Storage, and Disposal Facility Preparedness and Prevention (OAC 3745-65-31 through 35, 3745-65-37) (40 CFR 265.31 through 265.35, 265.37)	Section 4.5.3
Interim Status: Treatment, Storage and Disposal Facility Contingency Plan and Emergency Procedures (OAC 3745-65-51 through 56) (40 CFR 265.51 through 265.56)	Section 4.5.3
Container Storage (OAC 3745-52-34, 3745-66-70 through 77) (40 CFR 262.34, 265.170 through 265.177)	Section 4.1.3 & 4.5.4
Residue of Hazardous Waste in Empty Containers (OAC 3745-51-07) (40 CFR 261.7)	Section 4.3
Closure Performance Standards (OAC 3745-66-11, 3745-66-14) (40 CFR 265.111, 265.114)	Section 4.8
Land Disposal Restrictions (OAC 3745-59) (40 CFR 268)	Section 5.0

NOTE: Compliance with the applicable or relevant and appropriate requirements (ARARs) is discussed in Section 6.0 and in Table 6-1 of the attached Project Specific Plan (PSP).

FERNALD MIXED WASTE STABILIZATION PROJECT
PROJECT SPECIFIC PLANS AND PROCEDURES

VOLUME I - PROJECT SPECIFIC PLANS

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LIST OF ACRONYMS

ACA	Amended Consent Agreement
ALARA	As Low As Reasonably Achievable
AEDO	Assistant Emergency Duty Officer
BAT	Best Available Technology
BDAT	Best Demonstrated Available Technology
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CWA	Clean Water Act
CWG	Compatible Waste Groupings
DOE-FN	U. S. Department of Energy, Fernald Field Office
DOT	Department of Transportation
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
EPCRA	*Emergency Planning and Community Right-to-Know Act*
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FFCA	*Federal Facility Compliance Agreement*
HEPA	High Efficiency Particulate Air
IDLH	Immediately Dangerous to Life or Health
LDR	Land Disposal Restrictions
LLRW	Low Level Radioactive Waste
MDO	Materials Disposition Order
MEF	Material Evaluation Form
MSDS	Material Safety Data Sheet
NPDES	National Pollutant Discharge Elimination System
NEMA	National Electrical Manufacturer's Association
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFS	Nuclear Fuel Services, Inc.
NTS	Nevada Test Site
NRC	Nuclear Regulatory Commission
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
PAT	Process Acceptance Test
PDC	Performance Development Corporation
PESI	Perma-Fix Environmental Services, Inc.
PWBS	Project Work Breakdown Structure
RA	Removal Action
RAM	Radioactive Materials
RCRA	*Resource Conservation and Recovery Act*
RTR	Real Time Radiography
SCQ	Site-Wide CERCLA Quality Assurance Project Plan
SIC	Standard Industrial Codes
TCLP	Toxicity Characteristic Leaching Procedure
TLD	Thermo Luminescent Dosimeter
TSD	Treatment, Storage, and Disposal
WAC	Waste Acceptance Criteria
WMB	White Metal Box

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1.0 INTRODUCTION

This work plan describes the objectives and scope of work for the Mixed Waste Stabilization Project to be conducted at the U. S. Department of Energys Fernald Site (DOE-FN). The Fernald Site is a government owned, former uranium processing facility located near Cincinnati, Ohio. The site was placed on the National Priorities List in 1989 and is currently undergoing remediation under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) in accordance with the 1991 *Amended Consent Agreement* (ACA) between the DOE and the U. S. Environmental Protection Agency (EPA).

The ACA requires DOE-FN to submit an annual compendium of existing procedures and documentation for the sites Low-Level Radioactive Waste (LLRW) Management Program, in lieu of Removal Action Work Plans (RAWP). Additionally, DOE-FN committed to submitting project specific work plans for certain projects, including Mixed Waste Stabilization, in Addendum No. 1 to the Removal Action (RA) No. 9 - Removal of Waste Inventories Work Plan. Submittal of this plan is intended to satisfy ACA and RA No. 9 driven requirements by incorporating the documentation and management of the project under RA No. 9.

Project plans for the Mixed Waste Stabilization Project are documented in this two volume set of project plans and procedures. Volume 1 contains the Project Specific Work Plan, Process Control Plan, Sampling and Analysis Plan, Quality Assurance Plan, and Health and Safety Plan for the project. Volume 2 of the set contains the working level practices, procedures, and instructions for work accomplishment and control. In combination, these documents demonstrate that the proposed project will be accomplished in compliance with applicable federal, state, and local regulatory requirements, DOE Orders, and site procedures.

1.1 Objectives

The objective of the Mixed Waste Stabilization Project is to safely treat approximately 1550 drums of characteristic mixed LLRW currently being stored at the Fernald Site. These wastes have been characterized as containing waste constituents regulated under EPA waste codes D004 through D011. The wastes will be treated for land disposal at the Nevada Test Site (NTS) using Best Demonstrated Available Technology (BDAT) to meet RCRA Land Disposal Restrictions (LDR) and NTS waste acceptance criteria (WAC) established under the *Nevada Test Site - Defense Waste Acceptance Criteria, Certification, and Transfer Requirements* (NVO-325, Rev. 1). BDAT will be accomplished using a cement based stabilization/solidification process that renders toxic heavy metals and radionuclides insoluble by precipitation, and locks them in a grout matrix.

On-site waste treatment processes will be accomplished by personnel from Perma-Fix Environmental Services, Inc. (PESI) and Performance Development Corporation (PDC) working in conjunction with DOE-FN and FERMCO personnel. Perma-Fix and PDC personnel will manage the on-site treatment process and will perform all waste treatment operations conducted at the site.

1.2 Organization of This Work Plan

This Work Plan is organized in the manner committed to by DOE-FN in a fax submitted to Ohio EPA in January, 1995. This Work Plan and its attached appendices provide a complete description of how and where the proposed mixed waste stabilization project will be performed. The plan identifies the parties responsible for storage, handling, stabilization and disposal of mixed wastes, and those parties having oversight responsibilities for quality assurance, environmental compliance, and health and safety. Section 2.0 of the Work Plan provides a description of the mixed wastes to be stabilized, in terms of the Material Evaluation Form (MEF) characterization process. Appendix E provides detailed MEF information regarding wastes to be stabilized during this project. Section 3.0 describes bench-scale treatability and optimization tests aimed at developing and successfully applying design stabilization recipes tailored to each type of waste. Treatability tests have already been performed by Nuclear Fuel Services, Inc., whose report is included as Appendix F of this Work Plan. Section 4.0 provides a detailed description of the stabilization process and all of its ancillary and support activities, and Appendix A, the Process Control Plan provides additional detail regarding control of the process. This process description is presented in terms of the major work tasks and a Process Flow Diagram, Figure 4-3. Section 5.0 describes plans for disposition of stabilized waste. Section 6.0 describes the applicable or relevant and appropriate requirements for this project. Section 7.0 describes the health and safety program to be implemented during this project, with Appendix D, the Health and Safety Plan providing more detail. Section 8.0 describes the organization of the project team, and how the work and the project schedule will be managed. Appendix B is the Sampling and Analysis Plan, and Appendix C is the Quality Assurance Plan for this project.

2.0 WASTE DESCRIPTION

Since October 1991, RCRA closure actions and CERCLA response actions have redirected the central mission of the FEMP towards the implementation of waste management and environmental restoration initiatives. One of these initiatives is to identify, characterize, treat, and dispose of all legacy waste stored at the Fernald site in accordance with applicable federal, state and local requirements. Currently, 1,550 drums of legacy mixed waste have been identified to be treated by cement stabilization under this project for disposal at NTS. The mixed waste is currently in storage in RCRA-permitted warehouses at the Fernald site.

The drums of mixed waste have been grouped and categorized using the Material Evaluation Form (MEF) procedures discussed later in this section. The mixed waste is mostly solid material contaminated with uranium and hazardous constituents with EPA waste codes D004 through D011 (toxic heavy metals). Real Time Radiography (RTR), which uses x-ray technology to view the contents of a container, was also used to determine the physical properties of the waste such as presence of free liquid, particle size, and container capacity. The 1,550 drums have been divided into five general waste categories:

1. Grit blast residues . . . . . approx. 875 drums
2. Solidified furnace salts . . . . . approx. 145 drums
3. Sump cakes . . . . . approx. 465 drums
4. Construction rubble . . . . . approx. 40 drums
5. Miscellaneous trash . . . . . approx. 25 drums

Each drum of mixed waste has been assigned a lot code according to the FEMP Lot Coding Procedure, which is part of RM-0005, "Requirements Manual", to provide a means of control and accountability of nuclear material. Lot code markings are also used to provide information required to identify the contents of any container of waste material. The FEMP lot code has five basic elements: Production Order Number/Materials Disposition Order (MDO) Number, Origin or Source Code, Class or Enrichment Code combined with Material Description Code, and Lot Sequence Number. Material Description Codes for the mixed wastes included in the Mixed Waste Stabilization Project is cross referenced against each waste's category, description, and EPA waste code in Table 2.1.

Mixed waste to be treated as part of this project has been characterized using process knowledge and sampling and analysis results in accordance with site procedure EW-0001, "Initializing Waste Characterization Activities Using the Material Evaluation Form" and the FEMP Waste Analysis Plan. The waste characterization methodologies specified by EW-0001 are consistent with USEPA and OEPA hazardous waste regulations. Waste characterizations performed under EW-0001 provide a 90 percent confidence level that waste identified on a MEF exhibits only the waste characteristics stated. Although the drums of mixed waste have been characterized under EW-0001, it is possible that some waste containers may contain waste materials that are prohibited for disposal under the NTS WAC. During waste stabilization operations, prohibited materials will be physically removed from the waste, repackaged, and placed back in the FERMCO RCRA

inventory for eventual disposal as part of another project. Prohibited materials will not be stabilized or encapsulated in the final stabilized product that will be disposed of at NTS. Additional information on NTS prohibited items is included in Table 4-1 of Section 4.3.2.

The primary document for completing waste characterization is the two page Material Evaluation Form (MEF) which is part of EW-0001 (see Appendix E). The first page of the MEF is the Generator's Section which summarizes information provided by the FEMP (internal) waste generator. It is similar to the waste profile sheets used by commercial treatment, storage, and disposal facilities (TSDFs) allowing for documentation of information regarding: generator and waste stream identification; generation information; gross material characteristics; material composition; and health and safety precautions.

The second page of the MEF is the Evaluation Section, which summarizes the results of the waste characterization with respect to the evaluation criteria. It summarizes pertinent information from the evaluation process including: material regulatory status; material management requirements; and health and safety precautions.

The MEF evaluation process relies on a combination of process knowledge and sampling and analysis to complete the waste characterization process. Process knowledge includes the sum of all information that can be collected on a material, including information from operating procedures, manufacturing specifications, material safety data sheets (MSDS), spill reporting logs, visual inspections, and personnel affidavits. All process knowledge that is brought to bear on waste characterization is documented in the waste characterization files.

Sampling and analysis conducted in support of the MEF process is conducted in accordance with USEPA SW-846, *Test Methods for Evaluating Solid Waste,* for RCRA waste characterization. Protocols required by other regulatory programs are used when applicable. All data required to support waste characterization by sampling and analysis are included in the MEF waste characterization files. This includes the request for analysis, sampling plan, field sample log book, analytical data report, QA/QC report, chain-of-custody forms, and statistical treatment of analytical data once the sampling and analysis is completed. An inventory list of the mixed waste drums with their corresponding MEF number, EPA waste codes, and inventory descriptions, and RTR results are shown in Appendix E.

TABLE 2.1
MATERIAL DESCRIPTION CODES

Waste Category 1 - Grit Blast Residue

Material Description Code	Material Description	EPA Waste Codes
008	Grit blast residue	D008

Waste Category 2 - Solidified Furnace Salts

Material Description Code	Material Description	EPA Waste Codes
044	Sludges/salts, soft, chloride (heat treat salt)	D005, D007
060	Furnace salt, solidified, chloride	D004, D011
061	Furnace salt, solidified, non-chloride	D007, D008, D010
065	Scrap salts, high fluoride, including floor sweepings	D007, D008
066	Scrap salts, low fluoride, including floor sweepings	D007

Waste Category 3 - Sump Cakes

Material Description Code	Material Description	EPA Waste Codes
001	Discard process residues, trailer cakes, waste slurries, raffinates, etc.	D006, D008, D010
002	Sump cake - copper contaminated, low uranium	D005, D007
041	Sludges, oily, for oxidation, high free metal	D005, D006, D007, D008, D009

TABLE 2.1
(Continued)
MATERIAL DESCRIPTION CODES

Waste Category 3 - Sump Cakes

Material Description Code	Material Description	EPA Waste Codes
042	Sludges, cleanout, non-oily, for roasting	D007, D008
043	Sludges, solvent-stencil type of solvent on container	D007, D011
047	Samples, non-metallic, miscellaneous	D007
052	Barium-contaminated materials	D005
062	Dust collector residues - high fluoride	D004, D006, D007, D008, D011
068	Wet sump or filter cake, oil contaminated	D011
069	Wet sump or filter cake, non-oily	D005

Waste Category 4 - Construction Rubble

Material Description Code	Material Description	EPA Waste Codes
011	Contaminated soil, rocks, sand, bricks, and ceramics - furnace brick	D004, D005, D007, D008, D010, D011
028	Contaminated asbestos material	D008
049	Lead and lead-contaminated materials	D008
053	Non-burnable metal with uranium content	D010

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TABLE 2.1
(Continued)
MATERIAL DESCRIPTION CODES

Waste Category 5 - Miscellaneous Trash

Material Description Code	Material Description	EPA Waste Codes
003	Non-recoverable trash	D004, D006, D007, D008. D010, D011
025	Contaminated metallic filter elements and cartridges	D008, D010
029	Dust collector bags	D007

3.0 TREATABILITY STUDY AND BENCH SCALE TESTING

The key to successfully meeting the RCRA LDR treatment standards and NTS WAC is application of well-designed and demonstrated stabilization treatment recipes to specific wastes. Initial stabilization recipe development and optimization for the project was performed as a treatability study, to ensure that an effective recipe could be developed and applied to each waste category. Additional bench scale testing will be performed to ensure optimization of final design recipes. Stabilization recipe development has proceeded in three stages:

- Stage 1 - Treatability Study
- Stage 2 - Design Recipe Optimization
- Stage 3 - Design Recipe Adjustment

3.1 STAGE 1 - TREATABILITY STUDY

The Stage 1 Treatability Study was conducted by Nuclear Fuel Services, Inc. (NFS), on representative composite samples from each of the five waste categories. Scoping tests were performed to provide "Proof in Principle" that cement stabilization would produce LLRW forms capable of meeting RCRA LDR treatment standards and the NTS WAC. The scoping tests involved testing each of the five representative composite samples to evaluate the initial waste loadings, type of stabilization reagents, and dosage ranges that would produce an acceptable treated waste form. Proving tests were also performed as part of the treatability study. The proving tests included evaluating the effects of pretreating the waste with ferrous sulfate and sodium sulfide to chemically stabilize (precipitate) the toxic heavy metals before solidifying the waste with cement. During the proving tests, measurement of hydrogen sulfide and ammonia concentrations were performed in the headspace over the waste in the mixer. These measurements were performed to provide additional data from which worker exposures and atmospheric emissions could be evaluated.

The *Treatability Study Report for the Stabilization of FERMCO Mixed Waste* is included in Appendix F. The treatability study showed that Type I Portland Cement had the best solidification performance of the solidification reagents tested. The treatability study also showed that using ferrous sulfate and sodium sulfide during pretreatment to precipitate toxic metals reduced the strength of the solidified waste product and slowed the setting and curing process. Although pretreatment with ferrous sulfate and/or sodium sulfide is necessary for some specific MEF waste categories, higher cement to waste ratio will be used to ensure a solid waste product with acceptable strength will be produced.

The measurements of gaseous emissions from the waste during proving tests resulted in useful data that has been considered in the design of this project for worker protection and for estimating atmospheric emissions. Hydrogen sulfide gas was not detected during the pretreatment of the waste with sodium sulfide, or during the dilution of sodium sulfide with water. This is partly due to the fact that water with a pH 9.0 was used for sodium sulfide dilution. The precaution of using alkaline water for sodium sulfide dilution will be incorporated into the process operating procedures used during full-scale treatment. Ammonia gas was given off when the pH of the

sump cakes, construction rubble, and miscellaneous trash was treated with Type I Portland Cement which raised the pH of the waste above 12.0. The source of the ammonia is believed to be ammonium hydroxide that became intermixed with these wastes during past plant operations. Ammonium hydroxide was used during production to precipitate uranium.

3.2 Stage 2 - Design Recipe Optimization

After mobilization on the Fernald site, the Perma-Fix team will conduct additional bench-scale tests to optimize the final design recipes. These optimization tests will be performed for each MEF waste category before waste from that MEF is treated in the full-scale stabilization process. The results of the NFS treatability study will be used as a starting point for the bench-scale optimization tests. Since some MEFs do not have enough volume to fill a White Metal Box (WMB) once the waste is treated, they will be combined with compatible MEFs to produce a sufficient volume of waste to fill WMB. Before multiple MEF waste streams are combined and stabilized in the full-scale treatment system, a bench-scale optimization test will be performed to verify the applicability of the design recipe and develop a modified design recipe if necessary.

Upon completion of bench scale tesing, the design recipe for each MEF waste category will be provided to the operators in the form of a Design Recipe Notice which will be posted at each mix unit location for ready reference by the mix unit operators. The Design Recipe Notice will include:

- A Raw Waste Profile
- Prescribed Dosages
- Performance Specifications

The raw waste profile provides the operator with a physical description of the waste to which the design recipe can be successfully applied. If the operator encounters a waste that does not fit the raw waste profile, processing of that waste will be postponed until new bench-scale optimization tests can be performed. The prescribed dosages specify to the operator the minimum reagent dosages necessary to successfully treat waste that meets the raw waste profile. The performance specifications describe to the operator the physical and chemical attributes that should be exhibited by waste after the treatment has been completed.

3.3 Stage 3 - Design Recipe Adjustment

If performance standards are not met by the design recipe, or if additional reagents must be routinely added to meet the performance standards, the design recipe may require adjustment. In these situations, additional bench-scale optimization tests will be performed to provide a basis for adjustment of the design recipe. The Mix Unit Operators will provide the Process Supervisor with timely process feedback so that decisions whether or not to adjust the design recipe can be made in a timely and deliberate manner.

4.0 PROCESS DESCRIPTION

This process description includes information regarding the grouping of mixed waste for stabilization treatment, the development and application of treatment recipes, and the sequence of operations in the production of stabilized waste forms acceptable to NTS.

4.1 WASTE STABILIZATION TREATMENT GROUPS

Wastes will be scheduled for stabilization by grouping compatible waste streams to ensure that appropriate stabilization methods and reagents are applied in a manner consistent with good design practice. Grouping of waste for treatment through the stabilization process will be planned and performed on a global basis according to waste categories, MEFs, and Material Description Codes.

4.1.1 Waste Category Control

The 1550 drums of mixed waste referenced in Section 2.0 of this Project Specific Work Plan were divided into five general waste categories by FERMCO - grit blast, furnace salt, sump cake, construction rubble, and miscellaneous trash. Waste stabilization work will proceed within each waste category, by creating waste sub-groupings called Compatible Waste Groupings (CWG).

4.1.2 Compatible Waste Groupings

When working with each waste category, the project team will control the flow of waste materials through the process, to ensure proper application of stabilization methods and reagents to specific wastes. Within each of the five waste categories, there may be one or more subcategories of waste based on the MEF and Material Description Code. In controlling the movement and processing of specific containers of waste, the CWG will be used to ensure that stabilized wastes combined in a White Metal Box (WMB) for shipment to NTS are compatible with each other, and are amenable to the same stabilization methods and reagents.

The mixed waste inventory at the Fernald site is packaged in steel containers of various sizes, ranging from 5-gallon pails up to 110-gallon overpack drums. In some cases, smaller containers have been repetitively overpacked to produce a stacked arrangement of concentric containers. The waste containers have been characterized and classified by MEF Number and Lot Code Number, as previously described in Section 2.0. An adequate amount of analytical data, process knowledge and real-time radiography (RTR) data is available, so that the need for additional waste characterization before stabilization will be minimal. If a need for additional raw waste characterization is discovered during the project, it will be performed using the MEF approach as previously described in Section 2.0.

In preparing waste for stabilization, existing MEF characterization and RTR data will be reviewed and used to assemble a CWG that contains waste streams that are compatible, and will produce a treated waste volume adequate to fill a WMB, which will be used for shipping stabilized waste to NTS. During the stabilization of a waste category, all containers included in a CWG will be assembled and processed together. For MEFs that have five or more 55-gallon drum equivalents,

such as grit blast media, the MEF is internally compatible, and is large enough to fill one or more WMBs without the addition of other wastes. For these MEFs, waste compatibility grouping will involve assembling the appropriate number of original containers to comprise a volume of waste that will fill a WMB after being stabilized in the process. The upper portion of Figure 4-1 is a schematic diagram of how large MEFs will be divided into CWGs.

For MEFs which do not have enough projected stabilized waste volume to fill a WMB, multiple MEFs from the same Waste Category (i.e., grit blast media, sump cake, etc.) will be combined to make a CWG of adequate volume to fill a WMB. In combining MEFs, the MEF characterization information will be used to ensure that only compatible wastes are combined. The RTR data will be used to estimate volumes of waste which can be combined to achieve the desired volume to fill a WMB and provide a warning to the technicians of whether one or more concentric containers are present inside the outer waste container. The lower portion of Figure 4-1 is schematic diagram of how small, compatible MEFs will be combined to produce a CWG.

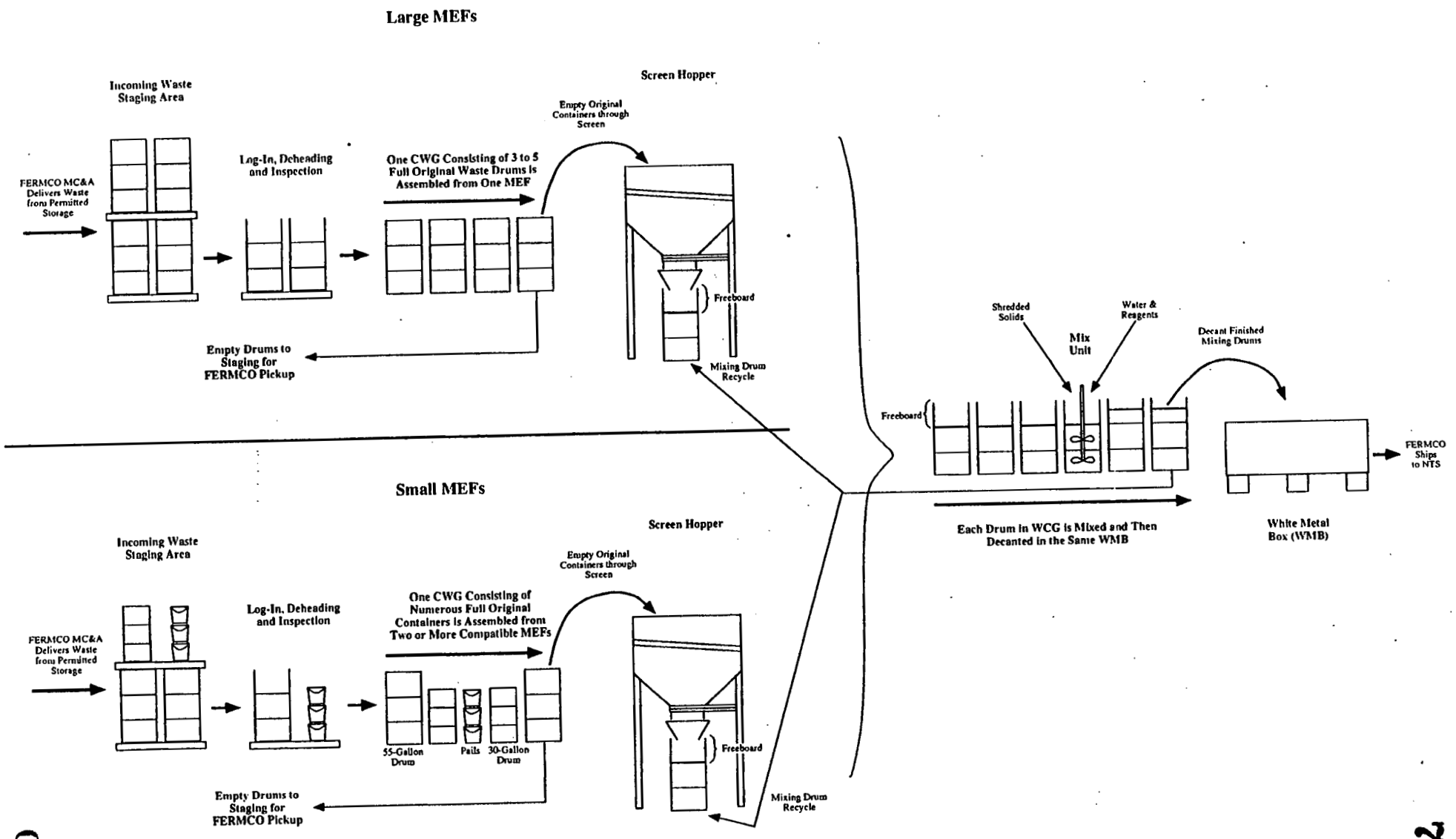
4.1.3 Management and Stabilization of Mixed Wastes in Containers

This mixed waste stabilization project involves container management at every step of the process. The mixed wastes brought to the process area by FERMCO MC&A personnel will be contained in steel drums of varying size from 30-gallon to 110-gallon capacity. These containers have been under continuous management at RCRA-permitted storage facilities on the Fernald Site. Therefore, they are already packaged, labeled, and marked in accordance with RCRA requirements. In some cases, the original waste containers have been overpacked one or more times during storage.

Mixed waste stabilization during this project will take place in 55-gallon mixing drums, but not in the original containers. The mixing drums must be strong enough to withstand the mechanical abrasion of the waste and the mixing equipment without developing leaks. Also, the waste must be removed from its original container, screened to remove any prohibited materials entrained in the waste, and size reduced if necessary before stabilization can proceed.

The screening operation is the process in which waste is removed from its original container, and is repackaged in 55-gallon mixing drums. The mixing drums to be used in the stabilization process will be handled in new or used heavy-wall 55-gallon steel drums meeting either the United Nations UN 1A2X485 specification or the old DOT 17-C specification. Each mixing drum will be filled with waste from the screening hopper to provide freeboard (empty headspace) in the mixing drum to make room for stabilization reagents, hydration water, and size reduced solids, as specified in the design recipe. Each mixing drum will be placed under a mechanical mix unit and the waste stabilized in the drum.

When stabilization is complete, the mixing drum will be removed from the mix unit and transported to a decanting area where the waste will be decanted into a WMB meeting NTS disposal requirements. The WMB is a heavy steel box having a nominal capacity of 40 cubic feet (dimensions of 7ft. × 4ft. × 2ft.). Each WMB will be labeled and marked in accordance with DOT requirements. Operating records will preserve the original container identities and reference these to the CWG Number and the WMB Number.



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Figure 4-1
Container Management Diagram

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As previously described in Section 3.0 of this work plan, a three stage program of bench-scale treatability and optimization testing will be implemented to ensure that effective stabilization design recipes will be developed and applied to each MEF waste category. The bench-scale tests conducted at each stage contribute useful information in the development of design recipes. Section 3.1 of this Work Plan describes the Stage 1 bench-scale treatability studies conducted to date, primarily for the purposes of evaluating waste/cement ratios, and gas evolution potential. In these tests, small composite samples of representative waste from each of the five waste categories were tested. These tests showed that portland cement loadings of between 20 and 40 percent by weight were sufficient to produce acceptable final waste forms for all waste categories except solidified furnace salts. The furnace salts will require a portland cement loading of between 60 and 70 percent. The tests also showed that off-gassing of ammonia after pH of the waste reaches 12.0 will take place for sump cake, construction rubble and miscellaneous trash. These preliminary tests are useful in planning the project, but further design recipe optimization tests will be needed before any MEF is treated in the full-scale stabilization process.

After mobilization on the Fernald site, the stabilization subcontractor will conduct additional bench-scale design recipe optimization tests (Stage 2) for each waste category. These bench-scale tests will employ the same reagents and methods that are planned for the full-scale stabilization program. The design recipe for each waste category resulting from the optimization tests will be communicated to the operators in the form of a Design Recipe Notice, which will be posted at each work station. Operator questions or concerns regarding applicability of the design recipe to specific raw wastes will be resolved by the Process Supervisor. Figure 4-2 is a blank Design Recipe Notice which shows the format and type of information included in the notice. Each Design Recipe Notice will include a raw waste profile, prescribed reagent dosages for key stabilization and solidification reagents, and performance specifications. The raw waste profile describes the visual and physical attributes of raw wastes which can be reliably stabilized by application of the prescribed dosages. Operators use the raw waste profile to pre-screen the waste for treatability using the design recipe. If any operator determines that the raw waste does not fit the raw waste profile, the operator may choose to postpone treatment until further bench-scale dosage optimization tests can be performed. If the waste conforms to the raw waste profile, the operator may proceed with stabilization as described in Section 4.3.

The performance specifications are used by the operator in evaluating the results of treatment before the stabilized waste is removed from the processing area and decanted into a WMB for curing and eventual disposal. If the performance specifications have not been met by addition of the prescribed dosages, the operator may add more reagents to the mix as necessary to meet the performance specifications.

In the event that the prescribed dosages consistently fall short of meeting the performance specifications, the operator will notify the Process Supervisor, who may choose to perform bench-

Figure 4-2

Design Recipe Notice

Waste Category Designation _____

Posting Date_____ Posting Time_____

Raw Waste Profile

Color_____
Texture_____

Free Water
Content _____

Macro Solids_____
_____
_____

pH_____

Freeboard _____ inches.

Prescribed Reagent Dosages

1. Adjust pH to _____,
with _____.

2. Stabilize Barium & Chromium
with _____ Gallons of _____%
Ferrous Sulfate, Mix _____ min.

3. Adjust pH to _____,
with_____.

4. Allow to Soak _____ hrs.

5. Stabilize all metals with
_____ Gallons of_____%
Sodium Sulfide, Mix _____ min.

6. Add solidification reagent
_____ lbs/gallons of Type ____
Portland Cement, Mix ____ min.

Performance Specifications

Final Color of Treated Waste _____.
Final Texture of Treated Waste _____.
Lead Acetate Test Color Intensity Value, _____ minimum (CIV).
Slump Test Value, _____ maximum (inches).
_____ minimum (inches).

scale tests for the purpose of adjusting the design recipe (Stage 3). Until the time that a new Design Recipe Notice is posted by the Process Supervisor, the operator will continue to operate using the current Design Recipe Notice, and will incrementally add reagent doses as necessary to meet the performance specifications.

4.3 PRODUCTION PROCESS DESCRIPTION

The waste treatment process that will be employed in stabilizing Fernald mixed wastes, is a production process, in which mixed waste (exhibiting hazardous and low level radioactive characteristics) will be stabilized to produce stable, non-hazardous LLRW forms capable of meeting RCRA LDR treatment standards and NTS WACS. The stabilization subcontractor will perform all stabilization activities and will manage all waste containers in the project area. This section describes the sequence of operations that comprise the production process. Figure 4-3 is a block flow diagram of the mixed waste stabilization process. Figure 4-4 is a schematic diagram illustrating how major materials handling activities will be accomplished. Figure 4-5 is an equipment layout drawing of the process area in the Plant 6 Building. The individual process units, which make up the waste treatment production process, are enclosed by dashed lines in Figure 4-3 and designated as follows:

Process Unit A - Waste Preparation
Process Unit B - Macro Solids Sorting and Size Reduction
Process Unit C - Chemical Stabilization
Process Unit D - Solidification
Process Unit E - Decanting and Curing
Process Unit F - Reagent Makeup

All process operations will be performed by highly qualified and experienced technicians, who will be referred to in the following presentation as "operators."

4.3.1 Process Unit A - Waste Preparation

Process Unit A, Waste Preparation, is the process unit in which Compatible Waste Groupings (CWG) are created, as described in Section 4.1.2, and in which the waste and containers in each CWG are processed to prepare them for stabilization. The waste preparation process unit begins when waste containers are transported from an Incoming Waste Staging Area (See Figure 4-5) to the Deheading and Inspection Station where the containers are logged in, opened and inspected. Whenever possible, the containers will be opened in the normal manner, by unfastening lid retaining rings.

Free liquids are pumped out of the containers with an air-driven double diaphragm pump, which discharges by way of overhead piping to a contaminated water holding tank. This tank is located within a manufactured secondary containment of sufficient capacity to contain over 100 percent

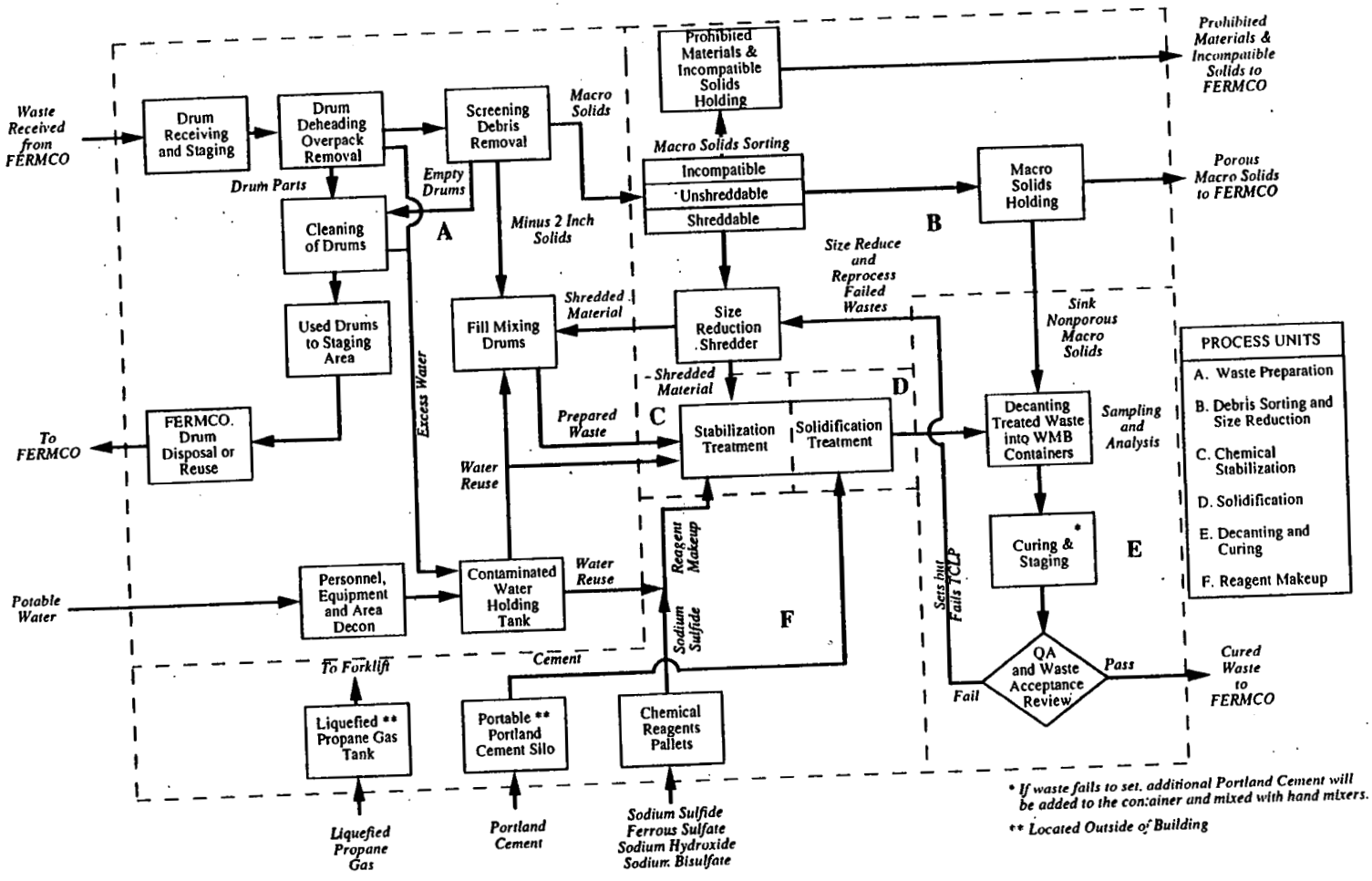
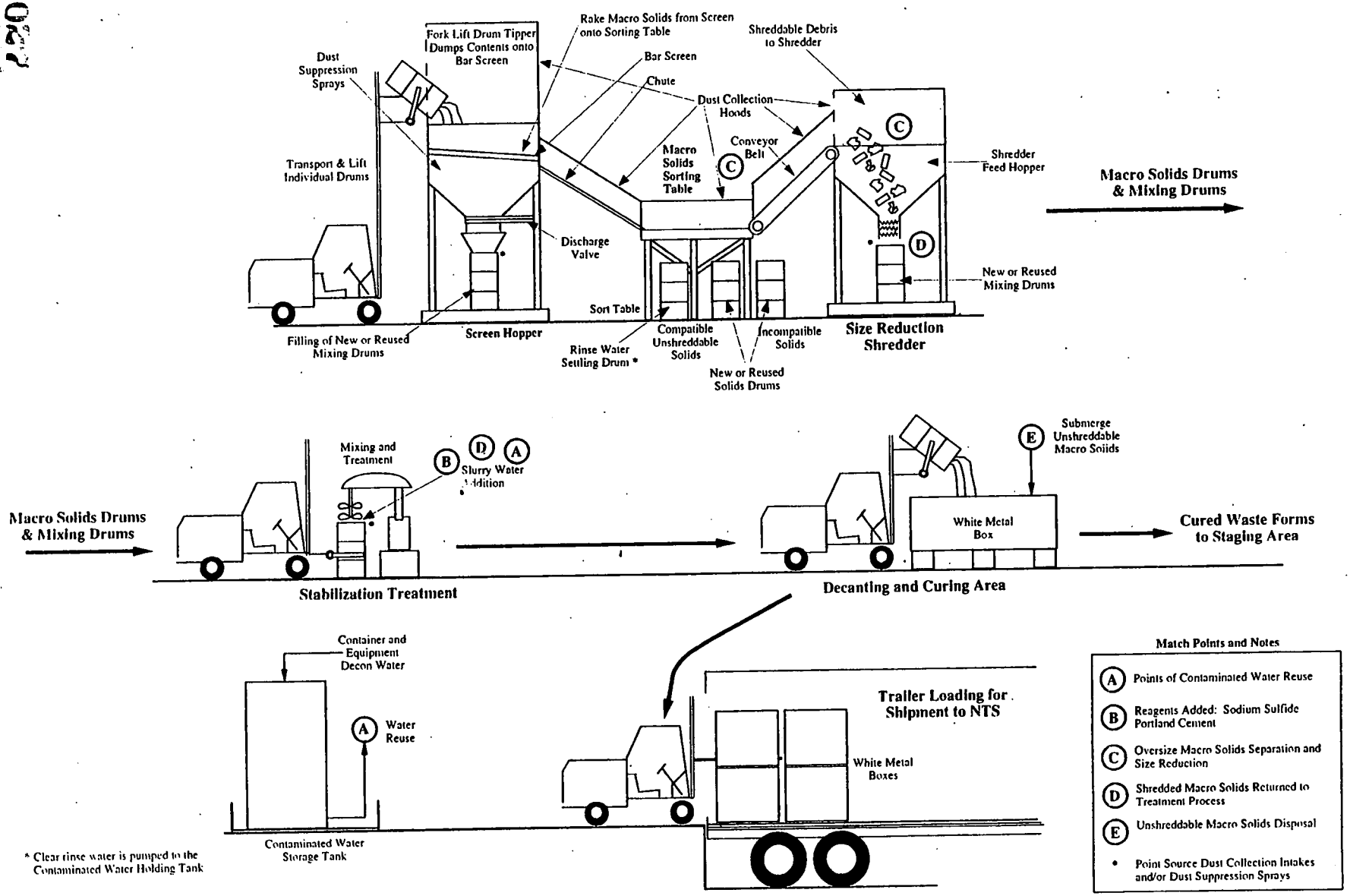


Figure 4-3
Block Flow Diagram - Mixed Waste Stabilization Process

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Figure 4-4
Schematic Diagram of Treatment Process

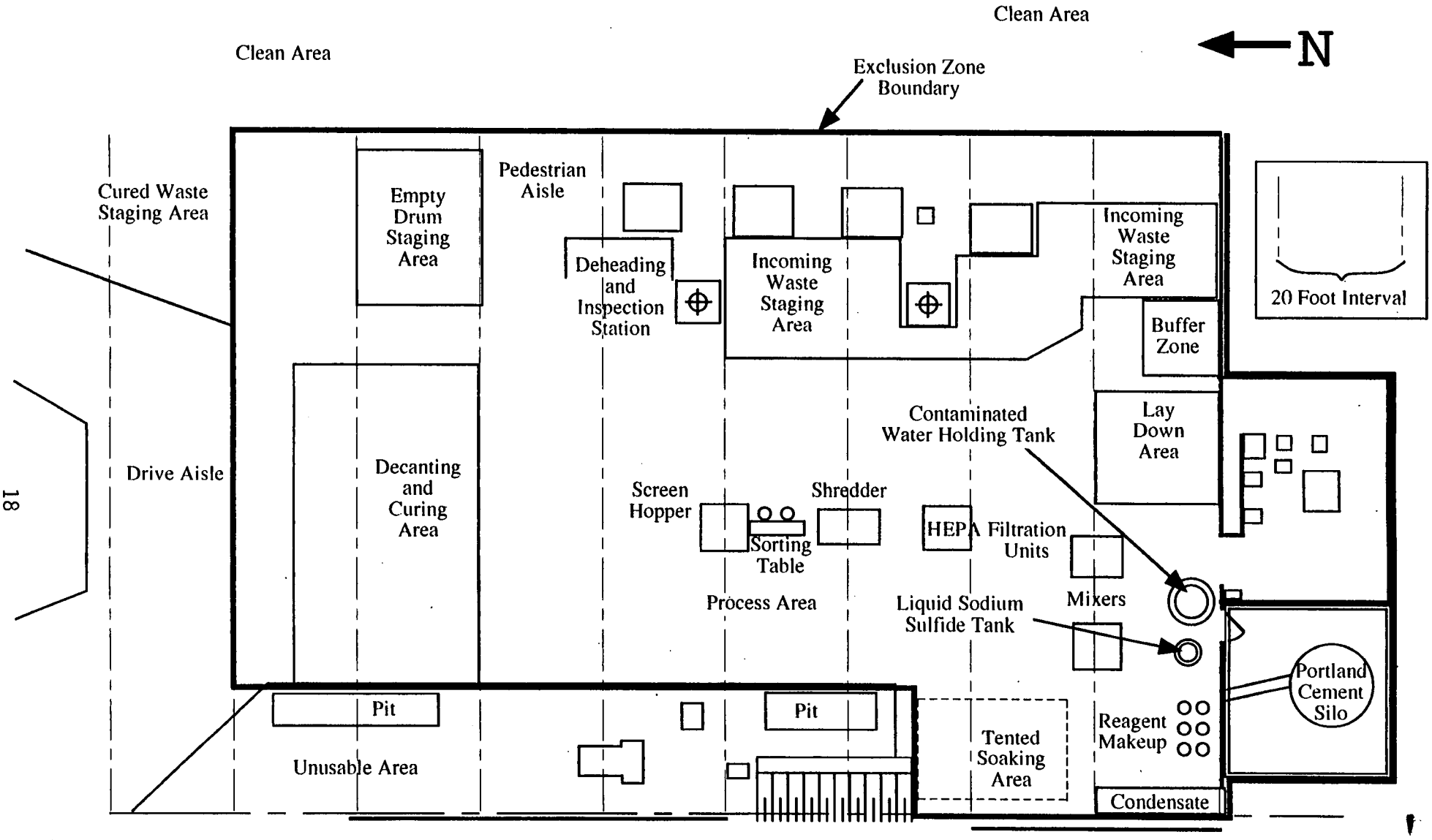


Figure 4-5
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

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of the capacity of the tank. The floor of the Deheading and Inspection Station is spill protected by a metal drip pan and Herculite™ diking. The Deheading and Inspection station is also equipped with an engineered negative pressure dust/fume collection system which discharges outside the building through a prefilter and a high efficiency particulate air (HEPA) filter.

Some waste containers have been overpacked one or more times while in on-site RCRA-permitted storage. In theses cases, an existing jib hoist and suitably rated lifting straps will be used to lift the inner container out of the overpack. This operation will be performed over the metal drip pan in the Deheading and Inspection Station, so that any spills due to container leaks will be contained. Waste from the inner container will be decanted into the overpack and the overpack will then be managed in the same manner as other containers that contained no inner containers. Empty inner containers and lids will be rinsed to ensure compliance with the RCRA empty container rule promulgated in 40 CFR 261.7 (OAC 3745-51-07), and placed in an Empty Container Storage Area to await pickup by FERMCO MC&A personnel. Rinse waters will be collected, and pumped to the Contaminated Water Holding Tank in the same manner as the excess liquids were removed from the containers.

After the waste containers have been opened, excess liquid removed, and inner containers separated from the waste, the waste containers are grouped by the operators at the Deheading and Inspection Station into CWGs. A CWG is sized, based on the design recipe, to fill a WMB after all hydration water, reagents and shredded solids have been combined with the waste in the stabilization step. Based on the treatability tests performed at Nuclear Fuel Services, Inc., all of the waste categories except for solidified furnace salts will require approximately 24 cubic feet of raw waste to fill a 43 cubic foot WMB to a final volume of 40 cubic feet. For the solidified furnace salts, approximately 12 cubic feet of raw waste will become 40 cubic feet of stabilized waste in the WMB. For large MEFs (exceeding 24 cubic feet), an appropriate number of containers from the same MEF will be grouped into a CWG. For small MEFs (less than 24 cubic feet total volume), two or more compatible MEFs must be combined to fill a WMB.

In the next step of the waste preparation process, macro solids (over 2 inches in any dimension) are separated from the waste by passing the waste through a bar screen in a screening hopper as shown in Figure 4-4. Each drum in a CWG is clamped in a drum tipping attachment on a fork lift, lifted to the top of the screen hopper, and the contents dumped onto the bar screen. Macro solids retained by the bar screen are raked down a chute onto a sorting table where Process Unit B begins. Waste that passes through the bar screen is dispensed from the bottom of the screen hopper through a discharge valve into a heavy wall 55-gallon mixing drum as described in Section 4.1 and shown in Figure 4-1. If necessary, the loading of solids and liquids in each mixing drum is adjusted to the proper ratios, and freeboard is provided to make room for the added reagents. Adjustments to the solid/liquid ratio are made by either adding recycled water from the Contaminated Water Holding Tank or by pumping off excess water. Removed water will be temporarily held in a Contaminated Water Holding Tank until it can be reused in the process for slurrying solids or hydrating reagents.

4.3.2 Process Unit B - Macro Solids Sorting and Size Reduction

In Process Unit B, Macro Solids Sorting and Size Reduction, macro solids that have been screened out of the waste at the Screen Hopper are raked down a chute onto a sorting table. Here the macro solids are manually sorted to remove any NTS-prohibited materials or solids that are incompatible with the stabilization process. Table 4-1 summarizes NTS prohibited materials and process incompatible wastes. A major emphasis will be placed upon preventing NTS prohibited or process-incompatible waste from exiting the shredder.

Table 4-1
NTS Prohibited Materials and Process Incompatible Solids

Prohibited or Incompatible Materials	Examples	Classification
Batteries	Auto, Ni-Cad, Lithium, or Mercury	NTS prohibited items
Lead-bearing Material	Lead metal, pipe dope, lead flashing, oil filters	NTS prohibited items
Mercury-bearing Material	Switches, vacuum pumps	NTS prohibited items
Solvents or Solvent Soaked Rags	Kerosene, Toluene, Acetone	NTS prohibited items & process incompatible, and potentially ignitable
Liquid or Semi-Solid Petroleum	Oil, grease, soft tar	Process incompatible & potentially ignitable
Compressed Gas Containers	Aerosol Cans, gas cylinders	Process incompatible unless empty (at atmospheric pressure), potentially ignitable
Polychlorinated biphenyls	Transformers, capacitors, fluorescent light ballasts	NTS prohibited items
Explosives and pyrophorics	Explosives, pycric acid residues, porous uranium metal, uranium turnings and grinding sludges, and metal powders	NTS prohibited items & process incompatible, potentially ignitable
Chelating Agents	EDTA, NTA, amino-polyacetic acids	Process incompatible
Infectious Agents	Medical wastes, animal carcasses	NTS prohibited items & process incompatible

Prohibited materials and process incompatible solids are sorted by physical characteristics, and packed in containers for return to FERMCO custody. Sorting also separates process compatible solids into shreddable and unshreddable categories. Unshreddable solids are rinsed on the sorting table, confirmed by project procedure to be compatible for disposal at NTS, and sent to the Decanting and Curing Area (See Figure 4-5) for submerging into the stabilized wastes in the WMB before the grout sets. Rinse water is collected in a 55-gallon settling drum and pumped from there to the Contaminated Water Holding Tank.

Shreddable solids are rinsed and placed on a belt conveyor which transports these materials to the feed hopper of a size reduction shredder. Shredded solids exit the shredder through the bottom, directly into a single 55-gallon drum. The drum which receives the shredded solids may be empty or may already contain prepared waste. In this way, shredded solids may be recombined with the prepared waste as it falls out of the shredder, without direct handling of solids by personnel. Alternatively, shredded solids can be moved in a separate drum to the Chemical Stabilization Process Unit, and added by hand to the mixing drum during the mixing process. In this way, the waste and the size-reduced solids are treated together in the mixing drum.

If any solidified waste in the Cured Waste Staging Area or the Decanting and Curing Area (See Figure 4-5) is found to have failed a TCLP extraction analysis or any other provision of the NTS WACS, the operations logs will be reviewed, and the laboratory data will be validated. If the TCLP failure is confirmed, the WMB will be cut open, and the waste/grout monolith will be broken up into man-portable chunks. These chunks of monolith will be transferred to 55-gallon drums and transported back to the belt conveyor at the inlet of the shredder, to be feed through the shredder and repackaged in mixing drums. The shredder is the point where WAC-rejected monoliths re-enter the stabilization process for reprocessing.

In the operation of the sorting table and shredder, care is exercised to ensure that process-compatible solids (shreddable and unshreddable) remain with the mixing drums of the same CWG. If necessary, process-compatible solids from the CWG will be placed in another 55-gallon drum that becomes an additional container in the CWG as it enters downstream process units.

4.3.3 Process Unit C - Chemical Pretreatment Stabilization

Process Unit C, Chemical Pretreatment Stabilization, is the operation in which toxic heavy metals and radionuclides in the waste are chemically precipitated to transform them into a chemical form that exhibits low water solubility, and therefore makes them less leachable.

To ensure that stabilized waste will meet RCRA LDR treatment standards and NTS WACS, most of the waste streams identified in Table 2-1 will be subjected to chemical pretreatment stabilization as described in the following discussion. At this time, the Grit Blast stream appears to be the only one of the five waste categories in Table 2-1 which may not require chemical pretreatment stabilization. For the Grit Blast stream, the chemical pretreatment stabilization step may be bypassed, with the prepared Grit Blast CWGs being treated for solidification directly in Process

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Unit D, Solidification Treatment. For all other waste categories in Table 2-1, the following chemical pretreatment stabilization process will be employed.

Mixing drums of waste, previously prepared and staged in CWGs in Process Units A and B, are transported by lift truck and drum grapple to Process Unit C, the Chemical Stabilization Process Unit, and placed under a mix unit. The mix unit operator involved in mixing the waste and reagents performs the actual chemical pretreatment stabilization of the waste in each 55-gallon mixing drum. The mix unit operator follows the design recipe and established procedures in adding the prescribed dosages of stabilizing chemicals, and in evaluating the stabilized waste for compliance with the performance specifications. If the MEF characterization data indicates high concentrations of chromium or barium, ferrous sulfate additions may be required. The design recipe may also specify pH ranges for some reactions. If the operator's testing shows pH outside the required range, the pH may have to be adjusted by reagent additions. To raise pH, the operator will add either sodium hydroxide or lime. To lower pH, the operator will add sodium bisulfate. For some wastes, the design recipe may call for a period of soaking to allow reactions to proceed to completion.

Experience from the treatability studies conducted by NFS Inc. showed that pH measurement instruments performed poorly when measuring pH of mixed waste samples. Midway through those treatability tests, color-indicating pH paper was adopted as the most reliable means of measuring pH. Because of this proven success, color-indicating pH papers will be used for process control in the full-scale mixed waste stabilization program. Measurements of pH with instruments will be performed infrequently and only as a check on the paper method.

The final chemical stabilization step will involve reaction of the heavy metals and radionuclides in the waste with sodium sulfide to produce low-solubility metal sulfides. The operator tests the waste with color-indicating lead acetate paper to detect the sulfide reaction end point (a slight excess of unreacted sulfide after all demand has been satisfied). Sulfide additions continue until the lead acetate test shows the endpoint to be reached. Stabilization reagents are completely mixed throughout the waste volume so that all leachable metals and radionuclides are precipitated. The mix unit is a hydraulically-driven, variable speed, reversible propeller mixer with three staged impellers. The unit has complete freedom of movement within the confines of a cylindrical container. The only parts that come in contact with the waste are the impeller shaft and blades.

Shredded solids will be stabilized along with the prepared wastes in the chemical pretreatment stabilization step. Shredded solids may be brought to the mixing location and added by hand to the batch during the chemical stabilization stage of treatment. Alternatively, the mixing drums may already contain prepared waste and shredded compatible solids in the proper proportions to comply with the design recipe.

The mix units will be equipped with a negative pressure dust/fume collection system to protect the operator from exposure to dusty waste constituents, chemical fumes or vapors, and radioactive contamination. This negative pressure dust collection system will discharge to the atmosphere

outside the Plant 6 Building by way of the prefilter and HEPA filter system discussed in Section 4.6.1.7 of this Work Plan. In addition, mix unit operators will be suited out in Level C until health monitoring shows that these requirements can be relaxed. See the Health and Safety Plan, Appendix D for details.

Because of the use of sodium sulfide, there is a potential that hydrogen sulfide gas could be generated if sodium sulfide became mixed with acid or was added to a waste mixture that has a low pH. To protect against this possibility, pH of the receiving material (water or waste) will be checked each time before sodium sulfide is added. Sodium sulfide will not be added unless pH of the receiving material is at least 9.0. If a receiving material is found to have a pH less than 9.0, its pH will be adjusted upward with an alkaline reagent such as caustic soda, lime or portland cement before the sodium sulfide is added. The same precautions will be exercised whenever dry sodium sulfide flake is dissolve in water to make a sodium sulfide solution.

Portions of three waste categories (Sump Cake, Construction Rubble, and Miscellaneous Trash) are suspected to contain ammonium hydroxide. During treatability testing by NFS, samples of these wastes were observed to generate significant ammonia concentrations in the headspace above the sample whenever the pH of the waste exceeded 12.0 pH units, such as after portland cement addition. Ammonia could be a health threat to project workers if it were allowed to concentrate inside the Plant 6 Project Area. The negative pressure dust/fume collection systems previously described will also provide a route for ammonia emissions to be exhausted from the building. For wastes in which the design recipe calls for an overnight soaking or reaction period, the chemically pretreated mixing drums containing these wastes will be placed in a tented area inside the Plant 6 Project Area (See Figure 4-5). This tented area will be connected to the negative pressure dust/fume collection system, to provide a means of collecting and exhausting any ammonia that may be generated during soaking.

Due to the nature of the stabilization process, a potential for minor spillage and splash out of waste materials from the mixing drums under the mix unit exits. Operators will exercise care in mix unit operations to minimize spills and splashing. The floor area immediately around the mix units will covered with Herculite™ polymer diking. Also, daily housekeeping in these areas with HEPA wet-vacs will be performed to prevent a buildup of transferrable contamination on the floor in this area.

4.3.4 Process Unit D - Solidification Treatment

Process Unit D, Solidification Treatment, is the operation in which solidification reagents are added to the waste and thoroughly mixed. After waste has been subjected to chemical pretreatment stabilization in Process Unit C, it is further stabilized with pozzolans to bring about solidification of the waste into a solid waste/grout monolith. If the Grit Blast waste stream bypasses chemical pretreatment stabilization in Process Unit C, the CWGs from this category will proceed directly to solidification treatment. Solidification treatment takes place under the same mix units which were used to perform chemical pretreatment stabilization. Solidification treatment may proceed

immediately after chemical pretreatment stabilization has been completed, or it may take place at a later time. Solidification reagents such as portland cement, fly ash, cement kiln dust, or other mixtures can be used, but it is anticipated that Type I portland cement will be the only solidification reagent used for the five waste categories identified in Table 2-1 of this Work Plan. The solidification reagent's primary purpose is to bind free water, solidify the waste into a crystalline matrix, and elevate the waste's pH.

The mix unit operator constantly observes visual, textural, or consistency characteristics with respect to the design recipe and its performance specifications, and corrects any observed variance from the design recipe. If the operator finds that the prescribed reagent dosages of the design recipe are inadequate to meet the performance specifications, additional incremental doses of reagent will be added until the performance specifications are met.

4.3.5 Process Unit E - Decanting and Curing

After solidification treatment is complete, the lift truck/drum tipper is used to lift the drum of treated waste, remove it from beneath the mix unit and transport it to Process Unit E, the Decanting and Curing Area, and decant the waste into a WMB. Each WMB will have a 10-mil plastic liner which will be sufficiently large to drape over the exterior sides of the WMB, to prevent exterior contamination of the container during decanting and curing operations.

Setting and curing begins immediately after decanting (initial set within four to twelve hours and a hard set after 24 hours). Additional curing time may be provided to achieve desired compressive strength criteria, but all necessary curing should be complete within 14 days. The mix unit operators and process supervisor observe waste in the curing area to determine whether setting and curing are occurring as planned.

If waste inside a WMB in the Decanting and Curing area fails to set within 48 hours, it will be evaluated for possible corrective action. If the waste has become stiff and only needs more time to set and cure, the corrective action will involve an additional 48 hours of curing and observation. If the waste in the WMB is still fluid, any grab samples that were collected from the WMB will be added back to the box and additional stabilization reagents will be added directly to the WMB. The waste will then be mixed, either with man-portable mixers, or by transporting the whole WMB back to the mix unit at Process Unit D, the Solidification Process Unit.

After the waste has cured, each WMB will be sealed and then moved by means of a fork lift truck to a staging area to await analytical results and pickup by FERMCO. If sweating or bleeding of a monolith is observed, granular absorbent or dry Portland Cement may be placed on top of the monolith, before the container is sealed. These absorbent materials will absorb and chemically bind any sweat of bleed water to ensure that the WMB will contain no free liquid when shipped to NTS.

Waste acceptance samples will be taken at the time of decanting before the waste sets. The samples will be collected in accordance with the Sampling and Analysis Plan described in Appendix B stored

until they are subjected to the TCLP extraction and laboratory analysis to determine whether the reagent recipe has effectively stabilized the waste. If the recipe requires adjustments, bench-scale optimization tests will be used to determine the optimum recipe for new waste characteristics. If the waste contained in any of the WMBs fails to meet RCRA LDR treatment standards and NFS WACS, the WMB will be cut open, the enclosed monolith broken up, and reprocessed as described in Section 4.3.2.

4.3.6 Process Unit F - Reagent Makeup

Process Unit F, Reagent Makeup, is the operation in which reagents prescribed in the design recipe are prepared for addition to the waste. This activity involves reagent receiving, storage, and dispensing to prepare reagent charges for use in Process Units C and D. Since contaminated water from the Contaminated Water Holding Tank will be reused for reagent dilution, this reuse water stream is also a material of concern.

The reagents and materials of concern include portland cement, ferrous sulfate, sodium sulfide, pH adjusting chemicals and contaminated water. The storage, handling, and use aspects of each of these materials are described in the following paragraphs and in the Material Safety Data Sheets (MSDSs) that will be provided and maintained in the work area.

4.3.6.1 Portland Cement Makeup

Portland cement is received in bulk shipments and stored in a portable cement silo equipped with a high efficiency bag filter to prevent significant emissions of cement dust during pneumatic truck unloading operations. Volumetric charges of portland cement are discharged dry from the silo by way of a screw feeder and charging hopper into covered buckets which are staged near the mixers. The charge buckets are manually emptied into the mixing drum by the mix unit operator, slowly to minimize dust loss. A manual water spray will be used to suppress dust during transfer. Also, the negative pressure dust/fume collection system will remove any portland cement dust from the air space over the mix unit. Another negative pressure dust/fume collector intake will be located at the charge bucket filling station.

4.3.6.2 Sodium Sulfide Makeup

Sodium sulfide flake is received in drums on pallets which are then transferred to a designated storage area in reagent makeup area inside the Plant 6 Project Area (See Figure 4-5). Individual drums of sodium sulfide are transported to the reagent makeup area by lift truck. Sodium sulfide flake is either carried dry in charge buckets to the mix units for dosing, or is dissolved in water in a 55-gallon drum or a mixing tank and dispensed into charge buckets as a sodium sulfide solution. Charge buckets are carried from the reagent makeup area to the mix units. Sulfide can be dissolved to produce a solution strength of between five and ten percent. The sodium sulfide solution is contained in charge buckets or in a drum until use. All sodium sulfide solution made will be consumed by the treatment process.

High pH water is used to minimize the potential for production of hydrogen sulfide gas in the work area. During the bench-scale treatability tests performed by NFS, water with a pH over 8.5 was used to dissolve the sodium sulfide flake. When dissolving the sodium sulfide flake, for these bench-scale tests, the container was bagged and a meter flow of 10 SCFH of nitrogen was passed through the bag. The hydrogen sulfide concentration was measured in the bag exhaust using a Sensidyne™ detector tube capable of reading 25 ppm hydrogen sulfide. Hydrogen sulfide in the exhaust was not detected at a detection limit of 2 ppm. This corresponds to a maximum possible

generation rate of 0.005 pounds per minute when preparing a 55-gallon drum of 10 percent sodium sulfide solution. Similar production rates were measured in the headspace above the waste after sodium sulfide solution was added during the bench-scale treatability tests.

In the full-scale operation, pH of the reuse water will be checked and adjusted if necessary to ensure that its pH is above 9.0 before sodium sulfide is added. The traces of hydrogen sulfide produced during the dissolving process can be easily collected and exhausted from the building by the negative pressure dust/fume collection system, which will have an intake in the reagent makeup area.

4.3.6.3 Ferrous Sulfate Makeup

Ferrous sulfate will be used for wastes having high concentrations of barium and chromium. Ferrous sulfate will be received as dry crystal in drums on pallets. These chemicals will be stored and handled in the same manner as sodium sulfide. Ferrous sulfate may be added dry to waste drums that have sufficient water content, or it may be dissolved in water prior to addition. In either case, it will be carried and added using charge buckets.

4.3.6.4 pH Adjustment Chemicals

Some treatment recipes may require pH adjustment steps using acids or caustics. If acid is required, it will be added in the form of dry sodium bisulfate, which hydrolyses with water to form sulfuric acid. If concentrated caustic soda is required, it will be received and stored in five-gallon plastic carboys. These materials will be stored in separate locations out of traffic patterns. Acid or caustic will be dispensed into compatible transfer containers suitable for that purpose, and added to the waste from those transfer containers. Acids will be segregated from caustics and sodium sulfide in the storage area by using engineering controls (materials will be stored on pallets with temporary berms around the pallets), so that reactions between these incompatible chemicals can not take place.

4.3.6.5 Contaminated Water Storage, and Reuse

A 1,500 gallon polyethylene storage tank will be provided to temporarily hold contaminated water from waste preparation and decontamination activities. This water is reused for waste slurrying and reagent hydration. The tank is located in an area of the building away from fork lift traffic but near

points of contaminated water generation and reuse. The floor area immediately around the tank is covered with impermeable plastic sheeting and protected from spill migration by temporary berms around the perimeter of the protected area. Water is transferred to and from the tank using small diameter hoses and air-driven pumps. All pumping activities are attended by process operators at the suction and discharge ends of the hose.

4.4 Production Process Control

Positive control of the production process by which waste is treated is a critical part of this project. A detailed presentation of the strategy and methods of production process control is presented in the Process Control Plan, Appendix C of this Volume I Work Plan.

4.5 Environmental Management

This section describes the environmental management measures taken on this project. In a manner consistent with the process flow, the following discussion focuses on minimizing the waste, managing the waste, and protecting the environment.

4.5.1 Waste Minimization

Waste minimization is an important activity in this mixed waste stabilization project. Waste is minimized through efficient operation of the stabilization process, through use of surplus chemicals, and through prevention of material, equipment, or site contamination.

4.5.1.1 Waste Minimization by Efficient Operation

The project team will work to minimize waste generation through efficient operation. This includes prevention of spills, leaks or discharges of mixed wastes to the floor which would result in contamination of spill response equipment and absorbent materials, and additional contaminated personal protective equipment. Also, tight control of material and reagent inventories in the Plant 6 Process Area will be exercised to minimize surplus materials or reagents from being left over in the process area at the conclusion of the project.

4.5.1.2 Waste Minimization by Use of Surplus Chemicals

Before any new chemical reagents are purchased and brought on to the Fernald site, surplus chemicals currently in storage on the site will be used in the stabilization of mixed wastes. Existing site inventories of sodium sulfide (flake and solution) and sodium hydroxide have already been identified on the Fernald Site. A search of the site chemical inventory will be conducted to identify additional surplus chemicals (e.g., ferrous sulfate, sodium sulfate, etc.) that may be available.

4.5.1.3 Waste Minimization by Prevention of Material or Equipment Contamination

Since anything that is used in the radiological control area (including the Plant 6 Process Area) can potentially become contaminated with radioactive particles, the project team must minimize materials, and equipment brought into the project area. An aggressive program of pollution prevention will be pursued to prevent uncontaminated materials from becoming contaminated.

Portland cement will be received by pneumatic tanker and stored in a portable silo, to be located outside the Plant 6 Building. It will be fed from the silo into the building by way of a screw conveyor. Any surplus portland cement in the silo at the end of the project will be uncontaminated. This method of portland cement storage and handling also avoids contamination of paper sacks and pallets. Other consumable supplies that are brought onto the site will enter through FERMCO receiving, where disposable packaging will be removed and replaced with site-reusable packaging. In this way disposable packaging will not become low level radioactive waste.

Wherever possible, project equipment will be covered in plastic sheeting to prevent contamination during process operations. This precaution will help to minimize surface contamination and downstream costs associated with decontamination activities. These temporary coverings greatly limit the degree to which equipment and containers become contaminated on their exterior surfaces, and should expedite FERMCO Radiological Control clearance for release of equipment and containers for off-site shipment. Any equipment that does become radiologically contaminated will be decontaminated if possible.

4.5.1.4 Waste Minimization by Prevention of Building or Area Contamination

The potential for the Fernald Mixed Waste Stabilization Project to significantly contribute to the contamination of Plant 6 is minimal. Past uranium processing in the Plant 6 Building has resulted the floors of the building having fixed contamination. It is unlikely that this low-level mixed waste stabilization project will result in significant additional contamination of the building floors. In areas where spills or leaks of liquid waste to the building floor could occur, drip pans and Herculite™ or equivalent floor covering will be used as appropriate to provide a local contamination barrier.

4.5.2 Prevention of Environmental Media Pollution

Potential discharges of pollutants to soil, surface water, groundwater, public sewer systems, and the atmosphere are minimized by the following measures. Section 6.0 of this Work Plan describes the permitting and regulatory issues regarding emissions to the environment.

For soil and groundwater pollution prevention, project activities are performed inside the Plant 6 Building. The Plant 6 Process Area has been surveyed to identify any potential points of communication between the building floor and the ground outside the building or the storm sewer system. The Plant 6 Process Area inside the building has no direct connections to the storm sewer.

Open doorways to the outside are present in two locations along the south wall of the building. The personnel door near the Reagent Makeup Area has a two-inch high curb. The vehicle access door at the Buffer Zone does not have curbing, and represents a potential point for spills to leave the building. Liquid handling will not be performed in this area.

Bulk liquid storage areas inside the exclusion zone of Plant 6 are provided with temporary secondary containment structures, capable of containing the contents of the largest tank inside the containment, with an ample margin of safety. Two large plastic tanks will be used for holding and blending of liquids during this mixed waste stabilization project. The Contaminated Water Holding Tank is a single, vertical cross-linked polyethylene tank having a nominal 1,500-gallon capacity. This tank will sit inside a 3,350-gallon secondary containment basin made of the same materials. This tank and its secondary containment basin are designed to hold a liquid with a specific gravity of 1.35. A Sodium Sulfide Tank will be provided for dissolving of sodium sulfide flake with recycled water from the Contaminated Water Holding Tank. The nominal capacity of the Sodium Sulfide Tank will be 500 gallons and its secondary containment basin will be sized to contain 600 gallons, in the event of a spill. Both the tank and its containment basin will be designed to hold a liquid with a specific gravity of 1.9.

For water pollution prevention, every effort is made to close the water balance by reusing all contaminated waters in the hydration of wastes and reagents during the treatment process. Contaminated water is accumulated in the Contaminated Water Holding Tank until the water can be reused. In the event excess water is generated, it will be managed as hazardous waste until such time as it is characterized for discharge to the FEMP wastewater treatment system. Wastewater that is unacceptable for discharge through this system will be containerized and placed back in the RCRA inventory.

Air pollution from the treatment process is minimized by providing dust suppression using water sprays at all likely fugitive dust emission points. Also, a negative pressure dust/fume collection system of hoods, hoses and ducts draws air from the fugitive dust zones and discharges it to the atmosphere outside the building via a prefilter and a high efficiency particulate air (HEPA) filter. The permitting and regulatory issues relating to air emissions are presented in Section 6.0 of this work plan.

4.5.3 Spill Prevention and Emergency Response

Care is exercised at all times to prevent spills from occurring inside or outside the Plant 6 Process Area. When spills or leaks do occur, prompt response action will be taken by the project team to contain and clean-up the spill, with all recovered materials being properly managed as recyclable materials or as wastes. Spill response will be in accordance with the following Fernald site plans and procedures.

FEMP RCRA Contingency Plan

FMPC Spill Prevention Control & Countermeasure Plan (PL-2194)

Spill Incident Reporting and Clean Up (SSOP-0067)

The spill will also be reported through the project organization to the FERMCO Mixed Waste Stabilization Project Manager, and the Assistant Emergency Duty Officer (AEDO).

In the event that an inspection tour reveals a leaking waste container, or accumulations of dry or liquid mixed wastes in process equipment or on the floor, the FERMCO Mixed Waste Stabilization Project Manager and the AEDO will be notified immediately and action will be taken to contain, clean-up and package the materials in question. Project team personnel will be the first responders for all spills or releases within the exclusion zone. Spill kits, containing dry absorbent granules, pads and booms, will be located in the exclusion zone close to areas of potential spills or leaks. In the event of a large spill, or a spill that causes a condition immediately dangerous to life or health (IDLH), project team personnel will evacuate the exclusion zone, notify the Fernald Emergency Response Team, and stay outside the exclusion zone until allowed to return by FERMCO. Plant 6 is also equipped with a dry pipe sprinkler system. Portable fire extinguishers will be place in accessible locations for emergency repsonse.

4.5.4 Waste Management and Disposal

During the Fernald Mixed Waste Stabilization Project, two main types of waste must be managed, primary waste and secondary waste. Primary waste includes all of the waste contained in the 44 MEFs that comprise the five waste categories to be stabilized. Secondary wastes include excess and decontamination water, used personal protective equipment, RCRA empty drums, and miscellaneous construction materials.

Table 4-2 provides rough estimates of the types and volumes of primary and secondary waste along with the anticipated disposal or long-term storage site. These volumes are calculated based on prior operating experience and treatability tests performed by Nuclear Fuel Services. In all cases, efforts are expended to minimize the volumetric swell of primary wastes due to treatment and the production of secondary waste. Since the volumetric breakdown of the 300 drums in Option 2 is not currently known, the totals have been prorated based on percentage breakdown of the Option 1 wastes.

To the extent possible under the NTS WAC, secondary wastes are disposed of with the primary wastes they are associated with by incorporating them into the processed waste. If separate disposal is required, secondary wastes are compacted to the extent possible to minimize their volume. Whenever possible, efforts are made to prevent contamination of solid waste materials with mixed waste constituents. Secondary waste production is further minimized to the extent possible, by

decontamination and recertification of personal protective equipment items such as respirators, outer boots, and gloves. The project team will begin the project using disposable protective clothing, but will likely switch to launderable protective clothing. Wastes which must be disposed of by FERMCO are properly labeled and marked, and transferred to FERMCO custody. FERMCO will handle all project waste under site procedure EW-0006, *Management of Excess Soil, Debris and Waste from a Project*. RCRA empty drums will be sent to the on-site drum crushing facility.

The project team will manage all waste materials in accordance with applicable or relevant and appropriate requirements (ARARs), site procedures and plans established for the project. Compliance with ARARs is discussed in Section 6.0. Fernald Site Procedures that will be used to ensure compliance with these waste management requirements, include the following.

SOP-20-C-017 "Movement of RCRA and Hazardous Waste"
SOP-20-C-500 "Inspecting RCRA Waste Load/Unload and Staging Areas"
SOP-20-C-616 "Inspection of Hazardous Waste Management Units"
SOP-20-C-630 "Receipt Inspection and Placement of Hazardous, Mixed, PCB and Asbestos Wastes into Storage"
SOP-20-C-606 "Hazardous Materials Spill Clean-up"
SSOP-0067 "Spill Incident Reporting and Clean-up"

Table 4-2
Summary of Estimated Waste Volumes for Disposal

Waste Description	Option 1 Volume Raw/Treated (Cubic Feet)	Option 2 Volume Raw/Treated (Cubic Feet)	Disposal or Long-Term Storage Site
Primary Mixed Wastes Treated to Eliminate Hazard Characteristic			
Grit Blast media	6,125/8,750	1,183/1,690	NTS
Soluble Furnace Salts	1,015/3,383	196/653	NTS
Sump Cakes	3,255/4,650	630/900	NTS
Construction Rubble	280/467	54/90	NTS
Misc. Trash	175/292	35/58	NTS
Total Waste Vol.	10,850/17,542	2,098/3,391	
Secondary Wastes Generated From Treatment Activities			
Compacted Anti-C Clothing	50	10	FEMP
Compacted Respirator Cartridges	50	10	FEMP
Damaged Respirator	5	2	FEMP
Wipes & Plastic	25	10	FEMP
Excess Water	150	50	FEMP
Used Drums (Crushed)	1,275/1,440	247/247	FEMP
Miscellaneous Construction Materials	60	0	FEMP
Totals Mixed Waste	1,615/1780	329	
Potential Free Release Solid Waste			
Wooden supports	60	0	FEMP
Office Trash	40	10	FEMP
Totals, Non-mixed Waste	100	10	

4.5.4.1 Facility and Container Inspections

Inspections of waste containers and holding tanks, and equipment in the Plant 6 Process Area will be conducted daily, at the end of each shift, during the period in which maintenance and housekeeping in the process area are performed. Inspections in container storage or staging areas will include, but not be limited to, inspection of containers for leaks, damage, indications of overpressure, loose or illegible labels, aisle spacing, waste compatibility. Also, the presence and accessibility of adequate quantities of emergency response equipment will be verified. Inspections in the area where waste materials are held in tanks, will include an inspection of the secondary containment for evidence of leakage from the tank.

Process equipment will be inspected for any mechanical or electrical conditions which could cause an accident or emergency, or render the equipment inoperable if not corrected. If such a condition is found, the equipment will be immediately tagged out of service and maintenance or repairs initiated. Before maintenance or repair work can take place, the equipment must be de-energized and locked out by the person performing the work, so that it cannot be re-energized until the employee removes their lock. The Lock-Out/Tag-Out procedures in place at the Fernald Site (Ref: FERMCO Site Procedure OP-0004) will be used in these situations.

4.5.4.2 Management of Contaminated Water

Wash water is collected in the Contaminated Water Holding Tank. Contaminated water is reused in slurrying of wastes and dissolving of reagents. The objective is to operate the process with a zero discharge water balance, if possible. If excess water is produced, it will be packaged as directed by FERMCO and custody will be transferred to FERMCO.

4.5.4.3 Management of Secondary Waste

Secondary wastes listed in Table 4-2 will be segregated into separate containers by category, so that they may be managed as efficiently as possible. The most significant secondary waste stream is used personal protective equipment and protective clothing. At each break, personnel in the exclusion zone pass through a decontamination line where personal protective equipment and clothing is doffed. Respirators and cartridges are replaced each time a seal is broken. Separate plastic-lined collection drums for protective clothing, used respirators, outer gloves, outer boots and disposable items (e.g.: glove liners, cartridge wrappers, etc.) will be provided at the egress station. Used respirators are collected, decontaminated, and recertified by FERMCO for subsequent reuse.

4.5.4.4 Management of Miscellaneous Construction Materials

Miscellaneous secondary waste materials include contaminated polymeric sheeting, ductwork and piping, and wipes used for decontamination. Contaminated plastic is washed in place to remove potentially leachable waste constituents before removal from the process area. Decontaminated

polymeric sheeting is bundled for disposal by FERMCO. All reagent containers are completely emptied and rinsed before staging for pick-up and disposal by FERMCO.

4.5.5 Materials Management

Non-waste materials such as reagents, equipment spare parts, and consumable supplies will be managed to prevent emergency situations from spills or releases, and to prevent project delays due to shortages of critical supplies. The consumable supplies are vendor-supplied materials necessary to make the production process function. These include fuels, equipment maintenance supplies (eg: lubricants, hydraulic fluids, filters, etc.), hand tools, spare parts, quality control test supplies (such as lead-acetate paper), housekeeping supplies, emergency or spill response supplies, personal protective equipment, and office supplies.

Reagents and supplies are to be received, handled, processed, and stored in accordance with applicable procedures. Records of supplies are made and receipts are kept. The record shows the date received, quantity received, condition when received, and where the reagent or supplies are to be stored. Supplies are handled carefully. Operations are inspected to see if handling and use can be improved. Bulk materials should be moved pneumatically, with pallets, or other carriers whenever possible. All supplies rejected at inspection will be considered for rework unless they are irreparably damaged.

For storage, proper floor loads, stacking heights, and shelf strength for the storage area will be defined. Procedures for storing materials on-site will be followed. Regular, periodic inspection of both the storage area and inventories will be made.

The reagents certain to be used during this project include sodium sulfide, portland cement, and ferrous sulfate. Other reagents that may be used are sodium bisulfate, quick lime and caustic soda. In addition to the process reagents, wash detergents, lubricants, greases, and hydraulic oils will be used to maintain and operate the equipment. Prior to mobilization, MSDSs are supplied for each of these materials and for any chemicals subsequently identified as being necessary to the project. The Worker Right-to-Know Program, files, and training are managed per SARA Title III requirements.

Material control for this project is the method by which all materials, supplies, and purchased parts are obtained and stored at the project site until they are used, and which inventories are controlled to prevent shortages. The quantity of each item that triggers the ordering of replenishment stocks is determined, considering lead time, supplier reliability, the value of the materials, the cost of storage, and risks of deterioration. Documentation concerning the quality of materials used in the process is retained with the project files. Typically, this documentation includes:

- Manufacturer and lot number for calibration standards.
- Certificates of analyses for chemicals used in decontamination.

- Certificates of decontamination furnished by the equipment manufacturer.
- Material certificates and lot numbers for construction materials.

Materials are controlled by a master production schedule and received in advance of scheduled production processing. A hand check of materials and supplies in stock is routinely made. Project personnel will determine when the reorder point is reached for bulk consumable items.

4.6 Facilities and Equipment

This section describes the facilities and equipment that are used to stabilize the mixed waste. FERMCO will provide water, electricity, local phone service, and shelter for the waste treatment equipment. All tools, vehicles, and equipment will be inspected by FERMCO for radioactive contamination prior to initial entry and upon removal from the designated processing area. An accurate and up-to-date floor plan is maintained in a current condition and includes placement of equipment and work stations, and dimensions of work areas around equipment.

A complete, written inventory of facilities and equipment is maintained on an inventory sheet in the project files. This sheet includes name and description of the equipment, model number, serial number, and other relevant data (i.e., capacities, limitations, maintenance requirements). The same sheet is used to record maintenance and repair of the equipment. Written records of the work space environment includes data regarding floor load capacities, location and capacity of utilities supplies, ventilation, and waste disposal.

4.6.1 Processing Facilities

The FEMP is located near Fernald, Ohio, approximately 20 miles northwest of downtown Cincinnati as shown in Figure 4-6. The total area of the site is 1,050 acres of which 850 acres are in Hamilton County and 200 acres in Butler county. Figure 4-7 is an illustration of the Fernald site and identifies where the project will be conducted. All waste processing activities conducted by the Perma-Fix Team will take place in Plant 6.

4.6.1.1 Process Area

All waste stabilization operations will be performed in an exclusion zone inside Plant 6.
The space requirements of the work area are a function of available space, operational requirements, critical equipment dimensions, maneuvering space, material storage, and equipment space. A single indoor work area totaling approximately 18,000 square feet is planned. Figure 4-5 is an Equipment Layout Drawing of the Process Area in Plant 6. The following specific work/activity stations are shown inside the exclusion zone:

- Buffer Zone (Delivery of incoming waste drums)
- Incoming Waste Staging Area
- Drum Deheading and Inspection Station
- Screen Hopper (Macro solids separation)
- Sorting Table (Macro solids sorting)
- Shredder (Macro solids size reduction)
- Mix Units (Stabilization treatment)
- HEPA Filtration Units
- Decanting and Curing Area
- Cured Waste Staging Area
- Empty Drum Staging Area
- Reagent Makeup Area
- Tented Soaking Area

The portion of the building used for the process area has unrestricted overhead clearance of approximately 20 feet above floor level. The floor is capable of safely supporting the wheel load of a 6,000 pound rated capacity fork lift, fully loaded. Secondary containment pans and basins, and Herculite™ floor coverings will be used as appropriate in locations where a high potential exists for liquid spills or leaks. Otherwise the floors will remain uncovered. There are no floor drains in the area where the stabilization process will take place. A HEPA wet-vac will be used in daily housekeeping of the process area to prevent accumulation of contaminants on the floor.

4.6.1.2 Decanting and Curing Area

Figure 4-5 shows the location of the Decanting and Curing Area, which totals approximately 1,500 square feet. Individual 55-gallon mixing drums of treated waste are brought to this area where they are upended and emptied into White Metal Boxes (WMB) for setting and curing. The WMBs will remain in this area until setting is complete, estimated at 48 hours. Then the WMBs will be move to a Cured Waste Staging Area outside the exclusion zone.

4.6.1.3 Cured Waste Staging Area

The cured waste staging area is contiguous to the Process Area, but is located outside the exclusion zone along two major drive aisles of Plant 6. There is in excess of 8,000 square feet of space in this cured waste staging area. This portion of the work area has the same overhead clearance and floor load capacity as the process area.

4.6.1.4 Incoming Waste Staging Area

The incoming waste staging area is located inside the process area, inside the exclusion zone, and totals approximately 1,600 square feet.

4.6.1.5 Reagent Makeup Area

The reagent makeup area is located inside the process area, inside the exclusion zone and totals approximately 300 square feet. This is the area where individual charges of treatment reagents are prepared. Reagent charges will be either dry, or in aqueous solution. Primary reagents are portland cement, sodium sulfide, and ferrous sulfate. Sodium bisulfate, sodium hydroxide and/or lime may be used for pH adjustment. Acids, caustics and potentially reactive reagents will be segregated from each other in storage.

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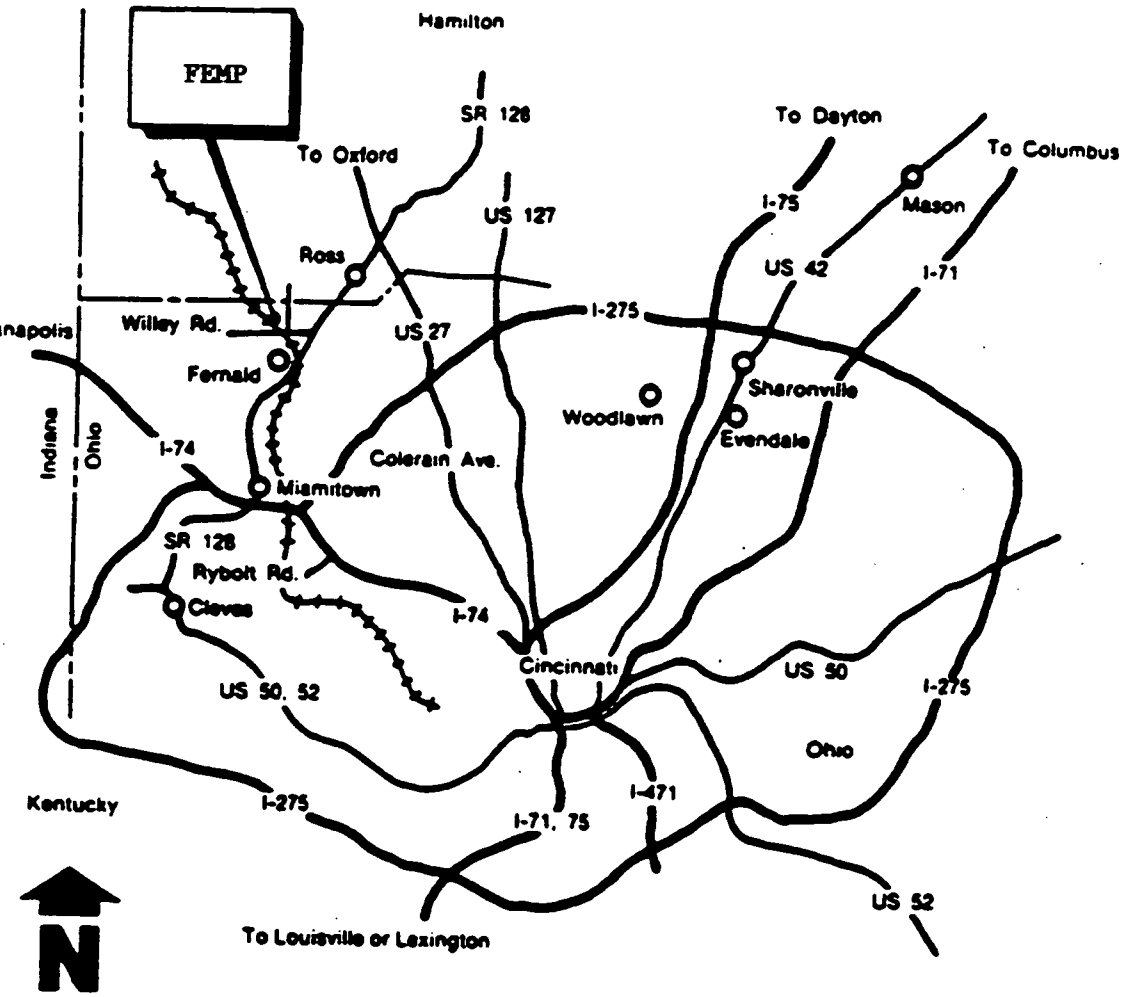
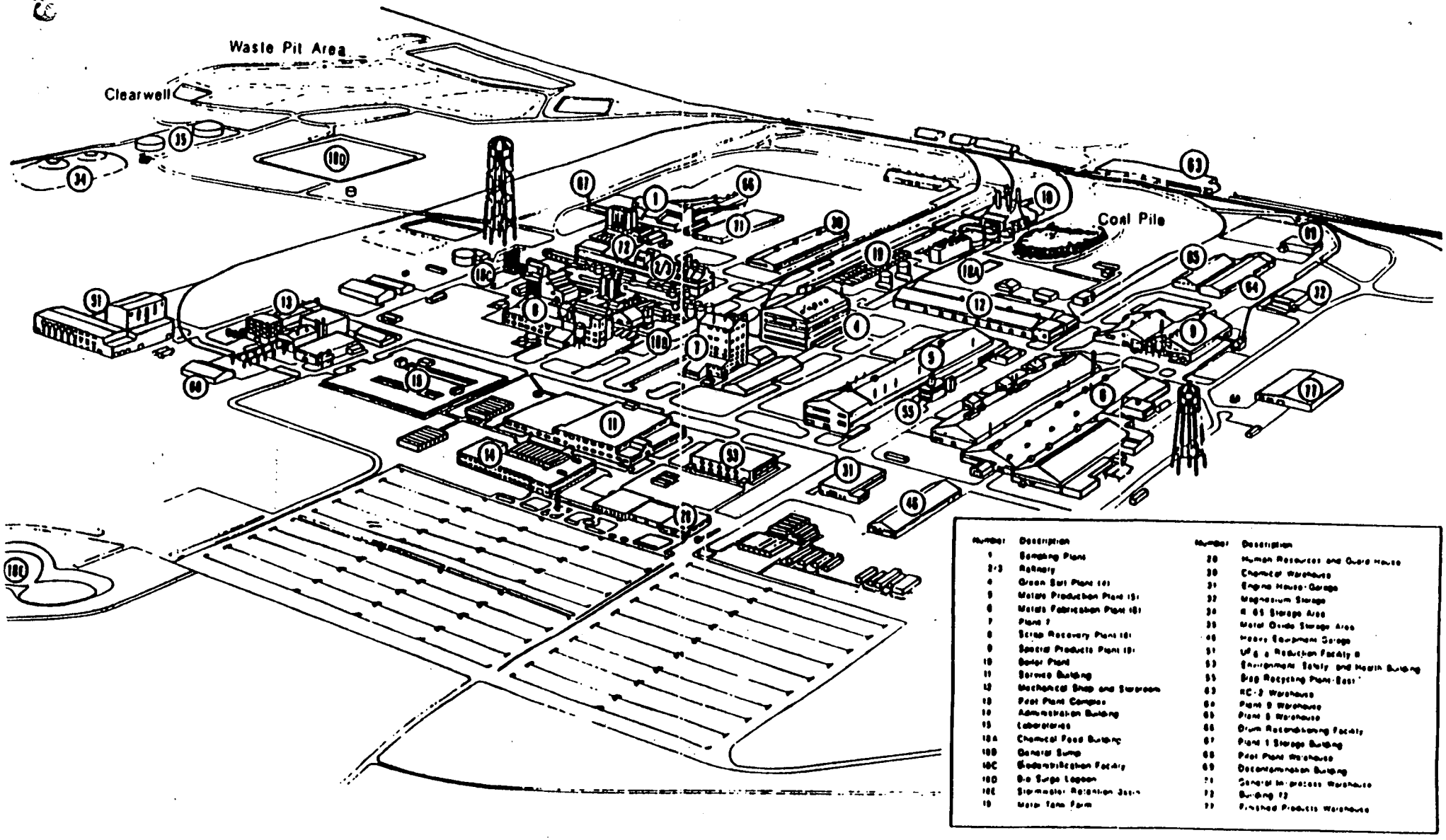


Figure 4-6: Location of the FEMP

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Number	Description	Number	Description
1	Sampling Plant	30	Human Resources and Guard House
2/3	Refinery	36	Chemical Warehouse
4	Green Salt Plant (4)	37	Engine House-Garage
5	Metals Production Plant (5)	38	Magnesium Storage
6	Metals Fabrication Plant (6)	39	K-65 Storage Area
7	Plant 7	40	Metal Oxide Storage Area
8	Scrap Recovery Plant (8)	44	Heavy Equipment Garage
9	Special Products Plant (9)	51	UF_6 Reduction Facility B
10	Boiler Plant	53	Environmental Safety and Health Building
11	Service Building	55	Slag Recycling Plant-East
12	Mechanical Shop and Storeroom	63	RCRA Warehouse
13	Feed Plant Complex	64	Plant 9 Warehouse
14	Administration Building	65	Plant 5 Warehouse
15	Laboratories	66	Drum Reconditioning Facility
18A	Chemical Feed Building	67	Plant 1 Storage Building
18B	General Sump	68	Feed Plant Warehouse
18C	Biodenitrification Facility	69	Decontamination Building
18D	Bio Surge Lagoon	71	General In-process Warehouse
18E	Stormwater Retention Basin	72	Building 72
19	Water Tank Farm	77	Finished Products Warehouse

FIGURE 4-7 - FEMP Site Layout

4.6.1.6 Exclusion Zone

The exclusion zone is the area of Plant 6 that will be restricted to project personnel, authorized FERMCO personnel and visitors specifically authorized and qualified to enter in accordance with the Health and Safety Plan in Appendix D of this Work Plan. Personnel entering the exclusion zone must be properly dressed and wearing respiratory protection and must comply with all other posted entry requirements. The boundary of the exclusion zone is shown in Figure 4-5.

4.6.1.7 Emission Control and Off-gas Operations

Suppression of dust with water mists, and pneumatic collection and filtration of fugitive dusts in the process area is a key feature of the Health and Safety Plan for this project. At each location where dust generation is likely, the dust zone will be hooded, and a pneumatic intake will draw a flow of air sufficient to provide adequate capture velocity to capture dust, gases and vapors that may be generated by the processing activity. Each intake and its downstream duct network will be vented to a properly sized high efficiency particulate air (HEPA) filter which will exhaust to atmosphere outside the Plant 6 building. Each HEPA unit will also be equipped with a pre-filter. The location of the HEPA filter(s) is shown in Figure 4-5. The water misting equipment will be installed around opening of the screen hopper where the drums will be dumped and above the shredder.

4.6.2 Utilities

The following utilities are required to efficiently perform the work:

- Electric Power

40 HP Shredder Motor (1 each)	440 VAC, 3 Phase, 52 amps full load
30 HP Mixer Drive Motors (2 each)	440 VAC, 3 Phase, 40 amps (each) full load
5 HP HEPA Units (2 each)	440 VAC, 3 Phase, 7.6 amps (each) full load
120 HP Total 440 VAC, 3 Phase Load	440 VAC, 3 Phase, 139.6 amps full load
3 HP Belt Conveyor Drive Motor (1 each)	208 VAC, 3 Phase, 11 amps full load
3 HP Screw Conveyor Drive Motor (1 ea.)	208 VAC, 3 Phase, 11 amps full load
6 HP Total 208 VAC, 3 Phase Load	208 VAC, 3 Phase, 22 amps full load
3 HP Total of Misc.	120 VAC, 1 Phase, 40 amps full load

- Potable Water — 15 gpm peak flow capacity
- Compressed Air — 100 PSIG for air-power hand tools
- Sewer Connection — For hand wash and personnel showers only
- Lighting — By FERMCO
- HVAC — By FERMCO
- Supplied Breathing Air — By FERMCO

4.6.3 Services

In addition to the utilities listed above, FERMCO will provide various services, equipment and materials for this project. These include the following specific items.

- An 18,000 square foot area inside Plant 6 for the process area.
- Laboratory analytical services for process feedback and waste acceptance analyses by the TCLP extraction procedure for comparison against the Regulatory Levels in 40 CFR 261.24.
- Specification White Metal Boxes (WMB) for packaging of stabilized waste for disposal at NTS.
- On-site transportation services for incoming waste containers and WMBs filled with stabilized wastes.
- Removal and disposal of RCRA-empty containers and incompatible macro solids from the empty container staging area.
- Removal, treatment and discharge of any excess free water or decontamination waters contained in the Contaminated Water Storage Tank.
- FERMCO Radiological Control and industrial hygiene monitoring support.
- Use of one of the existing jib cranes in the process area.

4.6.4 Processing Equipment

The processing equipment to be used for stabilizing the mixed waste is listed in Table 4-3. The equipment specifications are based on the equipment design basis and are contained in section 3.0 of the Volume II Project Procedures.

4.6.4.1 Equipment Maintenance

Maintenance is performed on all equipment as needed to keep all process operations going. There are two aspects to preventive maintenance. First, routine maintenance such as lubrication and cleaning is performed regularly by the operating crew members and in accordance with manufacturers instructions. For major corrective maintenance, a mechanic (other than a crew member) may be brought in. Every attempt is made to anticipate the need for maintenance and repair. Key features of the plan to maintain equipment are as follows:

- Critical spare parts are kept on site in case of failure including mixer propellers, shredder knives, hydraulic fluid, air prefilter elements, HEPA filter elements, air and hydraulic hoses, and housekeeping supplies.
- Three operating crew members are experienced mechanics who can work on all equipment used.
- Hydraulic fluid levels of fork lifts and mix units are checked daily.
- Housekeeping is performed daily.
- HEPA filter differential pressure is monitored daily.
- Shredder blades are replaced if and when they fail to perform their intended function.
- Cleanup is performed using fresh water which is drained, collected with HEPA wet-vacs and recycled by being added to waste during treatment.

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- Forklifts are available within 24 hours.
- National Electrical Manufacturer's Association (NEMA), frame motors for the shredder are available within 24 hours.

4.6.5 Equipment Mobilization

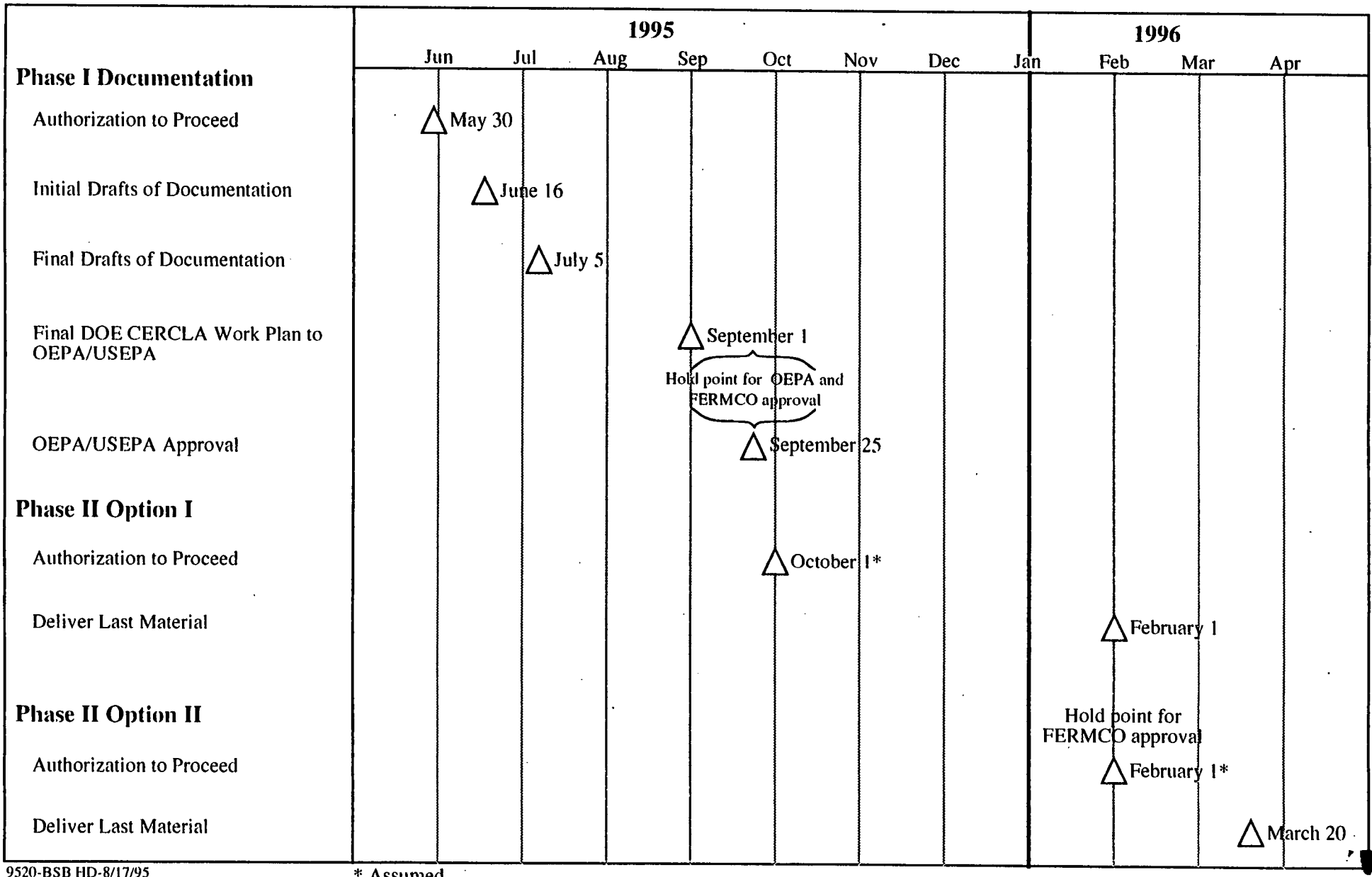
Mobilization activities include the consideration of utility connections, drainage, warehousing, office area, laydown and storage areas, parking and other considerations required to manage the project. Heavy equipment is transported, off-loaded, and erected. Project materials and supplies are staged in the process area. Fire protection, first aid, and medical services are coordinated with FERMCO. Other mobilization considerations include communications, document reproduction, general security, building maintenance, office setup, reagent supply, and building preparation activities.

The process area in Plant 6 already has substantial fix floor contamination, which is subject to future decontamination and decommissioning requirements. Therefore, it will not be necessary to protect the floor from added contamination. Floor coverings will be used only in areas where a potential of liquid spills exists. In these areas, only the necessary areas around the equipment or process in question will be covered. Where floor coverings are required, Herculite™ polymer sheeting will be used. Any joints in the floor covering will be overlapped and sealed with Herculite™ bonding compound. Herculite™ may also be used as a tenting material in locations where barrier control of air exchange is required.

4.7 Project Schedule

The master schedule showing major milestones of the project is in Figure 4-8. These milestones are contractual requirements of the project. A hold point occurs between the end of Phase I and the beginning of Phase II. During this period, DOE will seek and obtain approval of the Ohio EPA and U.S. EPA to proceed with Phase II. Phase II activities cannot begin until Ohio EPA approval is obtained. The project schedule requires DOE's Final CERCLA Work Plan to be submitted to the regulatory agencies by September 1, 1995, and agency approvals by September 25, 1995. This schedule will be maintained for the duration of the project and will provide the basis for progress tracking and reporting. The detailed schedule, work breakdown structure and logic diagram for the project are included in Section 8.0 of this Work Plan.

TABLE 4-3 PROCESSING EQUIPMENT LIST	
NUMBER	TYPE
2	Skid-mounted Perma-Fix Mix Units
1	Screen Hopper for Macro Solids Separation
1	Sorting Table for Macro Solids Sorting
1	Shredder for Macro Solids Size Reduction
1	Portland Cement Silo
1	Contaminated Water Storage Tank
2	Propane Fueled Fork-lift Trucks (6,000 lbs capacity)
2	Hydraulic Drum Tipping Attachments (for Fork-lifts)
200	New Mixing Drums and Reagent Buckets
4	Extra Mixer Blades for Perma-Fix Mixer Units
2	Right-angle Drills (½ in. drive) and Mud Paddles
Lot	Bench Scale Testing Equipment
Lot	Sampling Equipment and Containers



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* Assumed

Figure 4-8

Summary Schedule
Fernald Mixed Waste Stabilization Project

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4.8 DECONTAMINATION ACTIVITIES

Decontamination activities are an integral part of this project. The primary method of decontamination will be performing surface wash and rinse of non-porous items using a soapy (dilute detergent solution) water wash, followed by a clean water rinse. This method will be applied to the decontamination of equipment, tools, and non-porous macro solids which may be sunk into the treated waste in WMB before set. These methods will also be used for area cleanup and housekeeping at the end of each shift. Recovered wash and rinse solutions will be reused directly in the preparation and treatment of waste, or will be collected and transferred to the Contaminated Water Holding Tank, for holding until reuse at a later time.

At the end of the project, the Plant 6 Process Area and all the equipment it contains must be decontaminated for closure. Dry vacuum, solution flush, triple-rinse, and surface wipe procedures will be used as appropriate in final decontamination of the equipment and process area. Accumulated decontamination waters will be held in the Contaminated Water Holding Tank for waste characterization by FERMCO. Whenever decontamination activities are performed, they are done in compliance with DOE Order 5400.5, *Radiation Protection of the Public and the Environment,* and FERMCO site procedure RP-0009, *Radiological Requirements for the Release of Materials at the Fernald Environmental Management Project.*

4.8.1 Decontamination of Equipment Prior to Use

New equipment is considered uncontaminated by hazardous or radioactive waste. No survey or measurements will be made unless requested by FERMCO. Before any previously used equipment is used on the project, it must be surveyed for contamination and decontaminated, if necessary to protect against cross contamination, and to avoid adding additional waste codes to the wastes. All equipment will be surveyed and approved by FERMCO prior to coming on to the FEMP site.

4.8.2 Decontamination for Routine Good Housekeeping

FERMCO Radiological Control technicians make routine surveys of fixed or removable contamination in the facility. If removable contaminants are detected on floors or work surfaces in the exclusion or contamination reduction zones which exceed posted values, or if removable contaminant levels exceed those posted in the support zone, then the surfaces will be promptly decontaminated as described previously.

4.8.3 Decontamination of Macro Solids Found in Waste

Macro solids that prove to be unshreddable, or incompatible with the waste stabilization process will be separated from the waste in the Screen Hopper, and sorted on the Sorting Table. Process - compatible, unshreddable macro solids will be surface decontaminated by the wash/rinse methods previously described. If these materials are porous, they will be packaged and managed in the Plant 6 Process Area as mixed wastes until they are returned to the FERMCO mixed waste inventory.

If these materials are non-porous, then surface decontamination will reduce both hazardous and radioactive surface contaminants to insignificant levels. Non-porous, unshreddable macro solids will be taken to the Decanting and Curing area and sunk into the stabilized waste from the same CWG in the WMB. Any residual RCRA metal contamination on the surfaces of the non-porous macro solids will react with the excess sulfide in the stabilized waste, causing precipitation of the metals in the same manner as the metals stabilized at the mix unit.

Porous macro solids that cannot be decontaminated, or macro solids that are on the prohibited items list (see Figure 4-4), will be packaged, labeled, marked and staged for disposition by FERMCO. FERMCO will disposition the unacceptable items that are mixed waste under the Chemical Treatment Project as described in the FFCA Site Treatment Plan.

Rinse waters from surface decontamination of macro solids will be collected and pumped to the Contaminated Water Holding Tank until they can be reused in the waste stabilization process.

4.8.4 Decontamination of Equipment and Process Area After Waste Processing

Once the waste is processed, equipment which has become contaminated with waste constituents is decontaminated and managed as shown in Table 4.4. Decontamination will consist of a surface rinse using a soapy water wash followed by a clean water rinse to remove all visual contamination. Samples of the final rinsate will be analyzed for TCLP metal consituents in accordance with OEPA Closure Plan Review Guidance to verify that the treatment system has been properly decontaminated. Wastewater generated will be drummed for disposition pending characterization. The equipment will be surveyed for radiological contamination by FERMCO Radiological Control for free release. If equipment requires further decontamination for free release, it will be steam cleaned, pressure washed or scrubbed, prior to resurveying.

Wipe methods may also be used to enhance the effectiveness of decontamination. Any used wipes will be double contained in taped plastic sheeting or plastic bags. Drop cloths used during decontamination activities will be rolled to the inside and taped for reuse. Visual floor contamination is removed by the same wash and rinse methods, except that the wash and rinse solutions are collected using HEPA wet-vacs. FERMCO Radiological Control technicians confirm that the process operations have not significantly increased fixed and removable contamination levels above as-found levels by repeating the measurements made in the baseline survey. If contamination exceeding baseline levels occurs, FERMCO Radiological Control personnel will assist subcontractor in further decontamination efforts directed by FERMCO.

Equipment that cannot be decontaminated can be released to an NRC or agreement state-licensed storage facility because contaminated equipment intended for further use in the processing of mixed or radioactive waste does not require decontamination to limits for unrestricted use. Perma-Fix owns such a facility in Gainesville, Florida. Equipment to be shipped to Florida will be packaged in a DOT-approved manner and surveyed to ensure that all external surfaces meet DOT limits. Equipment stored in this manner is restricted to future use only in the treatment of mixed or radioactive wastes.

The release of any equipment for unrestricted use is considered on a case-by-case basis at the time that it is proposed for release. The following guidelines will apply:

- A reasonable effort will be made to eliminate residual contamination.
- Radioactivity on equipment surfaces shall not be covered by paint, plating, or other covering material unless contamination levels are determined by a survey to be below acceptable limits.
- 100% survey will be required on all accessible equipment surfaces. Inaccessible surfaces will be surveyed or evaluated for release by authorized FERMCO material release evaluator.

4.8.5 Equipment Demobilization

Demobilization activities include completion of the following checklist items. This is prior to leaving the Fernald Site and after decontamination.

- Empty and clean out lockers.
- Return FERMCO furnished radio (if applicable).
- Return FERMCO radio pass (if applicable).
- Sign medical termination form.
- Leave exit urine sample.
- Return TLD.
- Fill out request for final dosimetry reading.
- Take an exit INVIVO.
- Return identification badge.
- Provide forwarding address.
- Provide FERMCO with turnover debriefing information.

Upon completion of the work, the site will be restored where the equipment was installed to its prior condition. This includes, but is not limited to the removal of all equipment and supplies utilized in the processing and packing of the waste, anchor bolt removal, pavement repairs, and utility restoration. All restoration work will be completed to FERMCO satisfaction.

Table 4-4
SEQUENCE OF ACTIONS REQUIRED FOR CLOSURE OF PLANT 6
PROCESS AREA
FERNALD MIXED WASTE STABILIZATION PROJECT

Equipment Item	Actions
Metal Duct Work	• Disassemble and remove • Decontaminate (rinse) • Sample rinseate for decontamination verification and manage wastes • Compact and manage scrap metal
Flexible Plastic Hose	• Disassemble and remove • Compact and manage scrap metal
HEPA Filters & Wet-vacs	• Remove and Bag Filter Elements • Disassemble and survey • Decontaminate (rinse) • Sample rinseate for decontamination verification and manage wastes • Free release for unrestricted use or maintain on-site for restricted use
Contaminated Water Piping	• Flush to Contaminated Water Holding Tank to decontaminate in-place • Disassemble and remove • Decontaminate (rinse) • Sample rinseate for decontamination verification and manage wastes • Compact and manage scrap metal
Tanks and Secondary Containment	• Decontaminate (rinse inside and outside and vacuum) • Decontaminate (wipe inside and outside if necessary • Sample rinseate for decontamination verification and manage wastes • Free release for unrestricted use or maintain on-site for restricted use

Equipment Item	Actions
Screen Hopper & Frame	• Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Manage wastes • Take wipe samples for decontamination verification • Sample rinseate for decontamination verification and manage wastes • Free release for unrestricted use or maintain on-site for restricted use • Compact and manage scrap metal if necessary
Sorting Table & Chute	• Decontaminate (vacuum and/or wipe as appropriate) • Manage wastes • Take wipe samples for decontamination verification • Sample rinseate for decontamination verification and manage wastes • Free release for unrestricted use or maintain on-site for restricted use • Compact and manage scrap metal if necessary
Shredder Motor & Frame	• Decontaminate (vacuum and/or wipe as appropriate) • Manage wastes • Take wipe samples for decontamination verification • Free release for unrestricted use or maintain on-site for restricted use • Compact and manage scrap metal if necessary
Shredder Knife Bed & Feed Hopper	• Decontaminate (rinse inside and outside) • Disassemble and remove knife blades for disposal • Decontaminate shafts (vacuum and/or wipe as appropriate) • Take wipe samples for decontamination verification • Sample rinseate for decontamination verification and manage wastes • Free release machine without blades for unrestricted use or maintain on-site for restricted use • Compact and manage scrap metal (knife blades)

Equipment Item	Actions
Macro Solids Belt Conveyor	• Decontaminate (rinse inside and outside) • Disassemble and remove belt and rollers for disposal (as necessary) • Decontaminate shafts, motor and frame (vacuum and/or wipe as appropriate) • Take wipe samples for decontamination verification • Sample rinseate for decontamination verification and manage wastes • Free release machine without belt for unrestricted use or maintain on-site for restricted use • Compact and manage scrap materials (belt, and rollers as appropriate)
Portland Cement Silo (located outside Plant 6 Process Area)	• Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Take wipe samples for decontamination verification • Free release silo for unrestricted use or maintain on-site for restricted use
Portland Cement Screw Conveyor	• Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Take wipe samples for decontamination verification • Sample rinseate for decontamination verification and manage wastes • Free release machine for unrestricted use or maintain on-site for restricted use
Propeller Mix Units	• Disassemble and remove propeller shafts for disposal • Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Take wipe samples for decontamination verification • Sample rinseate for decontamination verification and manage wastes • Free release machine for unrestricted use or maintain on-site for restricted use • Compact and manage scrap metal

Equipment Item	Actions
Lift Trucks & Attachments	If FERMCO supplies lift trucks: • Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Take wipe samples for decontamination verification • Release machine for restricted use on-site If subcontractor supplies lift trucks: • Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Take wipe samples for decontamination verification • Replace tires and manage contaminated tires • Free release machine for unrestricted use or maintain on-site for restricted use • Compact and manage scrap metal (if necessary)
Area Isolation Materials & Floor Coverings	• Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Fold and compact plastic sheet materials • Survey and decontaminate supports as necessary • Compact and manage waste materials
Hand Tools	• Decontaminate (vacuum and/or wipe as appropriate) • Take wipe samples for decontamination verification • Free release tools for unrestricted use or maintain on-site for restricted use
Used Drums & Buckets	• Decontaminate (vacuum and/or wipe as appropriate) • Decontaminate (rinse inside and outside) if necessary • Take wipe samples for decontamination verification • Compact and manage waste materials

5.0 WASTE DISPOSITION

After stabilization, the treated waste will be sampled and analyzed in accordance with the "FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1", SW-846, and the project-specific sampling and analysis plan in Appendix B. These plans have been developed to meet the requirements of NVO-325, (Rev 1), Nevada Test Site (NTS) Defense Waste Acceptance Criteria, Certification, and Transfer Requirements. NTS must review the project plans and procedures before approval to ship the stabilized low-level waste is given. All sampling and analysis will be conducted in accordance with the FEMP Site-Wide CERCLA Quality Assurance Project Plan (SCQ).

Waste Characterization personnel will determine if the stabilized waste meets the requirements of the NTS WAC. If the waste meets the NTS WAC then FERMCO will take custody of the waste and prepare it for shipment to NTS. If the waste does not meet the NTS WAC the subcontractor will reprocess the waste.

The treated waste will be containerized in WMBs and transported to NTS by truck. Waste Certification personnel will certify the waste will be accepted by NTS and FERMCO will prepare the waste for shipment and prepare the necessary paperwork for shipment to NTS.

Secondary waste generated by the subcontractor will be treated to the extent possible by stabilization. PPE, excess water, office trash, empty drums, and waste that is not compatible with the treatment process will be characterized and managed according to existing site procedures.

6.0 ENVIRONMENTAL COMPLIANCE AND SPILL RESPONSE

The project involves treating radioactive low level mixed wastes for land disposal at the Nevada Test Site (NTS) using Best Demonstrated Available Technology (BDAT) to met RCRA based LDRs and NTS WAC established under Nevada Test Site - Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (NVO-325, Rev. 1). Treatment will be accomplished using a cement based stabilization/solidification process that renders toxic heavy metals and radionuclides insoluble by precipitation, and then locks them in a grout matrix. In addition to these requirements, the project will comply with all applicable or relevant and appropriate requirements (ARARs) established under federal and state environmental regulations.

The project will not result in the generation of any surface water run-off, since it will be accomplished entirely within the confines of Plant 6. Spill prevention and control measures will be employed during all project specific removal operations, in accordance with FEMP SOPs and the site's Spill Prevention Control and Countermeasures (SPCC) Plan. Process emission controls meeting OEPA's Best Available Technology (BAT) standards, will be installed to control airborne releases from the project. BAT for sources that have the potential to omit radionuclides will consist of HEPA filtration.

6.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Table 6-1 of this section identifies the Applicable or Relevant and Appropriate Requirements (ARARs) for the project. As part of RA No. 9, the project is exempt for the requirement to obtain administrative permit approval under Section 121(e) of CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as promulgated in 40 CFR 300.400(e).

Although on-site removal actions are exempt from the requirement to obtain administrative permit approval, Paragraph XIII.B of the ACA requires DOE to supply specific information regarding the permits that would have been required in absence of the CERCLA permitting exemption described above. To satisfy this ACA requirement, the following three pieces of information have also been included in Table 3-1:

- Identification of permits that would be required in absence of the CERCLA Section 121(e) exemption.
- Identification of the standards, requirements, criteria, or limitations (ARARs) that would have to be met to obtain the permits.
- An explanation of how the response action will meet the standards, requirements, criteria, or limitations identified above.

TABLE 6-1

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

PERMIT THAT WOULD BE REQUIRED	PERMIT REQUIREMENTS (ARARS)	COMPLIANCE PLAN
National Emission Standards for Hazardous Air Pollutants - (NESHAP) - 40 CFR Part 61, Subpart H - Emissions of Radionuclides Other Than Radon From DOE Facilities	40 CFR 61.92: Radiological emissions (except radon-222 and radon-220) to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in an effective dose equivalent of 10 mrem in any one year. 40 CFR 61.07 and 61.96(b): An application for approval does not have to be filed for radionuclide sources if the effective dose equivalent caused by all emissions from the new construction or modification is less than 0.1 mrem per year.	The dose resulting from the proposed project will be included in the annual FEMP NESHAP, Subpart H report. Emissions from the project will not result in exceedance of the annual standard. Radionuclide emissions from the project are not expected to cause any member of the general public to receive an effective dose quivalent of 0.1 mrem/year or greater.

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PERMIT THAT WOULD BE REQUIRED	PERMIT REQUIREMENTS (ARARS)	COMPLIANCE PLAN
National Pollutant Discharge Elimination System (NPDES) Permit - OEPA NPDES Permit No. 1IO00004*DD (OAC 3745-33-05)	40 CFR 61.93(b): Continuous emission monitoring is required for stacks and vents that have the potential, under normal operating condition, but without emission control devices, to release radionuclides in sufficient quantities to cause any member of the general public to receive an effective dose equivalent of 0.1 mrem/year or greater. Wastewater discharges must not cause a violation of effluent limitations or loading rates at NPDES permitted outfalls. Discharges must be conducted in accordance with applicable terms and conditions of the permit. These include compliance with the notification requirements promulgated in 40 CFR 122.42, and OEPA water quality standards established under OAC 3745-1.	Discharges associated with the project will comply with the current NPDES Permit. All excess wastewater that are not consumed during the stabilization process will be containerized and managed as hazardous waste until characterization indicates these wastewaters are nonhazardous and can be discharged to the FEMP wastewater treatment system.
Atomic Energy Act (10 CFR 835)	Radiation doses, levels, and concentrations in restricted and unrestricted areas.	Emissions from this removal action will not result in the radiation limits being exceeded in restricted and unrestricted areas in accordance with the Project Specific Health and Safety Plan.

PERMIT THAT WOULD BE REQUIRED	PERMIT REQUIREMENTS (ARARS)	COMPLIANCE PLAN
Air Pollution Control - Permits to Install & Permits to Operate (OAC 3745-31 and OAC 3745-35)	OAC 3745-31-05(A) Permits to Install: Installation of the proposed solidification equipment must not prevent or interfere with the attainment or maintenance of applicable ambient air quality standards; and must not result in a violation of any applicable laws; and must employ the Best Available Technology (BAT) to control emissions. OAC 3745-35-01 (C) - The solidification equipment must be operated in compliance with applicable air pollution control laws; must be constructed, located, or installed in compliance with the substantive requirements of the permit to install; and must not violate NESHAP standards adopted by the Administrator of USEPA.	The proposed project will not interfere with the attainment or maintenance of any applicable air quality standards or cause a violation of any applicable laws. BAT will be implemented in the form of HEPA filtration to control radiological particulate emissions. The solidification equipment will be operated in compliance with applicable air pollution control laws and will not violate applicable NESHAP Standards.
Safe Drinking Water Act (42 U.S.C. 300G; PL 93-523)	National Primary Drinking Water Regulations (40 CFR 141). National Revised Primary Drinking Water Regulations (40 CFR 141.60 through 141.63) Ohio Primary Drinking Water Regulations (OAC 3745-81)	Compliance will be demonstrated by site-wide environmental monitoring, including air, soil, and groundwater. Reports summarizing the site-wide monitoring results will be submitted to EPA. Surface water discharges will be conducted in accordance with the site NPDES permit and are not expected to impact groundwater quality. Engineering controls and best management practices will be used to mitigate the potential discharge of contaminated wastewater to the underlying aquifer. The FEMP will ensure groundwater is not adversely impacted through continued monitoring under its existing Groundwater Monitoring Program.

PERMIT THAT WOULD BE REQUIRED	PERMIT REQUIREMENTS (ARARS)	COMPLIANCE PLAN
Radiation Exposure to the Public	Radiation Dose Limit (40 CFR 192.02(b)) Radiation Dose Limit (Drinking Water Pathway) (10 CFR 834)	The project will be designed and operated to minimize the releases of radionuclides. Compliance will be demonstrated by site-wide environmental monitoring, including air, soil, and groundwater. Reports summarizing the site-wide monitoring results will be submitted to the EPA.
Resource Conservation and Recovery Act (U.S.C. 6901 et. seq.)	Hazardous Waste Determinations (OAC 3745-52-11) (40 CFR 262.11)	Project wastes have been characterized as containing heavy metals regulated under EPA waste codes D004-D011. Wastes generated from the project will be characterized in accordance with site procedure EW-0001 and the FEMP Waste Analyis Plan. Samples of pre-solidified material will be collected and analyzed to verify that the solidified material is nonhazardous. (See Appendix B & Section 8.6)
	Interim Status: Treatment, Storage, and Disposal General Facility Standards (OAC 3745-65-13 through 16) (40 CFR 265.13 through 265.16)	The project will operate in accordance with RCRA regulations. Existing site security measures will be utilized. Inspections are discussed in section 4.5.4.1. Training requirements are discussed in Section 7.0 & Appendix D. Personnel will be trained in accordance with FEMP requirements.
Resource Conservation and Recovery Act (U.S.C. 6901 et. seq.)	Interim Status: Treatment, Storage, and Disposal Facility Preparedness and Prevention (OAC 3745-65-31 through 35, 3745-65-37) (40 CFR 265.31 through 265.35, 265.37)	Preparedness and prevention equipment, as specified in regulations, will be on-site, available, and in operating condition throughout the duration of the project. The existing FEMP site-wide internal communications/alarm systems will be used. Portable fire extinguishers and spill control equipment will be placed in accessible locations to assist in emergency response. Plant 6 is also equipped with a dry pipe sprinkler system. Warning signs are posted at all entrances to Plant 6. Procedures for ensuring waste compatibility are discussed in Section 4.1.2. Container and equipment will be inspected daily as described in Section 4.5.4.1. Worker protection requirements are addressed in Appendix D.

PERMIT THAT WOULD BE REQUIRED	PERMIT REQUIREMENTS (ARARS)	COMPLIANCE PLAN
Resource Conservation and Recovery Act (U.S.C. 6901 et. seq.)	Interim Status: Treatment, Storage and Disposal Facility Contingency Plan and Emergency Procedures (OAC 3745-65-51 through 56) (40 CFR 265.51 through 265.56)	The existing RCRA FEMP Contingency Plan and Emergency Procedures will be followed for any hazardous waste emergency associated with the project. In the event of an off-normal event or spill, FERMCO will take appropriate actions with input from the Perma-Fix Team, as directed by the Assistant Emergency Duty Officer (AEDO).
	Container Storage (OAC 3745-52-34, 3745-66-70 through 77) (40 CFR 262.34, 265.170 through 267.177)	Containers of hazardous waste will be managed and inspected in accordance with regulatory requirements. Secondary containment will be provided for the 1500 gallon water tank and at the drumming stations and staging areas. Containers will be handled in a manner to prevent rupture, leakage, or spillage. The containers will be compatible with all stabilized material and will remain closed during storage.
	Residue of Hazardous Waste in Empty Containers (OAC 3745-51-07) (40 CFR 261.7)	Containers used for the project will be considered empty in accordance with the requirements of this rule.
	Closure Performance Standards (OAC 3745-66-11, 3745-66-14) (40 CFR 265.111, 265.114)	Decontamination of the treatment system will be conducted to meet closure performance standards as specified in Section 4.8. Equipment contacting waste will be decontaminated in accordance with OEPA Closure Plan Review Guidance.
	Land Disposal Restrictions (OAC 3745-59) (40 CFR 268)	All materials removed from the FEMP will be managed in compliance with applicable provisions of RCRA and other Federal and State requirements including EPA's off-site rule and the FEMP's Waste Analysis Plan.
Occupational Worker Protection & Training (29 CFR 1904 & 1910)	All facility personnel will be trained. Employers will develop and implement a written safety and health program for employees involved in hazardous waste operations.	This removal action will be conducted in accordance with the provisions of the Project Specific Health and Safety Plan.
National Environmental Policy Act (NEPA) (10 CFR 1021)	Ensure that all federal agencies (including DOE) consider environmental impacts in the planning and decision-making phases of their projects.	NEPA authorization for the project was granted on December 5, 1995 under Categorical Exclusion No. 455, Shipment of FEMP RCRA Mixed Waste.

PERMIT THAT WOULD BE REQUIRED	PERMIT REQUIREMENTS (ARARS)	COMPLIANCE PLAN
DOE Orders	To be considered.	All project design activities shall be implemented according to the DOE-FN procedures.

Representatives from DOE-FN and FERMCO will conduct inspections during the performance of this response action to ensure that the actions are conducted consistent with the discussions in the PSP. The inspections will ensure that the equipment associated with the project is properly cleaned and decontaminated and that all wastes resulting from the project are properly stored, labeled, and characterized.

7.0 HEALTH AND SAFETY

In addition to the Project Specific Health and Safety Plan which is attached as Appendix C of this Work Plan, personnel involved with the project will receive an appropriate level of training on the site documents listed in Table 7-1, dependent upon their specific job. This training includes general employee training, on-the-job training, and radiological worker training, in addition to training for specific tasks.

TABLE 7-1

SITE PLANS, MANUALS, AND STANDARD OPERATING PROCEDURES

NUMERICAL DESIGNATION	TITLE
PL-3020	FMPC Emergency Plan
None Assigned	FEMP RCRA Contingency Plan
RM-0021	Safety Performance Requirements Manual
PL-2194	FMPC Spill Prevention Control & Countermeasure Plan
RM-0007	FMPC Respiratory Protection Program
RM-0012	FERMCO Quality Assurance Program Plan
FMPC-0516	Control of Permits for Accomplishing Hazardous Work
SSOP-0003	The On-Site Transportation of Radioactive and Nonradioactive Hazardous Materials
RM-0005	FEMP Lot Marking and Color Coding System
SSOP-0089	Personnel Accountability
SSOP-0067	Spill Incident Reporting and Cleanup
SSOP-0018	Processing The Site Wide Analysis Request/Custody Record for Sample Control
SOP 20-C-606	Hazardous Waste Spill Cleanup
EQP-12.06	Certification of Hazardous Waste Loading, Examination of Transport Vehicle/Trailer for Off-Site Shipment
SOP 20-C-017	Movement of Hazardous Waste
SOP 20-C-630	Storage of Hazardous Waste
EW-0001	Initiating Waste Characterization Activities Using the Material Evaluation Form (MEF)
EM-2-013	Environmental On-Site Media Sampling
SP-P-35-028	Inspection and Performance Testing of Portable Radiation Survey Instruments
PP-0314	Packaging, On-Site Movement and Off-Site Shipment of Material

8.0 PROJECT MANAGEMENT

8.1 ORGANIZATION

The Perma-Fix Team is organized as shown in Figure 8-1. The organization is staffed by personnel from both Perma-Fix and PDC as indicated. The organization will function as a unit under the leadership and direction of the project manager in response to guidance and direction from the FERMCO designated technical manager and the FERMCO contracting officer.

Perma-Fix corporate responsibility for this project is assigned to Mr. Timothy Kimball, who is Perma-Fix Corporate Vice President for mixed waste management activities. Mr. Kimball will also serve as a senior technical advisor to the project.

Subunits of the organization will have mission and functions as follows:

8.1.1 Project Manager

The Project Manager is responsible for leading and directing all activities of the project. These include:

- Being the focal point of project activities and ensuring that all technical, quality, cost, and schedule requirements are met.
- Directing the preparation and maintenance of project plans and procedures.
- Directing the acquisition or otherwise securing of materials equipment and services necessary to prepare the facility for process operations.
- Directing production operations in accordance with customer and corporate requirements including applicable laws, regulations, standards, and specifications to achieve required results.
- Communicate formally and informally with the client.
- Plan, schedule, review, coordinate, and integrate the work of the project team to produce deliverables that accomplish project milestones and objectives.

8.1.2 Project Support Manager

The Team's Project Support Manager is responsible for assisting the Project Manager in planning and administering project activities. These include:

- Preparing and maintaining project plans and procedures.
- Preparing and maintaining project schedules.
- Preparing and maintaining the project cost estimate, cost controls, and tracking and reporting cost to the Project Manager and corporate management.
- Tracking project progress and preparing and providing project progress and status reports.
- Collecting project documents, data, and records, and maintaining documentation and records required for management and satisfying customer requirements.
- Planning and administering personnel selection, training, and certification.

- Tracking and expediting the resolution of problems and issues that could threaten project success.
- Planning and administering project procurement and property management activities.

8.1.3 Operations Manager

The Team's Operations Manager is responsible for organizing and directing production operations. This includes:

- Organizing production crews and ensuring the adequacy of their training and qualifications.
- Ensuring the operational readiness of equipment and personnel and taking any actions necessary to achieve and maintain readiness.
- Planning and supervising production campaigns and the staging of waste product and its transfer back to FERMCO.
- Planning and supervising feed and reagent materials, receipt, logging, storage, handling, tracking, and transferring activities.
- Planning and supervising the collection of samples and their identification, tracking, and control.
- Planning and supervising production inspections, and tests to ensure process control and product quality.
- Planning and supervising housekeeping and maintenance activities of the facility and its equipment.

8.1.4 Environmental, Safety, Health and Quality Assurance Manager

The Team's ESH&QA Manager is responsible for assisting the Project Manager in developing and implementing the projects ESH&QA programs and ensuring their adequacy and effectiveness. This includes:

- Preparing and recommending program plans and implementing procedures.
- Planning, coordinating and conducting project-specific training and orientation in ESH&QA activities.
- Planning and performing evaluations and assessments adequate to inform team, corporate, and customer managers concerning the adequacy and effectiveness of project activities and results.
- Identifying ESH&QA problems or potential problems and taking the lead in securing and expediting their resolution.
- Stopping work if a significant finding of health or safety hazard is observed. Stop work orders will be issued through the Project Manager.
- Evaluating project experience and determining, coordinating, and expediting improvement activities.
- Providing a point of contact for interface and coordination between the project ESH&QA activities and similar programmatic activities of the customer.
- Keeping the Perma-Fix corporate Vice President currently informed on any ESH&QA concerns with project activities.

8.1.5 Quality Assurance Advisor

The Team's Quality Assurance Advisor will be on call to assist the Project ESH&QA Manager as needed. This may include:

- Support in the preparation, review, approval, and maintenance of quality assurance plans and procedures.
- Support in the planning and conduct of evaluations and assessments.
- Support in the resolution of quality problems and planning of corrective actions.

8.1.6 Environment, Safety, and Health Advisor

The Team's ES&H Advisor will be on call to assist the Project ESH&QA Manager as needed. This may include:

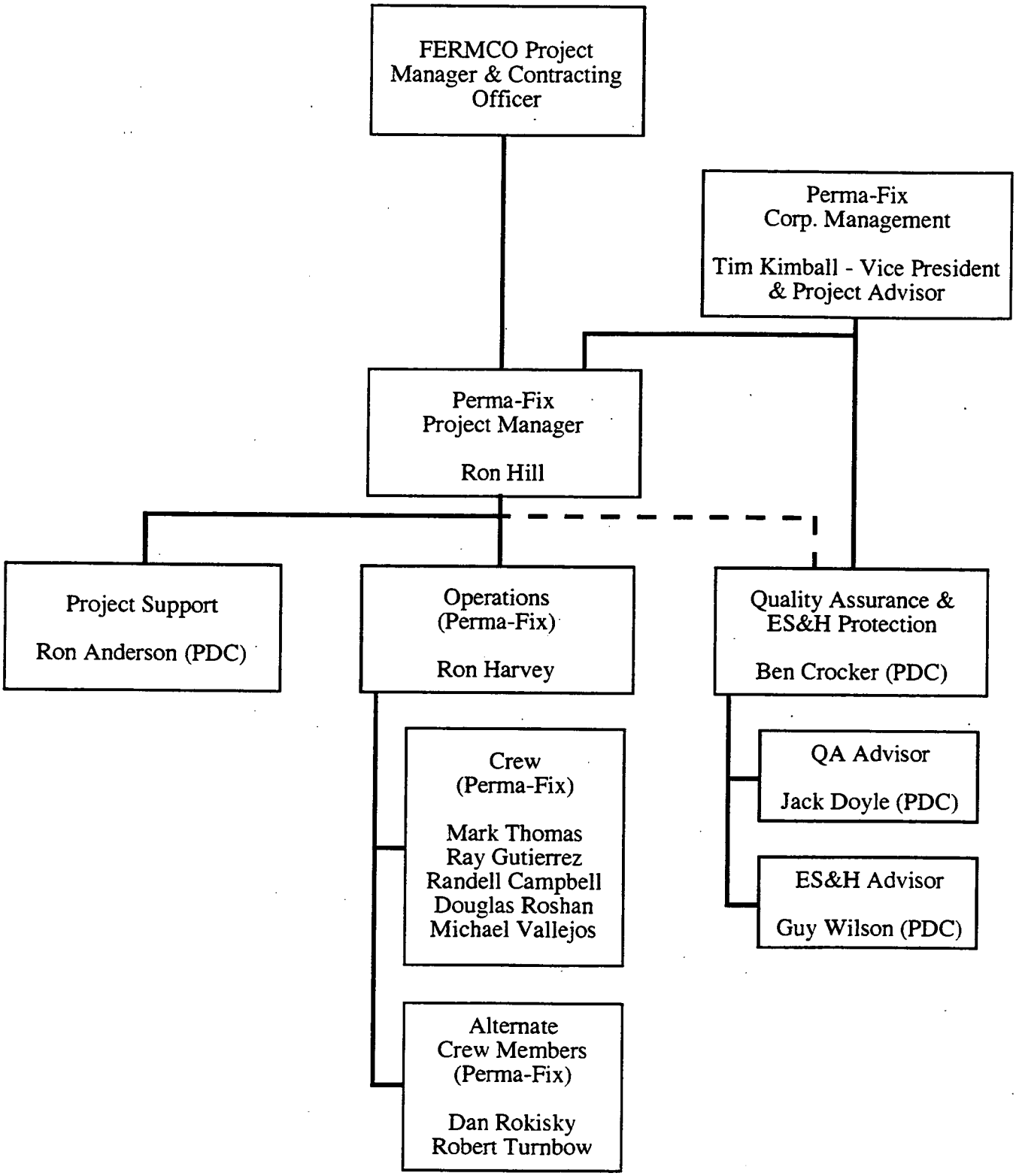
- Support in the preparation, review, approval, and maintenance of environmental protection, health and safety, and emergency preparedness plans and procedures.
- Support in the planning and conduct of evaluations and assessments.
- Support in the research and resolution of ES&H type problems and the planning and accomplishment of corrective or improvement actions.

8.2 Work Breakdown Structure

The Project Work Breakdown Structure (PWBS) is shown in Figure 8-2. At the first level of the breakdown, it reflects the three main elements of the job. These are Phase I, Phase II Option I, and Phase II Option II. In Phase I, Work Element 1.0, the ultimate product is a set of approved job plans, specifications, and procedures. In Phase II Option I, Work Element 2.0, the ultimate product is boxes of waste resulting from stabilizing and solidifying 1550 drums of Fernald waste that are certifiable and acceptable to NTS for disposal. In Phase II Option II, Work Element 3.0, the ultimate product is boxes of waste resulting from stabilizing and solidifying an additional 300 drums of Fernald waste that are certifiable and acceptable to NTS for disposal.

8.3 Logic Diagrams

The progression of work activities and their interrelationship are shown on the logic diagrams shown in Figure 8-3. The logic illustrated provides the basis for project schedules and resource needs for accomplishing the job as required.



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Figure 8.1
Project Organization Breakdown
FERMCO Mixed Waste Stabilization Project

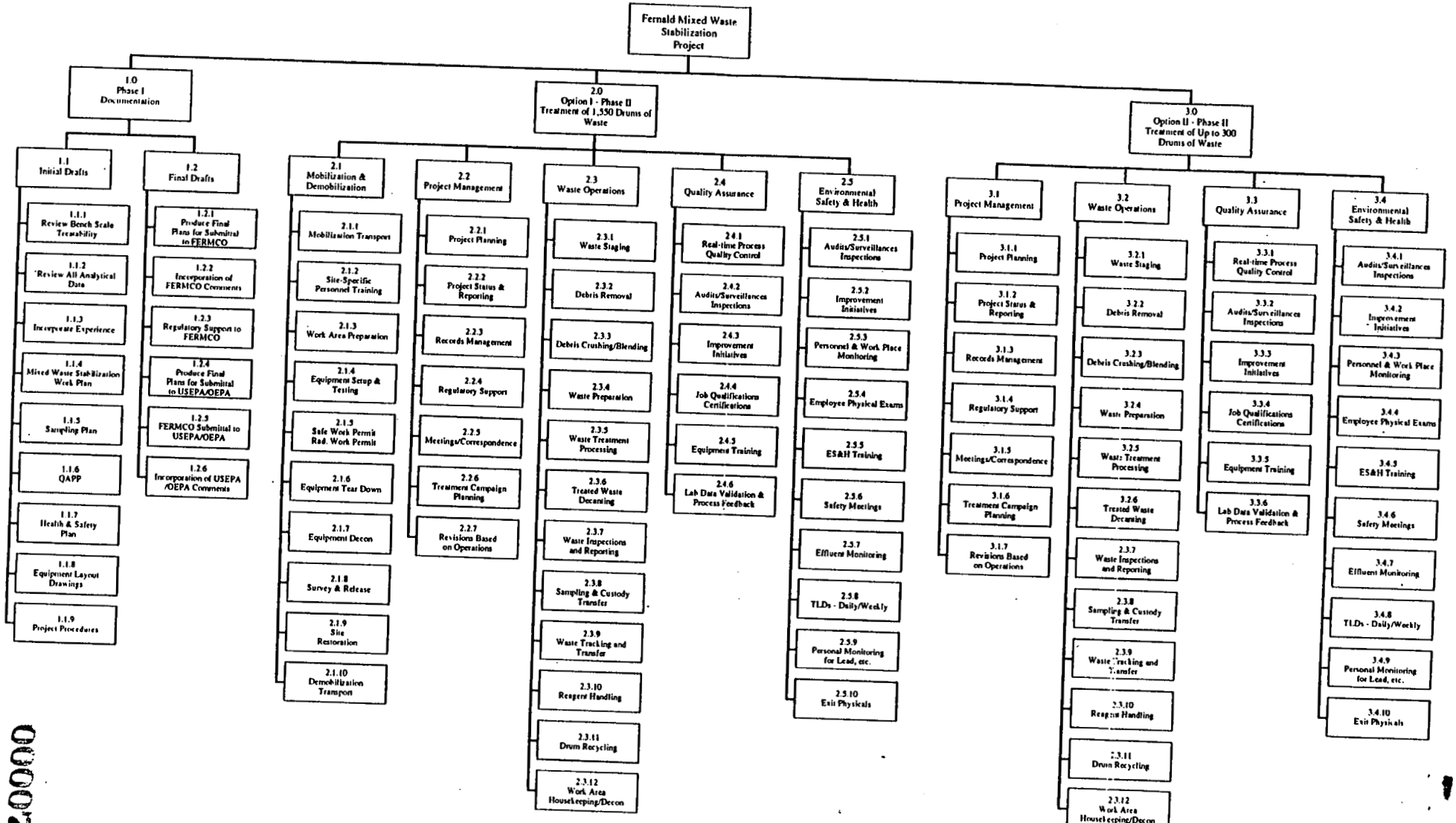
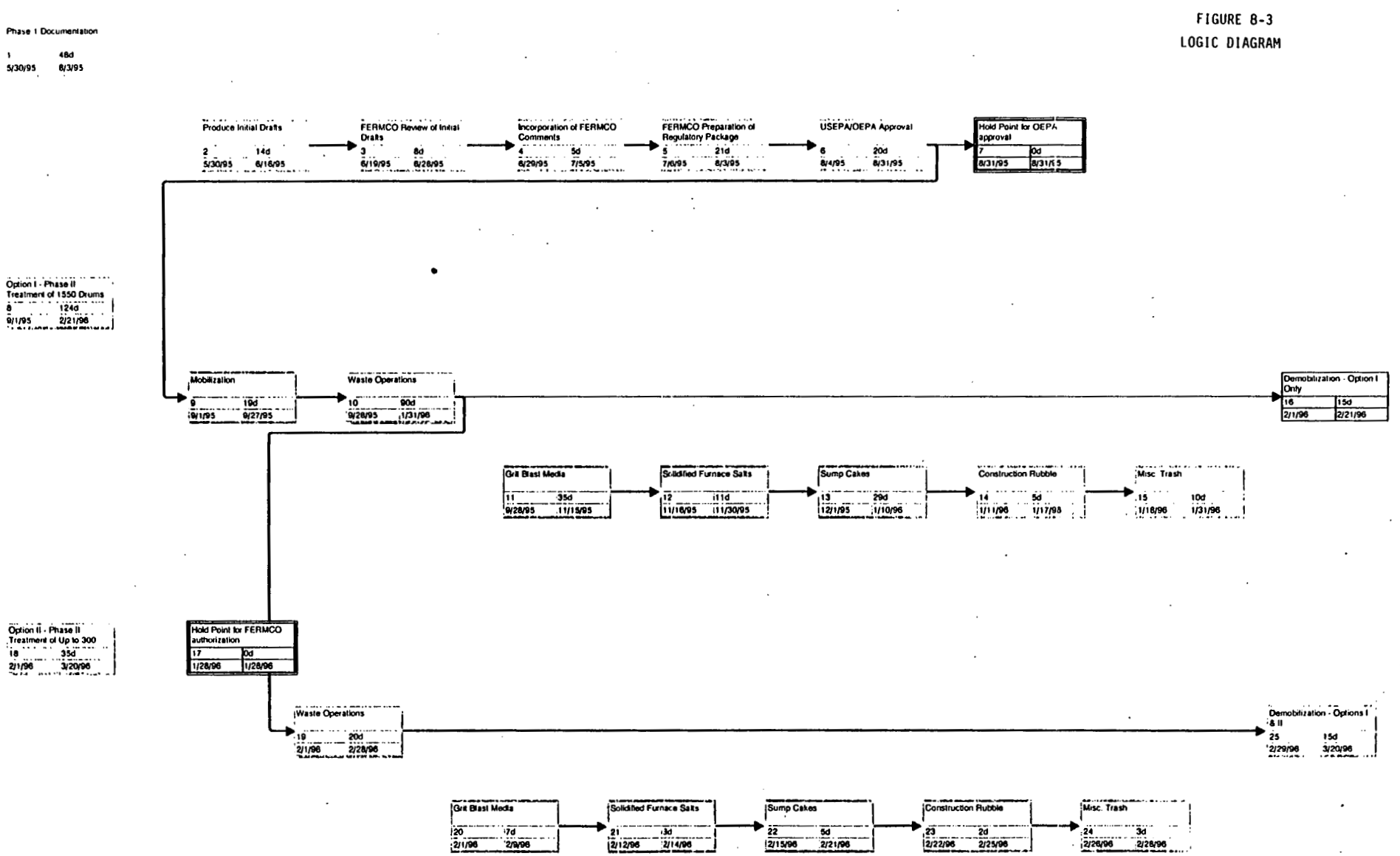


Figure 8.2
Project Work Breakdown Structure
Fernald Mixed Waste Stabilization Project

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FIGURE 8-3
LOGIC DIAGRAM



8.4 DATA CONTROL

The purpose of data control is to specify the requirements for the control of accuracy, precision, and completeness of data. Data control is exercised from the point of sample collection, through the laboratory analysis, and transmittal and validation of generated data. Data quality objectives (DQOs) represent a formal decision process which establishes the level of uncertainty FERMCO is willing to accept in analytical results derived from process data. The DQO process must strike a balance between time, cost, and data quality, and be initiated during project planning stages in order to prepare work plans that have a quantifiable degree of uncertainty. The criteria for DQOs are the end use of data to be collected and the cost to produce the data. DQOs are specified in the Sampling Plan in Appendix A.

DQOs are used to determine data reliability needed for a project, and the analytical support levels (ASLs) required to provide that data reliability. The ASLs apply to all of the techniques and methods that contribute to the generation of analytical data. ASLs A through E are described in DOE-FN/EPA 200 Report, Site-wide CERCLA *Quality Assurance Project Plan (SCQ),* Volume I. The choice of levels is based on the type of site to be investigated, the level of accuracy and precision required, and the intended use of the data. The following table outlines the ASLs:

TABLE 8-1
SCQ QC Levels

ANALYTICAL SUPPORT LEVEL (ASL)	EXAMPLES OF DATA USES
A Qualitative Field Analysis	Preliminary site characterization Real-time monitoring of implementation Field screening
B Qualitative, Semi-Quantitative, and Quantitative Analyses (Sublevel 1 or 2)	Site characterization Evaluation of alternatives Engineering design Real-time Monitoring of implementation Field screening
C Quantitative with Fully Defined QA/QC	Risk assessment Site characterization Evaluation of alternatives Engineering design Real-time Monitoring of implementation
D Confirmational with Complete QA/QC and Reporting	Risk assessment Vertical & horizontal extent Evaluation of alternatives Engineering design Evaluation of remediation results
E Non-Standard	Risk assessment Evaluation of alternatives Engineering design Vertical & horizontal extent Evaluation of remediation results

8.4.1 Data Quality Control Levels

Three separate ASLs are hereby adopted for this project in accordance with the SCQ. Real-time testing will be performed at ASL A. The lead acetate paper test for the sulfide reaction end point is a nonquantitative measurement using a colorimetric indicator to provide information conforming to RSL A criteria. The measurements of slump using ASTM methods provides numerical data which is compared with previously established norms for those parameters, and thus conforms to ASL A. The total metals analytical data generated from process feedback sampling and analysis activities will conform to ASL level B (sublevel 1). In cases where TCLP extraction and analysis of process feedback samples is required, ASL C will be used. The laboratory data produced for proof of LDR Treatment Standard compliance and NTS waste acceptance conform to ASL C. Field and laboratory QC standards will be complied with to assure that field and laboratory activities are consistent with the specified ASL.

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8.4.2 Project Documentation and Data

Project documentation will be maintained in dual storage per the requirements of NQA-1. These locations will include PESI's project office near the Fernald site and PDC offices in Oak Ridge, Tennessee. This documentation will include contractual records, official correspondence, operations logs, waste logs, sampling and analysis logs, self assessments, audits, and record of FERMCO product acceptance.

8.5 SAMPLE CONTROL

Sampling and analysis will be performed in accordance with the *Sampling and Analysis Plan* (SAP) attached as Appendix B. The plan defines samples taken for three different purposes including the following:

- Proof of LDR Treatment Standard Compliance and NTS Waste Acceptance
- Process Feedback Analysis and Control
- Project Archives

During waste stabilization operations, every mixing drum of stabilized waste will be sampled for waste acceptance and process feedback purposes. Two separate grab samples will be collected, one for waste acceptance and the other for process feedback. Each of these samples will have a nominal volume of 500 ml. Since the stabilized waste in each mixing drum is completely mixed before the samples are taken, there is no need for in-depth sampling of the material in the mixing drum. The samples can be collected from the surface of the waste. The samples are labeled and marked, and their identification numbers are recorded on the Operations Log Sheets as described in the Process Control Plan (Appendix A), the SAP (Appendix B), and the sampling and analysis procedures. Chain-of-Custody procedures are maintained at all times. After the samples have been documented, labeled and marked, they are placed in either the Process Feedback Archive or the Waste Acceptance Archive, as appropriate. These archives are stored in locked cabinets in the Plant 6 Process Area until curing is complete or they are used for analytical purposes.

As stated in the SAP, process feedback samples will first be analyzed for total metals concentration in the waste, and only extracted and analyzed according to the TCLP method if the total metals results exceed 20 times the LDR Treatment Standard. To minimize analytical costs, one drum out of every 50 processed will be analyzed. That drum will be randomly selected from the Process Feedback Archive.

As stated in the SAP, FERMCO Analytical will select at random a number of samples from each MEF in the Waste Acceptance Archive that will provide a 90 percent confidence level when analyzed.

At the conclusion of the project samples will be accumulated and distributed within the white metal box waste forms being presented to NTS for burial. For additional details regarding sampling and sample control see Appendices A and B.

8.6 QUALITY ASSURANCE

The quality assurance program for this project is intended to provide the project team, the project team's corporate management, and Fernald management with confidence that project objectives will be, are being or have been achieved. The program plan has been prepared as a project quality assurance plan and is contained in Appendix B of this volume. The program is designed and will be implemented to satisfy the requirements for quality assurance specified by FERMCO in their Quality Assurance Program Description (RM-0012) for quality level three. It will interface with and compliment the FERMCO overall project quality assurance program for mixed waste treatment and disposal. The project quality assurance program is also designed to implement applicable requirements of ASME NQA-1, EPA QAMS-005/80, DOE Order 5700.6C, and 10 CFR 830.120.

The project quality assurance program will be implemented by the project team with roles and responsibilities as described in the plan. Implementation will be in accordance with plans and procedures that are contained in Volumes I (this volume) and II of the Perma-Fix Fernald Mixed Waste Stabilization Project Plans and Procedures.

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9.0 REFERENCES

Comprehensive Environmental Response, Compensation, and Liabilities Act

Amended Consent Agreement Between DOE and U. S. EPA - 1991

U. S. EPA Best Demonstrated Available Technology/Resource Conservation and Recovery Act

Nevada Test Site - *Defense Waste Acceptance Criteria, Certification, and Transfer Requirements* (NVO-325, Rev. 1)

Solubility/pH Curves for Metal Hydroxides and Sulfides - Source: U. S. EPA Federal Register 52(155):29999 (August 12, 1987)

Federal Facility Compliance Agreement - Agreement Between DOE, U. S. EPA, and Ohio EPA

DOE Order 5400.5, *Radiation Protection of The Public and the Environment*

Superfund Amendments and Reauthorization Act - 1986

U. S. EPA Toxicity Characteristic Leaching Procedure (TCLP)

40 CFR 264, Waste Management Requirements

Ohio Administrative Code (OAC) Chapters 3745-49 through 3745-69

Emergency Planning and Community Right-To-Know Act (EPCRA)

40 CFR 355, Emergency Notifications

U. S. EPA, *Quality Objectives for Remedial Response Activities Development Process*, OSWER Directive 9355.0-7B, March 1987

FERMCO *Quality Assurance Program* (RM-0012)

ASME NQA-1, *Quality Assurance Program Requirements for Nuclear Facilities*, 1989 Edition

DOE Order 5700.67 C, *Quality Assurance*

EPA QAMS - 005/80

10 CFR 830.120, *Quality Assurance*

Occupational Safety and Health Administration Regulations

ANSI/ANS-40.37-1993, Mobile Radioactive Waste Processing System

ANSI Standard 288.2-1980, *American National Standards Practices for Respiratory Protection,*

National Institute of Occupational Safety and Health Publication No. 84114, *Personal Protective Equipment for Hazardous Materials*

51 Federal Register 45654, December 19, 1986

29 CFR 1910.120(b), *Hazardous Waste Operations and Emergency Response*: Interim Final Rule, Department of Labor

EPA Manual, "Test Methods for Evaluating Solid Waste" (SW-846)

APPENDIX A

PROCESS CONTROL PLAN

PROCESS CONTROL PLAN

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PROCESS CONTROL PLAN

1.0 INTRODUCTION

This Process Control Plan (PCP) describes how the mixed waste stabilization process will be controlled to ensure that the final waste forms produced will meet the Waste Acceptance Criteria (WAC) of Nevada Test Site. Waste acceptance at NTS involves making sure that all treated waste is free of drainable water, no longer exhibits the toxicity characteristic, and has a documentary "pedigree" that provides waste traceability, and demonstrates a high level of process and quality control. The following discussion describes how the process is controlled and how documentation is performed for each container of waste received for treatment.

2.0 PRODUCTION PROCESS CONTROL

Activities associated with mixed waste stabilization will be monitored and necessary corrective actions will be taken to ensure that activities are proceeding according to the FEMP Mixed Waste Stabilization Project Plan and the Project-Specific Work Plan. Implementation of process control involves two major activities. The first is measuring the results of the controlled treatment activities. The second is identifying deviations from planned performance (i.e., out of control condition) and taking actions to make necessary corrections. More specifically, process control for waste stabilization in this project consists of:

- Developing waste-specific design treatment recipes.
- Planning process operational actions and desired results.
- Measuring the results of process operations while the planned actions are being carried out.
- Comparing these actual results with planned results.
- Planning and implementing changes in process operations that will bring actual results closer to desired results.

There are four interrelated critical aspects of process control which are integral to the production of treated waste forms that are acceptable to NTS:

- Bench scale treatment recipe development
- Real-time testing
- Feedback sampling and analysis
- Waste acceptance sampling and analysis

2.1 Process Control Based Upon Bench Scale Treatment Recipe Development

The mixed waste stabilization process operates on a reagent-demand basis, but initial dosages of reagents must be established in order to ensure an efficient work flow during waste processing. In order to determine in advance the approximate reagent dosages to be used in

full-scale treatment operations, bench scale recipe development tests are performed on each of the five waste categoriestype of waste to be treated. The bench scale test results determine the amount of ferrous sulfate needed for barium and chromium stabilization and the demand for the sodium sulfide stabilization reagent. The initial dose of each reagent, the mixing and reaction times, and the physical characteristics of the waste before and after treatment are determined during the bench-scale tests. The calculated initial dose of each reagent, the raw waste profile, and the performance specifications to be met by the treatment are determined and written on a Design Recipe Notice, which is posted at each operator station. A copy of the Design Recipe Notice is provided as Attachment A of this Process Control Plan. This Design Recipe Notice officially communicates design recipe information to the operators, and provides them with readily accessible process control guidance. In full-scale treatment the initial doses of each reagent are added to the waste mixture at approximately 100 percent of the amount established by bench scale testing. Additional small, incremental doses of each stabilization reagent may be needed to completely satisfy the posted Performance Specifications for some waste batches. These additional doses are added until the Performance Specifications established in the design recipe have been met or exceeded. The sulfide demand of the waste has been satisfied when testing with lead-acetate paper produces a color intensity value (CIV) equal to or greater than the Performance Specification posted in the Design Recipe Notice. Lead acetate paper reacts with residual free sulfide in the waste to produce a stain varying in color intensity from beige to black. A slight residual of free sulfide is the established end point of the sulfide stabilization reaction.

The initial dosages of pozzolanic solidification reagents to be added to each full-scale waste batch are also based upon the bench scale test results. The initial pozzolan doses are calculated on a mass balance basis from dosages determined during the bench scale test program. The Design Recipe Notice previously described is also used to communicate the initial pozzolan dose requirements to the operators. In full-scale operation, the initial dosages of each pozzolan are added by the operator and thoroughly mixed. Then the operator observes and adjusts the water content, color, and texture of the treated waste to match the Performance Specifications posted on the Design Recipe Notice. Samples of mixed waste will be collected from the mixing drum, as necessary, and tested for slump, by methods consistent with ASTM Method C-143-78. Test methods are included in Process Operating Procedure (POP)-2.10 of the Volume II Procedure Manual. The acceptable range of slump test results will be determined during the bench-scale test program, and specified as Performance Specifications in the Design Recipe Notice. If the operator's evaluations indicate a need for more pozzolans, they will be added incrementally until the Design Recipe has been met or exceeded, and the waste exhibits compliance with the established Performance Specifications. If additional water is needed, it will be added to the batch from a water holding drum located close to the mixers. This drum will be replenished by pumping water to it from the contaminated water holding tank.

After all performance specifications have been met, the treated waste will be decanted from the mixing container into a White Metal Box (WMB) and allowed to set and cure. During the curing period, the waste will be observed to ensure that setting and curing are proceeding as expected. If the batch fails to set properly, additional pozzolans will be added directly to the WMB and mixed into the waste with hand-held mixers.

If operating experience indicates that adjustments to the Design Recipe are needed to ensure NTS acceptability of the treated waste form, additional bench scale tests will be performed, as necessary. These tests will establish a new Design Recipe and Performance Specifications, which will be posted, at each operator work station, as a replacement for the previous design recipe information.

2.2 Process Control Based Upon Real-Time Testing

Real-time testing is employed by the Mix Unit Operators to confirm that full-scale treatment operations conform to the Performance Specifications of the Design Recipe. The objectives of real-time testing during treatment are:

- To measure pH and provide a base of information for adjusting pH with added reagents.
- To detect sulfide reaction end points and verify that the sulfide reaction has reached completion before proceeding with addition of pozzolans.
- To provide real-time feedback as to whether the operators are complying with the Design Recipe and that Performance Specifications are being met.

To detect sulfide reaction endpoints, the operator ensures that the waste has been mixed sufficiently to homogenize all waste materials in the drum, and to completely disperse and react all metallic constituents with the added sulfide. Then he exposes a strip of lead acetate test paper to the waste and observes the intensity of the brown stain produced by reaction of the lead acetate with unreacted sulfide. A color intensity comparison chart is posted at each mixer location for the operator to use in evaluating his lead acetate paper test results against the color intensity value (CIV) required by the Performance Specifications. If the CIV is less than the acceptable range, more sodium sulfide reagent will be added and thoroughly mixed, and the lead acetate paper test will be performed again. This process will continue until the lead acetate test produces a stain within a CIV in the acceptable range. Only then will the operator proceed to the next treatment step, addition of pozzolans.

In-process quality control tests for compliance with the waste solidification performance specifications of the Design Recipe are made in real-time on samples collected from the batch being mixed. After the lead acetate test has shown the sulfide reaction to be complete, the design initial dose of pozzolans will be added to the waste in the mixing drum, and thoroughly mixed to homogenize the treated waste and uniformly blend in the pozzolans. Then the operator will observe and evaluate color, texture, homogeneity and stiffness of the mixture, and take appropriate action to ensure consistent performance from batch to batch. When he judges the waste treatment process to be complete, he may choose to check a sample of the waste for slump by a field test method consistent with ASTM Method C-143-78. At a minimum, one slump test per White Metal Box (one for every 5 mixing drums) will be performed. The slump test will be the primary real-time test method for evaluating solidification-treated waste against the Performance Specifications associated with the Design Recipe.

All real-time tests will be performed using field instrumentation and methods, so no testing at off-site laboratories will be required. Field test results will be recorded on the Operations Log Sheet, included in POP-2.15 in Section 2.0 of the Volume II Procedures Manual.

2.3 Process Control Based Upon Feedback Sampling and Analysis

To protect against the possibility that variable incoming waste characteristics could cause variability in the success of treatment, feedback sampling and analysis will also be performed. Sampling for process feedback purposes will be performed and recorded as described in the Sampling and Analysis Plan (Appendix B) of this Volume I Work Plan. A grab sample will be collected from each mixing drum of stabilized waste immediately before the drum is emptied into a WMB. All grab process feedback samples collected will be placed in a Process Feedback Archive, in a locked storage cabinet in the process area. For large MEF Number waste classifications, the waste population will be divided into 50 drum increments. A single sample will be selected at random from each 50 drum increment of samples and analyzed for the eight RCRA metals on a total metals basis. For MEFs that include less than 50 drums, only one process feedback sample will be analyzed. If any of the metals measured are reported at 20 times the Regulatory Levels listed in 40 CFR 261.24, the sample will be subjected to the TCLP extraction procedure and RCRA metals analysis of the extract. If the sample fails to meet the Regulatory Levels, we will assume that waste characteristics have deviated sufficiently to nullify the Design Recipe. In this event, the analytical data, the laboratory quality assurance information, and the Operations Log Sheets will be reviewed. If the data is valid, all 50 drum equivalents of waste will be scheduled for reprocessing, and further waste treatment operations will be halted until a bench scale test is performed to optimize the Design Recipe.

If early feedback analyses show consistent adequacy of the design recipe, the size of the feedback sampling increments will be increased from 50 to 100 drums, to reduce analytical costs. The sample ID number, the Mixing Drum ID Number, and the Waste Group Number will be recorded on the Operations Log Sheet along with the real-time test data recorded by the operator. This same information plus the date, time, sample container size and materials, and the identity of the sampler and all other persons having custody of the sample will be recorded on a Chain-of-Custody Form. The samples and their completed Chain-of-Custody Forms will be placed in a locked cabinet, under the custody of the Process Supervisor, until setting and initial curing have taken place (24 to 48 hours). A designated FERMCO team member will collect the cured samples from the Process Supervisor, completing the Chain-of-Custody Form to document the transfer, and maintain unbroken chain of custody for each sample. The designated FERMCO team member will deliver the samples to the laboratory. The analytical laboratory will perform the requested analyses. The analysis data reported back to the Project Office will be used to evaluate whether the Design Recipe is continuing to produce treated wastes acceptable for shipment to NTS for final disposal.

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2.4 Waste Acceptance Sampling and Analysis

Waste acceptance sampling and analysis is performed in order to provide high-accuracy analytical data to demonstrate the acceptability of the treated waste form to NTS . Grab samples are collected from each mixing drum batch after the pozzolanic solidification reagents have been added and thoroughly mixed, but before the treated waste is decanted into a WMB. Grab samples representative of each Mixing Drum decanted will be collected, packaged, labeled and allowed to set and cure as described above for the feedback samples. All waste acceptance grab samples will be placed in the Waste Acceptance Archive in a locked cabinet in the process area.

Sample tracking and integrity are of critical importance to the success of this project and the acceptability of the treated waste product at NTS. Custody of samples will be documented and transferred as described above for the feedback samples. When all of the waste in a particular MEF number grouping has been treated, FERMCO will select at random a quantity of samples statistically representative of the 90 percent confidence level, and provide these samples to a qualified analytical laboratory for TCLP extraction. This data will be used to determine whether the finished wastes are acceptable for shipment to NTS for final disposal.

3.0 Process Unit Control

The control logic for this project is based upon the concept of key area control. Although it is impractical to attempt to control every single operating variable and condition, a practical solution is to tightly control the process variables that are truly essential to meeting the ultimate goal, which is production of treated waste forms acceptable to NTS. Key area control involves the selection and control of process variables that are critical to process success. This Work Plan calls for simultaneous conduct of all process operations in terms of process units; therefore the key areas listed below are established based on the process units identified in the Process Description of Section 4.3 of the Work Plan.

A - Waste Preparation
B - Debris Sorting and Size Reduction
C - Chemical Stabilization
D - Solidification
E - Decanting and Curing
F - Reagent Makeup

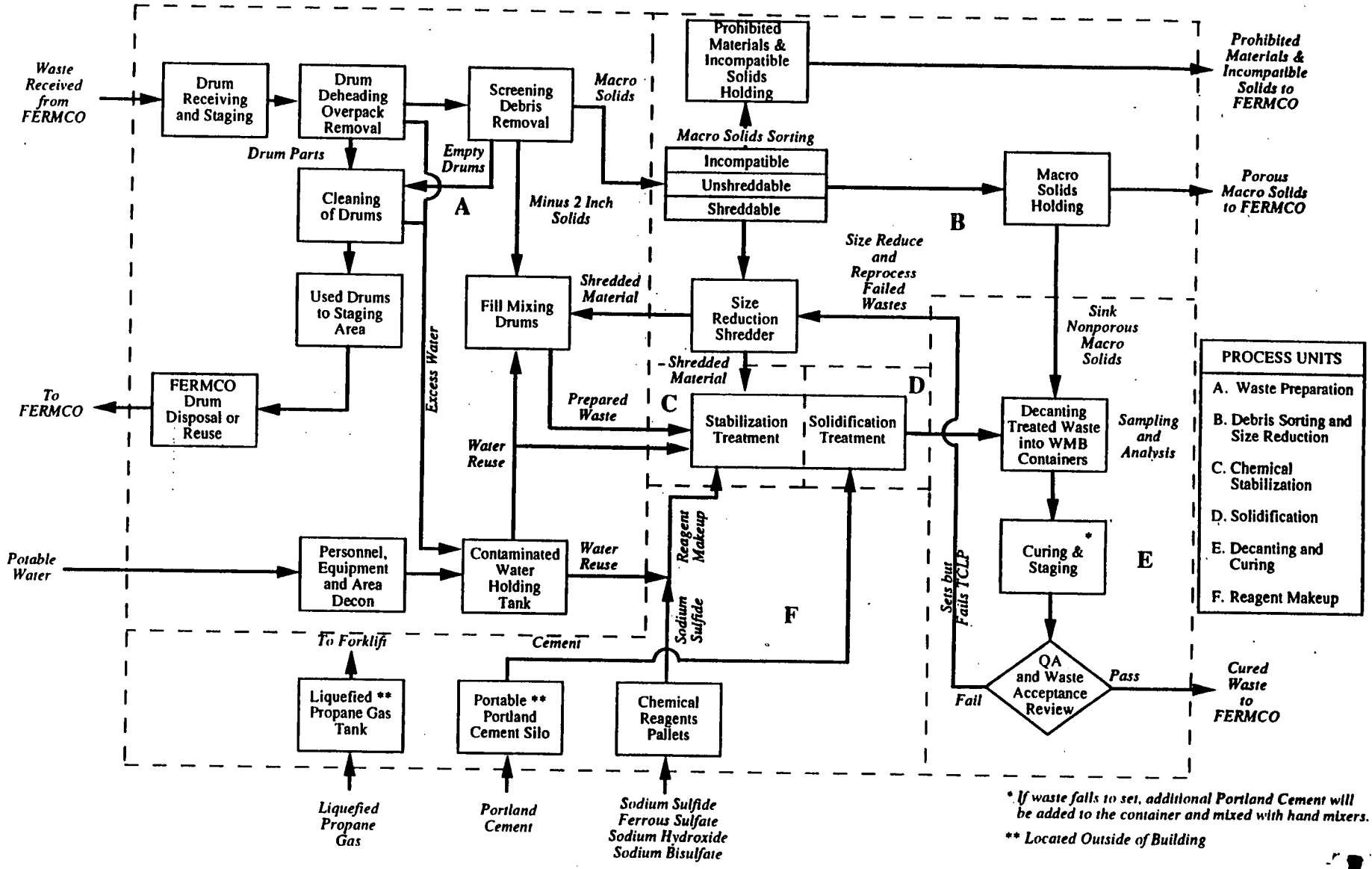
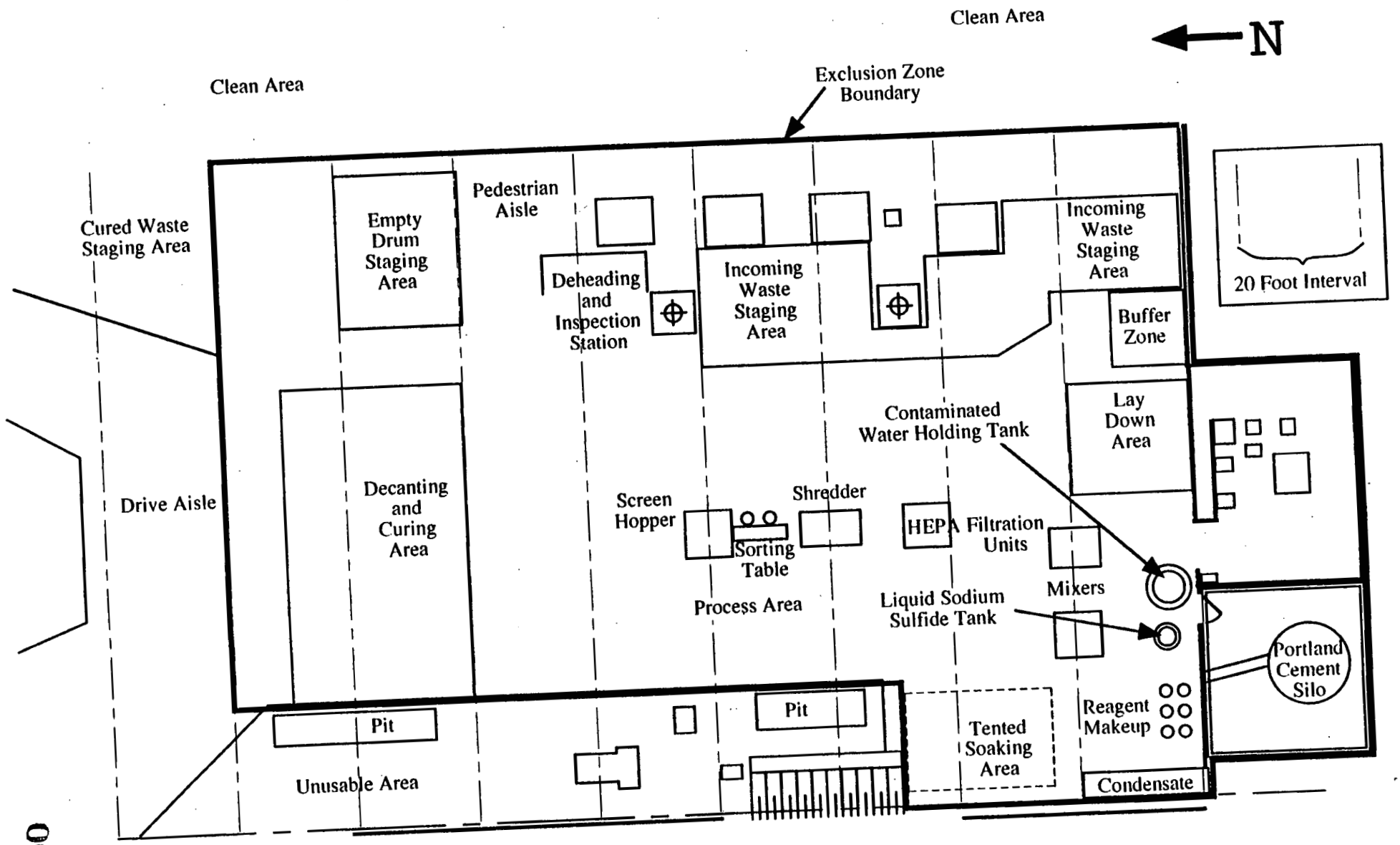


Figure 3-1
Block Flow Diagram - Mixed Waste Stabilization Process

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Figure 3-2
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

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For each of these key areas, operational tasks, critical process variables and methods of controlling these variables are presented in the following subsections. Each of these process units are shown in Figure 3-1, the Block Flow Diagram for the Mixed Waste Stabilization Project. The Equipment Layout Diagram for the Project Area is shown in Figure 3-2.

3.1 Waste Preparation

The process unit designated by the letter "A" in Figure 3-1 involves physical preparation of the waste to enter the chemical treatment process. In order for waste to be chemically treated in downstream processes, the following tasks must be performed.

Task 1 - Transport, Handling, Receipt, and Staging of Incoming Waste Containers
Task 2 - Deheading of Drums and Inspection of Contents
Task 3 - Removal of Free Water Layers
Task 4 - Unstacking of Inner Concentric Containers
Task 5 - Screening of Waste to Remove Macro Solids
Task 6 - Adjustment of Solid/Liquid Ratio and Provision of Freeboard in the Mixing Drums
Task 7 - Cleaning of Original Containers and Staging for Return to FERMCO

Raw waste, shredded material, and potable water enter this process unit, and mixing drums of prepared waste, RCRA empty (original) drums, macro solids and contaminated water leave this unit.

3.1.1 Task 1 - Transport, Handling, Receipt and Staging of Incoming Waste Containers

All deliveries of raw waste to the project site will be performed by FERMCO personnel using FERMCO equipment. A designated member of the Perma-Fix Team will observe and assist the FERMCO delivery personnel. The Perma-Fix Team member will log in the containers on the Operations Log Sheet, and stage the delivered containers according to their MEF Numbers. Incoming waste containers will be staged on pallets in the area designated for that purpose in the Equipment Layout Drawing, Figure 3.2. All handling and transport of drums in Task 1 will be on pallets lifted and carried by fork lift trucks. When waste containers are removed from the staging area, a fork-lift will carry a single pallet of waste containers to the Drum Deheading and Inspection Station.

3.1.2 Task 2 - Deheading of Drums and Inspection of Contents

When a pallet of drums is brought to the Drum Deheading and Inspection Station, the operators will observe the identification numbers of each container on the pallet, and record its MEF identification number, container inventory number, and size on the Operations Log Sheet. The fork-lift will be used to position the pallet of containers inside the zone of influence of dust/fume collection system intakes. Operators will consult the Real-Time Radiography Log, as necessary to identify drums which contain multiple concentric containers. Operators will use either manual speed wrenches or air-driven speed wrenches to loosen lid retention ring bolts, so the lids can be removed. For containers too corroded to be opened in this manner, the drum head will be punched with a non-sparking tool, and the

drum headspace will be checked with an LEL (lower explosive limit) meter. If a reading less than 10 percent of the LEL is detected, the head will be removed with an electric powered cutter. If an reading greater than 10 percent of the LEL is dectected, the drum will be allowed to equilibrate with the atmosphere and the LEL will be checked again. The drum cutter will not be used on a drum until the LEL in the drum headspace is less than 10 percent. These operations will be performed one container at a time. Any dusts or fumes emitted from the drums during deheading will be induced into the negative pressure collection system intake by a sweep air flow. This sweep of air will carry dust/fumes away from the operators.

The following data and observations associated with the drum deheading and inspection task will be recorded on the Operations Log Sheet.

Original Container Inventory Number
MEF Number
Date/Time of Deheading and Inspection (Beginning and Ending)
Outer Container Size
RTR Observation Notes
Inner Container Size
LEL Meter Reading (if drum is punched and cut)
Number of Empty Containers Transferred to the FERMCO Staging Area

Waste within each MEF Number will be grouped to produce a volume that will fill a WMB to the desired level after treatment (approximately 4 to 5 drums are required to fill one WMB). This waste grouping is called a Compatible Waste Grouping (CWG), and is given a CWG Number, which will be recorded on the Operations Log Sheet. If CWGs are properly sized, all of the treated waste from one CWG should be eventually contained in a single WMB. However, at this stage of the process, the WMB Identification Number is not known. The CWG Number is used to keep all containers in the group together as they go through downstream treatment process steps. An example of the Operations Log Sheet is included as Attachment B of this Process Control Plan, and in POP-2.15 in Section 2.0 of the Volume II Procedures.

Each drum of waste in a CWG will have its own Operations Log Sheet. The Operations Log Sheet travels from one work station to the next as the waste proceeds through the treatment process. In this way, the Operations Log Sheet describes all observations, test results and performance measurements associated with waste from a specific original container, and traces it to a specific WMB. The log is also used to document all transfers of waste from one container to another, by providing a record of each container's inventory number. In this way, a single document provides traceability from the original container to the WMB shipped for disposal at NTS. At the conclusion of the drum deheading and inspection task, the Operations Log Sheet is packaged in a plastic sleeve, and accompanies the container to the next activity.

3.1.3 Task 3 - Removal of Free Water Layers

The presence of too much water has the potential to increase overall project costs while interfering with setting and curing of the waste after pozzolan addition. Experience with similar wastes has shown that removal of free water layers from the waste is a necessary step in making sure that waste entering the treatment process does not contain too much water. Water contained in the interstitial spaces of the waste matrix can be completely consumed in hydration of pozzolans.

Each container will be inspected to determine if a free water layer is present. In order to gain control of water content, free water layers encountered during drum deheading and inspection will be bailed with buckets into a separate 55-gallon drum where solids will be allowed to settle out. Then, the clarified water will be pumped out of the settling drum and into the contaminated water holding tank, using an suction-screened, air-driven double diaphragm pump and transfer hose. The transfer hose will be suspended and draped from the building rafters, to prevent the hose from becoming a tripping hazard or an impediment to fork-lift movement. For drums or overpacks containing multiple concentric containers, each container will be checked for free water layers after deheading, and any free water encountered will be removed in the same manner. Once per day, accumulated sludge on the bottom of the settling drum will be removed and combined with compatible waste entering the treatment process.

The amount, if any, of free water removed from each container will be recorded on the Operations Log Sheet. The Operations Log Sheet will accompany the waste to the next stage of processing.

3.1.4 Task 4 - Unstacking of Inner Concentric Containers

When multiple concentric containers are found within a drum or overpack, the operators will attempt to separate the containers from the waste by unstacking containers one at a time. An existing jib crane will be used for lifting, along with a lifting strap rated for at least 1,200 pounds. The strap will be of the type that hooks under the rim of the drum or container. Most concentric containers will be lifted out before they are deheaded. Before attempting to lift an open container using this method, a wooden 2 × 4 brace will be positioned across the mouth of the container to prevent collapse during lifting. Some containers may break into two pieces during the lifting process. In these situations, the piece of the container and lid that comes away during the lift will be cleaned to RCRA empty status and handled and staged in all ways the same as intact empty containers. The portion of the container that remains in the drum or overpack will remain with the waste until it is separated or shredded in a later processing step. This unstacking procedure will be repeated, to the extent possible, for all concentric containers inside a drum or overpack.

The number of concentric inner containers removed from the original outer container will be recorded on the Operations Log Sheet. Broken pieces of containers will be counted as whole containers on the Log Sheet. The Operations Log Sheet will move with the waste to the next stage of the process.

3.1.5 Task 5 - Screening of Waste to Remove Macro Solids

To ensure successful mixing using the Perma-Fix mix units, it will be necessary to remove all macro solids that will not pass through a 2-inch bar screen. A specially designed screen hopper will be used to separate macro solids from the waste. After drums or overpacks have been deheaded, inspected and unstacked, as necessary, they will be transported from the Deheading and Inspection Station to the Screen Hopper using a fork-lift equipped with a hydraulic container grapple/rotator attachment. The fork-lift driver will lift the drum or container and position it over the Screen Hopper, and then he will rotate it to release its contents onto the bar screen. He will then return the empty container to the floor where it can be subsequently cleaned to meet RCRA empty container requirements. Another operator on a catwalk around the perimeter of the Screen Hopper will use poles and extended-handle box cutters to release any waste materials that may be trapped in the macro solids or drum liners retained on the bar screen. Using a hose spray, the operator on the catwalk will moisten all macro solids on the screen, and then he will rake the retained debris through a slide gate onto a chute leading to the macro solids sorting table. He will take shelter behind a reinforced steel partition or he will return to floor level before the next container is lifted and dumped.

Screened waste will drop to the bottom of the Screen Hopper and be dispensed into a heavy duty 55-gallon mixing drum (DOT 17-C, UN-1A2X485 or equivalent). A 12-inch diameter guillotine gate valve will be used to control the dispensing of waste into the mixing drum. A sliding door in the side of the hopper, underneath the screen can be used by the operator to dislodge any waste that fails to move through the hopper and gate valve by gravity.

Water mists and dust collector intakes will be positioned at the top of the Screen Hopper and at the screened waste dispensing station at the bottom of the hopper, for control of dust in these areas. These sprays will be turned on immediately before dumping or dispensing operations, and will be turned off immediately after the conclusion of these activities.

Removal of macro solids is a task that is critical to production of treated waste acceptable to NTS.

The following data and observations associated with the screening of macro solids from the waste will be recorded on the Operations Log Sheet.

Date/Time of Screening (Beginning and Ending)
Original Container Inventory Number
Estimated Waste Volume Entering the Screen
Estimated Waste Volume after Macro Solids Removal
Mixing Drum ID Number

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.1.6 Task 6 - Adjustment of Solid/Liquid Ratio and Provision of Freeboard in the Mixing Drums

After macro solids have been removed from the waste, the waste must be dispensed into mixing drums as previously described. In dispensing waste into the mixing drum, the operator will exercise care to leave a pre-determined amount of freeboard (empty space) at the top of the drum. This empty space will be filled with, water and reagents, and possibly shredded solids later in the treatment process. After the waste has been dispensed, the operator will add water as necessary to ensure that the waste is wet, but not enough to establish a free water layer above the solids. The water added to the mixing drums will be pumped from the contaminated water storage tank into the drum at the screened waste dispensing station by way of an air-driven double diaphragm pump and a pipe/hose transfer line. The hard pipe sections of the transfer line will be suspended from the building rafters to eliminate tripping hazards and impediments to fork-lift movement. A drop hose at the discharge end will provide freedom of movement for the operators.

A fork-lift operator will pick up each prepared waste mixing drum and move it to the next stage of the treatment process; either the macro solids shredding operation or directly to the Perma-Fix Mix Unit. The fork-lift used for this purpose must have a properly sized and adjusted drum grapple attachment.

For each mixing drum filled, the operator will record on the Operations Log Sheet the freeboard level and the estimated volume of water added in adjusting the solid/liquid ratio. The Operations Log Sheet will accompany the waste to the next stage of the process.

3.1.7 Task 7 - Cleaning of Original Containers and Staging for Return to FERMCO

Original waste drums emptied during the deheading and screening processes, whether intact or in pieces, must meet the definition of empty containers established by RCRA, 40 CFR 261.7. Operators will scrape out the drums into mixing drums as appropriate to render the original containers RCRA empty. If necessary, drums will be rinsed with reuse water from the Contaminated Water Holding Tank. Rinse water will be collected and reused immediately in adjusting Solid/Liquid Ratio in Task 6, or will be pumped back to the Contaminated Water Holding Tank.

The number of concentric inner and outer containers recovered in the screening process, and transferred to the empty container storage area will be recorded on the Operations Log Sheet. Broken pieces of containers will be counted as whole containers on the Log Sheet. The Operations Log Sheet will move with the waste to the next stage of the process.

3.2 Macro Solids Sorting and Size Reduction

The process unit designated by the letter "B" in Figure 3-1 involves sorting of macro solids for process compatibility, size reduction and recombination of compatible shredded solids with prepared waste. In order for waste and solids to be chemically treated in downstream processes, the following tasks must be performed.

Task 8 - Sorting of Macro Solids
Task 9 - Size Reduction of Macro Solids
Task 10 - Reprocessing of Waste Monoliths that Failed Waste Acceptance Tests

Macro Solids and failed monoliths for reprocessing enter this process unit, and shredded material and unshreddable macro solids leave this unit. All of these tasks are critical to the successful treatment of waste to meet the WAC of NTS.

3.2.1 Task 8 - Sorting of Macro Solids

Macro solids retained by the bar screen is manually raked down a chute onto the Macro Solids Sorting Table by an operator working on an access catwalk near the top of the Screen Hopper. Another operator at the sorting table separates macro solids into three categories:

Process Incompatible Macro Solids
Shreddable Compatible Macro Solids
Unshreddable Compatible Macro Solids

For macro solids to be compatible with the downstream treatment process, they must be inorganic or a solid plastic, and must not contain materials included in the Prohibited Materials List established in the FERMCO procedure for contaminated trash (PT-0009). A copy of the Prohibited Materials List will be posted at the Macro Solids Sorting Table. Such things as animal carcasses, soft tars, petroleum greases, aerosol cans, batteries, and containers of solvent are included in the Prohibited Materials List. These materials cannot be adequately treated by the stabilization process, and therefore must be segregated for alternative disposal. Also, some of the designated waste streams may have significant amounts of elemental lead, in the form of lead flashing. Processing large quantities of elemental lead through the stabilization process, increases the level of risk that a grab sample containing a large piece of elemental lead could fail the TCLP analysis, even though the waste that contains it has been properly stabilized. The operator working at the Macro Solids Sorting Table will remove any elemental lead and other prohibited materials and sort them into separate 55-gallon drums designated for these materials. When full, each incompatible material drum will be taken to a designated drum staging area to await pick up by FERMCO. Lead flashing will be given a surface rinse and will be kept separate from other process incompatible solids. The decontaminated lead flashing should be suitable for recycle by FERMCO.

Process compatible macro solids will be further sorted into shreddable and unshreddable portions. Any macros solids that are unshreddable due to physical strength or geometry will

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be separated, surface decontaminated on the sorting table, decontamination certified and placed in a designated container. At the present time structural steel appears to be the only macro solid that would be unshreddable. When full, the unshreddable solids container will be carried by fork-lift to the Decanting and Curing Area where the decontaminated solids will be sunk into the treated waste before it sets.

Shreddable macro solids will be raked into another 55-gallon drum designated for that purpose and staged for size reduction.

The following data and observations associated with the sorting of macro solids will be recorded on the Operations Log Sheet.

Date/Time of Receipt of Screened Solids
Estimated Volume and Description of Unshreddable Macro Solids
Estimated Volume and Description of Shreddable Macro Solids
Destination of Unshreddable Macro Solids

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.2.2 Task 9 - Size Reduction of Macro Solids

Size reduction of shreddable process compatible macro solids will be performed using an adequately sized and powered knife shredder. This unit is a low-speed shredder which can reduce macro solids to minus two inches. A 55-gallon drum containing shreddable macro solids from the sorting table will be lifted and dumped into the Shredder Feed Hopper using a fork-lift equipped with a hydraulic drum rotator.

Quantities of shreddable macro solids consistent with the available space in the prepared waste drums and the Design Recipe will be batched through the shredder and recombined with the prepared waste in the mixing drums. Shredded solids will be handled by one of two processing options. In Option 1, the mixing drum with its prepared waste will be placed under the shredder to receive the batch of shredded solids from the shredder discharge. Then the drum will be moved to one of the Perma-Fix Mix Units for concurrent treatment of the prepared waste and the shredded solids. In Option 2, shredded solids will be caught in an empty drum, and then carried to one of the Mix Unit locations, where it will be added by hand to the waste being treated. The following data and observations associated with the shredding of macro solids will be recorded on the Operations Log Sheet.

Volume of Shredded Solids Added to the Mixing Drum
Ending Date/Time of Solids Shredding and Transfer

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.2.3 Task 10 - Reprocessing of Waste Monoliths That Fail Waste Acceptance Tests

If WAC testing of treated wastes results in some monoliths being rejected for disposal at NTS, these monoliths will be broken into manageable pieces, placed in a 55-gallon drum on a fork-lift drum rotator, and dumped into the shredder. The shredder is the point where treated waste that fails NTS WAC will re-enter the process to be treated again. Due to the low strength design of the treated monoliths, they should be easily size reduced in this dual-purpose shredder.

The following data and observations associated with the reprocessing of rejected monoliths in the shredder will be recorded on the Operations Log Sheet.

Is This Waste Being Reprocessed after WAC Failure ? (Yes/No)

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.3 Chemical Stabilization

The process unit designated by the letter "C" in Figure 3-1 involves chemical precipitation of heavy metals and radionuclides using prescribed doses of stabilization reagents, based on the Design Recipe determined in the bench-scale optimization test program. In order to ensure that treated waste meets the WAC of NTS, it is necessary to accomplish the following tasks.

Task 11 - Slurrying, Homogenizing, and Pretreatment of Waste/Solids
Task 12 - Sodium Sulfide Treatment Step
Task 13 - Testing and Evaluation

Mixing drums containing prepared waste, or prepared waste plus shredded solids, enter the Stabilization Treatment Area and are placed under the mixer. Prepared charges of the prescribed stabilization reagents also enter this process unit. When stabilization treatment is complete, the mixing drum remains under the mixer while solidification treatment takes place, or is moved to a soaking area where reactions and off-gassing of ammonia are completed.

3.3.1 Task 11 - Slurrying, Homogenizing and Pretreatment of Waste/Solids

Mixing drums entering the Stabilization Treatment Area will have been prepared in previous processing steps as described above. The Solid/Liquid Ratio will be properly adjusted, the appropriate amount of freeboard provided, and shredded debris in measured amounts included, as appropriate. The fork-lift driver will transport the mixing drum into the Stabilization Treatment Area and place it underneath one of the mixers, and then back out and resume other transfer operations.

The mix unit operator will manipulate the hydraulic controls of the mixer to insert the impeller shaft completely into the drum and then mix the drum's contents until completely

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homogeneous. While mixing, the operator will manually pivot the mixer and move the hydraulic support arm in and out to ensure that all waste in the mixing drum is completely homogenized. The operator can tell when homogeneity has been achieved by the smoothness of mixer operation and the reduced effort necessary to pivot the mixer head.

For some wastes, a downward pH adjustment and chromium reduction step may be required. In these situations, the Design Recipe will specify the target pH, the pH adjustment reagent, and the amount of ferrous sulfate to be added for chromium reduction. Wastes containing high concentrations of barium will also be treated with ferrous sulfate. The most likely acidic reagent for decreasing pH will be dry sodium bisulfate, which produces sulfuric acid when dissolved in water. For safety of handling, sodium bisulfate will be added in dry form directly to the slurried waste in the mixing drum. Minimum mixing time will also be specified.

For some wastes, an upward pH adjustment step and an extended soaking period may be necessary, to allow degassing of ammonia. In these situations, the base will be added at the end of the homogenizing step. If an overnight soak is required, the homogenized and pH-adjusted drum will be moved to a ventilated soaking area. After the prescribed amount of time, each soaked waste drum will be returned to the Mix Unit for dosing of any additional reagents.

If manual additions of shredded solids are to be made, the operator will stop the mixer, withdraw it from the waste and place the shredded solids on the surface of the homogenized waste. He will then use the hydraulic controls to push the shredded solids down into the drum with the mixer impeller. Then, he will perform mixing again until the waste/solids mixture has been homogenized again.

The following data and observations associated with the slurrying and homogenizing of wastes in Mixing Drums will be recorded on the Operations Log Sheet.

Mixing Drum ID Number
Initial Conditions of the Waste (color, texture, pH)

The following data and observations associated with the barium/chromium stabilization step will be recorded on the Operations Log Sheet.

Date/Time of the Chromium Reduction Step (Beginning and Ending)
Identity, Strength and Amount of pH Adjustment Reagents Used
Identity, Strength and Amount of Reducing Reagent Used
Final pH of the Pretreated Waste
Reaction (Soak) Period (hours/minutes)

The following data and observations associated with the pH Adjustment/Ammonia Off-gassing Step will be recorded on the Operations Log Sheet:

Identity, Strength and Amount of pH Re-adjustment Reagents Used
Mixing Time (minutes)
Reaction (Soak) Period (hours/minutes)
Waste Conditions at the End of the Pretreatment Step (color, texture, pH)

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.3.2 Task 12 - Sodium Sulfide Treatment Step

When the waste/solids mixture has been thoroughly homogenized, the prescribed charges of stabilization reagents (probably sodium sulfide only) will be added based upon the Design Recipe determined in the bench-scale optimization program. The initial dosages and the performance specifications of the Design Recipe will be posted at each mixer location, so the mix unit operator will not have to trust his memory for this information. The mix unit operator or his helper will add the prepared reagent charges while the mixer is rotating, to ensure a rapid dispersion of the reagent throughout the waste mass. He will continue to mix the waste until color, texture and consistency of the waste is uniform, and then he will mix for at least 1 minute more, to ensure that reactions have been completed.

The following data and observations associated with the sodium sulfide treatment step in mixing drums will be recorded on the Operations Log Sheet.

Initial Waste Conditions (color, texture, pH)
Concentration of Sodium Sulfide Solution (wt. %)
Initial Volume of Sodium Sulfide Solution Added (gallons)
Volume of Subsequent Doses of Sodium Sulfide Added
Mixing Time (minutes) and Mixer Speed (High, Medium or Low)

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.3.3 Task 13 - Testing and Evaluation

The operator will test the sodium-sulfide treated waste using lead acetate paper to determine whether a sufficient residual of unreacted sulfide remains after reaction. If the residual is inadequate, additional sodium sulfide will be added and thoroughly mixed, and the lead acetate paper test will be repeated. This procedure will be repeated until the lead acetate paper test yields a result that is within the color intensity value (CIV) range prescribed. A color intensity comparison chart will be posted at each mixer location to aid the operator in evaluating the results of lead acetate paper tests. A copy of the comparison chart is attached to POP-2.5 in Section 2.0 of the Volume II Procedures Manual. For each incremental addition of sodium sulfide, the amount added, the mixing time and speed, and the CIV result will be recorded on the Operations Log Sheet.

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The following data and observations associated with real-time testing of wastes undergoing chemical stabilization in mixing drums will be recorded on the Operations Log Sheet.

Amount of Sodium Sulfide Solution Added With Each Dose,
Lead Acetate Paper Test Result (CIV) After Each Dose
Mixing Times and Speeds After Each Sodium Sulfide Dose

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.4 Solidification Treatment

The process unit designated by the letter "D" in Figure 3-1 involves addition of a prescribed dosage of pozzolanic solidification reagents, based on the Design Recipe determined in the bench-scale optimization test program. In order to ensure that treated waste meets the WAC of NTS, it is necessary to accomplish the following tasks.

Task 14 - Additions of Solidification Reagents
Task 15 - Testing and Evaluation

The mixing drum that has already been treated with stabilization reagents to the sulfide reaction end point, will remain under the same mixer, while pozzolanic solidification reagents are added and thoroughly mixed. All of these tasks are important to the successful treatment of waste to meet the WAC of NTS.

3.4.1 Task 14 - Additions of Solidification Reagents

After the waste/solids mixture in the mixing drum has been completely reacted with sodium sulfide and the prescribed reaction end point has been reached, the operator will begin solidification treatment while the mixing drum is still under the mixer. The operator will add the prescribed initial dose of pozzolans and thoroughly mix the waste and reagent until homogeneity has been achieved. If real-time testing and evaluations by the operator indicate that more pozzolan is needed, the operator will add it and thoroughly mix it with the waste. This process will continue until the operator judges the treated waste to be completely treated, and likely based on operating experience to set and cure properly. If more water is needed, the operator will add it as appropriate. When the pozzolan reactions are complete, the operator will hydraulically lift the mixer impeller out of the drum, and wipe the shaft and impeller blades with a plastic spatula to remove adhering waste/solids. Then the fork-lift driver will grab the drum with the hydraulic rotator, and move the drum to the Decanting and Curing Area where it will be decanted into a White Metal Box (WMB).

If the waste in the WMB has not set within 48 hours, the waste will be evaluated to determine its stiffness and probability of setting with additional time. If the waste is becoming stiff, more setting and curing time will be provided. If the waste remains fluid, additional pozzolans will be added directly to the WMB and mixed with hand held mixers. If headspace in the WMB is insufficient to provide room for the additional pozzolans, some

of the waste will be manually bailed back into a 55-gallon mixing drum, to make room in the WMB. The waste in the 55-gallon drum will be taken back to the mix unit and treated with more pozzolan, and this waste will be decanted into another WMB. The crew working at the decant station will be notified to reduce the number of drums in a compatible waste group by one. This reduced-size waste group will be combined with the extra waste drum in the WMB.

The following data and observations associated with solidification treatment in mixing drums will be recorded on the Operations Log Sheet.

Type of Portland Cement Added
Amount of Portland Cement Added With Each Dose
Mixing Time and Mixing Speed After Each Portland Cement Addition

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.4.2 Task 15 - Testing and Evaluation

During the addition and hydration of pozzolans in the solidification treatment step, the operator will continually perform visual evaluations of the mix in progress for color, texture, and complete hydration of the added pozzolans. Operator experience will be a reliable means of ensuring that solidification treatment will result in a monolith that meets all NTS physical requirements, without generation of free water.

In addition to these operator evaluations and judgements, the mix unit operator will also perform occasional measurements of slump, by methods consistent with ASTM-C-143-78, to verify that performance specifications are consistently met. Performance specifications are part of the Design Recipe Notice that will be posted at each mix unit location as a ready reference for the operators.

The following data and observations associated with solidification treatment in mixing drums will be recorded on the Operations Log Sheet.

Initial Waste Conditions (color, texture, pH)
Post-Treatment Waste Conditions (color, texture, pH) at Each Treatment Interval
Slump Test Spot (consistent with ASTM C-143-78)

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.5 Decanting and Curing

The process unit designated by the letter "E" in Figure 3-1 involves decanting of treated waste/solids mixtures from the 55-gallon drums into WMB. We anticipate that 5 mixing drums will be required to fill one WMB. A mixing drum will not be decanted into a WMB until the mix unit operator has determined that treatment is complete and that the waste will

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properly set and cure. In order to ensure that treated waste meets the WAC of NTS, it is necessary to accomplish the following tasks.

Task 16 - Sampling and Decanting of Mixing Drums
Task 17 - Observation of Set and Cure
Task 18 - Reprocessing of Unacceptable Wastes

The Decanting and Curing Area receives individual mixing drum batches and unshreddable macro solids. Assuming that all waste sets properly, the treated waste leaves the area in Webs. Waste that fails to set properly is treated with additional pozzolans inside the WMB and mixed with hand-held mixers. Waste monoliths that set, but fail TCLP analysis will be broken up and taken back to the shredder for size reduction and reprocessing through the remainder of the treatment process.

3.5.1 Task 16 - Sampling and Decanting of Mixing Drums

When the treatment of a batch in the mixing drum is complete, the drum will be moved to the Decanting and Curing Area. Two 500 milliliter grab samples of the treated waste will be collected and lightly compacted into a clean sample container using a trowel. The samples will be compacted only as much as required to eliminate air voids. A label on the outside of the sample container will be marked with the Mixing Drum ID Number, the WMB ID number, a unique sample ID number, the date and time of sampling, and the sampler's name. Then this sample will be placed into a locked storage cabinet in the custody of the Process Supervisor or his designee. One of the grab samples from each mixing drum will be designated as a Process Feedback Sample and will be allowed to set and cure in a secure storage cabinet in the Process Feedback Archive in the process area. The second grab sample from each mixing drum will be designated as a Waste Acceptance Sample and will be allowed to set and cure in a secure storage cabinet in the Waste Acceptance Archive in the project area. After setting and curing, FERMCO Sampling and Analysis Department personnel will randomly select samples from the Waste Acceptance Archive for waste acceptance testing.

After all sampling activities have been completed, the fork-lift operator will position the mixing drum over the appropriate WMB and rotate the drum to release its contents into the WMB. If necessary, he will use a plastic boat paddle to scrape the inside of the drum. The paddle will also be used to move waste inside the WMB as necessary to eliminate void space. If decontaminated, unshreddable macro solids have been brought to the Decanting and Curing Area, may be sunk into the waste in any WMB, prior to setting of the waste.

The following data and observations associated with sampling and decanting of treated waste will be recorded on the Operations Log Sheet.

Mixing Drum ID Number
Waste Group ID Number
WMB ID Number
Waste Acceptance Grab Sample ID Number

Feedback Grab Sample ID Number
Description of Unshreddable Macro Solids Sunk in the WMB

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.5.2 Task 17 - Observation of Set and Cure

The date and time of final decanting will be recorded on the Operations Log Sheet for each mixing drum decanted into a WMB. The WMB will be left open until the treated waste has set and cured for a minimum of 48 hours. Then the containers will be moved to a Cured Waste Staging Area outside the project area to cure for at least another 5 days before the WMB is closed and moved by fork-lift to a designated staging area. During the first 48 hours of setting and curing, the Process Supervisor or his designee will periodically inspect the waste to ensure that it is setting and curing properly. A pocket penetrometer will be used to evaluate the hardness of the waste as it sets and cures. If set does not occur within 48 hours, the waste will be evaluated and appropriate corrective actions will be taken as previously described .

The following data and observations associated with setting and curing of treated waste and samples will be recorded on the Operations Log Sheet.

Observations of Treated Waste Setting and Curing
Observations of Grab and Composite Sample Setting and Curing

The Operations Log Sheet will accompany the waste to the next stage of the process.

3.5.3 Task 18 - Reprocessing of Unacceptable Wastes

Reprocessing of previously treated wastes will occur only in two circumstances. The first is when treated waste fails to set inside the WMB. The second is when waste sets and cures properly but fails a TCLP analysis.

In the event that waste fails to set, it will be treated with additional pozzolans inside the WMB as previously described. Also, the original grab samples will be returned to the WMB and to be treated with the rest of the waste. Then new grab samples will be collected, documented and stored as previously described. An acknowledgment of reprocessing of the waste will be noted on the Operations Log Sheet, along with the amount of additional pozzolan added to the WMB.

If after review and validation of analytical data, a quantity of cured waste has been determined to have failed the waste acceptance analyses, the affected WMB(s) will be brought back to the process area from the staging or storage areas and the monolith(s) will be broken up, removed from the container, loaded into drums and dumped back into the shredder for size reduction. We anticipate that a concrete saw and pry bars may be used in breaking up the monolith(s). At the time that the monolith is returned to the process area for reprocessing, a new Compatible Waste Group (CWG) Number will be assigned and

recorded on the original Operations Log Sheet, and the original Chain-of-Custody form will be voided, but not destroyed. The size-reduced monolith materials exiting the shredder will be caught in mixing drums and will then go back through the process as necessary to provide complete re-treatment of the waste materials. When the size reduced monolith materials have been transferred into mixing drums, the original WMB ID number will be recorded on the new Operations Log Sheet. From this point on, the reprocessed waste materials will be handled, treated, sampled, decanted and documented in the same manner as the other wastes being processed.

The following information related to the reprocessing decision will be recorded on the Operations Log Sheet.

Failure to Set ? (Yes/No)
Amount of Additional Pozzolans Added to the WMB
Failure to Pass TCLP ? (Yes/No)
New Waste Group ID Number
Reclaim Drum ID Number

When the waste contained in a WMB has been determined to be acceptable for transfer to FERMCO custody (for eventual shipment for disposal at NTS) the WMB will be picked up by FERMCO, and the associated Operations Log Sheet will placed in the project file along with any sample analysis data generated.

3.6 Reagent Makeup

The process unit designated by the letter "F" in Figure 3-1 involves dispensing of reagents into charge buckets, either in dry or solution form. In order to ensure that treated waste meets the WAC of NTS, it is necessary to accomplish the following tasks.

Task 19 - Dissolution and Dispensing of Sodium Sulfide Charges
Task 20 - Dissolution and Dispensing of Ferrous Sulfate Charges
Task 21 - Dispensing of Portland Cement Charges

The Reagent Makeup Area receives dry portland cement and sodium sulfide flake from commercial or other on-site sources by way of storage or staging facilities in the project work area. Also, reuse water from the contaminated water holding tank is used for dissolving sodium sulfide flake and ferrous sulfate granules. All containers and buckets that contain reagents will have 704 (diamond) labels. All reagent charges prepared in this process unit are consumed either in chemical stabilization (Unit "C") or in solidification treatment (Unit "D").

3.6.1 Task 19 - Dissolution and Dispensing of Sodium Sulfide Charges

Dry sodium sulfide flake and reuse water from the contaminated water storage tank will be added to a 55-gallon drum and mixed with a plastic paddle or a 1/2-inch drive right-angle drill fitted with paint paddles. The pH of the dilution water will be checked before sodium sulfide is added. If pH is less than 7.0, the pH of the dilution water will be adjusted with sodium hydroxide to ensure that it is alkaline. Either mixing method is effective because sodium sulfide readily dissolves in water. Sodium sulfide will be dissolved at a standard concentration according to the Design Recipe, but usually will be between 3.5 and 10.0 percent by weight. Charges of sodium sulfide solution will be dipped from the makeup drum using charge buckets with lids and carried to the mixers by the reagent makeup operator or the mix unit operator. Any buckets or containers that contain Empty charge buckets will be returned to the reagent makeup area to be refilled. A pallet jack may be used to ease the movement of fully laden charge buckets between the dispensing location and the mixers.

In the early part of the project, an existing 3.5 percent sodium sulfide solution will be supplied by FERMCO. The sulfide solution will be transferred into 55-gallon drums by FERMCO personnel and delivered to the Plant 6 work area. Project personnel will move the drums to the Reagent Makeup area and dispense as previously described. The only difference is that this sodium sulfide is already in solution, and does not require dissolving.

Some Mixing Drums may contain marginally too much water at the time of sulfide addition. In these cases, the sodium sulfide can be added to the waste in the form of dry flakes that will dissolve during the mixing operation.

3.6.2 Task 20 - Dissolution and Dispensing of Ferrous Sulfate Charges

In the barium/chromium stabilization step, ferrous sulfate will be used. This chemical will be received in drums in a dry crystalline form, which must be dissolved in reuse water before it is added to the waste being treated under the mixer. The method of dissolving, dispensing and transporting ferrous sulfate will be the same as described above, except that ferrous sulfate will be dissolved to make 10 or 20 percent solutions. Also, there is no need to check or adjust pH of the reuse water prior to dissolving ferrous sulfate.

3.6.3 Task 21 - Dispensing of Portland Cement Charges

Portland cement will be received in bulk shipments by pneumatic tanker and stored in a silo located immediately outside the Plant 6 work area. A screw feeder will be used to transport portland cement from the silo to a dispensing station inside the building. At the dispensing station, an operator will fill charge buckets with portland cement and carry those charge buckets to the mixer locations, to ensure a steady flow of measured portland cement charges to both Perma-Fix Mix Units. He will bring empty charge buckets back to the dispensing station to be refilled. A pallet jack may be used to ease the movement of loaded charge buckets from the dispensing area to the mixer locations.

3.7 Operations Document Control

Maintaining project documentation is critical to maintaining the "pedigree" for the treated waste, which NTS requires. The two key operations documents that establish the pedigree of the waste are the Operations Log Sheet and the Sample Chain-of-Custody Form.

3.7.1 Operations Log Sheet

The primary operations document is the Operations Log Sheet, which was previously described in detail in the foregoing Section 3.0 discussions. When each log sheet is completed, the Decant Operator collects them, verifies that all required information has been properly recorded. At the end of the day, he delivers the accumulated Operations Log Sheets to the Process Supervisor who reviews them with the Project Manager and then places them in the project file.

3.7.2 Sample Chain-of-Custody

The document which establishes the pedigree of waste samples collected after waste treatment is the Sample Chain-of-Custody Form. This document provides a record of the following information for each sample collected during the project.

Sample ID Number
Waste Group Number
Mixing Drum Number
Date/Time of Sampling
Name of Sampler
Names of Each Person Having Custody
Name of Lab or FERMCO Person Receiving Sample

Completed Sample Chain-of-Custody Forms accompany the sample as it moves from the sample location to the laboratory or archive. When the sample custody transfers from Perma-Fix to any other organization, the persons giving and receiving the sample will sign and date the form, and a carbon or carbon-less copy will be detached and retained by Perma-Fix. The copy of the Chain-of-Custody Form will be placed in the Project Files. When analytical results are returned from the laboratory, the completed Chain-of-Custody Form for each sample will accompany the analysis report. These documents will also be placed in the Project Files.

4.0 Process Change Control

The application of the Perma-Fix Proce[illegible] to each specific waste stream to be treated is governed by the design recipe established for each waste during bench scale optimization testing. The Raw Waste Profile, the Prescribed Dosages and the Performance Specifications determined during the bench-scale optimization tests are posted in the Design Recipe Notice at each operator work station.

4.1 Control of the Design Recipe and Performance Specifications

The Process Supervisor has overall control of the design recipe and its associated performance specifications. He posts the Design Recipe Notice at each work station, in a location that is easily observable by the operator(s) working at each station. It is the operator's duty to follow the guidance of these posted notices in performing his tasks. The operator may use his own judgment in exceeding the minimum requirements of the design recipe if he determines this action to be necessary to meet the performance specifications. However, he may not decrease any specified dosages or mixing times.

If the Mix Unit Operator finds that he must consistently add additional reagent dosages, or if feedback analyses indicate a deficiency of the design recipe, the design recipe may be changed by the Process Supervisor. In order to change the design recipe and the performance specifications of the process, bench scale tests must be performed to determine what process control parameters need to be changed, and by how much. Then, the Process Supervisor prepares and posts new Design Recipe Notice at each operator work location. The operators are not authorized to implement any changes to the design recipe or performance specifications until the new notices have been posted by the Process Supervisor. If necessary to prevent further treatment of waste with an inadequate design recipe, operations may be halted by the Process Supervisor, until a new recipe can be developed and implemented.

4.2 Documentation of Process Changes

The Process Supervisor will maintain a Process Change Log Sheet and a file of all Design Recipe Notices throughout the project. The Process Change Log Sheet will document the starting and ending dates and times over which each a particular design recipe were in effect. It will also record the pertinent starting and ending identification numbers, including:

Original Container Inventory Number
Mixing Drum ID Number
White Metal Box (WMB) ID Number
Sample ID Numbers

The file will include copies of each Design Recipe Notice that was posted in the work area.

5.0 Personnel Qualifications

All process operators and the Process Supervisor assigned to this project will be trained, experienced and motivated individuals and will additionally meet the following requirements.

- Satisfactory completion of OSHA Hazardous Waste Operator (HAZWOPER) 40-hour training per 29 CFR 1910.120

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- Satisfactory completion of OSHA Hazardous Waste Operator (HAZWOPER) 8-hour annual refresher training per 29 CFR 1910.120
- Satisfactory completion of annual General Employee Training (GET) for the Fernald Site
- Satisfactory completion of Site Worker Training, Radworker II (RADII) Training, and RAD II Test and Practice Exercise
- Physicians certification for work on hazardous waste sites.
- Valid and current Respirator Fit Certification
- Satisfactory completion of Energy Control (Lock and Tag) Training.

Operators who will perform waste stabilization using the Perma-Fix Mix Unit, shall have demonstrated competence with the Perma-Fix Process, including Mix Unit operation and chemical treatment.

Operators who will operate lift-trucks and drum rotators shall have demonstrated competence with these types of equipment, per 29 CFR 1910.178.

Operators who will operate the shredder will be required to satisfactorily complete project-specific training, based on manufacturer's safe operating recommendations.

Operators who will perform sampling of wastes will be required to demonstrate knowledge of Chapter 1 of the EPA manual *Test Methods for Evaluating Solid Waste (SW-846)*, and the *FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1.*

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Attachment A

Design Recipe Notice

Design Recipe Notice

Waste Category Designation _____

Posting Date_____ Posting Time_____

Raw Waste Profile

Color_____
Texture_____

Free Water
Content _____

Macro Solids_____
_____
_____

pH_____

Freeboard _____ inches.

Prescribed Dosages

1. Adjust pH to _____,
with _____.

2. Stabilize Barium & Chromium
with _____ Gallons of _____%
Ferrous Sulfate, Mix _____ min.

3. Adjust pH to _____,
with_____.

4. Allow to Soak _____ hrs.

5. Stabilize all metals with
_____ Gallons of_____%
Sodium Sulfide, Mix _____ min.

6. Add solidification reagent
_____ lbs/gallons of Type ____
Portland Cement, Mix _____ min.

Performance Specifications

Final Color of Treated Waste _____.

Final Texture of Treated Waste _____.

Lead Acetate Test Color Intensity Value, _____ minimum (CIV).

Slump Test Value, _____ maximum (inches).
_____ minimum (inches).

Attachment B

Operations Log Sheet

Operations Log Sheet

A. – Waste/Sample Log-In and Traceability

Log-In Date: Log-In Time:
MEF Number: Waste Group Number:
Original Container Number:
Mixing Drum ID Number:
White Metal Box ID Number:

Waste Acceptance Sample Numbers:	Project Archive Sample Numbers:
Grab:	Grab:
Composite:	Composite

B. – Drum Deheading and Inspection

Real Time Radiography Notes:

Date and Time of Deheading and Inspection Beginning Date/Time: Ending Date/Time:

Outer Container Size:	U.S. Gallons	Opened (O) or Deheaded (D):	LEL Meter Reading:	Est. Free Water Removed:	U.S. Gallons
1st Inner Container Size:	U.S. Gallons	Opened (O) or Deheaded (D):	LEL Meter Reading:	Est. Free Water Removed:	U.S. Gallons
2nd Inner Container Size:	U.S. Gallons	Opened (O) or Deheaded (D):	LEL Meter Reading:	Est. Free Water Removed:	U.S. Gallons
3rd Inner Container Size:	U.S. Gallons	Opened (O) or Deheaded (D):	LEL Meter Reading:	Est. Free Water Removed:	U.S. Gallons
4th Inner Container Size:	U.S. Gallons	Opened (O) or Deheaded (D):	LEL Meter Reading:	Est. Free Water Removed:	U.S. Gallons
5th Inner Container Size:	U.S. Gallons	Opened (O) or Deheaded (D):	LEL Meter Reading:	Est. Free Water Removed:	U.S. Gallons

Number of Original Containers to Staging:

C. – Waste Feed Preparation

Beginning Date/Time: Ending Date/Time:
Original Container Number: Compatible Waste Group (CWG) Number:
Estimated Waste Volumes: Pre-Screening: U.S. Gal. Post-Screening: U.S. Gallons
Mixing Drum ID Number: Freeboard Level in Mixing Drum:
Estimated Water Added U.S. Gallons

D. – Macro Solids Sorting and Shredding

Date/Time of Receipt: Ending Date/Time of Solids Shredding and Transfer:

Estimated Volume of Shreddable Solids: U.S. Gallons Description of Shreddable Solids: Is This Waste Being Reprocessed after WAC Failure ? (Yes/No)

Estimated Volume of Unshreddable Solids: U.S. Gallons Description of Unshreddable Solids: Unshreddable Solids Destination: (Check One) FERMCO Staging Area (Recyclable Solids) FERMCO Staging Area (Non-recyclable Solids) Decanting and Curing Area

Estimated Volume of Shredded Solids Added to the Mixing Drum: U.S. Gallons

E. – Chemical Stabilization Treatment

Log-In of Waste: Initial Waste Conditions: Color:
Mixing Drum ID Number: Waste Group ID Number: Texture:
pH:

E-1 Barium / Chromium Reduction Step:

Beginning Date/Time: Reaction (Soak) Period (hours): Ending Date/Time:
pH Adjustment Chemical Added: Concentration of pH Adjustment Chemical: Amount Added:
pH After Adjustment:
Reducing Agent Added: Concentration of Reducing Reagent: Amount Added:

E-2 pH Readjusment / Ammonia Off-Gasing Step:

pH Readjustment Chemical Added: Concentration of pH Readjustment Chemical: Amount Added:
Mixing Time Minutes Reaction (Soak) Time Provided: Hours

Waste Conditions at End of Pretreatment Steps: Color: pH:
Texture:

E-3 Sodium Sulfide Treatment Step:

Log-In of Waste: Initial Waste Conditions: Color:
Texture:
Mixing Drum ID Number: Waste Group ID Number: pH:
Beginning Date/Time: Ending Date/Time:
Concentration of Sodium Sulfide Added: wt. %

Treatment to the Reaction End Point:

					Lead-Acetate Tests:
Initial Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	CIV:
Second Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	CIV:
Third Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	CIV:
Fourth Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	CIV:

F. – Solidification Treatment

Mixing Drum ID Number: Waste Group ID Number: Initial Waste Conditions: Color:
Beginning Date/Time: Ending Date/Time: Texture:
pH:

Type of Pozzolan Added: Type Portland Cement Source:

Treatment to the Meet Performance Specifications:

					ASTM Slump Spot Check:	Waste Conditions Spot Check: Color: Texture: pH:
Initial Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	Inches:	
Second Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	Inches:	
Third Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	Inches:	
Fourth Dose Added:	U.S. Gallons	Mix Time	Minutes	Mix Speed (High/Med/Low)	Inches:	

G. – Decanting, Sampling, Curing and Reclaim

Decanting:

Mixing Drum ID Number: Waste Group ID Number: White Metal Box ID Number:
Date/Time:

Sampling: Sample Indentification Numbers:

Waste Acceptance Samples: AAA - BB/CC - DDDD - E Feedback Samples: AAA - BB/CC - DDDD - E

500 Milliliter Grab: WAC - / - - 500 Milliliter Grab: PFB - / - -

BB - 2 Digit Month Code CC - 2 Digit Year Code DDDD - 4 Digit Serial No. E - 1 Digit Split Sample Code

Reclaim:
Failure to Set ? (Yes/No):
Amount of Additional Pozzolan Added:

Failure to Pass TCLP ? (Yes/No):
New Waste Group Number:
Reclaim Drum ID Number:

Co-disposal of Unshreddable Solids
Description of Solids Sent to WMB:

Observations of Set & Cure (In WMB):

Penetrometer Readings: PSI
12 hour
24 hour
48 hour
72
96 hour

Notes:

Observations of Set & Cure (In Sample Containers):

Penetrometer Readings: PSI
12 hour
24 hour
48 hour
72
96 hour

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APPENDIX B

SAMPLING AND ANALYSIS PLAN

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FERNALD MIXED WASTE STABILIZATION PROJECT

Sampling and Analysis Plan

Revision 0

July 28, 1995

PERMA-FIX Environmental Services, Inc. (PESI)

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FERNALD MIXED WASTE STABILIZATION PROJECT

Sampling and Analysis Plan

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Attachment A - Table of Random Numbers

FERNALD MIXED WASTE STABILIZATION PROJECT

SAMPLING AND ANALYSIS PLAN

1.0 INTRODUCTION

This Sampling and Analysis Plan provides the rationale and detailed approach for conducting sampling and analysis activities for the Fernald Mixed Waste Stabilization Project. These activities will be conducted to acquire the necessary data to confirm the treatment adequacy of the mixed wastes processed during this project. This plan applies only to sampling for the purpose of analysis in a chemical laboratory. In-process quality control testing, in real time, is addressed in other sections of the Work Plan (Volume I of the Plans and Procedures Manual) and Process Operations Procedure 2.10, in Section 2.0 of Volume II.

1.1 Purpose

The purpose of sampling and analysis is to provide evidence that the process and the Design Recipe have met the Waste Acceptance Criteria of NTS, which are to demontrate documented compliance with Title 40, Code of Federal Regulations (CFR) 261 through 268. All waste will be considered mixed waste until chemical analysis can document that the waste contains no characteristics of hazardous wastes as identified in 40 CFR 261.

1.2 Objectives

The sampling and analysis objectives during treatment of mixed wastes are to evaluate the stabilization of RCRA heavy metals, by the treatment process and the Design Recipe employed.

1.3 Scope

Grab samples will be collected, packaged, labeled, stored, cured and transferred by Perma-Fix Team personnel in accordance with the *FEMP Containerized Waste Sampling and Analysis Plan, Rev.1*, the project-specific requirements described below, and the supporting procedures SMP-7.2, 7.3 and 7.4, in the Volume II Procedures Manual. Two grab samples will be taken from each 55-gallon mixing drum, at the time when the treated waste is decanted from the mixing drum into a White Metal Box (WMB). These samples will be allowed to set and cure, and then will be archived in the project area until representative samples are selected from the archives to be analyzed. One sample from each mixing drum will be placed in a Waste Acceptance Archive. The other sample will be placed in the Process Feedback Archive. The Perma-Fix Team will be responsible for sampling and sample documentation, but FERMCO and their laboratory subcontractors will be responsible for sample analysis and reporting of results. The Perma-Fix Team also will be responsible for managing and maintaining the security of the sample archives.

FERMCO Sampling and Analysis Department will randomly select a statistically significant number of grab samples from the Waste Acceptance Archive for analysis. Each waste acceptance grab sample selected from the archive will be extracted by the Toxicity Characteristic Leaching Procedure (TCLP) and the extract will be analyzed as needed for waste acceptance purposes. For waste acceptance samples, the analytes will be selected based on the NTS Waste Acceptance Criteria, as set forth in *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements*, NVO-325 (Rev.1).

For process feedback samples, only the eight RCRA metals will be analyzed for total metals content. If any analyte is reported back at greater than 20 times the Regulatory Level shown in Section 2.5 (the TCLP test includes a 20 to 1 dilution), a TCLP analysis will be preformed.

2.0 APPROACH

The approach for sampling and analysis is to perform these activities according to established procedures which are designed to ensure the adequacy, representativeness, security, and traceability of samples from the moment each sample is collected, until it is analyzed in the laboratory and the results are reported back to the project office. Sample Management Procedures are included in Section 7.0 of Volume II of the Plans and Procedures Manual. Sampling and analysis include the following activities:

Sample Collection and Handling
Sample Security and Storage
Sample Custody Transfer
Sample Documentation
Sample Analysis

2.1 Sample Collection and Handling

Sample collection and handling address the frequency of sampling, and how samples are taken from a larger waste mass, packaged, labeled, and marked to ensure that the sample is representative of the larger waste mass. Sample Management Procedure, SMP-7.2, describes the methods to be employed in collecting a grab sample, packaging that sample, marking and labeling the container, and documenting the sampling activity on the Operations Log Sheet.

2.2 Sample Security and Storage

In order to maintain the usefulness of a waste sample for waste acceptance or process feedback purposes, it is necessary to store the sample in a secure location, where it will remain free from tampering, or accidental damage. Sample storage and security is especially important for this project, because samples will be collected before the waste/grout mixture sets.

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It is the responsibility of every person having custody of a sample to maintain the security of that sample while it is in their custody. A sample is considered in custody if:

- It is in the person's actual possession.
- It is in the person's view after being in his possession.
- It is in the person's possession and secured to prevent tampering.
- It is in a designated secure area which is restricted to authorized personnel.

After the treated waste sample has been collected, packaged, tamper indicating device attached, labeled and marked, it must be stored while it solidifies into a solid monolith, and cures. Since solidification may take as long as 24 to 48 hours, the storage location must be secure from access by unauthorized personnel. For this project, samples and their documentation will be stored in a locked metal cabinet until setting and initial curing have been completed. Only the Process Supervisor and the Project Manager will have keys to the sample storage cabinet. At the beginning of each break, and at the end of each operating day, all accumulated samples will be locked inside the secure storage cabinet, before the person having custody may leave the project work area.

2.3 Sample Custody Transfer

Since the Perma-Fix Team is responsible for sampling and FERMCO or another subcontractor is responsible for sample transportation and analysis, it is necessary that transfer of samples from one party to another be fully documented. Documentation must completely identify the sample(s), the date and time of sampling, the sampler's name, the laboratory analyses requested for each sample, the date and time at which custody of the sample transfers to another party, and the identity of each party having custody.

For this project, chain-of-custody will be in accordance with the *FEMP Containerized Waste Sampling and Analysis Plan, Rev.1*. When properly executed, an unbroken evidentiary trail for the sample is provided from the time of collection to the time of analysis and reporting. At each transfer of sample custody, the party relinquishing custody of the sample signs a Chain-of-Custody Form and records the date and time of the transfer, and the party receiving the sample does the same. The procedures for completing the Chain-of-Custody Form are included in SMP-7.2, in Section 7.0 of Volume II of the Plans and Procedures Manual.

2.4 Sample Documentation

There are two primary means of documenting sampling and sample custody transfers; the Chain-of-Custody Form discussed in the previous section, and the Operations Log Sheet. The Operations Log Sheet is a document which travels with the waste containers through the process, and is used by the operator at each work station to make a permanent record of required data, test results, and observations. Since the Operations Log Sheet contains a record of the Original Waste Container Inventory Number, the Waste Group Number, the MEF Number, the Mixing Drum ID Number, the White Metal Box ID Number, and the Sample ID Number, it provides a backup record for sample and waste traceability. The combination of the Chain-of-Custody Form, the Operations Log Sheet, and the Laboratory Analysis Report for a specific waste sample provides complete documentation of the treatment, sampling and analysis of the waste in question.

All documentation will be completed in waterproof black or blue ink. Corrections must be marked with a single line, dated, and initialed. Handwritten documents must be legible. Serialized documents are not to be destroyed or discarded, even if illegible or inaccurate. Voided entries must be maintained with project files.

2.5 Sample Analysis

Analysis of samples will be for two purposes; process feedback control and waste acceptance. The analyses to be performed in each case will be specified on the Chain-of-Custody Form.

In the case of the process feedback control samples, each sample will be initially analyzed for total metals, specifically the eight RCRA metals listed below. Only if an analysis report indicates total metals in excess of 20 times the Regulatory Level as defined in 40 CFR 261.24, Table 1.-Maximum Concentration of Contaminants for the Toxicity Characteristic, will the sample be subjected to the TCLP extraction. Extracts from process feedback control samples will be analyzed for the eight RCRA metals, and the results compared with the Regulatory Level for each analyte.

Parameter	EPA Waste Code	40 CFR 261.24, Table 1 Regulatory Levels (mg/L)
Arsenic	D004	5.0
Barium	D005	100
Cadmium	D006	1.0
Chromium	D007	5.0
Lead	D008	5.0
Mercury	D009	0.20
Selenium	D010	1.0
Silver	D011	5.0

In the case of the waste acceptance samples, each sample will be subjected to the TCLP extraction procedure for the eight RCRA metals listed above. The TCLP results must be below the Regulatory Levels in 40 CFR 261.24, Table 1 before the waste will be accepted at NTS.

3.0 SAMPLING

3.1 Sample Collection and Handling

Two grab samples will be collected from every mixing drum, immediately before the treated waste is decanted into a White Metal Box (WMB). These samples will be collected from the waste at the top of the drum, using a trowel. There is no need to perform in-depth sampling, because the waste has been thoroughly mixed in the mixing drum, before being decanted into the WMB. The sampled material is used to fill two 500 milliliter sample containers. The trowel is used to lightly pack the samples into the containers, so that air voids are eliminated, without undue compressing of the waste. Excess waste material is scraped from the top of the sample container with the trowel.

One of the grab samples will be placed into the Project Feedback Archive, from which one of every 50 samples will be selected for process feedback control analysis. The other grab sample will be placed into the Waste Acceptance Archive, from which FERMCO will randomly select a number of samples, sufficient to attain the 90 percent confidence limit, for waste acceptance analyses. This will demonstrate that the waste meets NVO-325, Rev 1.

An adhesive label will be marked with the following information and then attached to one side of each sample container.

Date/Time of Sampling
Waste Group Number (from Operations Log Sheet)
Mixing Drum ID Number (from Mixing Drum)
WMB ID Number (from WMB)
Sample ID Number (Composed as Shown Below)
Sampler's Name or Initials

The following alphanumeric numbering system will be used in assigning Sample ID Numbers.

AAA - BB/CC - DDDD - E

AAA - A three letter code indicating whether the sample is for waste acceptance purposes (WAC) or for process feedback purposes (PFB).

BB - A two digit code indicating the month when the sample was collected.

CC - A two digit code indicating the year when the sample was collected.

DD - A four digit serial number (assigned to each sample sequentially between 0001 and 9999).

E - A one letter code indicating which of two splits, A or B, the sample is (applies only to split samples).

The same information will be recorded on the Operations Log Sheet and on the Chain-of-Custody Form. The decant operator is responsible for collecting the samples, labeling and marking the sample containers, and maintaining their security during storage. He has official custody of the samples from the time they are collected until they are given to a FERMCO representative for delivery to the laboratory. The decant operator initiates Chain-of-Custody and Operations Log Sheet documentation.

3.2 Sample Security and Storage

Provisions will be made for all archive samples to be stored in locking cabinets, to provide positive protection from sample tampering during storage. Whenever the decant operator leaves the sampling area, for breaks or at the end of the operating day, he must ensure that all paperwork for the samples is complete, and that the samples and their paperwork are stored in the cabinet. The Project Manager and the Process Supervisor will have keys to the cabinet locks. Whenever the sampling area and the archives are unmanned, the cabinets shall be locked. At the beginning of each operating day, and at the end of each crew break, the Process Supervisor must unlock the cabinets.

3.3 Sample Custody Transfer

Transportation and custody of samples from the project work area to the laboratory will involve different persons than those involved in collecting the samples. Maintaining sample security and integrity during transportation is essential to maintaining the usefulness of the sample. The Chain-of-Custody Form previously described will be used to fully document the persons having custody of each sample, and the time periods in which they maintained custody. Prior to relinquishing the sample to the FERMCO representative who transports the sample to the laboratory, a tamper-indicating custody tape will be completed and attached across the closure of the sample container. In order for the container to be opened, the tape would have to be torn. The only personnel authorized to break a sample security tape are the laboratory personnel who will conduct the analyses. A duplicate of the executed Chain-of-Custody Form will be retained by the decant operator and filed in the project files. The remaining Chain-of-Custody package will accompany the sample to the laboratory, and be executed for each subsequent transfer of custody. The transporter and the laboratory will each keep a duplicate of the Chain-of-Custody Form, and the original top sheet will be returned to the Project Office by the laboratory with the Laboratory Analysis Report.

The laboratory personnel receiving the sample are to inspect the sample and its accompanying documentation to verify that all sample containers identified on the Chain-of-Custody Form have been received, that the sample(s) are intact and within their allowable holding times, and that the sample containers have not been previously opened. If the

samples are found in this inspection to be valid, the analysis will be performed immediately and the results reported. If the samples are judged to be invalid, a non-conformance report will be initiated, and the project office will be immediately notified. The sample will either be processed, "as is" with custody failure noted along with the analytical data, or rejected, with sampling rescheduled, if necessary.

Upon sample destruction or disposal of archive samples, the custodian of the archive (the decant operator) or the Project Manager will complete the Chain-of-Custody Record, indicating the fate of the sample. If the samples are packaged for disposal at NTS, the White Metal Box ID Number will be recorded on the Chain-of-Custody Form. The original and at least one duplicate of the Chain-of-Custody Form will be placed into the project file.

3.4 Sample Documentation

As previously described, sample documentation for each sample includes at a minimum the following specific documents:

Operations Log Sheet
Site-wide Analysis Request/Custody Record (Chain-of-Custody Form)
Laboratory Analysis Report

These documents will be compiled into a sample file for each sample collected, and each sample file will be added to the project files. Copies of the forms used on the Fernald Site are included in Appendix D of the *FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1.*

4.0 ANALYSIS

Analytical work will be performed on the process control and waste acceptance samples by FERMCO or their laboratory analytical subcontractor. All sampling and analysis will be compliant with the EPA manual *Test Methods for Evaluating Solid Waste* (SW-846).

4.1 Analysis for Process Control

Process control samples will be analyzed as a predictor of the acceptability of the stabilized waste at Nevada Test Site (NTS). Each sample selected for feedback control analysis will be analyzed first for the eight RCRA metals, on a total metals basis. If the analysis report indicates total metals exceeding 20 times the Regulatory Level (TCLP dilution factor), the sample will be subjected to the TCLP extraction and the extract will be analyzed for the eight RCRA metals previously mentioned.

The analysis of the process control samples will tell if the waste stabilization recipe is reliably producing wastes acceptable to NTS. In the unlikely event that a stabilized waste sample fails, the first step will be to research the operating log around the time of processing

to look for clues, and then verify the accuracy of the laboratory results. If the results are questionable, a second random sample will be made within the population (50 samples) where the sample in question was taken. The objective is to obtain a random samples in which any one individual characteristic found in one sample is likely to be included in any other. The number of confirmatory samples should be large enough to be representative; therefore, at least five more random samples should be taken from the population using the random number table for sample selection.

Should additional sampling indicate process failure, all work will stop and process formulas will be modified. The 50 drum batch of waste represented by the sampling will then be placed on hold until NTS sample analysis results are available and then the 50 drum batch will be reprocessed if necessary.

4.2 Analysis for Waste Acceptance

Samples selected and analyses performed for waste acceptance purposes will be in accordance with the *FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1*, and *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements, NVO-325 (Rev. 1).*

5.0 REFERENCES

The following documents are incorporated into the Sampling and Analysis Plan by reference.

1. *FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1*

2. *Test Method for Evaluating Solid Waste (SW-846)*

3. *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements, NVO-325 (Rev. 1)*

Attachment A

Table of Random Numbers

251630	188970	014150	214129	067312	718571
595768	971114	036525	107629	372393	329505
870011	199278	426340	184776	562236	815436
251863	737509	824449	900504	921737	011470
793997	643971	169205	327821	622024	781759
451972	533283	745225	670451	525624	950966
794648	460855	581519	118782	169303	336183
761608	734325	384145	608332	598301	291413
492036	807126	143870	634580	854092	943522
906318	383847	476141	196374	805132	192246
800887	707488	722567	366616	494316	691931
678724	720000	880890	180029	481331	900541
558343	635352	541310	546655	306931	281846
474457	905617	284811	834799	826841	639528
724848	247425	593485	453524	718619	136741
861119	241816	161871	153342	442767	512211
724746	277370	758319	159970	758616	120826
412282	092904	131413	239219	763611	996794
090767	042351	357417	200699	026374	278464
225011	862790	872401	882819	329593	886279
497211	598620	953678	700441	589973	441482
157868	875508	719152	000231	230280	783326
246869	163439	753634	498916	822360	240086
776378	416056	596173	488670	490907	093399
455479	445874	284050	414980	720288	340607
949504	146521	629028	654158	342434	697835
482593	629593	891704	305520	473721	031750
519302	947665	643829	978293	478940	154687
432444	482775	982096	163646	542584	341145
428207	410888	222885	707401	525704	910350
175514	750489	683860	362880	878739	516059
221223	049031	472877	173343	928304	149117
481210	280580	418671	771059	621065	540785
073950	795521	794405	600604	780334	325852
589055	721639	618498	569932	666067	427929
504352	680467	805648	709971	594813	700622
186542	449103	045547	708185	984996	169614
592164	787417	171983	094557	589317	325726
047670	076544	636637	366947	464958	069170
374038	699590	307943	047180	326825	055111
245991	314083	458897	535841	857710	810559
987871	122147	614713	711812	776743	584853

APPENDIX C

QUALITY ASSURANCE PLAN

DRAFT

Quality Assurance Plan

for the

FERMCO Mixed Waste Treatment Project

Perma-Fix Environmental Services, Inc.

JULY 1995

Revision 0

Perma-Fix Environmental Services, Inc. (PESI)

FERNALD MIXED WASTE STABILIZATION PROJECT

QUALITY ASSURANCE PLAN

Ben R. Crocker, Project ESH&QA Manager
Performance Development Corporation

7/20/95
Date

Tim Kimball, Vice President
Perma-Fix Environmental Services, Inc.

7/20/95
Date

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QUALITY ASSURANCE POLICY STATEMENT

It is the policy of PESI to provide products and services to our customers which meet or exceed their expectations. A central part of this policy is working and managing in a way that provides an objective basis for confidence that we will provide quality products and services while meeting any regulatory requirements imposed by the client or the client's regulatory agencies through the contract, operating licenses, permits, or similar means.

Our Quality Assurance Program is designed to provide this confidence, and to serve as an integral part of our approach to managing the job so that it is completed as scheduled. This program is primarily implemented by line managers and workers, with important supplemental activities being carried out by staff organizations. The integrated execution of all the actions contained in the program by line and staff personnel will provide PESI managers, and the customer, with confidence in the project's results.

The Quality Assurance program, being an integral part of our approach to the job, is not subject to being diminished due to cost, schedule, or other considerations. Performing work in accordance with the requirements of the Quality Assurance program, as contained in the project's procedures, is a condition of employment for all PESI managers and employees.

Tim Kimball, Executive Vice President
Perma-Fix Environmental Services, Inc.

DRAFT QUALITY ASSURANCE PLAN

FERMCO MIXED WASTE MOBILE TREATMENT PROJECT

INTRODUCTION

The purpose of the PESI Quality Assurance Plan for the FERMCO Mixed Waste Mobile Treatment Project is to document the overall approach to be used on this project for Quality Assurance activities. This applies to the activities that comprise the full life-cycle of the project, from mobilization of facilities, equipment, and personnel; through the treatment and packaging of waste; to project de-mobilization activities. Quality Assurance activities include all those actions that provide confidence in the quality of the final product, and the process that produced it. These activities are carried out by a combination of all project participants. This includes those involved in planning, performing, and assessing work and work results.

The PESI Quality Assurance Program meets the requirements of FERMCO specification RM-0012. Therefore, it also meets the requirements of ANSI/ASME NQA-1, EPA QAMS-005/80, DOE Order 5700.6c, and 10 CFR 830.120. For each work item or activity, RM-0012 requirements are selectively applied based on the item or activity's importance to health and safety, potential risk to the environment, or significance in meeting project objectives.

The scope and rigor of the individual assuring actions that collectively comprise the PESI Quality Assurance Program are anchored in the fact that the Perma-fix process is a known technology with a well-defined operating envelope that is implemented by well-trained and experienced operators and managers. Most assuring actions, therefore, are the responsibility of line managers and workers. The approach to Quality Assurance for this project emphasizes providing confidence that these people will do the right job right the first time by integrating the vast majority of assuring actions into the work process itself. Program-level assuring actions necessary to strengthen this approach are carried out by staff specialists in planning, Quality Assurance, Health and Safety, and similar disciplines.

The PESI Quality Assurance Program is composed of assuring activities related to ten criteria that are grouped under three functional categories: Management, Performance, and Assessment. The assuring activities to be applied in these areas are described below. The program will be implemented for all phases of the project. The elements of the program, and their associated documents, will be modified as needed based on data gained from operating experience.

FUNCTIONAL CATEGORY A: MANAGEMENT

Criterion 1.0: Program

The program is documented in the PESI Quality Assurance Policy Statement, in this Quality Assurance Plan, in the Quality Assurance Program Procedures, and in the Project Procedures that govern the conduct of Perma-Fix work under this contract. All participants will be certified to have read and understood the program documents that apply to their jobs. Changes to the program based on operating experience or other factors will be reflected in the program documentation, will be made in a controlled manner, and will be transmitted to all concerned.

The program is structured around the principle of line accountability. This means that PESI management is responsible for the implementation of all aspects of the program, and that emphasis is placed in the program design on each individual being responsible for the quality of his/her work. "Quality" work includes taking the actions that achieve the desired results and that also provide a basis for confidence in those results.

The organization of the Perma-Fix team is shown in Figure 1. The team is composed of experienced personnel who are responsible for ensuring that all aspects of the Quality Assurance program are implemented. The organizational structure provides for the following:

1. Quality is achieved and maintained by those responsible for performing the work.

2. Quality achievement is verified by persons or organizations not directly responsible for performance of the work.

3. Internal and external organizational interfaces are defined and understood.

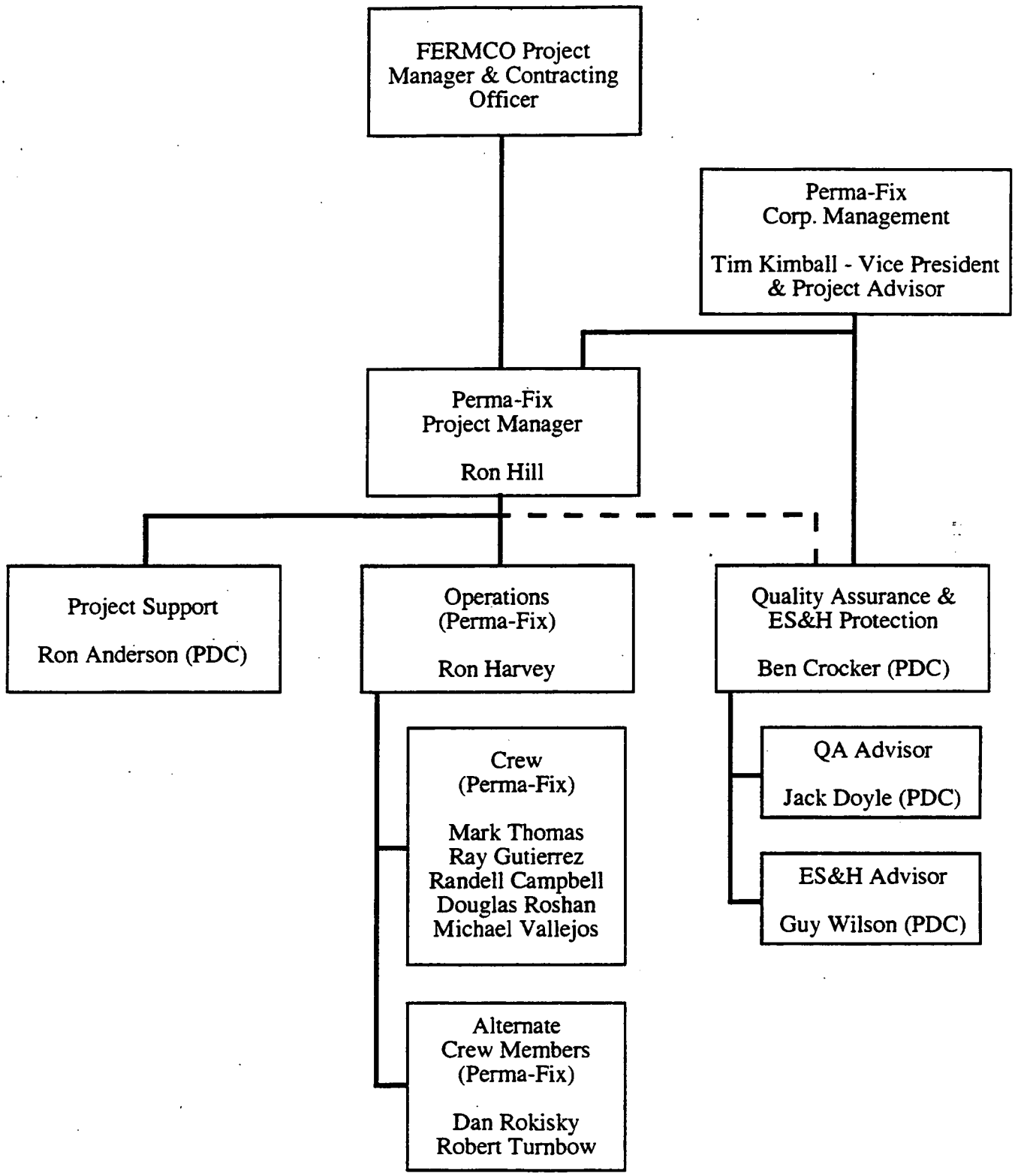
The functions and responsibilities of each position in the project organization are described below.

The Perma-Fix Project Manager reports to the Executive Vice President of Perma-Fix and is responsible for providing the overall policy for activities related to the project. The Project Manager is responsible for the quality of assigned operations, is the main point of contact with FERMCO, and ensures the effective implementation of this quality assurance program plan in functional and technical line organizations as follows:

1. Interfacing with the Quality Assurance Coordinator on all matters pertaining to quality.

2. Ensuring that procedures for controlling work activities and processes are developed, documented, available, clearly understood, controlled, and effectively utilized.

3. Ensuring compliance with applicable federal, state, and local codes, standards, regulations, as well as compliance with commercial practices and standards.



9520-BSB HD-7/20/95

Figure 1

Project Organization Breakdown
FERMCO Mixed Waste Stabilization Project

4. Ensuring that project programmatic and operational objectives are accomplished through an effective quality assurance program.

5. Reviewing and approving this plan and ensuring its requirements are satisfied.

6. Supervising the performance of project team members.

7. Ensuring that project deliverables are reviewed for technical accuracy and completeness including data validation before release to FERMCO.

8. Assigning duties to project members and providing orientation to the needs and requirements of this project.

The Perma-Fix Operations, Supervisors and Senior Operators report to the Project Manager. They ensure the quality of operations delegated by the Project Manager as follows:

1. Planning and implementing the appropriate requirements as the designated representative of the Project Manager.

2. Providing the personnel, resources, and equipment necessary to ensure that the services and support provided meet the quality assurance requirements of this plan.

3. Interfacing with the Quality Assurance Coordinator on matters concerning quality.

4. Ensuring that quality related issues and problems are identified and reported and that actions are taken to correct them.

5. Other responsibilities as requested by the Project Manager.

The Health and Safety Coordinator reports directly to the Executive Vice President and is responsible for ensuring the implementation of the procedures controlling radiation and industrial safety activities. This supervisor is also responsible for the appropriate training of personnel, conduct of surveys, and the collection and recording of appropriate radiation data and industrial safety data. The Health and Safety Supervisor has the authority to delay or stop activities upon observing an unsafe condition or for any anticipated adverse condition.

The Quality Assurance Coordinator reports to the Executive Vice President and has been delegated the authority for the effective implementation of quality assurance requirements for appropriate segments of this project. The Quality Assurance Coordinator has sufficient independence from the line functions and cost and schedule considerations. The Quality Assurance Coordinator also assists the Project Manager and the responsible technical supervisors and coordinators as follows:

1. Serving as the formal contact for the project's quality assurance matters.

2. Actively identifying and responding to quality assurance and quality control needs, resolving problems, and providing requests for guidance or assistance.

3. Reviewing, evaluating, and approving quality related changes to the project's operational plans.

4. Actively tracking the progress of the process tasks in this project and consulting periodically with the Project Manager and the Executive Vice President.

5. Verifying that the appropriate corrective actions are taken for Nonconformances.

6. Verifying that the appropriate methods are specified and accomplished for obtaining required data of known quality and integrity.

7. Scheduling and performing the appropriate verification activities to ensure compliance with requirements and procedures and to provide input for the development of quality improvement actions which could provide any needed management control enhancements and improve overall project effectiveness.

8. Assisting coordinators and supervisors in determining requirements for instructions, procedures, and drawings to support process activities.

9. Preparing and submitting quality assurance and quality control reports to the Project Manager.

10. Initiating stop work if appropriate.

11. Maintaining appropriate documentation and quality records.

12. Fulfilling other responsibilities as requested by the Project Manager.

The Quality Assurance Program will be binding on all project personnel, including those having responsibility for planning and scheduling. Perma-Fix management will take necessary actions to ensure that the Quality Assurance Program is understood and implemented by project participants.

Any project participant can stop work if an unsafe condition exists, or is thought to exist. Under normal circumstances, the Quality Assurance Coordinator will issue Stop Work orders, This person will also control the resumption of work to ensure that the conditions that brought the stop-work about are corrected before work is resumed. This incudes further processing, deliver, installation, or use of any Nonconforming items. The Quality Assurance Coordinator will have the authority to ensure that planning and scheduling considerations do not override safety, quality, or environmental protection considerations.

Criterion 2.0: PERSONNEL TRAINING AND QUALIFICATION

The Quality Assurance Coordinator will serve as the training coordinator for the project. This person will ensure that all project personnel receive FERMCO-required site training, that they have read and understood all operating procedures that pertain to their jobs, and that they understand both the letter and spirit of the Quality Assurance program that governs their work.

Only personnel with demonstrated capabilities and experience will be assigned project tasks. Initial training needed will be limited to that required by FERMCO. The Quality Assurance Coordinator will coordinate with FERMCO prior to the start of project activities to identify any legally required training so that it can be provided before work begins.
New training needs that arise will be identified and dealt with by the Quality Assurance Coordinator.

If FERMCO training personnel provide the required training, they will maintain the training records generated and will provide copies to the Quality Assurance Coordinator. Training records generated by PESI will be maintained as project records and will be turned over to FERMCO as part of the final records turnover package.

Criterion 3.0: QUALITY IMPROVEMENT

This project will be guided by the principle of continuous improvement. This will include practices designed to enhance quality by initiating improvements in work methods, processes, equipment, systems, documentation, training, and other aspects of the project and its implementation.

All workers and managers will be empowered to identify quality problems with items or processes; halt, curtail, or modify operations when necessary, and take actions to solve the problem. This will be accomplished through a prescribed and controlled system. Actions to solve the problem will include an identification of the causes of the problem, a set of actions to be taken to eliminate those causes, and a set of actions to be taken to prevent their recurrence. Significant quality problems will be identified to FERMCO upon discovery, and a copy of all written documents related to them will be provided. Corrective actions and actions to prevent recurrence will be approved by FERMCO.

Nonconforming items will be controlled to prevent inadvertent test, installation, or use. Nonconforming items will be dispositioned as follows:

Use-as-is
Repair
Rework
Scrap

Decisions to "use-as-is," "repair," or "rework" will be approved by FERMCO. Reworked or replaced items will be inspected and tested in accordance with the original requirements. Repaired items will be inspected and tested in accordance with specified alternatives to the original requirements.

The Project Manager and the Quality Assurance Coordinator will regularly examine daily operating experience, assessment results, and similar data sources to identify adverse trends and determine how to address them.

Criterion 4.0: DOCUMENTS AND RECORDS

Documented instructions are maintained for the preparation, issuance, and change of documents that specify quality requirements or prescribe activities affecting quality. These documents include records, drawings, specifications, procedures, and similar documents. These documents are controlled to ensure that correct documents are being used, are available at the location in which they are to be used, and are properly stored. At a minimum, the documented instructions provide for the following:

- Identification of documents to be controlled
- Identification of personnel, positions, and organizations responsible for preparing, reviewing, approving, changing, and issuing documents
- Review of documents for adequacy, completeness, and correctness prior to approval and issuance
- Classification and identification of documents for non record or record files
- Storage instructions

The instructions include distribution lists for the various types of documents to be issued. Distribution lists are limited to persons who need the information. Lists are periodically updated, and documents are approved for release by authorized personnel.

Documents that establish policies, prescribe work, specify requirements or establish design will be controlled in the above manner and will be designated Quality Assurance Records. Quality Assurance Records will not be erased or obliterated when revised. Instead, a line will be drawn through errors or items deleted. The person making the revision will initial and date the revision.

Criterion 5.0: WORK PROCESSES

Work will be performed to established technical standards and administrative controls. Work will be planned, authorized and accomplished under controlled conditions using technical standards, instructions, procedures, or other appropriate means.

Persons performing work are responsible for the quality of their work. Management will review work and related information to ensure that the desired quality is being achieved and to identify areas needing improvement.

Perma-Fix personnel will identify work activities and special processes (as required by specifications) and translate these specification requirements into working Project Procedures to be used to accomplish the scope of the work. These procedures will contain methods for on-site storage of items and materials that have been inspected and released for use. Measuring and test equipment for monitoring and data collection will be of the accuracy and type suitable for the intended use and will be controlled to ensure proper calibration, maintenance, and use. The objective for measurement of data is to provide adequate control and review so that the measurements and data collected by Perma-Fix are scientifically sound, defensible, and of known and documented quality.

Project Procedures define how containers of contaminated materials (for storage or processing) are uniquely identified. Items procured in quantity or off-the-shelf that do not have specific material, test, or inspection requirements are identified by the catalog number, standard identification number on the container, or in the shipping information. Waste receipts and shipment records for burial or storage are maintained in accordance with a Project Procedure, which specifies hold points for any necessary quality control checks.

Project Procedures prescribe controls to prevent damage or loss and to minimize deterioration to limited-life materials.

Criterion 6.0: DESIGN CONTROL

This project includes no design activities *per se*. All equipment is available from catalogs and off-the-shelf sources, so additional engineering is not needed. When Nonconforming items are dispositioned as "use-as is" or "repair", PESI and FERMCO will identify and complete all required reviews to ensure that items are subjected to the same degree of rigor as the original design.

Project mobilization activities have a critical enough impact on overall project success, however, to merit being treated in a manner that is very similar to the way in which design activities would be treated. Therefore, PESI will apply a number of design control activities to this phase of the project. Project plans and schedules will be reviewed much as a design would. Lists of equipment, facility layouts, and infrastructure descriptions will also be reviewed. Such items will be placed under configuration control, and changes to them will be subject to the same rigor as they received initially.

Criterion 7.0: PROCUREMENT

Control activities for items and services procured for this project are conducted in accordance with the applicable quality assurance requirements. Items and services are normally purchased as standard off-the-shelf or readily available services. Special instructions and controls are not usually required. Subcontractors are not expected to be used.

Items requiring special quality attributes are evaluated to ensure that they meet their intended use. As part of this evaluation, FERMCO will have the right of access to Perma-Fix's work area and offices, and all sub-tier vendors/suppliers for pre-award assessments and in-process audits, surveillances, and/or inspections as deemed appropriate.

Procurement activities are specified, reviewed, and controlled for any unique safety-related items. (Purchase of such items will be documented to show catalog items, supplier and any documentation from the supplier as to the grade or nature of the items or supplies.) Purchase orders are reviewed by engineering and quality assurance personnel who understand the requirements and intent of the procurement process. Procurement documents are controlled in accordance with Section 4.0 of this plan.

Criterion 8.0: INSPECTION AND ACCEPTANCE

All goods supplied will conform to the requirements of applicable purchase orders. Objective evidence of conformance to each specific drawing and specification required by the purchase order will be on file and available for examination by FERMCO.

Inspection checklists are prepared and maintained for quality-related inspections of key items or processes. These activities include checking chemical mixing calculations, sample preparation and collection, and pre-shipment preparation activities, and results are documented.

Project Procedures for controlling tests are prepared, reviewed and controlled in accordance with Section 4.0, "Documents and Records." Inspections are performed by qualified individuals who are independent from those directly responsible for the work. At a minimum, the following reviews and tests are periodically performed on project activities:

- Project Procedures approved for implementation
- Sampling
- Measuring and test equipment (M&TE) calibration
- Training and qualification records
- Proper posting of hazardous material
- Packaging and storage of hazardous material

The Quality Assurance Coordinator selects other areas in which to perform surveillance. The Quality Assurance Coordinator records data or verification of prerequisites, operating steps, or compares data to acceptance criteria delineated in an approved procedure. Results of these surveillances are documented.

Sludge sample testing is to be done by FERMCO. The testing laboratory will implement their approved Quality Assurance Plan.

A Project Procedure is provided for the process measuring equipment used in weighting, making volumetric determinations, etc., along with an Project Procedure for health physics equipment used to measure radiation. A list of M&TE is maintained as a quality record in accordance with Section 4.0. M&TE calibration and routine adjustments are made in accordance with the manufacturer's instructions for accuracy and frequency and will be controlled in accordance with Section 5.0, "Work Processes."

Status indicators are used to prevent the use of defective or otherwise Nonconforming items or materials. Each package returned to FERMCO for eventual disposal has a unique identifier.

Criterion 9.0: MANAGEMENT ASSESSMENT

The PESI project Manager will periodically, in coordination with the Quality Assurance Coordinator, conduct management assessments of project operations. These management assessments will normally be accomplished through review of daily operating logs, inspection and test results, and similar data; daily overview of the project's work processes and results; and review of the result of independent assessments by the Quality Assurance Coordinator. Formal assessment activities, such as surveillance, will not normally be needed but may be scheduled and conducted by the Project Manager if the need arises.

Criterion 10.0: INDEPENDENT ASSESSMENT

The Quality Assurance Coordinator is responsible for planning and performing assessments of key project activities and processes at scheduled intervals and on a random basis. Prepared checklists will be used during the conduct of the assessments. Assessment results will be transmitted to those affected, including the Executive Vice President. The PESI corrective action system will be used to ensure that all assessment results are reviewed, evaluated, and acted upon by the appropriate levels of management.

APPENDIX D

HEALTH AND SAFETY PLAN

UNCONTROLLED

Fernald Environmental

FERMCO

Restoration Management Corporation

FERNALD ENVIRONMENTAL

RESTORATION MANAGEMENT CORPORATION

PROJECT SPECIFIC HEALTH & SAFETY PLAN FOR FERNALD MIXED WASTE STABILIZATION PROJECT (MWSP)

JULY 1995

REV 0

EMERGENCY PHONE NUMBER 648-6511 RADIO: "CONTROL"

APPROVALS:

R W Kasparek 7/28/95

Dick Kasparek, Project Manager — Date

D L Mills 7/28/95

Daryl Mills, Construction Safety & Health Manager — Date

Carla J Hood 7/28/95

Carla Hood, FERMCO Health & Safety Officer — Date

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LIST OF ATTACHMENTS

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B. Personnel Environmental Monitoring and Action Levels

C. FEMP Rally Points

D. Location of FEMP Medical Facility

E. Work Area Material Safety Data Sheets (MSDSs)

F. Work Area Maps and Process Schematics

G. OSHA and DOE Employee Rights Poster

H. Acknowledgement Form

1.0 INTRODUCTION

This Project-Specific Health and Safety Plan (PSHSP) is for the Fernald Environmental Restoration Management Corporation (FERMCO) Mixed Waste Stabilization Project (MWSP). Compliance with this plan is required by all personnel who perform waste stabilization and support activities in association with this project.

All personnel who enter the Exclusion Zone for this project must be orientated to the requirements of this PSHSP and the Project-Specific Health and Safety Requirements Matrix (PSHSRM), Attachment A. After orientation, personnel must sign an Acknowledgement Form (Attachment H) stating they understand and will abide by the conditions of this plan. Acknowledgment Logs will be controlled by FERMCO health and safety personnel.

1.1 Work Area Characterization

The project involves mobilization of skid mounted treatment equipment in the southwest portion of Plant 6 at FEMP (Appendix F). The equipment will be used to physicochemically treat 1,550 barrels of mixed waste. The drums will be of five general waste categories, grit blast residues, solidified furnace salts, sump cakes, construction rubble, and miscellaneous trash. The treatment will involve mixing the waste with ferrous sulfate, sodium sulfide and portland cement. Ammonia gas maybe given off during treatment of sump cake. The treated waste will be packaged and will be in a chemical and physical form which meets the waste acceptance criteria (WAC) for disposal at the Nevada Test Site (NTS).

1.2 Work Description

Untreated waste is received in the drum receiving and staging area. Drum overpacks are removed and drums are deheaded. Deheaded drums are dumped onto a sizing screen. Material greater than 2 inches is moved to a ventilated sorting table where macro solids is sorted into three types: shredable, unshredable, and oversized. Shredable macro solids is moved into a shredder, and once it is shredded, it is added to waste in a mixing drum. The waste is mixed with chemical reagents, as required, which reacts with targeted chemicals in the waste. The reacted product is combined with oversized macro solids in product containers, which are transferred to a curing and staging area. Following a quality assurance and waste acceptance review, treated product waste is sent to NTS for disposal.

2.0 ORGANIZATION STRUCTURE AND KEY PERSONNEL RESPONSIBILITIES

The following table shows key personnel, including primary and alternates, for performance of this project.

TITLE	PRIMARY	ALTERNATE
FERMCO		
Manager, Construction Safety and Health Compliance	Daryl Mills	Jack Craighead
Health & Safety Officer	Carla Hood	Jack Craighead
Project Manager, Mixed Waste Stabilization Project	Dick Kasparek	Melissa Thomas
Subcontractor		
Project Manager	Ron Hill	Ron Harvey
Process Supervisor	Ron Harvey	Ray Gutierrez
ES&H Coordinator	Ben Crocker	Ron Anderson
Health & Safety Advisor	Guy Wilson	Jerry Erpenbach
Quality Assurance Advisor	Jack Doyle	Joe Anderson

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3.0 SITE CONTROL

Prior to actual stabilization of waste, the subcontractor's project manager will notify the FERMCO Project Manager that (1) staging is complete, (2) that equipment and chemicals have been received, and (3) that operations can commence. At that time a walkdown of the project work area will be performed. FERMCO staff who will participate in this walkdown include representatives from Industrial Hygiene, Radiological Control, the Process Supervisor, and the Mixed Waste Stabilization Project Health and Safety Officer/Assistant or designee. During the location walkdown, any specific hazards not previously identified will be noted. Hazards will be identified and explained to the project staff during project training.

The location for the Mixed Waste Stabilization Project is the Southwest corner of Plant 6, Appendix F.

3.1 Radiological Areas

Entrances to and perimeters of radiological areas will be defined by yellow and magenta rope or, where practical, by physical structures such as fences or buildings. All radiological areas will be identified by signs having the standard radiation symbol, the magenta trifoil on a yellow background.

The following radiological areas may/will be encountered in the performance of the work in Plant 6:

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

All areas inside the security fence are considered Controlled and Soil Contamination Areas. Plant 6 is a Contamination Area. To enter the Contamination Area (Plant 6) personnel must be briefed and sign off on the Radiological Work Permit (RWP) at the radiological control point.

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

3.2 Exclusion Zone

The Exclusion Zone for the project is shown in Figure F-1 of Appendix F. The Exclusion Zone shall have one ingress and egress point. Access to the Exclusion Zone will be limited to stabilization process technicians, project management staff, FERMCO HSO, IH Technicians, and Radiological Control Technicians (RCTs). All other personnel will be considered visitors.

Exclusion Zone barricades will consist of safety fence. The signs specifying the operation will be posted every twenty five (25) feet around the zone.

Prohibited items or conduct in the Exclusion Zone include:

- Eating, drinking, smoking, or any other activity which could lead to the possibility of hand to mouth exposure of contaminants
- Working when ill or when taking unapproved prescription medication
- Not having the required safety and health training
- Not meeting any other requirement specified in Section 4.0.

4.0 TRAINING

All personnel working in the Contamination and Exclusion Zone will be Radiological Worker II trained. Radiological Worker II trained personnel will have taken General Employee Training (GET), Site Worker Training, Radiological Worker II Training, Construction Rules & Regulations, Respirator Training and have 24 hours of supervised field experience.

4.1 Hazard Communication

4.1.1 Material Safety Data Sheets (MSDSs)

MSDSs for stabilization chemicals and for waste to handled are included in Attachment E. Additional FEMP MSDSs are available through the FERMCO Health and Safety Officer or can be obtained by calling (648)-4000 as needed.

Employees are required to review the MSDSs for products they are using and comply with the health and safety requirements on the MSDSs.

Depending on bench tests as the project progresses, all expected chemicals may not be present. Chemicals which are expected to be present for stabilization or as components of the waste include sodium sulfide, ammonia, type 1 portland cement, ferrous sulfate, Nu-Sal, uranium salts, hydrogen sulfide, sodium bisulfate, caustic soda, quick lime and lead. Propane will be used to fuel the fork lift and carbon monoxide will be generated as a result of fork lift operation.

MSDSs will be posted conspicuously in the work area in accordance with worker's Right-to-Know rules.

4.1.2 Safety Briefings and Meetings

All personnel involved in this project will be given orientation on the PSHSP prior to receiving authorization to begin work. Also, personnel will be briefed on Radiological Control and RWP requirements by an RCT prior to commencement of activities.

Management is to review work tasks with project workers daily and when new tasks are started. The worker is to be informed of the hazards and safety controls for the work being performed.

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

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

All personnel involved in routine daily operations of this project are required to attend all project training sessions and safety briefings.

Written documentation of the briefings and daily tailgate meetings, in the form of attendance sheets, will be maintained, and retained as part of the project's permanent record. File copies will be forwarded to the FERMCO Project Manger.

4.2 Records

Verification of project staffs' attendance of required OSHA and FERMCO site training courses consists of employee training records on file within the FERMCO Training Department, FERMCO Medical Services, the FERMCO Project Manager, and the FERMCO Environmental Division Training

Coordinator. Employees will keep their respirator fit test card and pink training verification card with them at all times.

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

Visitors entering Plant 6 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.
- Wear the required PPE specified on the posted FERMCO Work Permit.

5.0 MEDICAL MONITORING AND SURVEILLANCE

5.1 Requirements

All personnel engaged in the performance of project field activities and on site more than five days, are required to participate in the FEMP medical monitoring program. This program shall include in-vivo whole body monitoring and the routine urine monitoring program.

Incident bioassay samples, initial (end of shift) and post (start of next shift) urine samples for uranium concerns will be required if radiological conditions indicate potential exposures to personnel during the performance of the project. If any confirmed positive results occur, a 24-hour follow-up sample will be initiated by Dosimetry for the affected individual.

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

5.2 RECORDS

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

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This section addresses health and safety hazards which have been identified as being associated with the activities covered by this PSHSP.

Potential hazards to project stabilization process personnel may originate from the chemical, physical, radiological, electrical, and other safety hazards known or suspected to be present in the stabilization process area, the waste, and the stabilization chemicals.

6.1 Radiological Issues

Since inhalation of uranium potentially poses both radiological and toxic hazards, determinations must be made about which is most limiting, and in what situations one hazard or the other can be neglected. When radiological hazards are limiting, chemical hazards can generally be neglected except in overexposure situations. When chemical hazards are limiting, radiological hazards (i.e. organ doses and effective dose equivalents) can be neglected only if radiation doses are below regulatory concern as defined by DOE Order 5480.11. Operations Offices implementing order, or other guidance from DOE or internal dosimetry.

6.2 Industrial Hygiene Issues

6.2.1 Heat Stress

All processing area personnel could potentially be affected by heat stress. In addition to the overall physical condition of processing personnel, other factors such as temperature, relative humidity, work function, intake of fluids, PPE and duration of time exposed to elevated temperatures can greatly affect the degree of heat stress on an individual.

All project personnel will be able to identify the four stages of heat stress, and to be aware of the warning signs and symptoms. The four stages of heat stress, descriptions and symptoms are as follows:

Heat Rash - Often referred to as "prickly heat," is characterized by tiny, raised vesicles on the skin, or blister-like eruptions under the skin. Treatment includes the application of a mild drying lotion to the skin, and seeking medical attention.

Heat Cramps - Characterized by painful muscle spasms. Treatment includes administering liquids, and seeking medical attention.

Heat Exhaustion - Symptoms include pale, cool, moist, skin, heavy sweating, dizziness, nausea, and fainting. Treatment includes rest in a reclining position until water balances are restored, the administration of fluids (no caffeine) and seeking immediate medical attention.

Heat Stroke - By far the most dangerous, and potentially deadly stage of heat stress, is recognized by red, hot, dry skin, a lack of perspiration, nausea, dizziness and confusion, and a strong, rapid pulse. Treatment includes seeking immediate medical attention, and cooling down the affected person by immersion in cool water or by wrapping in a wet sheet with vigorous fanning with cool, dry air.

Fluid Intake During Hot/Humid Workplace Conditions - During hot weather, everyone needs to consciously increase their fluid intake to compensate for increased losses of body water primarily through sweating. Many fluid types can help, however, the National Institute for Occupational Safety and Health (NIOSH) and most scientific studies have determined the best

way to maintain hydration and help prevent heat-related illnesses is the frequent consumption of water.

6.2.2 Chemical Hazards

Chemical hazards will originate from the following sources:

- Waste chemicals
- Waste (radiologically "stable") heavy metals
- Processing chemicals
- Radionuclides (e.g., uranium compounds)

The subsections below describe some of the primary expected hazardous materials and some of their potential effects:

6.2.2.1 Sodium Sulfide (flake)

Sodium Sulfide (flake) is rated as a moderate health hazard, is slightly combustible, and is nonreactive. Acute inhalation results in irritation of nasal and respiratory passages. Sodium sulfide is very toxic when swallowed. Ingestion may result in decomposition to hydrogen sulfide in the stomach with systemic poisoning, and may cause nausea, vomiting, diarrhea, and gastrointestinal irritation. Sodium sulfide is a severe skin and eye irritant, causing chemical burns. Target organs and systems include the respiratory tract, the central nervous system, and the gastrointestinal system. In case of inhalation, remove to fresh air, give artificial respiration if not breathing, and get medical aid. In case of swallowing, do not induce vomiting. Dilute stomach with a large amount of water or milk and get medical aid. In case of skin contact, remove contaminated clothing, rinse skin with running water for at least 15 minutes, and get medical aide. In case of eye contact, flush eyes at once with water for at least 15 minutes and get medical aid. Sodium sulfide is received in flake form and premixed to a 5% solution. It will not be stored in proximity to strong acids.

6.2.2.2 Type I Portland Cement

Type I Portland Cement is rated as a moderate health hazard and is a corrosive and an irritant. It is noncombustible and nonreactive. Inhalation can irritate the upper respiratory system. Wet cement may cause chemical burns. Direct contact with eyes can cause irritation. The cement chemically burns with little warning—little heat is sensed. Wet cement—especially as an ingredient in plastic (unhardened) concrete, mortar, or slurries—can dry the skin and cause chemical burns from inhalation, skin contact, or eye contact. cement dust can cause inflammation of the mucous membranes of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. In case of inhalation, remove to fresh air and give artificial respiration if not breathing. Get medical aid. In case of swallowing, do not induce vomiting. Dilute the stomach content with a large amount of water or milk and get medical aid. In case of skin contact, remove contaminated clothing, rinse the skin with running water for at least 15 minutes, and get medical aid.

6.2.2.3 Ferrous Sulfate, 7-Hydrate

Ferrous sulfate is rated as a slight health hazard, is not combustible, and is not reactive. Inhalation can irritate the respiratory system. Direct contact with the eyes/skin can cause irritation. Ferrous sulfate should be handled in an area with adequate general or local exhaust ventilation to keep fume or dust levels as low as possible. If airborne concentration is high, use

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a dust mask or respirator. In case of inhalation, move the exposed person to fresh air and get medical attention. In case of ingestion, give large amounts of water and get medical attention. Ferrous sulfate will decompose in a fire or explosion to produce toxic sulfur oxide gases. Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode.

6.2.2.4 Nu-Sal

Nu-sal is a mixture of salts (potassium and sodium chloride) present in the waste. Excessive inhalation of suspended dusts of these common salts may produce irritation.

6.2.2.5 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 absorbed through the skin, but constitute a radioactive inhalation hazard to the lungs. The uranium compounds found in the waste to be stablized are the non-soluble type.

6.2.2.6 Carbon Monoxide

Carbon monoxide is a minor constituent of exhaust gas produced by the fossil-fueled fork lift (carbon dioxide is the more prevalent constituent). Carbon monoxide is classified as a moderate health hazard. It is flammable and produces asphyxiation when inhaled.

6.2.2.7 Hydrogen Sulfide

Hydrogen sulfide is a potential byproduct of sodium sulfide use. It poses a high health hazard if present. The most likely route of exposure is by inhalation, and at low concentration, the central nervous system and cardiovascular systems are targeted.

6.2.2.8 Sodium Bisulfate

Sodium bisulfate is a non-to-slightly combustible concrete hardening additive which is classified as a moderate health hazard. Upon inhalation, it effects the respiratory system and subsequently, the central nervous and immune systems.

6.2.2.9 Grit Blast (Black Beauty)

Coal slag type abrasive was typically used at the Fernald site and is present in the waste. This material consists of stable amorphous glass-like compounds. It contains trace quantities of heavy metals present in coal slag. Routes of entry into workers include inhalation and ingestion.

6.2.2.10 Heat Treat Salt

Furnace salt was used in uranium metal heat treating and is present in the waste. The salt used at Fernald is a mixture of sodium chloride and potassium chloride. Routes of entry are inhalation and ingestion.

6.2.2.11 (Sodium Hydroxide) Caustic Soda

Sodium Hydroxide may used during processing as a pH adjuster. Inhalation of low concentrations of sodium hydroxide vapor may cause sore throat and labored breathing and subsequently lung damage. Direct skin contact can produce severe chemical burns with ulceration.

6.2.2.12 Quick Lime (Calcium Hydroxide)

Quick lime may be used as a pH adjuster. Inhalation of suspended dust in low concentrations may cause respiratory distress or lung damage. Direct skin contact may produce acute dermatitis or burns. Considerable heat is liberated when quick lime hydrates on contact with water or available moisture.

6.2.2.13 Ammonia

Ammonia is present in the waste and tends to off gas during stabilization. The health effects of ammonia range from mild irritation to severe corrosion of sensitive membranes. In the concentration expected based on bench testing, irritation would be mild even without engineered controls. Ammonia has great affinity for water and generates significant heat as it dissolves. Therefore, ammonia is particularly irritating to moist skin.

6.2.2.14 Heavy Metals

Lead is present in the grit blast waste stream. Lead dust and pieces of lead metal may be present in other waste streams.

Other heavy metals (barium and chromium) are also present in the waste streams in small amounts. Barium is a toxin to the eyes, respiratory system, heart and central nervous system. Symptoms of barium exposure may include irritation, burns and slow pulse. Chromium is a toxin to the eyes and skin. Symptoms of chromium exposure may include irritation and sensitization dermatitis. Hexavalent chromium compounds are human lung carcinogens.

6.2.2.15 Other Chemical Hazards

Other hazards associated with the chemicals discussed above are identified in greater detail in the MSDSs in Attachment E to this PSHSP.

6.3 Safety Issues

The following safety issues have been evaluated during the preparation of this PSHSP.

6.3.1 Physical Hazards

6.3.1.1 Lifting

All employees are trained to use the proper posture when lifting in order to minimize the probability of a lifting accident or injury. Lifting on the project will comply with all OSHA requirements. The ES&H Coordinator will monitor lifting of heavy unshreddable objects, buckets of waste, jack hammered rubble, and other heavy loads and will ensure that more than one worker or hoisting equipment is used to assist in lifting loads greater than 50 lbs.

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6.3.1.2 Fork Lift

A propane gas powered fork lift will be used to lift heavy items such as loaded waste packages. To the extent practical, process stabilization technicians will maintain safe clearance from the fork lift when it is in operation. All fork-lift operators will have received fork-lift operations training.

The fork lift will be inspected by FERMCO before entering the FEMP site and daily and periodically by Perma-Fix. All inspections will be conducted in accordance with the DOE Hoisting and Rigging Manual and are to be documented. Prior to use, the path of transfer will be walked down to minimize hazards. The ES&H Coordinator will observe all transfers made with the fork-lift truck to ensure that adequate clearances to objects and personnel are maintained. Site hoisting and rigging procedures will be strictly adhered to.

6.3.1.3 Mixer

Because the mixing unit has powerful rotating parts, only trained operators will be permitted in close proximity during operation. To minimize the likelihood of a projectile such as shredded macro solids penetrating the mixing drum, drums of wall thickness equivalent to 17-C or better will be used for mixing. During certain operations and during maintenance, the mixer will be locked out both electrically and hydraulically.

6.3.1.4 Heavy Objects

Waste packages, chemical packages, waste macro solids and other heavy objects will be handled under direct supervision of the Subcontractor's Process Supervisor. A sorting table will be used to minimize dropping macro solids during sorting. A combination of safety shoes and good housekeeping practices will be employed to minimize the hazard of lighter objects that may be dropped. Macro solids exceeding shreddable dimensions and buckets of waste will be limited to 50 lbs per individual lifting. The ES&H Coordinator will verify enforcement of this limit.

6.3.1.5 Pressurized containers (drums)

Pressure may build up in some tightly sealed, unvented drums due to the decomposition of contents. Organic materials, especially in the presence of water, can produce methane or other gases which could cause the container to bulge and/or the lid to blow off when loosened. These gases could be flammable.

6.3.1.6 Shredder and Jack Hammer

Respirator face shields are required to protect workers from flying debris in proximity to the shredder and to an operating jack hammer. The shredder requires electrical lockout/tagout during maintenance.

6.3.1.7 Other Physical Hazards

Additional physical hazards are identified for specific tasks in Attachment A, the PSHSRM.

6.3.2 Electrical Hazards

The GFCI are to be placed at the source of the electrical service to protect both the cord and the devices connected.

Because the portable HEPA units, HEPA vacuums, shredder, mixer power supply, drill, and other equipment require maintenance and repair and depend on electrical power for operation, the potential for electrical shock exists. The likelihood of electrocution is minimized by proper lockout/tagout of power sources during maintenance as shown in Attachment A.

6.3.3 Sanitation

Toilets, showers, and washing facilities have been provided in the clean area, outside the Exclusion Zone. Drinking water is provided within the site building outside the Exclusion Zone. No eating, drinking or smoking is permitted within the Exclusion Area. A safety shower and eye wash are provided within the processing area for emergency use.

If an employee discovers evidence of contamination during frisking, he or she will notify the RCT present. The RCT will supervise and assist in decontamination.

6.4 Fire Protection

The potential for explosion during the performance of project work is minimal. Any welding or work with an open flame will require a FERMCO Open Flame and Welding Permit. To minimize the potential of explosion during electric deheader operation, an LEL head space survey is required to confirm sufficient inertness of head space gas. The fork lift is powered by scented propane to facilitate leak detection and insure ambient concentrations below LEL. approached.

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7.1 Engineering/Administrative Controls

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

- The use of water mist as a dust suppressant.
- Mixer speeds be limited to reduce splash or spinout of materials.
- The use of localized ventilation that will be HEPA filtered and exhausted out of the workplace.
- Drums suspected of being pressurized will be vented prior to opening

Administrative controls anticipated during the work covered by this PSHSP include the following:

- Limited ingress and egress to the waste processing area.
- Decontamination of equipment and personnel genuinely or potentially affected by the presence of inorganic contamination.
- The requirement that only qualified operators are assigned to operate the fork lift, jib crane, mixer, and shredder.
- The requirement that process chemicals will be added in volumes and at rates which limit heat and fume generation.
- The requirements for LEL survey prior to electric deheader operation.
- Lockout both hydraulically and electrically of the mixer during maintenance and certain operations.
- Lockout/tagout of the HEPA units during filter changes.
- Lockout/tagout of various electrically powered equipment during maintenance.
- Sodium sulfide (solid and solutions) will be physically separated from acids during storage and handling so that mixing of the materials does not occur.

7.2 Personal Protective Equipment (PPE)

All persons entering the Contamination Area and Exclusion Zone must wear all PPE posted at the entrance. The posted requirements will include a coverall with hood, safety boots, rubber shoe covers, cotton glove liners, neoprene outer gloves, and an MSA full-face twin-cartridge respirator mask fitted with GME-H combination filter cartridges (or supplied air in place of respirator). All openings such as sleeves, and pants legs will be sealed with tape. Non-porous sleeve covers will also be worn. This equipment will be donned prior to entry and will be doffed during exit through the decontamination line and radiation monitoring station. Drums for accumulation of used PPE will be located prior to the radiation monitoring station within easy reach of exiting personnel. Sticky pads will be taped to the floor at the exit to prevent tracking of contaminants into the clean zone on the soles of shoes.

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 with concurrence of Perma-Fix safety personnel, 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, Perma-Fix safety personnel, 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.

7.3 Monitoring and Sampling

This section explains the general concepts of an air monitoring program and specifies the surveillance activities that will take place during the project. Specific air monitoring requirements are outlined in Attachment B.

Air monitoring identifies and quantifies airborne contaminants to determine the need for and to verify the effectiveness of worker protection. Initial screening for contaminants is often qualitative (i.e., the contaminants, or classes of contaminants, are identified, but their concentration is determined after general airborne levels exceed predetermined limits). Two approaches may identify and/or quantify airborne contaminants:

- Using direct reading instruments on site.

- Collection and laboratory analysis of air samples obtained by gas sampling bags, collection media (filters, tubes), and/or bulk contaminant collection methods (sending solid or liquid samples to the laboratory).

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8.0 DECONTAMINATION

8.1 RADIOLOGICAL DECONTAMINATION REQUIREMENTS

When leaving the Contamination Area in Plant 6, workers are to perform whole body monitoring for radiological contamination by entering the PCMs at the control point. Should the PCM alarm contact the FERMCO RCT immediately.

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

8.1.2 Equipment Decontamination Requirements

Equipment for decontamination of radiological or chemical hazards shall be kept available in the area surrounding the work area exclusion zone. Upon leaving the work area exclusion zone. Workers will doff protective clothing into appropriate containers, frisk, and report personal contamination greater than 1000 dpm/100^2 (unless otherwise specified) or upon alarming the personnel contamination (whole-body) monitor (PCM) and frisk equipment (or have RCT frisk equipment) as per instruction provided in Radiological Worker II training.

Equipment must be monitored by a RCT prior to removal from a radiologically controlled area. Should the subcontractor's tools, material, or equipment become contaminated, they will have to be decontaminated by the subcontractor at its expense, before removal from the area. If decontamination becomes necessary, FERMCO will provide instructions for decontamination. Activities to ensure proper decontamination are expected to include disassembly as required. Tools detected to have fixed contamination may continue to be used in a Contamination Area, though certain conditions regarding allowable usage may be required by the FERMCO Radiological Control Department.

8.2 CHEMICAL DECONTAMINATION REQUIREMENTS

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

9.0 EMERGENCY/CONTINGENCY PLANS

9.1 Reporting

9.1.1 Emergency Numbers

Report all accidents and injuries to the Assistant Emergency Duty Officer (AEDO).

NAME	FEMP TELEPHONE NUMBER	RADIO CONSTRUCTION
Ambulance	648-6511	CONTROL
Hospital		
Fire		
Security		
Emergency Response		
FERMCO HSO	648-4262	967
Assistant Emergency - Duty Officer (AEDO)	648-4749/4444	202
Accountability	648-4111	Control

9.1.2 Site Notification Procedures

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

- Phone 648-6511
- Radio to "Control"

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

9.1.3 What to Report

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

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

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

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

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

9.2 Evacuation Routes/Accountability

Rally Point Accountability

Should a situation require an emergency evacuation of the work area, all equipment should be turned off (if possible) and left in place. All personnel are to proceed to Rally Point 5 located at the corner of 1st and D streets. (See Attachment C.)

9.3 Emergency Equipment

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

9.4 Emergency Response

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

9.4.1 Medical Emergency

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

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

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

Monitoring for personnel contamination shall not delay prompt medical attention. Deviation from procedures governing personnel monitoring is permitted under medical emergency situations.

9.4.2 Fire Emergencies

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

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

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

9.4.3 Explosion Emergencies

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

9.4.4 Chemical Emergencies

9.4.4.1 Personal Contamination

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

9.4.5 Releases

The supervisor-in-charge, AEDO, RCT, and the FERMCO HSO shall be notified of the release.

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10.0 CHANGES/AMENDMENT 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.

10.1 Control of Health and Safety Plan

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

TITLE	INDIVIDUAL
Field Copy	Carla Hood
Project Manager	Dick Kasparek
Project Manager, PESI	Tim Kimbail
Construction Safety	Jack Craighead
FERMCO Health and Safety Officer	Carla Hood
Radiological Control Technicians	Dan Thiel
Radiological Engineering	Scott Toler
Director FERMCO Medical Department	Doran Christensen
Supervisor, Industrial Hygiene Technicians	Jack Patrick
Manager, Industrial Hygiene	Dave Jackson

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

ATTACHMENT A

PROJECT-SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

PROJECT: MIXED WASTE STABILIZATION PROJECT

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

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
1 General Project minimum requirements to access work site NOTE: These general requirements apply to all sections of this matrix	Work on a CERCLA\RCRA\TSDF site Work in radiologically Contamination area (uranium contamination) Plant 6 Not all hazards are specified on this matrix.	Thermoluminescent Dosimeter (TLD) All personnel must perform whole body monitoring for uranium contamination prior to exiting the Contamination and Controlled area 25% of workers will wear BZs for uranium monitoring	• Steel toed safety shoes • Safety glasses w/rigid side shields • FERMCO issued clothing • Cloth Anti-Cs with hood • Full face respirator with combination cartridges • Rubber shoe covers • Surgical gloves	• Site GET Training • Site Worker Training • Rad Worker II Training • 24 Hr. Supervised Field Experience • Respirator training and fit test • Orientation on PSHSP and PSHSRM • Orientation on Project Specific MSDSs • Construction Rules & Regulations Additional for Supervisors: • OSHA Construction Outreach	Medical surveillance exam: baseline, annual, and termination Initial, bi-monthly, annual and termination in-vivo exam (whole body count) Initial, bi-monthly, annual and termination urinalysis Report all injuries to FERMCO Medical Department Medically approved for respirator use	Attend a pre-work kickoff/safety meeting Daily specific task review of matrix	FERMCO Work Permit Radiological Work Permit (RWP)	Personnel and material monitoring required to exit Contamination and Controlled areas.
	Hands off inspections of visiting the work site (Plant 6)	Thermoluminescent Dosimeter (TLD) All personnel must perform whole body monitoring for uranium contamination prior to exiting the Contamination and Controlled area	• Steel toed safety shoes • Safety glasses w/rigid side shields • Smock • Rubber shoe covers • Surgical gloves	Briefing by site supervisor or HSO on current activities, hazards and controls using the PSHSP and PSHSRM Sign the acknowledge form for PSHSP and standing permits		Inspectors and visitors to be escorted by person with Radiological II training unless they are trained to level of workers Visitors must have written permission of FERMCO Radiological Engineering and HSO unless trained to level of workers Prior to entering exclusion zone must contact supervisor		

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PROJECT SPECIFIC HEALTH AND SAFETY REQUIREMENTS MATRIX

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1 General Project minimum requirements to access work site (cont'd) NOTE: These general requirements apply to all sections of this matrix	Lifting injuries			Safety briefing on proper lifting	Report back problems to FERMCO Medical Department	Loads weighing more than 50 lbs. to be moved by more than one person and with mechanical assistance Perma-Fix ES&H Coordinator will monitor heavy lifting		
2 Working with grit blast residue	Lead paint chips	General area monitoring	Leather Gloves	Orientation on MSDS		Perma-Fix ES&H Coordinator to ensure proper placement and use of localized portable ventilation Misting with water will be used to control dust		
3 Working with Solidified Furnace Salts	Sodium and potassium chloride salts	General area monitoring	Rubber Gloves	Orientation on MSDS		Perma-Fix ES&H Coordinator to ensure proper placement and use of localized portable ventilation Misting with water will be used to control dust		
4 Working with Sump Cake	Quick lime (calcium Hydroxide	General area monitoring	Rubber Gloves	Orientation on MSDS		Perma-Fix ES&H Coordinator to ensure proper placement and use of localized portable ventilation Misting with water will be used to control dust		

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5 Working with Construction Rubble and Trash	Physical hazards		Leather gloves	Tailgate Safety Meeting (TSM) on sorting rubble and trash		Loads weighing more than 50 lbs. to be moved by more than one person and with mechanical assistance Perma-Fix ES&H Coordinator will monitor heavy lifting		
	Inhalation of uranium or other heavy metals					Perma-Fix ES&H Coordinator to ensure proper placement and use of localized portable ventilation Misting with water will be used to control dust		
6 Transporting drums by fork-lift truck	Collision or impact with transported load or vehicle			Fork lift driver training and certification		• Operator checks path prior to transport • Operator lifts load only as high as needed • Operator ensures slow transport • Operator sounds alarm during movement • Operator ensures visibility or uses signal man • Operator follows DOE and site hoisting and rigging requirements		

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7 Removing lids from drums (manual or impact wrench) and cutting dun liners	Inhalation of NH_3, CO, or other accumulated offgas of waste	Work place air monitoring for NH_3, CO, organic vapor		TSM on lid removal		Perma-Fix ES&H Coordinator to ensure proper placement and use of localized portable ventilation Contact FERMCO IH when CO, NH3 exceed action levels		
	Cuts and abrasions		Leather gloves			Contact FERMCO HSO		
	Pressurized drum		Leather gloves	TSM on pressurized drum opening		Punch drum with non-sparking tools Use remote punching device Ground drum		
	Inhalation of airborne particulate from drum	Workplace air for uranium				Perma-Fix ES&H Coordinator to ensure proper placement and use of localized portable ventilation Misting with water will be used to control dust		
8 Removing lids from drums (electric deheader)	Explosion burns, explosion pressure concussion, impact of projectile or flying debris	Drum headspace survey for LEL, O_2		TSM or electric deheader operation	Report injury to FERMCO Medical Department	Operator uses non-sparking punch tool to penetrate lid Perma-Fix ES&H Coordinator monitors headspace gas prior to deheading		
9 Lifting drums with jib hoist	Crushing from drum dropped on foot or other part of body			TSM on use of jib hoist	Report injury to FERMCO Medical Department	Perma-Fix ES&H Coordinator monitors compliance with DOE and site hoisting and rigging procedures Rigging fixtures approved by FERMCO HSO		

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9 Lifting drums with jib hoist (cont'd)	Direct exposure to waste on skin in case of drop and rupture					Contact FERMCO IH and RCT upon exposure		
	Inhalation of airborne particulate or gases in case of drum drop and rupture					Perma-Fix ES&H Coordinator ensures placement of localized ventilation		
10 Decanting or transferring liquid drum to drum (or to overpack with bucket)	Crushing from bucket dropped on foot or other part of body			TSM on decanting	Report injury to FERMCO Medical Department	Perma-Fix ES&H Coordinator ensures buckets are less than 50 lbs.		
	Back injury or slip and fall				Report injury to FERMCO Medical Department	Loads weighing more than 50 lbs. to be moved by more than one person and with mechanical assistance Perma-Fix ES&H Coordinator will monitor heavy lifting		
	Direct exposure to waste on skin		Water resistant protective clothing in place of cloth anti-c's		Report injury to FERMCO Medical Department	Contact FERMCO HSO, IH or RCT upon exposure		
11 Rinsing drums, buckets, tools, etc. with hose	Direct exposure to waste on skin		Water resistant protective clothing in place of cloth anti-c's	TSM on rinsing		Contact FERMCO HSO, IH and RCT upon exposure		
12 Operating air-driven diaphragm pump	Direct exposure to waste as a result of splash			TSM on pump operation		Contact FERMCO HSO, IH and RCT upon exposure		

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13 Lift drum with drum rotator	Crushing foot or other body parts upon drop			TSM on rotator use	Report injury to FERMCO Medical Department	Operator lifts and transports slowly Operator follows observer's hand signals Operator limits lift to required height Operator ensures good grip and positioning		
14 Visually checking tipped drums to confirm material release	Crushing or impalement by falling debris			TSM on tipped drum release	Report injury to FERMCO Medical Department	Operator uses mirror to avoid placing head under waste container		
15 Manually assisting release of waste from tipped drums	Crushing foot or other body parts upon drop				Report injury to FERMCO Medical Department	Operator lifts and transports slowly Operator follows observer's hand signals Operator limits lift to required height Operator ensures good grip and positioning		
	Inhalation of NH_3, CO or other accumulated off gas	Work place air monitoring for NH_3, CO, organic vapor				Perma-Fix ES&H Coordinator ensures placement of localized ventilation		
	Release of dust (uranium)					Misting with water		
	Direct exposure to waste as a result of rupture or splash				Report injury to FERMCO Medical Department	Contact FERMCO IH or HP upon exposure		
16 Manually separating waste from debris on bar screen with pry bars, etc.	Slip and Fall Back injury or sprain			TSM on bar screen operations	Report injury to FERMCO Medical Department	Perma-Fix ES&H Coordinator ensures compliance with OSHA and site requirements on ladder or steps		

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16 Manually separating waste from debris on bar screen with pry bars, etc. (cont'd)	Release of dust (uranium)					Misting with water		
17 Mixing waste using hydraulic powered mixer	Direct exposure due to splashing		Water resistant anti-c inplace of cloth anti-c's			Contact FERMCO IH & HP upon exposure Operator lowers RPM if splashing observed		
	Inhalation of CO, NH_3, rad or chemically toxic particulate, or treatment reagent due to splashing and off gassing	Ammonia four times daily				Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
18 Removal of mixer assembly from waste	Direct exposure of skin to waste or treatment reagents due to centripetal slinging on removal		Water resistant anti-c inplace of cloth anti-c's			Operator is sure mixer has ceased rotation prior to lifting		
19 Addition and mixing of sodium bisulfate	Inhalation of sodium bisulfate			TSM on MSDS for $NaHSO_4$		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Skin exposure to sodium bisulfate		Rubber gloves			Contact FERMCO IH & HP upon exposure		
20 Addition and mixing of ferrous sulfate	Inhalation of ferrous sulfate			TSM on MSDS for $FeSO_4$		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Skin exposure to ferrous sulfate		Rubber gloves			Contact FERMCO IH & HP upon exposure		

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21 Addition and mixing of unslaked lime	Inhalation of lime			TSM on MSDS for CaOH		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Skin exposure to lime		Rubber gloves			Contact FERMCO IH & HP upon exposure		
22 Handling of caustic soda (addition and mixing)	Inhalation of caustic soda			TSM on MSDS for NaOH		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Skin exposure to caustic soda		Rubber gloves					
23 Handling (addition and mixing) of sodium sulfide flake or liquid	Inhalation of sodium sulfide powder or hydrogen sulfide gas	Monitor for H_2S during mixing		TSM on NaS and H_2S		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Skin exposure to sodium sulfide powder or liquid. hydrogen sulfide gas. or sulfuric acids		Rubber gloves					
24 Slaking Lime	Inhalation of unslaked or slaked lime			TSM on MSDS for lime		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Direct skin contact with unslaked or slaked lime		Rubber gloves	TSM on lime slaking				
25 Addition and mixing of Type II Portland Cement	Inhalation			TSM on Portland Cement		Perma-Fix ES&H Coordinator ensures placement and proper use of localized ventilation		
	Skin exposure to Portland Cement							

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26 Checking pH. slump, specific gravity, and checking sulfide end point with lead acetate paper	Skin exposure to waste		Rubber gloves	TSM on field checks				
27 Hand addition of shredded waste into mix unit	Impalement by projectile laceration, or by slip and fall		Leather gloves	TSM on handling shredded waste		Add materials only when mixing blades are stopped		
28 Cleaning mixer blades with spatula	Collision, crushing, dismemberment, or decapitation from accidental start of unit			TSM on blade cleaning				
29 Transferring oversize debris to White Metal Box	Back injury and slip and fall			TSM on White Metal Box loading		Loads weighing more than 50 lbs. to be moved by more than one person and with mechanical assistance Perma-Fix ES&H Coordinator will monitor heavy lifting		
30 Bailing unset waste from White Metal Box	Back injury and slip and fall		Water resistant anti-c' inplace of cloth anti-c's Rubber gloves	TSM on bailing				
31 Mixing unset waste in White Metal Box with hand held drill and paddle	Wrist sprain		Water resistant anti-c' inplace of cloth anti-c's Rubber gloves	TSM on drill mixing				
32 Breaking up TCLP rejected waste in White Metal Box with jack hammer	Inhalation of airborne particulate			TSM on jack hammering waste		Perma-Fix ES&H Coordinator ensures proper placement and operation of localized portable ventilation Misting with water will be used to control dust		
	Noise	FERMCO evaluation	Hearing protection (ear plugs/muffs) shall be worn for exposures ≥ 85 dBA and exposures ≥ 85 dBA 8 Hr. TWA	Employees exposed to sound levels ≥ 85 dBA 8 hr. TWA shall be in a Hearing Conservation Program	Employees exposed to sound levels ≥ 85 dBA 8 hr. TWA shall be in a Audiometric testing program	Post area as hazardous noise area - hearing protection required.		

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33 Load drums with jack-hammered waste using shovels	Back injury. slip and fall			TSM on unloading boxes		Loads weighing more than 50 lbs. to be moved by more than one person and with mechanical assistance Perma-Fix ES&H Coordinator will monitor heavy lifting		
34 Shred TCLP-rejected jack-hammered waste in shredder	Inhalation of airborne particulate			TSM on shredding reject waste		Perma-Fix ES&H Coordinator ensures proper placement and operation of localized portable ventilation Misting with water will be used to control dust		
	Noise	FERMCO evaluation	Hearing protection (ear plugs/muffs) shall be worn for exposures ≥ 85 dBA and exposures ≥ 85 dBA 8 Hr. TWA	Employees exposed to sound levels ≥ 85 dBA 8 hr. TWA shall be in a Hearing Conservation Program	Employees exposed to sound levels ≥ 85 dBA 8 hr. TWA shall be in a Audiometric testing program	Post area as hazardous noise area - hearing protection required.		
35 Maintenance of shredder	Dismemberment. shredding of limbs. etc.. on accidental start			TSM on shredder		Perma-Fix ES&H Coordinator to ensure lockout/tagout Perma-Fix ES&H Coordinator to supervise use of localized ventilation and continuously supervise work		
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
36 Maintenance of portable HEPA unit	Collision or dismemberment on accidental start			TSM on HEPA				
	Inhalation of resuspended particulate					Perma-Fix ES&H Coordinator to supervise use of localized ventilation and continuously supervise work		
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
37 Maintenance of HEPA Vacuum	Collision or dismemberment on accidental start			TSM on HEPA Vacuum				

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37 Maintenance of HEPA Vacuum (cont'd)	Inhalation of resuspended particulate					Perma-Fix ES&H Coordinator to supervise use of localized ventilation and continuously supervise work		
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
38 Maintenance of mixer	Collision, dismemberment, or decapitation on accidental startup							
39 Maintenance of drill	Electrocution			TSM on drill				
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
40 Maintenance of jack hammer	Foot or hand injury from dropped part			TSM on jack hammer				
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
41 Maintenance of fork lift	Crushing injury, or injury from fire or explosion			TSM on fork lift				
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
42 Maintenance of electric deheader	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
43 Maintenance of pneumatic operated pump	Foot or hand injury from dropped part			TSM on pump				
	Equipment start-up from stored energy			Involved personnel to be trained to FERMCO SSOP-0719		Lock and Tag to be conducted in accordance with FERMCO SSOP-0719	Energy Isolation Plan	
44 Filter or pre-filter changeout on portable HEPA units	Inhalation of resuspended particulate			TSM on filter changeout		Perma-Fix ES&H Coordinator to supervise use of localized ventilation and continuously supervise work		
45 Decontamination and demobilization	Personnel Injury		Leather gloves					All debris created during activities to be removed

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ATTACHMENT B

PERSONNEL ENVIRONMENTAL MONITORING ACTION LEVELS

RADIOLOGICAL CONTROL ACTION LEVEL

MEASUREMENT	LEVEL	ACTION/RESPIRATORY PROTECTION NOTE 1,2,3
Alpha Probe	1000 dpm/100cm² (Uranium loose limit)20dpm/100cm² (Thorium loose limit)	Contact Radiological Control Technician @ ext. 9244.
Beta/Gamma Probe	1,000dpm/100cm²	Contact Radiological Control Technician @ ext. 9244.
U-238, Th-230, and Th-232	> 0.10 x DAC NOTE 4	Area posted as "Airborne Radioactivity Area"
U-238, Th-230, and Th-232	> 1.0 x DAC	Full-faced air purifying respirator with anti-C hood
U-238, Th-230, and Th-232	> 5.0 x DAC	Hooded air-supplied respirator
U-238, Th-230, and Th-232	> 10.0 x DAC	Contact Radiological Engineering
U-238, Th-230, and Th-232	> 40.0 x DAC	Invivo and/or Invitro sampling required by RC Dosimetry.
Rn-220	> 0.1 WL	Area posted as "Airborne Radioactivity Area"
Rn-220 daughters	< 0.25 Work Level (WL)	None
Rn-220 daughters	0.25 - 5.0 WL	Full-faced air purifying respirator (Hood required)
Rn-220 daughters	> 5.0 WL	Hooded air supplied respirator
Rn-222 daughters	> .033 WL	Area posted as "Airborne Radioactivity Area"
Rn-222 daughters	< 0.075 WL	None
Rn-222 daughters	0.075 - 1.65 WL	Full-faced air purifying respirator (Hood required)
Rn-222 daughters	> 1.65 - 33.0 WL	Hooded air-supplied respirator
Rn-222 daughters	> 33.0 WL	SCBA or air-supplied bubble suit

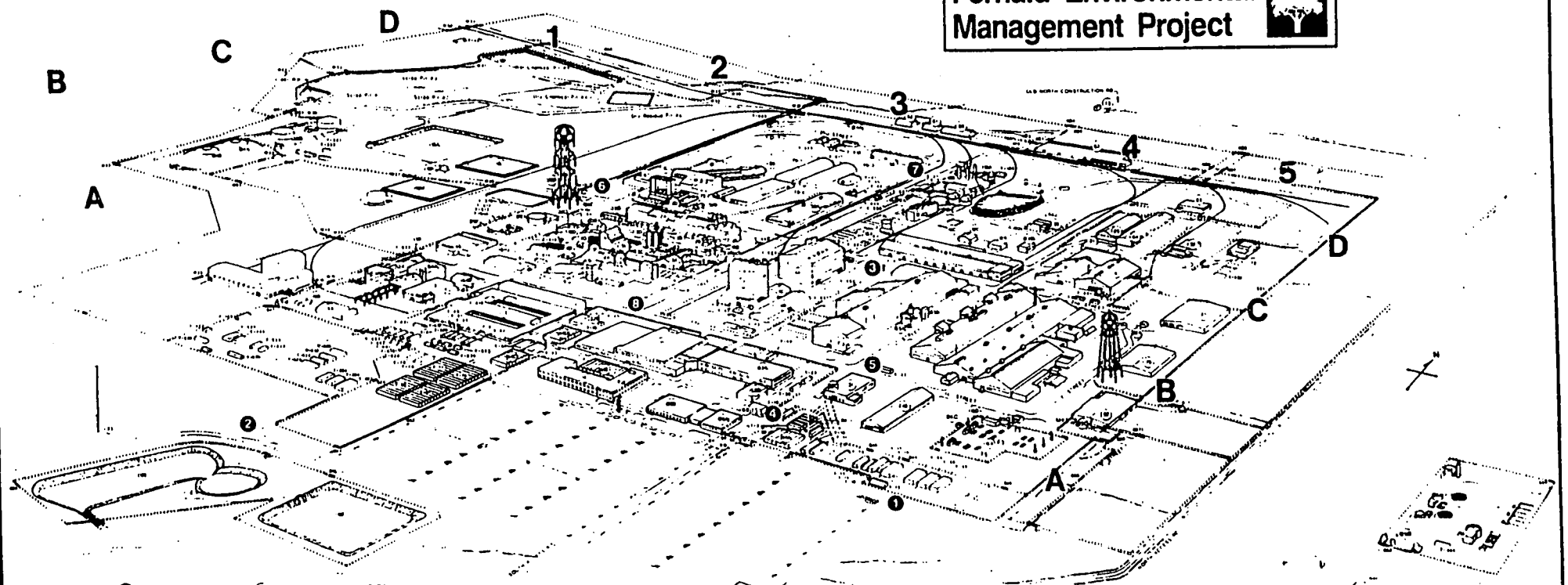
1. Area shall be posted as an "Airborne Radioactivity Area", based on air sample results, by the Radiological Control Technician.
2. Air sample results which indicate that individuals may have been exposed to 4 DAC-hours or more per week shall trigger internal dosimetry assessment (e.g. invitro and/or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

INDUSTRIAL HYGIENE PERSONNEL AND ENVIRONMENTAL MONITORING ACTION LEVELS		
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 contaminants.
Total dust	> 0.02 mg/m^3	• Contact FERMCO IH • Use air purifying respirator • Check engineering and administrative controls • Identify contaminant by air sampling or by process knowledge. Establish measurement methods, action levels, and action for the contaminant found.
Explosive gases	>25% LEL	• Contact FERMCO Fire and Safety
	100% LEL	• Withdraw from area and re-evaluate activities
Ammonia	>10 ppm	• Use air purifying respirator • Contact FERMCO IH • Check engineering and administrative controls
	>25 ppm	• Withdraw and re-evaluate activities
Hydrogen Sulfide	Detection to 5 ppm	• Contact FERMCO IH • Check engineering and administrative controls
	>10 ppm	• Withdraw and re-evaluate activities
Carbon monoxide	Detection to 10 ppm	• Contact FERMCO IH • Check engineering and administrative controls
	>25 ppm	• Withdraw and re-evaluate activities

ATTACHMENT C

FEMP RALLY POINTS

Fernald Environmental Management Project



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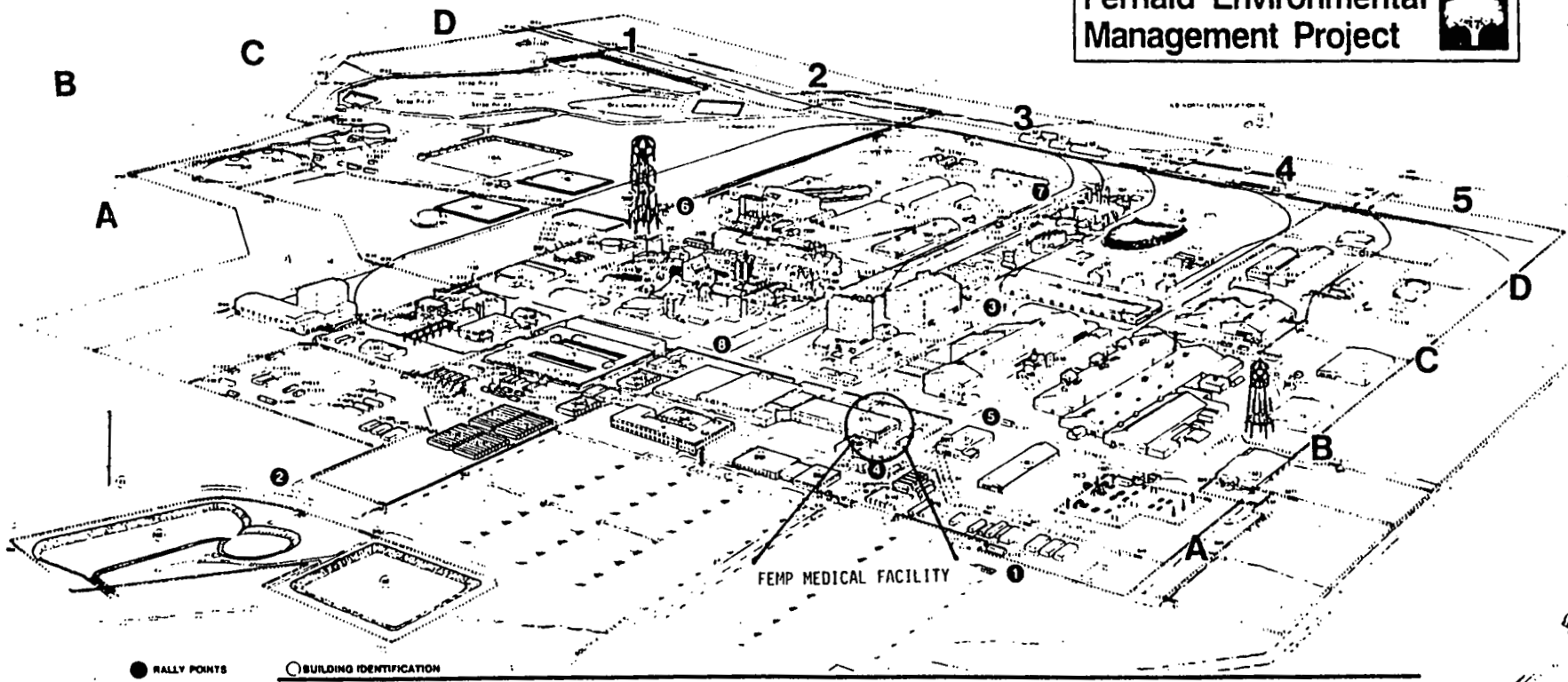
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Recycled and Recyclable

ATTACHMENT D

LOCATION OF FEMP MEDICAL FACILITY

Fernald Environmental Management Project



Recycled and Recyclable

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ATTACHMENT E

WORK AREA MATERIAL SAFETY DATA SHEETS (MSDSs)

- 7168

MATERIAL SAFETY DATA SHEET

MSDS CODE NO. 5B81-83 ORIGINAL ISSUE DATE: 8/85 REVISED 2/94

I. IDENTIFICATION

24 HOUR EMERGENCY TELEPHONE NUMBER
CHEMTREC 800-424-9300

RODUCT NAME: Anhydrous Ammonia
OMMON NAME: Ammonia
HIPPING NAME: Ammonia, Anhydrous, Liquefied, 2.2
UN 1005, RQ, Inhalation Hazard.

MANUFACTURER AND/OR DISTRIBUTOR:
LaRoche Industries Inc.
1100 Johnson Ferry Road N.E.
Atlanta, GA 30342
(404) 851-0300; (404) 491-7987 after hours
Prepared By: R. C. Cannon

II. INGREDIENTS AND RECOMMENDED OCCUPATIONAL EXPOSURE LIMITS

MATERIAL	FORMULA	CAS. NO.:	%WT.		EXPOSURE LIMITS		
					OSHA-PEL	ACGIH	
			C-Grade	P-Grade		TLV	STEL
Ammonia	NH_3	7664-41-7	99.5	99.995	50 ppm	25 ppm	35 ppm
Water	H_2O	7732-18-5	0.4	33 ppm	None Established	None Established	
Oil	—	—	0.1	2 ppm	5mg/M³	5mg/M³	—

III. PHYSICAL DATA

OILING POINT (°F) —28.1°	SPECIFIC GRAVITY (H_2O=1) 0.62 @ 60°F
ELTING POINT (°F) —107.9°	PERCENT VOLATILE BY VOLUME (%) 100
APOR PRESSURE (mm Hg.) 4802.9 (94 psi) @ 60°F	pH Approx. 11.6 for 1 N Soln in water
APOR DENSITY (AIR=1) 0.60 @ 32°F	SOLUBILITY IN WATER 33% (Wt.) @ 68°F

PPEARANCE AND ODOR: Colorless gas or liquid with extremely pungent odor.

V. FIRE AND EXPLOSION HAZARD DATA

ASH POINT (method used) Not Applicable
AMMABLE LIMITS 16-25% in air

NFPA HAZARD RATING			
	HEALTH	3	(High)
	FIRE	1	(Slight)
	REACTIVITY	0	(Least)

TINGUISHING MEDIA: With a source of ignition, ammonia will burn in the range of 16-25% in air. Use water fog or spray to extinguish flames.

PECIAL FIRE FIGHTING PROCEDURES: Stop flow of gas; move containers from fire zone if possible. Stay clear of tank heads. Use water cool fire-exposed containers and protect personnel. Use water spray to control vapors. Personnel must be equipped with appropriate protective thing and respiratory equipment. Do not put water on liquid ammonia.

V. REACTIVITY DATA

STABILITY	Unstable	
	Stable	X

CONDITIONS TO AVOID: Heating above ambient temperatures causes the vapor pressure of ammonia to increase rapidly.

COMPATIBILITY: Ammonia can react violently with strong acids. Under certain conditions, ammonia reacts with bromine, chlorine, fluorine odine to form compounds which explode spontaneously. Reactions of ammonia with gold, silver or mercury to form explosive fulminate-like npounds have been reported.

AZARDOUS DECOMPOSITION PRODUCTS: Hydrogen on heating to over 850°F. The decomposition temperature may be lowered to 5°F by contact with certain metals such as nickel.

HAZARDOUS POLYMERIZATION	May Occur	
	Will Not Occur	X

CONDITIONS TO AVOID: Not Applicable

TE: Anhydrous Ammonia is subject to the reporting requirements of SARA (1986, section 313 of Title III) and 40 CFR Part 372.

VI. SPILL OR LEAK PROCEDURES

TRANSPORTATION EMERGENCIES
Call CHEMTREC 800-424-9300

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED: Stop leak if feasible. Avoid breathing ammonia. Evacuate personnel not equipped with protective clothing and equipment. Use copious amounts of water spray or fog to absorb ammonia vapor. DO NOT put water on liquid ammonia. Contain run-off to prevent ammonia from entering a stream, lake, sewer or ditch.

Release of 100 lbs. or more of ammonia within 24 hours must be reported to the National Response Center at 800-424-8802, as well as appropriate local and state agencies. Immediate (within minutes) reporting is required.

WASTE DISPOSAL METHOD:
Recover ammonia if feasible. Otherwise, let ammonia evaporate if appropriate. Only personnel experienced in ammonia spills should add water to liquid ammonia. Dispose of diluted ammonia as a fertilizer or in an industrial process.

EPA Waste Identification No.: Not Applicable

For hazardous waste regulations, call the RCRA Hotline at 800-424-9346.

VII. HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE:

IDLH Level=500 ppm

MAJOR EXPOSURE HAZARD

[X] INHALATION [X] SKIN CONTACT [X] EYE CONTACT [ ] INGESTION

Ammonia is a strong alkali and readily damages all body tissues. Ammonia is not a cumulative metabolic poison, nor is it a listed carcinogen by IARC, NPT or OSHA. **Inhalation:** Depending on exposure concentration and duration, effects can vary from none or only mild irritation, to obstruction of breathing from laryngeal and bronchial spasm, to edema and severe damage of the mucous membranes of the respiratory tract with possible fatal results. Latent edema and residual reduction in pulmonary function may occur. **Skin Contact:** Prolonged contact with high concentrations can cause painful tissue damage, frostbite and serious chemical burns. **Eye Contact:** Exposure to liquid or high concentrations of vapor can cause painful, instant and possibly irreversible damage to tissues such as the conjunctiva, cornea and lens. Glaucoma and opacities may occur. **Ingestion:** Tissue damage, chemical burns, nausea and vomiting can occur. Ammonia is a gas under normal atmospheric conditions and ingestion is unlikely.

EMERGENCY AND FIRST AID PROCEDURES:
Eye Contact: Flush with large amount of water for at least 15 minutes then immediately seek medical aid. **Inhalation:** Remove from exposure. If breathing has stopped or is difficult, administer artificial respiration or oxygen as needed. Seek immediate medical aid. **Skin Contact:** Immediately flush with large quantities of water for at least 15 minutes while removing clothing. Clothing frozen to the skin should be thawed with water before removal. Seek immediate medical aid. **Ingestion:** Do not induce vomiting. Have the victim drink large quantities of water if conscious. Immediately seek medical aid. Never give anything by mouth to an unconscious person.

VIII. SPECIAL PROTECTION

RESPIRATORY:
Respiratory protection approved by NIOSH/MSHA for ammonia must be used when exposure limits are exceeded. Whether a chemical cartridge respirator or a self-contained breathing apparatus is sufficient for effective respiratory protection depends on the type and magnitude of exposure.

SKIN:
Rubber gloves and rubber or other types of approved protective clothing should be used to prevent skin contact. A face shield should be used for increased protection from contact with liquid.

EYE:
Chemcial splash goggles, approved for use with ammonia, must be worn to prevent eye contact with liquid or vapor. A face shield should be used for increased protection from contact with liquid.

VENTILATION AND ABSORPTION:
Local positive pressure and/or exhaust ventilation should be used to reduce vapor concentrations in confined spaces. Ammonia vapor, being lighter than air, can be expected to dissipate to the upper atmosphere. Ammonia concentrations may also be reduced by the use of an appropriate absorbent or reactant material.

OTHER PROTECTIVE EQUIPMENT AND MEASURES:
Emergency eyewash stations and deluge showers must be available in the work area. Post a list of emergency response contacts and telephone numbers.

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Refer to the ANSI K61.1 standard for storage and handling information. Protect containers from physical damage and temperatures exceeding 120° F. Use only approved storage systems. Zinc, copper, silver, cadmium and their alloys must not be used in ammonia systems since they can be rapidly corroded by it. Avoid hydrostatic pressure, which can cause equipment rupture, by adhering to proper filling procedures and the use of hydrostatic pressure relief valves where appropriate.

OTHER COMMENTS:
Contact lenses must not be worn when working with ammonia.

This information is taken from sources or based upon data believed to be reliable; however, LaRoche Industries Inc. makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

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

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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

122 -03
ective: 05/01/89

Barium Hydroxide, 8-Hydrate

Issued: 10/03/90

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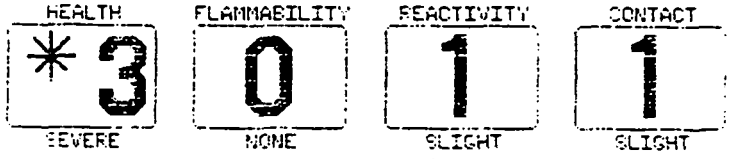
'. BAKER INC., 222 Red School Lane, Phillipsburg, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

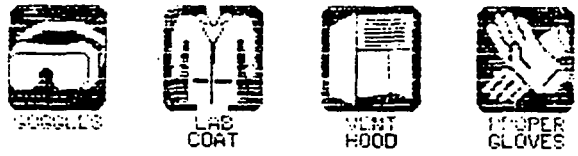
duct Name: Barium Hydroxide, 8-Hydrate
mon Synonyms: Barium Hydroxide, Octahydrate
mical Family: Barium Compounds
mula: $Ba(OH)_2 \cdot 8H_2O$
mula Wt.: 315.48
No.: 12230-71-6
SH/RTECS No.: N/A
duct Use: Laboratory Reagent
duct Codes: 1006

PRECAUTIONARY LABELING

ER SAF-T-DATA* System



ratory Protective Equipment



U.S. Precautionary Labeling

POISON! DANGER!
SE FATAL IF SWALLOWED. CAUSES IRRITATION. MAY CAUSE BURNS. EXCEPTIONAL TH HAZARD: READ MATERIAL SAFETY DATA SHEET.
ot get in eyes, on skin, on clothing. Do not breathe dust. Keep in tly closed container. Use with adequate ventilation. Wash thoroughly r handling.

Continued on Page: 2

PRECAUTIONARY LABELING (CONTINUED)

International Labeling

Harmful by inhalation and if swallowed.
After contact with skin, wash immediately with plenty of soap and water.

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

SECTION II - COMPONENTS

Component	CAS No.	Weight %	OSHA/PEL	ACGIH/TLV
Barium Hydroxide, 8-Hydrate	12230-71-6	90-100	N/E	N/E

SECTION III - PHYSICAL DATA

Boiling Point: N/A

Vapor Pressure (mmHg): 11 (20°C)

Melting Point: 78°C (172°F) (at 760 mm Hg)

Vapor Density (air=1): N/A

Specific Gravity: 2.18 (H_2O=1)

Evaporation Rate: N/A

Solubility(H_2O): Appreciable (>10%)

% 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: Colorless or white crystals. Odorless.

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Continued on Page: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

h Point (Closed Cup): N/A

ignition Temperature: N/A

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

Extinguishing Media
Use extinguishing media appropriate for surrounding fire.

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

ual Fire & Explosion Hazards
None identified.

o Gases Produced
none identified

osion Data-Sensitivity to Mechanical Impact
None identified.

osion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

shold Limit Value (TLV/TWA): 0.5 mg/m³

is for Barium, soluble compounds, as Ba.

t-Term Exposure Limit (STEL): Not Established

ssible Exposure Limit (PEL): 0.5 mg/m³

is for Barium, soluble compounds, as Ba.

city of Components

nformation is available
inogenicity: NTP: No IARC: No Z List: No OSHA Reg: No

SECTION V - HEALTH HAZARD DATA (CONTINUED)

arcinogenicity
None identified.

eproductive Effects
None identified.

ffects of Overexposure

INHALATION: excessive inhalation is irritating, may cause respiratory system damage

SKIN CONTACT: severe irritation or burns, prolonged contact may cause dermatitis

EYE CONTACT: severe irritation or burns

SKIN ABSORPTION: none identified

INGESTION: headache, nausea, vomiting, dizziness, gastrointestinal irritation

CHRONIC EFFECTS: irritation of respiratory system, central nervous system damage, damage to spleen, liver, bone marrow

arget Organs
eyes, skin

edical Conditions Generally Aggravated by Exposure
none identified

rimary Routes of Entry
inhalation, ingestion, absorption, eye contact, skin contact

mergency 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.

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.

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Continued on Page: 5

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SECTION V - HEALTH HAZARD DATA (CONTINUED)

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

e: Yes Chronic: Yes Flammability: No Pressure: No Reactivity: No

emely Hazardous Substance: No
LA Hazardous Substance: No
313 Toxic Chemicals: Yes Contains Barium
Generic Class: C15
Inventory: Yes

SECTION VI - REACTIVITY DATA

ility: Stable Hazardous Polymerization: Will not occur

itions to Avoid: none documented

mpatibles: strong acids

mposition Products: none identified

SECTION VII - SPILL & DISPOSAL PROCEDURES

s 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.

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

Hazardous Waste Number: D005 (EP Toxic Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use general or local exhaust ventilation to meet TLV requirements.

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

Skin Protection: Safety goggles, uniform, apron, rubber gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

NFPA-T-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: Chemicals, n.o.s. (Non-regulated)

International (I.M.O.)

Proper Shipping Name: Barium compounds, n.o.s. (Barium Hydroxide, 8-Hydrate)
Hazard Class: 6.1 I.M.O. Page: 6073
ID: UN1564 Marine Pollutants: Yes Packaging Group: III
Labels: HARMFUL - STOW AWAY FROM FOOD STUFFS
Regulatory References: 49CFR 172.102; Part 176; IMO

IR (I.C.A.O.)

Proper Shipping Name: Barium compounds, n.o.s. (Barium Hydroxide, 8-Hydrate)
Hazard Class: 6.1
ID: UN1564 Packaging Group: III
Labels: HARMFUL - STOW AWAY FROM FOOD STUFFS
Regulatory References: 49CFR 172.101; 173.6; Part 175; ICAO/IATA

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

Customs Harmonization Number: 28163000004

= Not Applicable or Not Available
= Not Established

nformation in this Material Safety Data Sheet meets the
irements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and
ilations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the
dian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document
ntended only as a guide to the appropriate precautionary handling of
material by a person trained in, or supervised by a person trained
chemical handling. The user is responsible for determining the
autions and dangers of this chemical for his or her particular
ication. Depending on usage, protective clothing including eye and
guards and respirators must be used to avoid contact with material
reathing chemical vapors/fumes.
sure to this product may have serious adverse health effects. This
ical may interact with other substances. Since the potential uses
so varied, Baker cannot warn of all of the potential dangers of use
nteraction with other chemicals or materials. Baker warrants that
chemical meets the specifications set forth on the label.
R DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD
HE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS
A PARTICULAR PURPOSE.
user should recognize that this product can cause severe injury and
death, especially if improperly handled or the known dangers of use
not heeded. READ ALL PRECAUTIONARY INFORMATION. As new documented
ral safety information becomes available, Baker will periodically
se this Material Safety Data Sheet. If you have any questions,
se call Customer Service (1-800-JTBAKER) for assistance.

RIGHT 1990 J.T.BAKER INC.
ADEMARKS OF J.T.BAKER INC.

oved by Quality Assurance Department.

Material Safety Data Sheet

7168

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

Product: CALCIUM HYDROXIDE

MSDS No: AGCA / AGCA 22
Revision: A
Date: March 29, 1989

SECTION I. MATERIAL IDENTIFICATION

Trade/Material Name: CALCIUM HYDROXIDE 10035

Other Designations: Hydrated Lime, High Calcium Hydrated Lime, Caustic Lime, Calcium Hydrate, Slaked Lime, Ca(OH)2, ASTM C259, C53, etc. GE Material D4B3.

CAS: 001 305 620

Material available from many sources, including:

Manufacturers: Harshaw Chemical Co.
1945 E. 97th Street
Cleveland, OH 44106

Phone: (216) 721-8300

Warner Co.,Ind. Mineral Div.
P.O. Box 448
Bellefonte, PA 16823

Phone: (717) 355-4761

Ash Grove Cement Co.
P.O. Box 25900
Overland Park, KS 66255

Phone: (913) 381-8901

SECTION II. INGREDIENTS AND HAZARDS

Ingredient Name:	Percent:	Exposure Limits:
Typical Composition:*		
Calcium hydroxide, Ca(OH)2	>90	8-hr. TWA 5 mg/m3**
Calcium carbonate, CaCO3	<4	
Magnesium oxide, MgO	<3	Rat, Oral LD50 7.3 gm/kg
Oxides (Al2O3, Fe2O3, SiO2, etc.)(other)	<3	

*Commercial material prepared by hydration of lime.
**ACGIH (1984) TLV; no specific OSHA PEL established (minimum control would be as a nuisance particulate).

SECTION III. PHYSICAL DATA

Appearance & Odor: Crystals or soft, white powder or granules. Odorless.

Water solubility (%): g/100 sat. solution: 0°C = 0.185, At 25°C= 0.159, At 100°C = 017.

Specific gravity (H2O=1): 2.3-2.4
Molecular weight: 74.1

composition point (-H2O): 580
of saturated solution at 25°C: 12.5

MSDS AGCA 22 continues on page 2

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

Product: CALCIUM HYDROXIDE

MSDS No: AGCA / AGCA 22
Revision: A
Date: March 29, 1989

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point (method): N/A

Extinguishing Media: This material is not combustible. Use extinguishing media which is appropriate for the surrounding fire.

Autoignition Temp: N/A

Unusual fire or explosion hazards: When heated above 580°C, material can decompose to produce CaO.

Special fire-fighting procedures: When this material is involved in a fire situation, firefighters should wear full protective clothing, and use eye protection and self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

Material is* stable

Chemical incompatibilities: Calcium hydroxide is a strongly alkaline material which is incompatible with acidic materials. It forms salts with nitroparaffins in the presence of water which are explosive when dried. It can cause the explosive decomposition of maleic anhydride. Boiling elemental phosphorus in a calcium hydroxide solution can liberate spontaneously flammable phosphines. It liberates NH_3 from ammonia salts.

Conditions to avoid: When exposed to the air, it will slowly absorb carbon dioxide to form calcium carbonate. When heated at temperatures above 580°C, it loses water to form calcium oxide or lime.

*This is a stable solid in a sealed container at room temperature.

SECTION VI. HEALTH HAZARD INFORMATION

Summary of risks: This material in the presence of moisture, is a moderately caustic irritant and can be damaging to human tissue. Excessive skin contact will irritate the skin and produce dermatitis. Eye contact gives a burning sensation with severe irritation and possible damage. Inhalation in particulate form is irritating and can be damaging to the mucous membranes of the upper respiratory tract. Do not ingest.

First aid:

Eye contact: Promptly flush with plenty of running water, including under eyelids, for at least 15 minutes; then, get prompt medical attention.

Skin contact: Wash exposed skin with plenty of water. Remove contaminated clothing promptly. Get medical help if exposed area is large or if irritation persists.

Inhalation: Remove to fresh air. Contact physician immediately.

Ingestion: Dilute by giving 2 glasses of water or milk to drink, followed by fruit juice or diluted vinegar to neutralize the alkali; then consult physician.

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Material Safety Data Sheet

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

Product: CALCIUM HYDROXIDE

MSDS No: AGCA / AGCA 22
Revision: A
Date: March 29, 1989

SECTION VII. SPILL, LEAK AND DISPOSAL PROCEDURES

Spill / Leak procedures: Those involved in clean up of spills should use protective equipment (See Sect. VIII). Pick up spilled powder avoiding dusting conditions and place in a clean steel container for reclaim or disposal. Safety personnel should be involved when large spills occur. Traces of residue can be flushed to the sewer with much water dilution.

Waste management / Disposal: Consider the following methods of disposing of scrap material: Use to neutralize waste acid; spread on surface or ground in an isolated, protected area to react with CO2 from the air to form CaCO3 (limestone); or disperse in water, neutralize with hydrochloric acid, precipitate with soda ash and flush to sewer with much water to keep below 250 mg NaCl/liter. Follow Federal, State, and Local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Personal protective equipment:

Goggles: Wear safety glasses, goggles, face shield to prevent contact.

Gloves: Wear rubber gloves, protective clothing, long-sleeved shirt with buttoned collar, apron, etc. to prevent skin contact with this material as required for the conditions under which it is used.

Respirator: Provide approved dust or mist respirators or self-contained respirators for non-routine or emergency use above the TLV.

Other: Use of protective creams on areas of skin exposed to dust has been recommended.
Remove severely contaminated clothing promptly and launder before reuse.

Workplace considerations:

Ventilation: Provide general ventilation and local exhaust ventilation for dust control (or mist control if used as a water dispersion) to meet TLV requirements. Vent dust to appropriate collector.

An eyewash station and safety shower must be readily available where this material, or its water dispersions, are used.

SECTION IX. SPECIAL PRECAUTIONS

Storage segregation: Store in a cool, dry area in tightly closed containers. Protect containers from physical damage.

Special handling / storage: Keep away from acidic materials and other incompatibles (See Sect. V).

Other precautions: Prevent contact with clothing or with the body, or inhalation of dust or solution mist. Use due caution in mixing with water and handling the alkaline water dispersions of this material (milk of lime). Follow good personal hygiene practices. Wash thoroughly after handling.

Data source code(s): 1, 2, 4-9, 11, 14, 20, 47. N

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

Product: CALCIUM HYDROXIDE

MSDS No: AGCA / AGCA 22
Revision: A
Date: March 29, 1989

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

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MATERIAL SAFETY DATA SHEET

Effec. 3/85

7168

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917) 10139

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
EED MINERALS DIVISION, Harsco Corporation	219-923-4200
ADDRESS (Number, Street, City, State, and ZIP Code) 149 C Kennedy Ave., Highland, Indiana 46322	
CHEMICAL NAME AND SYNONYMS oal Slag	TRADE NAME AND SYNONYMS Black Beauty Abrasives
CHEMICAL FAMILY ineral Slag	FORMULA Similar to Amorphous Glass

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
IENTS		N/A	BASE METAL		N/A
ALYST		N/A	ALLOYS		N/A
ICLE		N/A	METALLIC COATINGS		N/A
VENTS		N/A	FILLER METAL PLUS COATING OR CORE FLUX		N/A
ITIVES		N/A	OTHERS		N/A
ERS		N/A	OCT 15 1991		-

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Black Beauty Abrasives are stable amorphous glass-like compounds.		-
Toxic effects from exposure have not been demonstrated.		
Typical Free Silica $<0.1\%$		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) Melts	$>2500^{o}$	SPECIFIC GRAVITY (H_2O=1)	$\simeq 2.76$
VAPOR PRESSURE (mm Hg.)	N/A	PERCENT, VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (_____ =1)	N/A
SOLUBILITY IN WATER	Neg		

APPEARANCE AND ODOR Black granular solid and no apparent odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
N/A	N/A		

EXTINGUISHING MEDIA None Required

SPECIAL FIRE FIGHTING PROCEDURES None

UNUSUAL FIRE AND EXPLOSION HAZARDS None

000159

THRESHOLD LIMIT VALUE
Not established for coal slag.
Nuisance Dust 5 mg/M^3 < 10 um; 15 mg/M^3 Total Dust
as per 29 CFR 1910.1000 Tbl. 2-3.
EMERGENCY AND FIRST AID PROCEDURES
No special procedure required.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	None
INCOMPATABILITY *(Materials to avoid)* None			
HAZARDOUS DECOMPOSITION PRODUCTS None			
HAZARDOUS POLYMERIZATION	MAY OCCUR	-	CONDITIONS TO AVOID
	WILL NOT OCCUR	X	None

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
No special action required.

WASTE DISPOSAL METHOD
May be used as fill material similar to sand. EP Toxicity not detected and/or exceeded for Cr, Ag, As, Hg, Cd, Se, Pb, Ba.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*
Use NIOSH certified respiratory protection equipment as required.

VENTILATION	LOCAL EXHAUST: Sufficient to allow visual contact with work surface and maintain compliance with applicable regulations.
PROTECTIVE GLOVES: Standard abrasive blasters gloves	EYE PROTECTION: Hood with protective lens.

OTHER PROTECTIVE EQUIPMENT
Use appropriate abrasive blasting protective equipment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Keep dry to assure free flow.

Keep free of all contamination.

OTHER PRECAUTIONS
Use an appropriate safety screen over fill hatch of blasting pot.

"The opinions expressed herein are those of qualified experts within Harsco Corporation. Harsco believes that the information contained herein is current and accurate for the normal and intended use of this product as of the date of this Material Safety Data Sheet. Since the use of this information and of those opinions on the conditions of use of the product are not within the control of Harsco Corporation, it is the user's obligation to determine and observe the conditions of safe use and disposal of the product by their operations."

000200

Martin Marietta Energy Systems, Inc.[0m
Material Safety Data Sheet[0m

7168

-------- 1. IDENTIFICATION[0m

tID:[0m 00320 Version No:[0m 1
No:[0m 000630-08-0 Version Date:[0m 10/0
990
terial Name:[0m CARBON MONOXIDE

onyms:[0m
1) CARBON MONOXIDE, CRYOGENIC LIQUID
2) CARBON OXIDE
3) CARBONIC OXIDE
4) EXHAUST GAS
5) FLUE GAS

tus Information:[0m

MSDS Type	MSDS Status	MSDS Available	Request Outstanding
D	A	Yes	No

ification History:[0m

Date of Entry	Date of Change	Last Modifi
08/25/1991	05/20/1992	THI

cial Condition:[0m
Group Code:[0m C

D No:[0m GSC0024-2400

es No:[0m 039275550

e Chemical:[0m Yes
mical Formula:[0m C-O

lth Hazard Ratings:[0m 2, <MODERATE HEALTH HAZARD>
ASPHYXIANT

e Hazard Ratings:[0m 4, <EXTREMELY FLAMMABLE>

ctivity Hazard Ratings:[0m 0, <NONREACTIVE>

sical Form:[0m LIQUID,GAS

:[0m UNISOLATED COMPONENT OF GASEOUS FUELS, E.G. WATE

GAS REDUCING AGENT IN METALLURGICAL OPERATIONS IN MANUFACTURING METAL CARBONYLS AND ZINC WHITE PIGMENTS CHEMICAL INTERMEDIATE FOR PHOSGENE, METHANOL, ACETIC ACID, ACRYLIC ACID REDUCING AGENT IN IRON ORE PROCESSING

CS No:[0m FG3500000

ufacturers:[0m (Name, Address, Phone, FAX No, Contact)[0m
1) AIR PRODUCTS AND CHEMICALS, INC.
INDUSTRIAL GAS DIVISION
ALLENTOWN, PA 18195
Phone: 215-481-4911

2) LIQUID AIR CORP.

000201

ONE CALIFORNIA PLAZA, SUITE 350, 2121 N.
CALIFORNIA BLVD.,
WALNUT CREEK, CA 94596
Phone: (800)231-1366

3) MATHESON CO.
P.O. BOX 85, EAST RUTHERFORD, NJ 07073
Phone: (201)933-2400

ISDS Listing:[0m

MFR No[0m	Manufacturer Name[0m	MFR MSDS Prep	MSDS Date[0m	To Rcvd	Used Modif Date[
Tech Data[0m					
AIR2	AIR PRODUCTS AND CHEMICALS, INC.	08/01/1991	01/22/1993		No
LIQ	LIQUID AIR CORP.	10/01/1985	03/19/1992		Yes
MATH	MATHESON CO.	10/01/1985	03/19/1992		Yes

-------- 2. PHYSICAL DATA --------[0m

laterial Description:[0m COLORLESS, ODORLESS GAS; VERY FLAMMABLE, BURN
AIR WITH BRIGHT BLUE FLAME

lolecular Weight:[0m 28.01

)ensity/Specific Gravity:[0m 1.250 G/L AT 32 DEG F, 0 DEG C FOR GAS; 0.793
:C
FOR LIQUID

'a-or Density:[0m 1.0 (AIR=1)
: Pressure:[0m >1 ATMOSPHERE AT 68 DEG F, 20 DEG C

.oiling Point:[0m -312.7 DEG F, -191.5 DEG C
:elting Point:[0m -337 DEG F, -205 DEG C
reezing Point:[0m

'ercent Volatiles:[0m NISS

olubility in Water:[0m 3.3 ML/100 ML AT 32 DEG F, 0 DEG C
'vaporation Rate:[0m NISS

-------- 3. INGREDIENTS --------[0m

	CAS No.[0m	RTECS No[0m	Percent[0m	Perce
omments[0m				
	----------[0m	--------[0m	-------[0m	-----
--------[0m				

ECID:[0m
ngredient Name:[0m PURE CHEMICAL
azard Evaluation:[0m

-------- 4. FIRE AND EXPLOSION HAZARD DATA --------[0m

lash Point:[0m NISS

utoignition:[0m 1128 DEG F, 609 DEG C

-er Flammability Limit:[0m 12.5%
: Flammability Limit:[0m 74%

xtinguishing Media:[0m USE WATER SPRAY/FOG, DRY CHEMICAL, CARBON DIO
OR FOAM. FOR SMALL FIRES, LET BURN UNLESS LEAK

000202

-------- 10. TRANSPORTATION DATA --------[0m

Information:[0m (Name, Class, Label, Number)[0m

1) CARBON MONOXIDE, CRYOGENIC LIQUID
FLAMMABLE GAS
FLAMMABLE GAS; FLAMMABLE GAS
NA9202

2) CARBON MONOXIDE
FLAMMABLE GAS
FLAMMABLE GAS; FLAMMABLE GAS
UN1016

ortable Quantity:[0m NISS

ID Number:[0m NISS

erences:[0m - CHEMLINE, CHEMICAL DICTIONARY ONLINE (DATA BASE) NATIONAL LIBRARY OF MEDICINE, BETHESDA MD, 1991.
- RTECS, REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (DATABASE). NATIONAL LIBRARY OF MEDICINE, BETHESDA MD, 1991.
- AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS. TLV'S THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES FROM 1991-1992. CINCINNATI OH: AMERICAN CONFERENCE OF GOVERNMENTAL HYGIENISTS, 1991.
- MATERIAL SAFETY DATA SHEETS (MSDS) PROVIDED BY MANUFACTURERS.
- HSDB, HAZARDOUS SUBSTANCES DATA BANK (DATA BASE), NATIONAL LIBRARY OF MEDICINE, BETHESDA MD, 1990.
- SCIENTIFIC REVIEW COMMITTEE FOR MSDS

NING: THE INFORMATION CONTAINED HEREON IS INTENDED SOLELY FOR THE USE OF EMPLOYEES OF MARTIN MARIETTA ENERGY SYSTEMS, INC. THE INFORMATION IS NOT INTENDED TO BE A DEFINITIVE STATEMENT OF ALL HAZARDS ASSOCIATED WITH SAID MATERIAL OR ALL METHODS OF COUNTERACTING HUMAN EXPOSURE TO SAME. USERS ARE CAUTIONED TO PROCEED WITH DUE CARE IN THE HANDLING, STORING AND DISPOSAL OF THIS MATERIAL AND TO SEEK FURTHER INFORMATION REGARDING PARTICULAR APPLICATIONS AS REQUIRED.

MARTIN MARIETTA ENERGY SYSTEMS, INC.
P.O. BOX 2008
BLDG. 3550, MS 6291
OAK RIDGE, TENNESSEE 37831
PHONE: 615-574-0784
FAX: 615-576-6087

MG/CU M (1989-90)

:OSH Recommendation:[0m 8-HR TWA 35 PPM, CEILING 200 PPM

.iatly Dangerous to[0m
Life & Health:[0m 1500 PPM

:her Exposure Limits:[0m NISS

:ute Inhalation:[0m CAUSES HYPOXIA WHICH CAUSES: HEADACHE, DIZZINE DROWSINESS, NAUSEA, UNCONSCIOUSNESS, CONVULSIONS, COMA. MYOCARDIAL AND CENTRAL NERVOUS SYSTEM DAMAGE, PERSONALITY CHANGES. DEATH BY ASPHYXIATION.

:ute Swallowing:[0m NISS

:ute Skin Absorption:[0m NISS

:ute Skin Contact:[0m NONIRRITATING, LIQUID CAUSES FREEZING OF SKIN

:ute Eye Contact:[0m NONIRRITATING

:ronic Effects:[0m AFTER INHALATION: APPETITE DISORDERS, HEADACHE DIZZINESS, INCOORDINATION, DROWSINESS, CYANOSIS, AND PALLOR.

arget Organs/Systems:[0m ALL ORGANS BECAUSE OF OXYGEN DEPRIVATION, PRIMARILY CENTRAL NERVOUS SYSTEM, CARDIOVASCULAR SYSTEM, RESPIRATORY SYSTEM, BLOOD.

.ation Emergency:[0m REMOVE TO FRESH AIR IMMEDIATELY. ADMINISTER OXYGEN. GET MEDICAL AID.

wallowing Emergency:[0m
kin Contact Emergency:[0m
ye Contact Emergency:[0m
hysicians Notes:[0m GIVE HYPERBARIC OXYGEN, DIAZEPAM FOR CONVULSIO MONITOR FOR CEREBRAL EDEMA

ggravated Conditions:[0m CARDIOVASCULAR DISEASES

arcinogenicity:[0m NOT LISTED AS CARCINOGEN OR POTENTIAL CARCINOG BY NATIONAL TOXICOLOGY PROGRAM (NTP), IARC, OSHA. (LIQUID AIR CORP, 1985)

enotoxicity:[0m NISS

eproductive/Developmental[0m
Toxocity:[0m NISS

-------- 7. SPILL LEAK AND DISPOSAL INFORMATION --------[0m

pill or Leak Emergency:[0m

ION HELP IMMEDIATELY.
. 12: SHIFT SUPERINTENDENT, 4-7172 OR 911
X-10: SHIFT SUPERVISOR, 4-6606 OR 911
K-25: SHIFT SUPERVISOR, 4-3282 OR 911
PADUCAH: SHIFT SUPERVISOR, BELL-6211, PAX-511
MINIMIZE THE SPILL OR RELEASE IF YOU CAN DO SO SAFELY.

VACUATE THE AREA.

sposal Procedure:[0m

-12: TRANSFER STORAGE OR DISPOSAL OF WASTE PROCEDURE 70-903, DISPOSAL OF ZARDOUS MATERIALS. FOR MORE INFORMATION, CONTACT THE WASTE DISPOSAL PARTMENT, 6-7768.
-10: WASTE, TRANSPORTATION, STORAGE, AND DISPOSAL MANUAL, EPM-8.0, FORM CN-13696. FOR MORE INFORMATION, CONTACT THE DEPARTMENT OF ENVIRONMENTAL ANAGEMENT, 4-7467.
-25: SPP-4600, FORM UCN-12463. FOR MORE INFORMATION, CONTACT THE WASTE ANAGEMENT DIVISION, 4-8214.
ADUCAH: ESH-28, FORM UCN-12463A. FOR MORE INFORMATION, CONTACT THE WASTE ANAGEMENT DEPARTMENT, PAX-401 OR BELL-6319.

-------- 8. SPECIAL PROTECTION INFORMATION --------[0m

spirators:[0m
RESPIRATORS MAY BE REQUIRED WHEN USING THIS MATERIAL. CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT FOR MORE INFORMATION.

ntilation:[0m
CONDITIONS, QUANTITIES, AND OTHER FACTORS DETERMINE VENTILATION REQUIREMENTS. IF THERE ARE UNCERTAINTIES, CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT.

oves:[0m
WEAR PLASTIC OR RUBBER GLOVES, INSULATING GLOVES IF LIQUID IS HANDLED.

e Protection:[0m
WEAR SAFETY GOGGLES OR GLASSES.

er Protective Equipment:[0m SPECIAL EQUIPMENT FOR SKIN PROTECTION IS REQUIRE WHEN HANDLING LIQUID. USE ONLY IN WELL-VENTILATED AREAS. A SAFETY SHOWER SHOULD BE READILY AVAILABLE.

purities, By-Product,[0m
Contaminants:[0m NISS

-------- 9. SPECIAL HANDLING, STORING, PACKAGING --------[0m

OTECT CYLINDERS FROM PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL-VENTILATED EA OF NON-COMBUSTIBLE CONSTRUCTION AWAY FROM HEAVILY TRAFFICKED AREAS AND ERGENCY EXITS. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO CEED 130 DEG F 54 DEG C. CYLINDERS SHOULD BE STORED UPRIGHT AND FIRMLY CURED TO PREVENT FALLING OR BEING KNOCKED OVER. FULL AND EMPTY CYLINDERS OULD BE SEGREGATED. POST "NO SMOKING OR OPEN FLAMES" SIGNS IN THE STORAGE OR SE AREA. THERE SHOULD BE NO SOURCES OF IGNITION IN THE STORAGE OR USE,AREA. LVE PROTECTION CAPS MUST REMAIN IN PLACE UNLESS CONTAINER IS SECURED WITH LVE OUTLET PIPED TO USE POINT. DO NOT DRAG, SLIDE OR ROLL CYLINDERS. USE A ITABLE HAND TRUCK FOR CYLINDER MOVEMENT. USE A PRESSURE RECUDING REGULATOR EN CONNECTING CYLINDER TO LOWER PRESSURE (<2,000 PSIG) PIPING OR SYSTEMS. DO OT HEAT CYLINDER BY ANY MEANS TO INCREASE THE DISCHARGE RATE OF PRODUCT FROM HE CYLINDER. USE A CHECK VALVE OR TRAP IN THE DISCHARGE LINE TO PREVENT ZARDOUS BACK FLOW INTO THE CYLINDER. CARBON MONOXIDE CAN BE HANDLED IN ALL MMONLY USED METALS UP TO APPROXIMATELY 500 PSIG (3450 KPA). ABOVE THAT ESSURE IT FORMS TOXIC AND CORROSIVE CARBONYL COMPOUNDS WITH SOME METALS. TH-GROUND AND BOND ALL LINES AND EQUIPMENT ASSOCIATED WITH THE CARBON OXIDE SYSTEM. ELECTRICL EQUIPMENT SHOULD BE NONSPARKING OR EXPLOSION-PROOF. OMPRESSED GAS CYLINDERS SHOULD NOT BE REFILLED EXCEPT BY QUALIFIED ODUCERS OF COMPRESSED GASSES.

CAN BE STOPPED IMMEDIATELY. FOR LARGE FIRES, USE WATER SPRAY, FOG, OR FOAM.

--fighting Procedures:[0m COOL CONTAINERS EXPOSED TO HEAT OR FLAMES WITH WATER FROM THE SIDES UNTIL WELL AFTER THE FIRE HA BEEN EXTINGUISHED.
REMOVE CONTAINERS FROM FIRE AREA IF POSSIBLE.
WITHDRAW IMMEDIATELY IN CASE YOU HEAR A RISING SOUND FROM VENTING SAFETY DEVICE OR SEE ANY DISCOLORATION OF TANK DUE TO FIRE.
WEAR PRESSURE-DEMAND, SELF-CONTAINED BREATHING APPARATUS AND FULL FIREFIGHTING PROTECTIVE CLOTHING.
STOP FLOW OF GAS.

ire and Explosion Hazards:[0m CLOSED CONTAINERS MAY EXPLODE WHEN EXPOSED TO EXTREME HEAT.
RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.
HAZARDOUS DECOMPOSITION PRODUCTS: CARBON DIOXIDE AND OTHER OXIDES OF CARBON.

-------- 5. REACTIVITY DATA --------[0m

tability:[0m STABLE
helf Life In Days:[0m
helf Life Comments:[0m NISS

onditions to Avoid:[0m AVOID HEATING. AVOID IGNITION SOURCES.

ncompatible Materials:[0m

MINE TRIFLUORIDE
IUM MONOXIDE
CHLORINE TRIFLUORIDE
IODINE HEPTAFLUORIDE
LITHIUM AND WATER
NITROGEN TRIFLUORIDE
OXYGEN (LIQUID)
OXYGEN DIFLUORIDE
POTASSIUM AND OXYGEN
SILVER OXIDE
SODIUM AND AMMONIA
OXIDIZERS
NICKEL

ncompatible Materials Comments:[0m

azardous Polymerization:[0m WILL NOT OCCUR

ombustion and Decomposition Products:[0m

CARBON DIOXIDE AND OTHER OXIDES OF CARBON

ombustion and Decomposition Products Comments:[0m

-------- 6. HEALTH HAZARD DATA --------[0m

SHA Standards:[0m TWA 35 PPM OR 40 MG/CU M, CEILING 200 PPM OR MG/CU M

CGIH TLV:[0m TWA 50 PPM OR 57 MG/CU M, STEL 400 PPM OR 45

TRADE NAMES

Canadian Centre for Occupational Health and Safety

*** IDENTIFICATION ***

CORD NUMBER : 239830
NGUAGE : ENGLISH
ADE NAME(S) : [redacted]
ODUCT IDENTIFICATION DATA : J.T. BAKER MSDS NUMBER: C4305 PRODUCT CODES: 4961
TE OF MSDS : 1989-05-01

13533

*** MANUFACTURER INFORMATION ***

NUFACTURER : J T BAKER CHEMICAL CO
DRESS : 222 RED SCHOOL LANE
PHILLIPSBURG NEW JERSEY
U.S.A. 08865
ERGENCY TELEPHONE NO.(S) : 201-859-2151
800-424-9300 (CHEMTREC)
800-424-8802 (NATIONAL RESPONSE CENTER)

*** MATERIAL SAFETY DATA ***

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

305 -04 CHROMIUM PAGE: 1
FECTIVE: 05/01/89 ISSUED: 07/21/90

T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

ODUCT NAME: CHROMIUM
MMON SYNONYMS: N/A
EMICAL FAMILY: METALS
RMULA: CR
RMULA WT.: 52.00
S NO.: 7440-47-3
OSH/RTECS NO.: CB4200000
ODUCT USE: LABORATORY REAGENT
ODUCT CODES: 4961

PRECAUTIONARY LABELING

AKER SAF-T-DATA* SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	0	NONE

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT

U.S. PRECAUTIONARY LABELING

DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

INTERNATIONAL LABELING

DO NOT BREATHE DUST.

SAF-T-DATA* STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

CONTINUED ON PAGE: 2

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
CHROMIUM	7440-47-3	90-100	1 MG/M3	0.5 MG/M3

SECTION III - PHYSICAL DATA

BOILING POINT: 2200 C (3992 F)
(AT 760 MM HG)

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: 1900 C (3452 F)
(AT 760 MM HG)

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: 7.14
(H2O=1)

EVAPORATION RATE: N/A

ORAGE REQUIREMENTS

KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

7168

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

MESTIC (D.O.T.)

OPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

TERNATIONAL (I.M.O.)

OPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)
MARINE POLLUTANTS: NO

R (I.C.A.O.)

OPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

S. CUSTOMS HARMONIZATION NUMBER: 81122000004

'A = NOT APPLICABLE OR NOT AVAILABLE
= NOT ESTABLISHED

IE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE EQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND EGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE ANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT S INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF IE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED I, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE RECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR PPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND ACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL R BREATHING CHEMICAL VAPORS/FUMES.
XPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS HEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES RE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE

CONTINUED ON PAGE: 7

000203

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 F 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 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.

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* TRADEMARKS OF J.T.BAKER INC.

APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --

REPORT NUMBER: 971 VAN WATERS & ROGERS INC. PAGE: 001
MSDS NO: MZFESUL MATERIAL SAFETY DATA SHEET
EFFECTIVE DATE: 07/22/93 VERSION: 002

PRODUCT: FERROUS SULFATE

ORDER NO:
PROD NO :

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

---------- EMERGENCY ASSISTANCE ----------

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC
(800)424-9300

PRODUCT NAME:
FERROUS SULFATE

MSDS #: MZFESUL

PRODUCT IDENTIFICATION:

Synonyms: Iron (II) sulfate (1:1), heptahydrate; sulfuric acid, iron (2+) salt (1:1), heptahydrate

Formula CAS No.: 7782-63-0 (Hydrated) Molecular Weight: 278.01
TSCA CAS No.: 7720-78-7 (Anhydrous)
Hazardous Ingredients: Chemical Formula: FeSO4 7H2O
Ferrous sulfate (ca. 100%)

PRECAUTIONARY MEASURES

WARNING! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE EYE IRRITATION.
Avoid contact with eyes.
Wash thoroughly after handling.

EMERGENCY FIRST AID

If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. Call a physician. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes.
SEE SECTION 5.

PRODUCT: FERROUS SULFATE

ORDER NO:
PROD NO :

DOT Hazard Class: Not Regulated

Physical Data SECTION 1

Appearance: Blue-green fine crystals.
Odor: Odorless.
Solubility: 48.6 g/100 g water @ 50 C (122 F)
Boiling Point: Decomposes >300 C (572 F)
Melting Point: Loses water @ 65 C (149 F)
Vapor Density (Air=1): No information found.
Vapor Pressure (mm Hg): No information found.
Specific Gravity: 1.90
Evaporation Rate: No information found.

Fire and Explosion Information SECTION 2

Fire: Not considered to be a fire hazard.
Explosion: Not considered to be an explosion hazard.
Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire.
Special Information: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Reactivity Data SECTION 3

Stability: Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products: When heated to decomposition it emits toxic fumes of sulfur oxides.
Hazardous Polymerization: Will not occur.
Incompatibilities: Alkalies, soluble carbonates, and oxidizing materials. Reacts in moist air to form ferric sulfate.

Leak/Spill Disposal Information SECTION 4

Ventilate area of leak or spill. Clean-up personnel may require respiratory protection from dust. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Disposal: Whatever cannot be saved for reclamation may be delivered to an approved waste disposal facility.
Reportable Quantity (RQ)(CWA/CERCLA) : 1,000 lbs.
Ensure compliance with local, state and federal regulations.

Health Hazard Information SECTION 5

A. Exposure/Health Effects

Inhalation: Excessive inhalation of dust may be irritating to the respiratory tract.

Ingestion: Low toxicity in small quantities but larger dosages may cause nausea, vomiting, diarrhea, and black stool. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma, and death from iron poisoning has been recorded. Smaller doses are much more toxic to children.

Skin Contact: May cause mild irritation.

Eye Contact: Contact may cause irritation, redness, and pain.

Chronic Exposure: Severe or chronic ferrous sulfate poisonings may damage bood vessels. Large chronic doss cause ricketts in infants.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion: If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. Call physician immediately.

Skin Exposure: Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Exposure: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

C. TOXICITY (RTECS,* 1992)

Oral mouse LD50: 1520 mg/kg, investigated as a mutagen.

Occupational Control Measures SECTION 6

Airborne Exposure Limits: -OSHA Permissible Exposure Limit (PEL): 1 mg/m3 (TWA) soluble iron salts as Fe -ACGIH Threshold Limit Value (TLV): 1 mg/m3 (TWA) soluble iron salt as Fe

Ventilation System: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators If the TLV is exceeded, a dust/mist respirator

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(NIOSH Approved) may be worn up to ten times the TLV. Consult respirator supplier for details.

Skin Protection: Wear protective gloves and clean body-covering clothing.

Eye Protection: Use chemical safety goggles. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

Storage and Special Information SECTION 7

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances.

Addendum to Material Safety Data Sheet
REGULATORY STATUS
Hazard Categories for SARA Section 311/312 Reporting

Acute	Chronic	Fire	Pressure	Reactive
X				

Product or Components of Product:	SARA EHS Sec. 302 RQ	SARA EHS Sec. 302 TPQ	SARA Sec. 313 Chemicals Name List	SARA Sec. 313 Chemicals Chemical Category	CERCLA Sec.103 RQ lbs	RCRA Sec. 261.33
FERROUS SULFATE (7720-78-7)	No	No	No	No	No	No

SARA Section 302 EHS RQ:
Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.
SARA Section 302 EHS TPQ:
Threshold Planning Quantity of Extremely Hazardous substance. An asterisk (*) following a Threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity = 10,000 LBS.
SARA Section 313 Chemicals:
Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.
CERCLA Sec. 103:
Comprehensive Enviromental Response, Compensation and Liability Act (Superfund) Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center, (800-424-8802); Listed at 40 CFR 302.4
RCRA:
Resource Conservation and Reclamation Act. Commercial chemical product wastes designated as acute hazards and toxic under 40 CFR 261.33

Addendum to MSDS - California Proposition 65

The State of California requires that we provide to customers and employees in California warnings about reproductive and carcinogenic

000241

PRODUCT: FERROUS SULFATE

ORDER NO:
PROD NO :

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hazards associated with substances sold in California that are listed under Proposition 65. Information on this Proposition 65 MSDS addendum addresses that requirement and should be used in conjunction with this Material Safety Data Sheet.

Product(s): FERROUS SULFATE
CAS NO. 7782-63-0 TSCA NO. 7720-78-7
WARNING: This product may contain a chemical known to the state of California to cause birth defects or other reproductive harm.

---------- FOR ADDITIONAL INFORMATION ----------

CONTACT: MSDS COORDINATOR VAN WATERS & ROGERS INC.
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

07/19/95 09:30 PRODUCT: CUST NO: ORDER NO:

---------- NOTICE ----------

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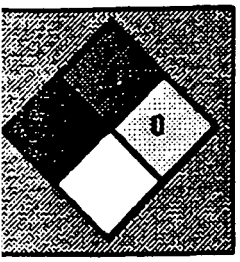
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*** E N D O F M S D S ***



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Martin Marietta Energy Systems, Inc.
Material Safety Reference Sheet

Martin Marietta Energy Systems Material Safety Reference Sheet (MSRS) is to be used in conjunction with the Manufacturer's MSDS. The information is not intended to be a definitive statement of all hazards associated with the material. It will not meet OSHA requirements used alone.

Identification:

RECID: 00324 Version: 2 Version Date: 30-SEP-1993
Material Name: HYDROGEN SULFIDE
CAS No: 007783-06-4

Synonyms:

HYDROGEN SULFURIC ACID
STINK DAMP
SULFURETED HYDROGEN
HYDROSULFURIC ACID
SULFUR HYDRIDE
DIHYDROGEN SULFIDE

Status Information:	MSDS Type	MSDS Status	MSDS Available
	MMES	APPROVED	Yes

Special Condition: N
HM Group Code: C
MMES Carcinogen: No

Reproductive/ Developmental Effector:	Per RTECS	Per MMES
	Yes	No

Avid Numbers:

GSC0044-4400

Stores Numbers:

Pure Chemical: Yes

Health Hazard Rating: 3, [HIGH HEALTH HAZARD]
IRRITANT, ASPHYXIANT, LACRIMATOR
Fire Hazard Rating: 4, [EXTREMELY FLAMMABLE]
Reactivity Hazard Rating: 0, [NONREACTIVE]

MARTIN MARIETTA ENERGY SYSTEMS HEALTH HAZARD RATINGS ARE BASED ON THE POTENTIAL TOXICITY OF A MATERIAL. FIRE AND REACTIVITY HAZARD RATINGS ARE ASSIGNED ACCORDING TO NFPA CRITERIA. HAZARD RATINGS ARE NOT TO BE USED BY THEMSELVES BUT ARE TO BE USED IN CONJUNCTION WITH A HEALTH AND SAFETY EVALUATION OF THE PROCESS IN WHICH THE MATERIAL IS USED IN ORDER TO DETERMINE THE POTENTIAL EXPOSURE HAZARDS. A HAZARD CLASSIFICATION GUIDE IS PROVIDED IN ESS-IH-140.

EPA ID Number: U135
RTECS Number: MX1225000

Target Organ/Systems: Per MFG.
Target Organ Comments:
CENTRAL NERVOUS SYSTEM, CARDIOVASCULAR SYSTEM

Manufacturers: (Name, Address, Phone, FAX No, Contact)

LIQUID AIR CORP.
ONE CALIFORNIA PLAZA, SUITE 350, 2121 N. CALIFORNIA BLVD.,
WALNUT CREEK, CA 94596
Phone: (800)231-1366
MATHESON GAS PRODUCTS
30 SEAVIEW DRIVE
SECAUCUS, NJ 07096
Phone: (201)867-4100

Ingredients:

P U R E C H E M I C A L

Carcinogenicity:

The MMES Carcinogen Control Program includes human, human suspect, and confirmed animal carcinogens. [See MMES Carcinogen: (Yes/No or Not Yet Determined) in Section 1.] Chemicals and compounds in concentration of 0.1% or greater are subject to the guidelines set forth in the MMES Carcinogen Control program. Substitution with a non-carcinogen should be made if feasible.

Reproductive/Developmental Toxicity:

THE RTECS REPRODUCTIVE/DEVELOPMENT EFFECTORS ARE MATERIALS LISTED IN THE REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES THAT HAVE POSITIVE REPRODUCTIVE EFFECTS DATA FOR AT LEAST ONE MAMMALIAN SPECIES THROUGH ANY ROUTE OF ADMINISTRATION. THE MMES REPRODUCTIVE/DEVELOPMENTAL EFFECTORS ARE A SUBSET OF THE RTECS MATERIALS THAT HAVE POSITIVE EFFECTS IN TWO OR MORE MAMMALIAN SPECIES OR ONE POSITIVE STUDY IN HUMANS THROUGH COMMON OCCUPATION ROUTES (DERMAL, INGESTION, AND INHALATION) OF EXPOSURE. IN EITHER GROUP SUCH EFFECTS MAY INCLUDE PATERNAL, MATERNAL, FERTILITY, EMBRYO/FETUS,

NEONATAL, DEVELOPMENT ABNORMALITIES OR TUMORIGENESIS. AN ENTRY IN EITHER GROUP DOES NOT AUTOMATICALLY IMPLY THAT THE SUBSTANCE IS HAZARDOUS FOR COMMON USE. A HAZARD DETERMINATION IS GENERALLY REQUIRED.

E 7168

* *
* TRADE NAMES *
*
* Canadian Centre for Occupational Health and Safety *
* *

*** IDENTIFICATION ***

13727

CORD NUMBER : 163618
NGUAGE : English
ADE NAME(S) : LEAD OXIDE
ODUCT IDENTIFICATION DATA : MSDS Number: P2468.4
TE OF MSDS : 1989-08-27

*** SUPPLIER INFORMATION ***

PPLIER/DISTRIBUTOR : Van Waters & Rogers Inc (U.S.)
DRESS : 1600 Norton Building
Seattle Washington
U.S.A. 98104-1564
ERGENCY TELEPHONE NO.(S) : 800-424-9300 CHEMTREC Assist (U.S. & Canada)
SENTIAL INFORMATION : For additional information please contact Douglas Eiser, Technical Director at 206-447-5911 during business hours, Pacific time.

*** MATERIAL SAFETY DATA ***

VAN WATERS & ROGERS INC., SUBSIDIARY OF UNIVAR
1600 NORTON BLDG. SEATTLE, WA 98104-1564 (408) 435-8700

----------EMERGENCY ASSISTANCE----------

EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL CHEMTREC (800)424-9300

----------FOR PRODUCT AND SALES INFORMATION----------

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE

----------PRODUCT IDENTIFICATION----------

UCT NAME: LEAD OXIDE CAS NO.: 1317-36-8
ON NAMES/SYNONYMS: LITHARGE; VW&R CODE: T2468
ULAR LITHARGE; LEAD MONOXIDE

ULA: PB O DATE ISSUED: 08/89
RD RATING (NFPA 704) SUPERCEDES: 03/89
HEALTH: 4 HAZARD RATING SCALE:
FIRE: 0 0=MINIMAL 3=SERIOUS
REACTIVITY: 0 1=SLIGHT 4=SEVERE
SPECIAL: 2=MODERATE

----------HAZARDOUS INGREDIENTS----------

		EXPOSURE LIMITS, MG/M3			
		OSHA	ACGIH	OTHER	
COMPONENT	%	PEL	TLV	LIMIT	HAZARD
LEAD MONOXIDE	>99	0.05 (PB)	0.15 (PB)	0.10 (PB) (NIOSH)	TOXIC

000219

----------PHYSICAL PROPERTIES----------

OILING POINT, DEG F: NOT GIVEN VAPOR PRESSURE, MM HG/20 DEG C: N/A
ELTING POINT, DEG F: 1630 VAPOR DENSITY (AIR=1): N/A
PECIFIC GRAVITY (WATER=1): 9.53 WATER SOLUBILITY, %: NIL
PPEARANCE AND ODOR: EVAPORATION RATE (BUTYL ACETATE=1): N/A
ELLOW/ORANGE CHIPS; ODORLESS

----------FIRST AID MEASURES----------

F INHALED: REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF NOT REATHING. GET IMMEDIATE MEDICAL ATTENTION.

N CASE OF EYE CONTACT: IMMEDIATELY FLUSH EYES WITH LOTS OF RUNNING ATER FOR 15 MINUTES, LIFTING THE UPPER AND LOWER EYELIDS OCCASIONALLY. ET IMMEDIATE MEDICAL ATTENTION.

N CASE OF SKIN CONTACT: IMMEDIATELY FLUSH SKIN WITH LOTS OF RUNNING ATER FOR 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES; WASH EFORE REUSE. GET IMMEDIATE MEDICAL ATTENTION.

F SWALLOWED: IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING BY GIVING 2 LASSES OF WATER AND STICKING A FINGER DOWN THE THROAT. GET IMMEDIATE EDICAL ATTENTION. DO NOT GIVE ANYTHING TO AN UNCONSCIOUS OR CONVULSING ERSON.

----------HEALTH HAZARD INFORMATION----------

RIMARY ROUTES OF EXPOSURE: INHALATION, SKIN OR EYE CONTACT.

IGNS AND SYMPTOMS OF EXPOSURE

INHALATION: LEAD CAN BE ABSORBED THROUGH THE RESPIRATORY SYSTEM. OCAL IRRITATION OF BRONCHIA AND LUNGS CAN OCCUR. PROLONGED EXPOSURE OR EPEATED EXPOSURE CAN LEAD TO LEAD POISONING AND DEATH. (SEE SWALLOWING)

EYE CONTACT: DUSTS MAY IRRITATE THE EYES.

SKIN CONTACT: PROLONGED OR REPEATED CONTACT WITH THE DUST WILL RRITATE THE SKIN.

SWALLOWED: POISON] EARLY SYMPTOMS OF LEAD POISONING ARE FATIGUE, ISTURBANCE OF SLEEP, CONSTIPATION. MORE SEVERE EXPOSURES MAY RESULT IN BDOMINAL PAIN, NAUSEA, HEADACHE, LOSS OF APPETITE, METTALLIC TASTE IN OUTH, MUSCLE AND JOINT PAIN, DIZZINESS AND HYPERTENSION. PROLONGED VEREXPOSURE CAN SEVERELY DAMAGE RED BLOOD CELL FORMATION, CENTRAL AND ERIPHERAL NERVOUS SYSTEM, KIDNEYS AND LIVER. RESULTING HIGH LEVELS OF EAD IN BLOOD MAY LEAD TO CONVULSIONS, COMA AND DEATH. OSHA HAS EPORTED THAT LEAD MAY IMPAIR THE REPRODUCTIVE SYSTEMS OF BOTH MEN AND OMEN; DAMAGE MAY ALSO BE CAUSED TO THE UNBORN FETUS.

HRONIC EFFECTS OF EXPOSURE: LEAD IS A CUMULATIVE POISON AND EXPOSURES VEN TO SMALL AMOUNTS CAN RAISE THE BODY'S CONTENT TO TOXIC LEVELS. HE SYMPTOMS OF CHRONIC EXPOSURE ARE LIKE THOSE FOR INGESTION.

EDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: PERSONS WITH RE-EXISTING NERVE OR CIRCULATORY DISORDERS OR WITH SKIN OR EYE PROBLEMS AY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS SUBSTANCE.

----------TOXICITY DATA----------

RAL: DOG LDLO=1.4 GM/KG

ERMAL: NO DATA FOUND

NHALATION: NO DATA FOUND

ARCINOGENICITY: THIS MATERIAL IS NOT CONSIDERED TO BE A CARCINOGEN
Y THE NATIONAL TOXICOLOGY PROGRAM, THE INTERNATIONAL AGENCY FOR
ESEARCH ON CANCER, OR THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

THER DATA: PBO HAS SHOWN SOME CARCINOGENICITY IN EXPERIMENTAL ANIMALS.

----------PERSONAL PROTECTION----------

ENTILATION: LOCAL MECHANICAL EXHAUST VENTILATION CAPABLE OF MAIN-
AINING DUST EMISSIONS AT THE POINT OF USE BELOW THE PEL.

ESPIRATORY PROTECTION: IF USE CONDITIONS GENERATE DUSTS, WEAR A NIOSH-
PPROVED RESPIRATOR APPROPRIATE FOR THOSE EMISSION LEVELS. APPROPRIATE
ESPIRATORS MAY BE A FULL FACEPIECE OR A HALF MASK AIR-PURIFYING CART-
IDGE RESPIRATOR WITH PARTICULATE FILTERS, A SELF-CONTAINED BREATHING
PPARATUS IN THE PRESSURE DEMAND MODE, OR A SUPPLIED-AIR RESPIRATOR.

/E PROTECTION: CHEMICAL GOGGLES UNLESS A FULL FACEPIECE RESPIRATOR IS
.SO WORN. IT IS GENERALLY RECOGNIZED THAT CONTACT LENSES SHOULD NOT BE
)RN WHEN WORKING WITH CHEMICALS BECAUSE CONTACT LENSES MAY CONTRIBUTE
) THE SEVERITY OF AN EYE INJURY.

ROTECTIVE CLOTHING: LONG-SLEEVED SHIRT, TROUSERS, SAFETY SHOES, AND
.OVES.

THER PROTECTIVE MEASURES: AN EYEWASH AND SAFETY SHOWER SHOULD BE
.ARBY AND READY FOR USE.

----------FIRE AND EXPLOSION INFORMATION----------

ASH POINT, DEG F: NOT FLAMMABLE FLAMMABLE LIMITS IN AIR, %
METHOD USED: N/A LOWER: N/A UPPER: N/A
TINGUISHING MEDIA: USE WATER SPRAY, DRY CHEMICAL, CO2 OR FOAM. DO
T USE A DIRECT WATER STREAM.

ECIAL FIRE FIGHTING PROCEDURES: FIRE FIGHTERS SHOULD WEAR SELF-
NTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. USE WATER
RAY TO COOL NEARBY CONTAINERS AND STRUCTURES EXPOSED TO FIRE.

USUAL FIRE AND EXPLOSION HAZARDS: NONE.

----------HAZARDOUS REACTIVITY----------

ABILITY: STABLE POLYMERIZATION: WILL NOT OCCUR
NDITIONS TO AVOID: NONE

TERIALS TO AVOID: CHLORINATED RUBBER, STRONG OXIDIZERS, METALS, NON-
TALS, ETHYLENE, CHLORINE, FLUORINE, METAL ACETYLIDES, PEROXY-FORMIC
ID, SELENINYL CHLORIDE.

ZARDOUS DECOMPOSITION PRODUCTS: MAY LIBERATE TOXIC FUMES OF LEAD
IDE.

----------SPILL, LEAK, AND DISPOSAL PROCEDURES----------

ACTION TO TAKE FOR SPILLS OR LEAKS: WEAR PROTECTIVE EQUIPMENT INCLUDING RUBBER BOOTS, RUBBER GLOVES, RUBBER APRON, AND A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE OR A SUPPLIED-AIR RESPIRATOR. IF THE SPILL OR LEAK IS SMALL, A FULL FACEPIECE AIR-PURIFYING CARTRIDGE RESPIRATOR EQUIPPED WITH PARTICULATE FILTERS MAY BE SATISFACTORY. IN ANY EVENT, ALWAYS WEAR EYE PROTECTION. FOR SMALL SPILLS, SWEEP UP AND DISPOSE OF IN DOT-APPROVED WASTE CONTAINERS. FOR LARGE SPILLS, SHOVEL INTO DOT-APPROVED WASTE CONTAINERS. KEEP OUT OF SEWERS, STORM DRAINS, SURFACE WATERS, AND SOIL.
COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS ON SPILL REPORTING, AND HANDLING AND DISPOSAL OF WASTE.

DISPOSAL METHODS: DISPOSE OF CONTAMINATED PRODUCT AND MATERIALS USED IN CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL. CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO ASCERTAIN PROPER DISPOSAL PROCEDURES.
NOTE: EMPTY CONTAINERS CAN HAVE RESIDUES, GASES AND MISTS AND ARE SUBJECT TO PROPER WASTE DISPOSAL, AS ABOVE.

----------SPECIAL PRECAUTIONS----------

STORAGE AND HANDLING PRECAUTIONS: STORE IN A COOL, DRY, WELL-VENTILATED PLACE AWAY FROM INCOMPATIBLE MATERIALS. KEEP BAGS OR FIBER DRUMS DRY AT ALL TIMES. WASH THOROUGHLY AFTER HANDLING. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

REPAIR AND MAINTENANCE PRECAUTIONS: NONE.

OTHER PRECAUTIONS: CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, WILL RETAIN PRODUCT RESIDUE AND VAPORS. ALWAYS OBEY HAZARD WARNINGS AND HANDLE EMPTY CONTAINERS AS IF THEY WERE FULL.

----------FOR ADDITIONAL INFORMATION----------

CONTACT MSDS COORDINATOR, VAN WATERS & ROGERS INC.
DURING BUSINESS HOURS, PACIFIC TIME (408)435-8700

----------OTHER REGULATORY INFORMATION----------

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICAL(S) CONSIDERED BY THE STATE OF CALIFORNIA'S SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) AS CAUSING CANCER OR REPRODUCTIVE TOXICITY AND FOR WHICH WARNINGS ARE NOW REQUIRED:

CHEMICAL	CAS NO.	%
LEAD IN LEAD OXIDE	NONE	93%

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S ACCURACY OR SUFFICIENCY. CONDITIONS OF USE ARE BEYOND VW&R'S CON-
DL AND THEREFORE USERS ARE RESPONSIBLE TO VERIFY THIS DATA UNDER
EIR OWN OPERATING CONDITIONS TO DETERMINE WHETHER THE PRODUCT IS
ITABLE FOR THEIR PARTICULAR PURPOSES AND THEY ASSUME ALL RISKS OF
EIR USE, HANDLING, AND DISPOSAL OF THE PRODUCT, OR FROM THE PUBLICA-
DN OR USE OF, OR RELIANCE UPON, INFORMATION CONTAINED HEREIN. THIS
FORMATION RELATES ONLY TO THE PRODUCT DESIGNATED HEREIN, AND DOES NOT
LATE TO ITS USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY OTHER
OCESS.

----------REVISION----------

/89: REVISED PERSONAL PROTECTION, FIRE FIGHTING INFORMATION, SPILL
) LEAK PROCEDURES AND HANDLING ADVICE. ALSO ADDED OTHER REGULATORY
FORMATION.

/89: CHANGED HEADING AND CONTACT INFORMATION.

MATERIAL SAFETY DATA SHEET

7168

Park Chemical Company
8074 Military Avenue
Detroit, Michigan 48204
(313) 895-7215

#10006

SECTION 1

oduct Name: YU-SAL
rmula Number: MDS 213
te: 04/92

SECTION 2 - HAZARDOUS INGREDIENTS

S Registry No.	Ingredient	%	TLV (Other)
-16-5	SODIUM CHLORIDE		NONE ESTAB.
-40-7	POTASSIUM CHLORI		NONE ESTAB.

SECTION 3 - PHYSICAL DATA

Boiling Point: NA
Vapor Pressure: NA
Water Solubility: APPRED.
Specific Gravity: 1.0
Percent Volatile: NA
Evaporation Rate: NA
pH: NA
Appearance: POWDER

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

Flash Point: NA
Flammable Limits: NA
Extinguishing Media: NA

Special Fire Fighting Procedures: NA
Unusual Fire and Explosion Hazards: NA

000224

SECTION 5 - HEALTH HAZARD DATA

Threshold Limit Value: NONE EST.
Effects of Overexposure: EYES - CAN BE IRRITATING. SKIN - MAY BE IRRITATING. INHALATION - MAY BE IRRITATING. AVOID EXCESSIVE INHALATION OF DUST. INGESTION - EFFECT NOT KNOWN.

Emergency and First Aid Procedures: NONE USUALLY NECESSARY. EYES - WASH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SKIN - WAS WATER INGESTION - SEEK MEDICAL ADVICE.

SECTION 6 - REACTIVITY DATA

Stability: YES
Incompatability: NONE KNOWN
Hazardous Decomposition Products: NONE KNOWN
Hazardous Polymerization: NO

SECTION 7 - SPILL OR LEAK PROCEDURES

Spill Information: SWEEP UP AND RETURN TO DRUM FOR REUSE.
Waste Disposal: THIS MATERIAL IS CONSIDERED A NON-HAZARDOUS WASTE UNDER THE RESOURCE, CONSERVATION AND RECOVERY ACT.

SECTION 8 - SPECIAL PROTECTION INFORMATION

Respiratory Protection: NIOSH APPROVED DUST MASK IS RECOMMENDED FOR HANDLING DRY PRODUCT OR IF DUST BECOME EXCESSIVE.
Ventilation: MECHANICAL VENTILATION RECOMMENDED.

Protective Gloves: THERMAL PROTECTION RECOMMENDED.
Eye Protection: SAFETY GOGGLES RECOMMENDED.
Other Protective Equipment: N.A.

SECTION 9 - SPECIAL PRECAUTIONS

Handling and Storage Precautions: STORE IN CLOSED CONTAINERS TO AVOID MOISTURE PICK UP.
Other Precautions: N.A.

10423

POTASSIUM CHLORIDE
POTASSIUM CHLORIDE
POTASSIUM CHLORIDE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

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DEC 18 1991

SUBSTANCE IDENTIFICATION

CAS-NUMBER 7447-40-7

SUBSTANCE: **POTASSIUM CHLORIDE**

TRADE NAMES/SYNONYMS:
POTASSIUM CHLORIDE (KCL); CHLOROPOTASSURIL; ENSEAL; KALITABS; KAON-CL; KLOTRIX; NEOBAKASAL; POTASSIUM MONOCHLORIDE; POTAVESCENT; REKAWAN; SLOW K; SUPER K; SUPER K (SALT); POTASSIUM MURIATE; KALEORID; PFIKLOR; SPAN-K; P-217; P-330; BP366; CLK;

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: K-CL

MOLECULAR WEIGHT: 74.56

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: POTASSIUM CHLORIDE PERCENT: 100
CAS# 7447-40-7

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS TO WHITE CRYSTALS OR GRANULAR POWDER WITH A STRONG SALINE TASTE. BOILING POINT: 2732 F (1500 C) SUBLIMES

MELTING POINT: 1418 F (770 C) SPECIFIC GRAVITY: 1.984

000226

F 2168

SOLVENT SOLUBILITY: SOLUBLE IN GLYCEROL, ALKALIES, ETHER; SLIGHTLY SOLUBLE IN ALCOHOL; INSOLUBLE IN ACETONE.

0002702

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

POTASSIUM CHLORIDE:
IRRITATION DATA: 500 MG/24 HOURS EYE-RABBIT MILD.
TOXICITY DATA: 938 MG/KG/2 DAYS ORAL-INFANT LDLO; 60 MG/KG/DAY ORAL-WOMAN TDLO; 20 MG/KG ORAL-MAN LDLO; 2600 MG/KG ORAL-RAT LD50; 2715 MG/KG ORAL-MOUSE LD50; 2500 MG/KG ORAL-GUINEA PIG LD50; 660 MG/KG INTRAPERITONEAL-RAT LD50; 1181 MG/KG INTRAPERITONEAL-MOUSE LD50; 900 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; 85 MG/KG INTRAPERITONEAL-DOG LDLO; 2550 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 40 MG/KG PARENTERAL-GUINEA PIG LDLO; 142 MG/KG INTRAVENOUS-RAT LD50; 117 MG/KG INTRAVENOUS-MOUSE LD50; 77 MG/KG INTRAVENOUS-GUINEA PIG LDLO; 130 MG/KG INTRAARTERIAL-GUINEA PIG LDLO; MUTAGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION.
TARGET EFFECTS: POISONING MAY AFFECT THE POTASSIUM LEVEL WITH RESULTANT DISTURBANCES IN THE HEART RHYTHM.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH RENAL, CARDIAC, PANCREATIC AND ADRENAL INSUFFICIENCIES; PERSONS WITH ESOPHAGEAL, PYLORIC OR DUODENAL STENOSIS.
ADDITIONAL DATA: INTERACTIONS WITH MEDICATIONS HAVE BEEN REPORTED.

HEALTH EFFECTS AND FIRST AID

INHALATION:
POTASSIUM CHLORIDE:
ACUTE EXPOSURE- NO DATA AVAILABLE.
CHRONIC EXPOSURE- INHALATION IN POTASSIUM MINES AND PLANTS HAS BEEN REPORTED TO RESULT IN LESIONS OF THE NASAL SEPTUM DUE TO POTASSIUM CHLORIDE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
POTASSIUM CHLORIDE:
ACUTE EXPOSURE- NO DATA AVAILABLE.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
POTASSIUM CHLORIDE:
ACUTE EXPOSURE- MAY CAUSE IRRITATION. TESTED IN RABBIT EYES, APPLICATION OF 500 MG FOR 24 HOURS RESULTED IN MILD IRRITATION. CONCENTRATED SOLUTIONS MAY CAUSE A STINGING SENSATION.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
POTASSIUM CHLORIDE:
ACUTE EXPOSURE- MAY CAUSE GASTROINTESTINAL IRRITATION WITH NAUSEA, VOMITING, EPIGASTRIC DISTRESS, ABDOMINAL DISCOMFORT, AND DIARRHEA. HIGH LOCAL CONCENTRATIONS IN THE GASTROINTESTINAL TRACT MAY CAUSE ESOPHAGEAL ULCERATION, IF THERE IS DYSPHAGIA; GASTRIC ULCERATION, ESPECIALLY IF GASTRIC EMPTYING IS DELAYED; AND ULCERATION, OBSTRUCTION, HEMORRHAGING AND PERFORATION OF THE SMALL BOWEL. ACUTE INTOXICATIONS ORALLY ARE UNCOMMON SINCE LARGE DOSES USUALLY INDUCE VOMITING AND NORMALLY FUNCTIONING KIDNEYS EXCRETE POTASSIUM RAPIDLY. HOWEVER, IF AN OVERDOSE RESULTS IN HYPERKALEMIA THERE MAY BE PARESTHESIAS, ANESTHESIAS, GENERALIZED WEAKNESS, HYPOREFLEXIA, FLACCID PARALYSIS, LISTLESSNESS, APPREHENSION, VERTIGO, MENTAL CONFUSION, HYPOTENSION, SLOW, WEAK PULSE, CARDIAC ARRHYTHMIAS, HEART BLOCK, AND POSSIBLE DEATH. ANIMALS POISONED BY POTASSIUM SALTS DIED FROM RESPIRATORY FAILURE SOMETIMES FOLLOWING CONVULSIONS AND ACCOMPANIED BY GASTROENTERITIS, DEHYDRATION OF ORGANS AND EARLY RENAL TUBULAR NECROSIS. SURVIVORS HAD ANOREXIA, POLYDIPSIA, POLYURIA, FEVER, CONVULSIVE MOVEMENTS AND GASTROINTESTINAL DISTURBANCES DURING THE FIRST 24 HOURS, BUT RECOVERED RAPIDLY.
CHRONIC EXPOSURE- REPEATED AND PROLONGED INGESTION OF EXCESSIVE AMOUNTS MAY CAUSE SYMPTOMS AS IN ACUTE EXPOSURE. SKIN RASHES HAVE BEEN REPORTED RARELY.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

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INCOMPATIBILITIES:
POTASSIUM CHLORIDE:
BROMINE TRIFLUORIDE: MAY REACT VIOLENTLY.
SULFURIC ACID AND POTASSIUM PERMANGANATE: POSSIBLE EXPLOSION.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND CORROSIVE FUMES OF CHLORINE.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****

CONDITIONS TO AVOID

NONE REPORTED.

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH SPILLED MATERIAL INTO SEWER. KEEP UNNECESSARY PEOPLE AWAY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.

ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.

ANY TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ANY SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC, INC.
CREATION DATE: 12/17/84 REVISION DATE: 12/03/90

-ADDITIONAL INFORMATION-
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Revised 7/18/94

Material Safety Data Sheet

for

Portland Cement

Section I-Identity

Manufacturer's name and address: Rio Grande Portland Cement
P.O. Box 100
#1 Cement Plant Lane
Tijeras, NM 87059

Emergency Telephone Number: (505) 281-3311

Chemical Name and Synonyms: Portland Cement (CAS #65997-15-1)

Trade Name and Synonyms: Hydraulic Cement, Types I, II, & III

Section II-Chemical Data

Chemical family: Calcium Salts

Formula: Portland cement consists of a finely ground portland cement clinker mixed with a small amount of calcium sulfate to control set. Portland cement clinker is a sintered material produced by heating to high temperature (greater than 1200 degrees celsius) a mixture of substances such as limestone and shale from the earth's crust. The substances manufactured are essentially hydraulic calcium silicates contained in a crystalline mass, not separable into the individual components.

Substances similar to the following are known to be present in portland cement:

$3CaO.SiO_2$	(CAS # 12168-85-3)
$2CaO.SiO_2$	(CAS # 10034-77-2)
$3CaO.Al_2O_3$	(CAS # 12042-78-3)
$4CaO.Al_2O_3.Fe_2O_3$	(CAS # 12068-35-8)
$CaSO_4.XH_2O$	(CAS # 13397-24-5)

Small amounts of CaO, MgO, K_2SO_4, Na_2SO_4 may also be present.

Section III-Hazardous Ingredients

Ingredients: Portland cements are listed by OSHA in 29 CFR 1910.1000, Table Z-1-A and require material safety data sheets (FR, January 19, 1989).. MSHA (30 CFR 55.5.-1, Ref. 2. ACGIH TLV's for 1973, Appendix E) and ACGIH (TLV's for 1984-5. appendix D) list portland cements as nuisance dusts. Portland cements are NOT listed by NTP, IARC, OR OSHA as carcinogens. However, since portland cement is manufactured from raw materials mined from the earth (limestone, marl, sand, shale, clay, etc.)

and process heat is provided by burning fossil fuels, trace, bu
detectable, amounts of naturally occurring, and possible harmful, element
may be found during chemical analysis. Under ASTM standards, portlan
cement may contain .75 percent insoluble residue. A fraction of thes
residues may be free crystalline silica.

Section IV-Physical Data

Boiling Point: Not applicable, portland cement is a powdered solid.

Vapor Pressure: Not applicable, portland cement is a powdered solid.

Vapor Density: Not applicable, portland cement is a powdered solid.

Solubility in Water: Slight (0.1-1.0%)

Specific Gravity: (H_2O=1) 3.15

Evaporation Rate: Not applicable, portland cement is a powdered solid.

Appearance and Odor: Gray or white powder; no odor.

Melting Point: Not applicable.

Section V-Fire and Explosion Hazard Data

Flash Point: Portland cements are noncombustible and not explosive

Flammable or Explosive Limits: Not applicable.

Extinguishing Media: Not applicable.

Special Firefighting Procedures: Not applicable.

Unusual Fire and Explosion Hazards: None.

Lower Explosive Limit: Not applicable.

Upper Explosive Limit: Not applicable.

Section VI-Health Hazard Data

ACGIH Threshold Limit Value (1988-89): Total dust containing asbestos and less than silica - 10 mg/m^3

OSHA PKL (Transitional): Total dust - .50 million particles/ft^3

OSHA PKL (Final): Total dust - 10 mg/m^3
Respirable Dust - 5 mg/m^3

Effects of Overexposure:

Acute: Wet cement, especially as an ingredient in plastic (unhardened) concrete, mortar or slurries, can dry the skin and cause caustic burns. Direct contact with the eyes can cause irritation. Inhalation can irritate the upper respiratory system.

Chronic: Cement dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. [Cement may contain trace (less than 0.05%) amounts of chromium salts or compounds including hexavalent chromium, or other metals found to be hazardous or toxic in some chemical forms. These metals are mostly present as trace substitutions within the principal minerals.]

Emergency and First Aid Procedures: Irrigate eyes immediately and repeatedly with water and get prompt medical attention. Wash exposed skin areas with soap and water. Apply sterile dressings. If ingested, consult a physician immediately. Drink water.

Section VII-Reactivity Data

Stability: Product is stable. Keep dry until used.

Incompatibility: Aluminum powder and other alkali and alkaline earth elements will react in wet mortar or concrete, liberating hydrogen gas.

Hazardous Decomposition Products: None.

Hazardous Polymerization: Will not occur.

Section VIII-Spill Procedures

Steps to be taken in case material is spilled: Use dry cleanup methods that do not disperse the dust into the air. Avoid breathing the dust. Emergency procedures are not required.

Disposal Method: Small amounts of material can be disposed of as common waste or returned to the container for later use it if is not contaminated. Large volumes may require special handling.

Section IX-Special Protection Information

Respiratory Protection: In dusty environments, the use of a MSHA/NIOSH-approved respirator is recommended.

Ventilation: Local exhaust can be used to control airborne dust levels.

Eye Protection: Use tight fitting goggles in dusty environments.

Skin Protection: Use barrier creams, impervious, abrasion- and alkali-resistant gloves, boots and protective clothing to protect the skin from prolonged contact with wet cement in plastic concrete, mortar or slurries. Immediately after working with cement or cement-containing materials, workers should shower with soap and water. Precautions must be taken. Cement burns with little warning--little heat is sensed.

Section X-Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
ft^3	Cubic foot
IARC	International Agency for Research on Cancer
m^3	Cubic meter
mg	Milligram
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure List
TLV's	Threshold Limit Values

Note: This material safety data sheet attempts to describe as accurately as possible the potential exposures associated with normal cement use. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. Users have the responsibility to evaluate and use this product safely and to comply with all applicable laws and regulations.

Section XI-Regulatory Information

FEDERAL EPA

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center of release of quantities of Hazardous Substances equal to or greater than the reportable quantities (RQs) in 40 CFR 302.4.

Components present in this product at a level which could require reporting under this statute are:

None

Superfund Amendments and Re-Authorization Act of 1986
SARA Title III

Requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable quantities (RQs) in 40 CFR 335 (used for SARA 302,304,311, and 312).

Components present in this product at a level which could require reporting under this statute are:

None

Superfund Amendments and Re-Authorization Act of 1986
SARA Title III

Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material.

Components present in this product at a level which could require reporting under this statute are:

None

- 7168

SODIUM BISULFATE, MONOHYDRATE
SODIUM BISULFATE, MONOHYDRATE
SODIUM BISULFATE, MONOHYDRATE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACT:
GASTON L. PILLORI
(201) 796-7100

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SUBSTANCE IDENTIFICATION

CAS NUMBER 10034-88-5

SUBSTANCE: **SODIUM BISULFATE, MONOHYDRATE**

TRADE NAMES/SYNONYMS: SULFURIC ACID, MONOSODIUM SALT, FUSE-RATE, SODIUM ACID SULFATE, MONOHYDRATE, SODIUM PYROSULFATE, MONOHYDRATE; BISULFATE OF SODIUM, MONOHYDRATE; SODIUM HYDROGEN SULFATE, MONOHYDRATE

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: H-O4-S-Na.H2-O MOL WT: 138.06

CODE RATINGS (SCALE 0-3) HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=0

COMPONENTS AND CONTAMINANTS

PERCENT: 100 COMPONENT: SODIUM BISULFATE, MONOHYDRATE

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NONE ESTABLISHED

PHYSICAL DATA

DESCRIPTION: ODORLESS, DELIQUESCENT CRYSTALS BOILING POINT: DECOMPOSES

MELTING POINT: 130 F (59 C) SPECIFIC GRAVITY: 2.1

PH: 1.4 (0.1 M SOLUTION) SOLUBILITY IN WATER: 67%

SOLVENT SOLUBILITY: DECOMPOSES IN ALCOHOL

SODIUM BISULFATE MONOHYDRATE

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
REACTS, IF WET WITH COMMON METALS TO YIELD FLAMMABLE AND EXPLOSIVE HYDROGEN GAS.

FLASH POINT: NON-COMBUSTIBLE

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:
MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

EXTINGUISH USING AGENT INDICATED, DO NOT USE WATER DIRECTLY ON MATERIAL. IF LARGE AMOUNTS OF COMBUSTIBLE MATERIALS ARE INVOLVED, USE WATER SPRAY OR FOG IN FLOODING AMOUNTS. AVOID BREATHING CORROSIVE DUSTS AND FUMES FROM BURNING MATERIAL, KEEP UPWIND (BUREAU OF EXPLOSIVES, EMERGENCY HANDLING OF HAZARDOUS MATERIALS IN SURFACE TRANSPORTATION, 1981).

TOXICITY

193 MG/KG INTRAPERITONEAL-MOUSE LD50; CARCINOGEN STATUS: NONE.
SODIUM BISULFATE, MONOHYDRATE IS CORROSIVE TO EYES, MUCOUS MEMBRANES, AND SKIN.

HEALTH EFFECTS AND FIRST AID

INHALATION:
CORROSIVE.

ACUTE EXPOSURE- INHALATION OF ACIDIC FUMES OR MIST MAY CAUSE COUGHING, CHOKING, HEADACHE, DIZZINESS, WEAKNESS, HYPOTENSION, AND DELAYED PULMONARY EDEMA WITH CHEST TIGHTNESS, APNEA, FROTHY SPUTUM, AND CYANOSIS. DYSPNEA AND HEMOPTYSIS ARE POSSIBLE FOR SEVERAL WEEKS AFTER EXPOSURE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO ACIDIC FUMES MAY CAUSE EROSION OF TEETH FOLLOWED BY JAW NECROSIS. BRONCHIAL IRRITATION WITH COUGH AND FREQUENT ATTACKS OF BRONCHIAL PNEUMONIA MAY OCCUR. GASTROINTESTINAL DISTURBANCES ARE ALSO POSSIBLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. MAINTAIN AIRWAY AND BLOOD PRESSURE. TREAT PULMONARY EDEMA. GET MEDICAL ATTENTION.

SKIN CONTACT:
CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE PAIN AND BROWNISH OR YELLOW STAINS. BURNS MAY BE DEEP WITH SHARP EDGES AND HEAL SLOWLY WITH SCAR

TISSUE FORMATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO LOW LEVELS MAY CAUSE DERMATITIS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES, DIRECTING A STREAM OF WATER UNDER CLOTHING WHILE IT IS BEING REMOVED. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). IN CASE OF BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION.

EYE CONTACT:
CORROSIVE.
ACUTE EXPOSURE- DIRECT CONTACT WITH THE EYE MAY CAUSE REDNESS, PAIN, BLURRED VISION, AND LACRIMATION. CORNEAL INJURY AND BURNS ARE POSSIBLE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15 MINUTES). IN CASE OF BURNS, APPLY STERILE BANDAGE LOOSELY WITHOUT PRESSURE. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
CORROSIVE.
ACUTE EXPOSURE- INGESTION MAY BE FOLLOWED BY SEVERE PAIN, VOMITING AND DIARRHEA OF DARK PRECIPITATED BLOOD, AND PERITONITIS. BRUNISH OR YELLOWISH STAIN MAY BE FOUND AROUND THE MOUTH AND THROAT. ASPHYXIA MAY OCCUR FROM EDEMA OF THE GLOTTIS. IF DEATH DOES NOT OCCUR IN THE FIRST 24 HOURS, THE PATIENT MAY IMPROVE FOR 3-4 DAYS AND THEN HAVE A SUDDEN ONSET OF SEVERE ABDOMINAL PAIN, ABDOMINAL RIGIDITY, AND RAPID HYPOTENSION INDICATING DELAYED PERFORATION OF GASTRIC ULCERATION.

FIRST AID- IF VICTIM IS CONSCIOUS, GIVE LARGE QUANTITIES OF WATER IMMEDIATELY TO DILUTE THE ACID. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY

REACTIVITY:
STABLE IN CLOSED CONTAINERS UNDER NORMAL CONDITIONS UP TO THE BOILING POINT, WHERE DECOMPOSITION OCCURS.

INCOMPATIBILITIES:
MAY CAUSE EXPLOSION ON COMPRESSION WITH CALCIUM HYPOCHLORITE, PICRIC, AND SODIUM CARBONATE. MAY CATALYZE THE EXPLOSIVE REACTION OF ARSENIC ANHYDRIDE WITH ETHANOL.

EXPLOSIVE REACTION WITH MAGNESIUM, ALUMINUM ON MELTING.

CORROSIVE TO MOST METALS IN THE PRESENCE OF MOISTURE.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE SULFUR DIOXIDE AND SODIUM OXIDE.

POLYMERIZATION:
NOT KNOWN TO OCCUR.

****

CONDITIONS TO AVOID

FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. MAY IGNITE COMBUSTIBLES (WOOD, PAPER, OIL, ETC.).

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
HIGH LEVELS- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE, HELMET, OR HOOD. SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

FIREFIGHTING- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - ALLIED FISHER SCIENTIFIC
CREATION DATE: 03/14/85 REVISION DATE: 11/14/85

J.T.Baker
222 Red School Lane
Phillipsburg, NJ 08865
24-Hour Emergency Telephone 908-859-2151
National Response Center 800-424-8802
Chemtrec 800-424-9300

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

FICHE SIGNALETIQUE | HOJAS DE DATOS DE SEGURIDAD

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals. All non-emergency questions should be directed to Customer Service (1-800-JTBAKER) for assistance.

- 7168

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ffective: 01/04/94

Sodium Chloride

10295

Page: 1
Issued: 01/28/95

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

SECTION I - PRODUCT IDENTIFICATION

roduct Name: Sodium Chloride
ommon Synonyms: Salt; Rock Salt; Saline; Table Salt
hemical Family: Inorganic Sodium Compounds
ormula: NaCl
ormula Wt.: 58.44
AS No.: 7647-14-5
IOSH/RTECS No.: VZ4725000
roduct Use: Laboratory Reagent
roduct Codes: 3625,3630,4058,3624,3632,3629,5589,5833,4924,3628,3627

PRECAUTIONARY LABELING

AKER SAF-T-DATA* System

HEALTH	FLAMMABILITY	REACTIVITY	CONTACT
1	0	0	1
SLIGHT	NONE	NONE	SLIGHT

aboratory Protective Equipment



U.S. Precautionary Labeling

CAUTION!
AY CAUSE IRRITATION. MAY BE HARMFUL IF SWALLOWED IN LARGE QUANTITIES
uring use avoid contact with eyes, skin, clothing. Wash thoroughly after
andling. When not in use keep in tightly closed container.

Continued on Page: 2

S3338 -03 Sodium Chloride Page:
Effective: 01/04/94 Issued: 01/28/

PRECAUTIONARY LABELING (CONTINUED)

International Labeling

Avoid contact with eyes. After contact with skin, wash immediately with plenty of water. Keep container tightly closed.

FAF-T-DATA* Storage Color Code: Orange (general storage)

SECTION II - COMPONENTS

Component	CAS No.	Weight %	OSHA PEL	ACGIH/TL
Sodium Chloride	7647-14-5	99-100	N/E	N/E

SECTION III - PHYSICAL DATA

Boiling Point: 1413°C (2575°F) (at 760 mm Hg)

Vapor Pressure (mmHg): <1 (20°C)

Melting Point: 801°C (1473°F) (at 760 mm Hg)

Vapor Density (air=1): N/A

Specific Gravity: 2.16 (H_2O=1)

Evaporation Rate: N/A

Solubility(H_2O): Appreciable (>10%)

% 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 crystalline solid. Odorless.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

ash Point (Closed Cup): N/A

itoignition Temperature: N/A

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

re Extinguishing Media
Use extinguishing media appropriate for surrounding fire.

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

nsual Fire & Explosion Hazards
None identified.

xic Gases Produced
hydrogen chloride

plosion Data-Sensitivity to Mechanical Impact
None identified.

plosion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

reshold Limit Value (TLV/TWA): Not Established

rt-Term Exposure Limit (STEL): Not Established

rmissible Exposure Limit (PEL): Not Established

xicity of components

al Rat LD_{50} for Sodium Chloride 3000 mg/kg

traperitoneal Mouse LD_{50} for Sodium Chloride 2602 mg/kg

utaneous Mouse LD_{50} for Sodium Chloride 3150 mg/kg

travenous Mouse LD_{50} for Sodium Chloride 645 mg/kg

Continued on Page: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

Carcinogenicity: NTP: No IARC: No Z List: No OSHA Reg: No

Carcinogenicity
None identified.

Reproductive Effects
None identified.

Effects of Overexposure

INHALATION: irritation of upper respiratory tract

SKIN CONTACT: irritation

EYE CONTACT: irritation

SKIN ABSORPTION: none identified

INGESTION: ingestion of large quantities may cause gastrointestinal irritation

CHRONIC EFFECTS: high blood pressure, rapid ineffective breathing

Target Organs
eyes, skin, respiratory system, mucous membranes

Medical Conditions Generally Aggravated by Exposure
high blood pressure

Primary Routes of Entry
inhalation, ingestion, skin contact, eye contact

Emergency and First Aid Procedures

INGESTION: If swallowed and the person is conscious, immediately gi e large amounts of water. Get medical attention.

INHALATION: If a person breathes in large amounts, move the exposed person to fresh air.

SKIN CONTACT: In case of contact, immediately wash skin with plenty of soap and water for at least 15 minutes.

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

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Continued on Page: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

SARA/TITLE III HAZARD CATEGORIES and LISTS

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

Extremely Hazardous Substance: No
CERCLA Hazardous Substance: No
SARA 313 Toxic Chemicals: No
WHMIS Inventory: Yes

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: none documented

Incompatibles: strong oxidizing agents, lithium, inter-halogens (ex. bromine trifluoride), iron, cement

Decomposition Products: hydrogen chloride

SECTION VII - SPILL & DISPOSAL PROCEDURES

Steps to be Taken in the Event of a Spill or Discharge
Wear suitable protective clothing. Carefully sweep up and remove.

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

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, use an appropriate respirator or dust mask.

Continued on Page: 6

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT (CONTINUED)

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

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* Storage Color Code: Orange (general storage)

Storage Requirements
Keep container tightly closed. Suitable for any general chemical storage area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Domestic (D.O.T.)

Proper Shipping Name: Chemicals, n.o.s. (Non-regulated)

International (I.M.O.)

Proper Shipping Name: Chemicals, n.o.s. (Non-regulated)
Marine Pollutants: No

AIR (I.C.A.O.)

Proper Shipping Name: Chemicals, n.o.s. (Non-regulated)

U.S. Customs Harmonization Number: 25010000000

NOTE: When handling liquid products, secondary protective containers must be used for carrying.
-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

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plication. Depending on usage, protective clothing including eye and
ce guards and respirators must be used to avoid contact with material
breathing chemical vapors/fumes.
posure to this product may have serious adverse health effects. This
emical may interact with other substances. Since the potential uses
e so varied, Baker cannot warn of all of the potential dangers of use
interaction with other chemicals or materials. Baker warrants that
e chemical meets the specifications set forth on the label.
KER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD
THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS
R A PARTICULAR PURPOSE.
e user should recognize that this product can cause severe injury and
en death, especially if improperly handled or the known dangers of use
e not heeded. READ ALL PRECAUTIONARY INFORMATION. As new documented
neral safety information becomes available, Baker will periodically
vise this Material Safety Data Sheet.
te: CHEMTREC, CANUTEC, and NATIONAL RESPONSE CENTER emergency telephone
mbers are to be used ONLY in the event of CHEMICAL EMERGENCIES involving
spill, leak, fire, exposure, or accident involving chemicals. All
n-emergency questions should be directed to Customer Service
-800-JTBAKER) for assistance.
-
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moved by Quality Assurance Department.

DATE: 06/14/95 ACCT: 191075060
INDEX: A51646370 CAT NO: S318500 PO NBR: 247855

SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR
SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR
SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR

10036

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 1310-73-2

SUBSTANCE: **SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR**

TRADE NAMES/SYNONYMS:
CAUSTIC SODA; SODA LYE; LYE; WHITE CAUSTIC; CAUSTIC SODA, BEAD; CAUSTIC SODA, DRY; CAUSTIC SODA, FLAKE; CAUSTIC SODA, GRANULAR; CAUSTIC SODA, SOLID; SODIUM HYDRATE; SODIUM HYDROXIDE (NA(OH)); SODIUM HYDROXIDE, FLAKE; SODIUM HYDROXIDE, DRY; SODIUM HYDROXIDE, SOLID; ASCARITE; SODIUM HYDROXIDE; S318; S813; S320; S812; BP359; UN 1823; STCC 4935235; NAOH; ACC21300

CHEMICAL FAMILY:
Inorganic base

MOLECULAR FORMULA: NA-O-H

MOLECULAR WEIGHT: 40.00

CERCLA RATINGS (SCALE 0-3): HEALTH-3 FIRE-0 REACTIVITY-1 PERSISTENCE-0
NFPA RATINGS (SCALE 0-4): HEALTH-3 FIRE-0 REACTIVITY-1

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM HYDROXIDE PERCENT: 100
CAS# 1310-73-2

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
SODIUM HYDROXIDE:
2 mg/m3 OSHA ceiling
2 mg/m3 ACGIH ceiling
2 mg/m3 NIOSH recommended ceiling
2 mg/m3 DFG MAK TWA (total dust);
4 mg/m3 DFG MAK 5 minute peak, momentary value, 8 times/shift

Measurement method: Particulate filter; hydrochloric acid; titration; (NIOSH Vol. III # 7401, Alkaline Dusts).

1000 pounds CERCLA Section 103 Reportable Quantity

OSHA revoked the final rule limits of January 19, 1989 in response to the 11th Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993. See 29 CFR 1910.1000 (58 FR 35338)

PHYSICAL DATA

DESCRIPTION: Odorless, white or off-white hygroscopic solid.

BOILING POINT: 2534 F (1390 C) MELTING POINT: 604 F (318 C)

SPECIFIC GRAVITY: 2.130 VAPOR PRESSURE: 100 mmHg @ 1111 C

PH: 14 @ 5% solution SOLUBILITY IN WATER: 111%

SOLVENT SOLUBILITY: Soluble in alcohol, glycerol; insoluble acetone, ether

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
Negligible fire hazard when exposed to heat or flame

FIREFIGHTING MEDIA:

DATE: 06/14/95 ACCT: 191075060
INDEX: A51646370 CAT NO: S318500 PO NBR: 247855

Dry chemical, carbon dioxide, water spray or regular foam (1993 Emergency Response Guidebook, RSPA P 5800.6).

For larger fires, use water spray, fog or regular foam (1993 Emergency Response Guidebook, RSPA P 5800.6).

FIREFIGHTING:
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks (1993 Emergency Response Guidebook, RSPA P 5800.6, Guide Page 60)

Use agent suitable for type of fire. Use water in flooding quantities as fog. Apply water from as far a distance as possible.

TRANSPORTATION DATA

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
Sodium hydroxide, solid-UN 1823

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - Corrosive material

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101 AND SUBPART E:
Corrosive

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.154
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 15 kg
CARGO AIRCRAFT ONLY: 50 kg

TOXICITY

SODIUM HYDROXIDE:
IRRITATION DATA: 500 mg/24 hours skin-rabbit severe; 1% eye-rabbit severe; 50 ug/24 hours eye-rabbit severe; 1 mg/24 hours eye-rabbit severe; 400 ug eye-rabbit mild; 1 mg/30 seconds rinsed eye-rabbit severe; 1%/24 hours eye-monkey severe.
TOXICITY DATA: 1350 mg/kg skin-rabbit LD50 (Van Waters & Rogers Inc. MSDS); 500 mg/kg oral-rabbit LDLo; 104-340 mg/kg oral-rat LD50 (Van Waters & Rogers Inc. MSDS); 40 mg/kg intraperitoneal mouse LD50; mutagenic data (RTECS).
CARCINOGEN STATUS: None.
LOCAL EFFECTS: Corrosive- inhalation, skin, eye, ingestion.
ACUTE TOXICITY LEVEL: Toxic by ingestion; moderately toxic by dermal absorption.
TARGET EFFECTS: No data available.
AT INCREASED RISK FROM EXPOSURE: Persons with pre-existing skin and eye conditions.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SODIUM HYDROXIDE:
CORROSIVE. 250 mg/m3 Immediately Dangerous to Life or Health.
ACUTE EXPOSURE- Effects due to inhalation of dusts or mist may vary from mild irritation of the nose at 2 mg/m3 to severe pneumonitis depending on the severity of exposure. Low concentrations may cause mucous membrane irritation with sore throat, coughing, and dyspnea. Intense exposures may result in destruction of mucous membranes and delayed pulmonary edema or pneumonitis. Shock may occur.
CHRONIC EXPOSURE- Prolonged exposures to high concentrations of dusts or mists may cause discomfort and ulceration of the nasal passages. Repeated exposures of 5000 mg/L were harmless to rats, but 10,000 mg/L led to nervousness, sore eyes, diarrhea and retarded growth. Rats exposed 30 minutes/day to unmeasured concentrations of sodium hydroxide aerosols suffered pulmonary damage after 2-3 months. Death occurred in 2 of 10 rats exposed to an aerosol of 40% aqueous sodium hydroxide for 30 minutes, twice a week for 3 weeks. Histopathological examination showed mostly normal lung tissue with foci of enlarged alveolar septae, emphysema, bronchial ulceration, and enlarged lymph adenoidal tissues. An epidemiologic study of 291 workers chronically exposed to caustic dusts for 30 years or more found no significant increase in mortality in relation to duration or intensity of such exposures.

FIRST AID: Remove from exposure area to fresh air immediately. Perform artificial respiration if necessary. Maintain airway, blood pressure and respiration. Keep warm and at rest. Treat symptomatically and supportively. Get medical attention immediately. Qualified medical personnel should consider administering oxygen.

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SKIN CONTACT:
SODIUM HYDROXIDE:
CORROSIVE.
ACUTE EXPOSURE- Upon contact with the skin, damage including redness, cutaneous burns, skin fissures and white eschars may occur without immediate pain. Exposure to solutions as weak as 0.03 N (0.12%) for 1 hour has caused injury to healthy skin. With solutions of 0.4-4%, irritation does not occur until after several hours. Solutions of 25-50% caused no sensation of irritation within 3 minutes in human subjects. Skin biopsies from human subjects having 1 N sodium hydroxide applied to their arms for 15 to 180 minutes showed progressive changes beginning with dissolution of the cells in the horny layer and progressing through edema to total destruction of the epidermis in 60 minutes. A 5% aqueous solution caused severe necrosis to the skin of rabbits when applied for 4 hours. Alkalies penetrate the skin slowly. The extent of injury depends on the duration of contact. If sodium hydroxide is not removed from the skin, severe burns with deep ulceration may occur. Exposure to the dust or mist may cause multiple small burns and temporary loss of hair. Pathologic findings due to alkalies may include gelatinous, necrotic areas at the site of contact.
CHRONIC EXPOSURE- Effects are dependent upon concentration and duration of exposure. Dermatitis or effects similar to those for acute exposure may occur.

FIRST AID- Remove contaminated clothing and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). If burns occur, proceed with the following: Cover affected area securely with sterile, dry, loose fitting dressing. Treat symptomatically and supportively. Get medical attention immediately.

EYE CONTACT:
SODIUM HYDROXIDE:
CORROSIVE.
ACUTE EXPOSURE- Contact may cause disintegration and sloughing of conjunctival and corneal epithelium, corneal opacification, marked edema and ulceration. After 7 to 13 days either gradual recovery begins or there is progression of ulceration and corneal opacification. Complications of severe eye burns are symblepharon with overgrowth of the cornea by a vascularized membrane, progressive or recurrent corneal ulceration and permanent corneal opacification. Blindness may occur.
CHRONIC EXPOSURE- Effects are dependent upon concentration and duration of exposure. Conjunctivitis or effects similar to those for acute exposure may occur.

FIRST AID- Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15-20 minutes). Continue irrigating with normal saline until the pH has returned to normal (30-60 minutes). Cover with sterile bandages. Get medical attention immediately.

INGESTION:
SODIUM HYDROXIDE:
CORROSIVE/TOXIC.
ACUTE EXPOSURE- The reported lethal dose in rats is 140-340 mg/kg. Ingestion may cause a burning sensation in the mouth, corrosion of the lips, mouth, tongue and pharynx, and severe esophageal and abdominal pain, vomiting of blood and large pieces of mucosa, and bloody diarrhea. Asphyxia can occur from swelling of the throat. Mediastinitis, alkalemia, pallor, weak, slow pulse, cardiovascular collapse, shock, coma and death may occur. Perforation of the alimentary tract and constrictive scarring may result. Esophageal stricture may occur weeks, months, or even years later to make swallowing difficult. The estimated fatal dose in man is 5 grams. Cases of squamous cell carcinoma of the esophagus have occurred with latent periods of 12 to 42 years after ingestion. These cancers were believed to be sequels of tissue destruction and possibly scar formation rather than the result of direct carcinogenic action of sodium hydroxide.
CHRONIC EXPOSURE- Depending on the concentration, repeated ingestion of alkaline substances may result in inflammatory and ulcerative effects on the oral mucous membranes and other effects as with acute ingestion.

FIRST AID- Do not use gastric lavage or emesis. Dilute the alkali by giving Water or milk to drink immediately and allowing vomiting to occur. As soon as possible, have qualified medical personnel do esophagoscopy and irrigate injured areas with 1% acetic acid until the alkali is completely neutralized. (Dreisbach, Handbook of Poisoning, 11th Edition) Get medical attention immediately.

ANTIDOTE:
No specific antidote. Treat symptomatically and supportively.

REACTIVITY

REACTIVITY:
Reacts exothermically with water.

INCOMPATIBILITIES:

SODIUM HYDROXIDE
ACETALDEHYDE: May result in violent polymerization.
ACETIC ACID: Mixing in closed container increases temperature and pressure
ACETIC ANHYDRIDE: Mixing in a closed container increases temperature and pressure
ACIDS: May react violently.
ACROLEIN: May result in an extremely violent polymerization.
ACRYLONITRILE: May cause violent polymerization.
ALLYL ALCOHOL + BENZENE SULFONYL CHLORIDE: Possible explosion hazard.
ALLYL CHLORIDE: Hydrolyzes.
ALUMINUM: Vigorous reaction.
ALUMINUM, ARSENIC TRIOXIDE, SODIUM ARSENATE: May generate flammable hydrogen gas.
AMMONIA + SILVER NITRATE: Precipitation of explosive silver nitride may occur.
AMMONIUM SALTS: May react violently evolving ammonia gas.
BENZENE-1,4-DIOL: Exothermic reaction.
N,N'-BIS(TRINITROETHYL)UREA: Formation of explosive compound.
BROMINE: Possible explosion if not stirred continously.
CHLORINE TRIFLUORIDE: May cause violent reaction.
CHLOROFORM + METHYL ALCOHOL: Exothermic reaction.
CHLOROHYDRIN: Mixing in a closed container causes an increase in temperature and pressure.
4-CHLORO-2-METHYLPHENOL: Possible ignition.
CHLORONITROTOLUENES: Possible explosion.
CHLOROPICRIN: May cause violent reaction.
CHLOROSULFONIC ACID: Mixing in a closed container causes an increase in temperature and pressure.
CINNAMALDEHYDE: Exothermic reaction.
COATINGS: May be attacked.
COPPER: Solutions may slowly corrode.
CYANOGEN AZIDE: May form sodium 5-azidotetrazolide, which is explosive if isolated.
2,2-DICHLORO-3,3-DIMETHYLBUTANE: Hazardous reaction.
1,2-DICHLOROETHYLENE: May form spontaneously flammable monochloroacetylene.
DIBORANE AND OCTANAL OXIME: Exothermic reaction.
ETHYLENE CYANOHYDRIN: Mixing in a closed container causes an increase in temperature and pressure.
FLAMMABLE LIQUIDS: Fire and explosion hazard.
GLYCOLS: May cause exothermic decomposition with evolution of hydrogen gas.
GLYOXAL: Mixing in a closed container increases temperature and pressure.
HALOGENATED HYDROCARBONS: Violent reaction.
HYDROCHLORIC ACID: Mixing in a closed container causes an increase in temperature and pressure.
HYDROFLUORIC ACID: Mixing in a closed container causes an increase in temperature and pressure.
HYDROQUINONE: Rapid decomposition of hydroquinone with evolution of heat.
IRON: Solutions may slowly corrode.
LEAD: May be attacked; flammable hydrogen gas may be liberated.
LEATHER: May be attacked.
MALEIC ANHYDRIDE: Explosive decomposition.
METALS: Corrodes metals, reacting to form flammable hydrogen gas.
4-METHYL-2-NITROPHENOL: Exothermic reaction.
NITRIC ACID: Mixing in closed container increases temperature and pressure
NITROBENZENE: Possibly explosive reaction upon heating in presence of water.
NITROETHANE: Forms an explosive salt.
NITROMETHANE: Forms an explosive salt.
NITROPARAFFINS: The nitroparaffins, in the presence of water, form dry salts with organic bases. The dry salts are explosive.
NITROPROPANE: Forms an explosive salt.
O-NITROTOLUENE: Possible explosion.
OLEUM: Mixing in a closed container causes an increase in temperature and pressure.
ORGANIC PEROXIDES: Incompatible.
PENTOL (3-METHYL-2-PENTENE-4-YN-1-OL): Possible explosion.
PHOSPHORUS: May form mixed phosphines which may ignite spontaneously in air.
PHOSPHORUS PENTOXIDE: May react violently when heated.
PLASTICS: May be attacked.
B-PROPIOLACTONE: Mixing in a closed container causes an increase in temperature and pressure.
PROPYLENE OXIDE: Ignition or explosion may occur.
RUBBER: May be attacked.
SODIUM TETRAHYDROBORATE: Dry mixtures with sodium hydroxide containing 15-40% of tetrahydroborate liberate hydrogen explosively at 230-270 C.
SULFURIC ACID: Mixing in a closed container causes an increase in temperaure and pressure.
1,2,4,5-TETRACHLOROBENZENE: Violent reaction.
TETRACHLOROBENZENE + METHYL ALCOHOL: Possible explosion.
TETRACHLOROETHYLENE: Possible explosion.
TETRAHYDROFURAN: Serious explosions can occur.
TIN: Evolution of hydrogen gas which may form an explosive mixture.
1,1,1-TRICHLOROETHANOL: Explosion may occur.
TRICHLOROETHYLENE: Formation of explosive mixtures of dichloroacetylene.
TRICHLORONITROMETHANE + METHANOL: May cause violent reaction.
WOOL: May be attacked.
ZINC (DUST): Fire and explosion hazard.
ZIRCONIUM: May cause explosive reaction upon heating.

DECOMPOSITION:

Thermal decomposition may release toxic fumes of sodium oxide.

POLYMERIZATION:
Hazardous polymerization has not been reported to occur under normal temperatures and pressures.

STORAGE AND DISPOSAL

Observe all federal, state and local regulations when storing or disposing of this substance.

Storage

Store in a cool, dry, well-ventilated location. Separate from acids, water, metals. Immediately remove and properly dispose of any spilled material (NFPA 49, Hazardous Chemicals Data, 1991)

Store away from incompatible substances.

Disposal

Disposal must be in accordance with standards applicable to generators of hazardous waste, 40 CFR 262. EPA Hazardous Waste Number D002.
100 pound CERCLA Section 103 Reportable Quantity.

CONDITIONS TO AVOID

May burn but does not ignite readily. Flammable, poisonous gases may accumulate in tanks and hopper cars. May ignite combustibles (wood, paper, oil, etc.).

SPILL AND LEAK PROCEDURES

SOIL SPILL:
Dig holding area such as lagoon, pond or pit for containment.

Use protective cover such as a plastic sheet to prevent material from dissolving in fire extinguishing water or rain.

WATER SPILL:
Add suitable agent to neutralize spilled material to pH-7.

OCCUPATIONAL SPILL:
Do not touch spilled material. Stop leak if you can do it without risk. For small spills, take up with sand or other absorbent material and place into containers for later disposal. For small dry spills, with clean shovel place material into clean, dry container and cover. Move containers from spill area. For larger spills, dike far ahead of spill for later disposal. Keep unnecessary people away, isolate hazard area and deny entry.

Reportable Quantity (RQ): 1000 pounds
The Superfund Amendments and Reauthorization Act (SARA) Section 304 requires that a release equal to or greater than the reportable quantity for this substance be immediately reported to the local emergency planning committee and the state emergency response commission (40 CFR 355.40). If the release of this substance is reportable under CERCLA Section 103, the National Response Center must be notified immediately at (800) 424-8802 or (202) 426-2675 in the metropolitan Washington, D.C. area (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
Provide local exhaust ventilation system to meet published exposure limits.

RESPIRATOR:
The following respirators and maximum use concentrations are recommendations by the U.S. Department of Health and Human Services, NIOSH Pocket Guide to Chemical Hazards; NIOSH criteria documents or by the U.S. Department of Labor, 29 CFR 1910 Subpart Z.
The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH/MSHA).

SODIUM HYDROXIDE:

50 mg/m3: Any powered air-purifying respirator with a dust and mist filter.
Any supplied air respirator operated in a continuous flow mode.

100 mg/m3: Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
Any air-purifying full facepiece respirator with a high efficiency particulate filter.

250 mg/m3: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.

Escape: Any air-purifying full facepiece respirator with a high efficiency particulate filter.
Any appropriate escape-type self-contained breathing apparatus.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure demand or other positive-pressure mode.

Any supplied-air respirator that has a full facepiece and is operated in a pressure demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure demand or other positive pressure mode.

CLOTHING:
Employee must wear appropriate protective (impervious) clothing and equipment to prevent any possibility of skin contact with this substance.

GLOVES:
Employee must wear appropriate protective gloves to prevent contact with this substance.

EYE PROTECTION:
Employee must wear splash-proof or dust-resistant safety goggles and a faceshield to prevent contact with this substance.

Emergency wash facilities:
Where there is any possibility that an employee's eyes and/or skin may be exposed to this substance, the employer should provide an eye wash fountain and quick drench shower within the immediate work area for emergency use.

AUTHORIZED - FISHER SCIENTIFIC, INC.
CREATION DATE: 12/17/84 REVISION DATE: 06/30/94

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REPORT NUMBER: 971 VAN WATERS & ROGERS INC. PAGE: 001
MSDS NO: PG0066 MATERIAL SAFETY DATA SHEET
EFFECTIVE DATE: 03/14/94 VERSION: 004

PRODUCT: SODIUM SULFIDE

ORDER NO:
PROD NO :

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

---------- EMERGENCY ASSISTANCE ----------

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC
(800)424-9300

PRODUCT NAME:
SODIUM SULFIDE

MSDS #: PG0066

- - - SODIUM SULFIDE

DATE: 03/01/93
EDITION: 006
TRADE NAME: SODIUM SULFIDE
CHEM NAME/SYN: SODIUM MONOSULFIDE

CHEMICAL FAMILY: SULFUR CHEMICALS
FORMULA: NA2S (FLAKE AND SOLID)
CAS NUMBER: 001313-82-2
U.S. DOT SHIPPING NAME: SODIUM SULFIDE, HYDRATED
U.S. DOT HAZARD CLASS: 8 (CORROSIVE MATERIAL)
SUBSIDIARY RISK: N/A
I.D. NUMBER: UN1849
PACKING GROUP: II
REPORTABLE QUANTITY: N/A
IMO DESCRIPTION: SODIUM SULFIDE, HYDRATED, CLASS 8, UN1849, PACKING GROUP II, IMDG CODE PAGE 8227.

PRODUCT: SODIUM SULFIDE

ORDER NO:
PROD NO :

SECTION 1 - PHYSICAL DATA

BOILING POINT @ 760 MM HG:	346 F
VAPOR DENSITY (AIR=1):	N/A
SPECIFIC GRAVITY (H2O=1):	1.858 (FLAKE)
PH OF SOLUTIONS:	STRONGLY ALKALINE
FREEZING/MELTING POINT:	92 C (197 F)
SOLUBILITY (WEIGHT % IN WATER):	15% @ 68 F
BULK DENSITY:	40 LBS./CU.FT. (FLAKE)
VOLUME % VOLATILE:	VERY LOW
VAPOR PRESSURE:	UNKNOWN
EVAPORATION RATE:	N/A
HEAT OF SOLUTION:	MILDLY EXOTHERMIC

APPEARANCE AND ODOR:
WHITE TO YELLOW FLAKES; SLIGHT ROTTEN EGG ODOR

SECTION 2 - INGREDIENTS

MATERIAL	PERCENT
SODIUM SULFIDE	60-62
(HYDRATED--38% WATER OF CRYSTALLIZATION)	

SECTION 3 - FIRE/EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED):
NONFLAMMABLE

FLAMMABLE LIMITS IN AIR (% BY VOLUME)
LEL: N/A
UEL: N/A

EXTINGUISHING MEDIA:
NOT APPLICABLE

SPECIAL FIRE FIGHTING PROCEDURES:
FIREFIGHTERS MUST WEAR NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
CONTACT WITH ALL ACIDS WILL LIBERATE POISONOUS, FLAMMABLE HYDROGEN SULFIDE GAS. IF HYDROGEN SULFIDE GAS IS LIBERATED, THE FIRE AND EXPLOSION HAZARD SHOULD BE HANDLED IN THE SAME MANNER AS THE HYDROGEN SULFIDE. (REFER TO

000253

PRODUCT: SODIUM SULFIDE

ORDER NO:
PROD NO :

ATTACHED PPG HYDROGEN SULFIDE MSDS).

SECTION 4 - HEALTH HAZARD DATA

TOXICITY DATA:

LC50 INHALATION:	UNKNOWN
LD50 DERMAL:	(RABBITS) 177.8 MG/KG
SKIN/EYE IRRITATION:	SEE SECTION 5
LD50 INGESTION:	(RATS) 200 MG/KG
FISH,LC50 (LETHAL CONCENTRATION):	(BLUEGILL SUNFISH) TLM: 48 HR., 61 PPM

CLASSIFICATION:

INHALATION:	UNKNOWN
SKIN:	HIGHLY TOXIC
SKIN/EYE:	CORROSIVE
INGESTION:	MODERATELY TOXIC
AQUATIC:	TOXIC

SECTION 5 - EFFECTS OF OVEREXPOSURE

IS CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN?
NTP - NO IARC - NO OSHA - NO

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:
NONE KNOWN.

PERMISSIBLE EXPOSURE LIMITS:
NONE ESTABLISHED BY OSHA, ACGIH OR PPG.

ACUTE:

INHALATION: IRRITATION OF MUCOUS MEMBRANES, EYES, AND RESPIRATORY TRACT IS POSSIBLE FOLLOWING EXPOSURE TO THE DECOMPOSITION PRODUCT, HYDROGEN SULFIDE GAS, WHICH IS POTENTIALLY LETHAL. (REFER TO ATTACHED PPG HYDROGEN SULFIDE MSDS).

EYE/SKIN: MAY CAUSE IRRITATING AND SEVERE BURNS TO THE SKIN. MATERIAL IS CONSIDERED CORROSIVE AND HAS THE CAPABILITY OF BEING ABSORBED THROUGH THE SKIN PRODUCING THE TOXICITY TYPICAL OF HYDROGEN SULFIDE POISONING.

SIMILAR EFFECTS AS ALKALIES FOLLOWING DIRECT EXPOSURE TO THE EYE AND CAN CAUSE IRREVERSIBLE DAMAGE, INCLUDING BLINDNESS.

NOTE: THE TEST DATA FROM RABBIT STUDIES DEMONSTRATE THAT THIS MATERIAL

HAS A DERMAL LD50 BELOW 200 MG/KG. HOWEVER, THE EXTREME IRRITATION EXPERIENCED BY SKIN CONTACT PRECLUDES THE LIKELIHOOD THAT EXPOSURE TO AMOUNTS SUFFICIENT TO CAUSE HUMAN ILLNESS WOULD BE ENCOUNTERED. PPG, THEREFORE, CONSIDERS THAT THE IRRITATING PROPERTIES OF THIS MATERIAL AND THE LONG HISTORY OF SAFE USE OBVIATES THE NEED TO LABEL IT A POISON B.

INGESTION: GASTRIC ACIDITY WOULD CONVERT MATERIAL TO HYDROGEN SULFIDE GAS WHICH IS POTENTIALLY LETHAL. MATERIAL IS QUITE CORROSIVE AND WOULD PRODUCE BURNS OF THE STOMACH LINING CAPABLE OF CAUSING SEVERE INJURY AND DEATH. (REFER TO ATTACHED PPG HYDROGEN SULFIDE MSDS).

CHRONIC:
THE EFFECTS OF LONG-TERM, LOW-LEVEL EXPOSURES TO THIS PRODUCT HAVE NOT BEEN DETERMINED. SAFE HANDLING OF THIS MATERIAL ON A LONG-TERM BASIS SHOULD EMPHASIZE THE AVOIDANCE OF ALL EFFECTS FROM REPETITIVE ACUTE EXPOSURES.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION:
(HYDROGEN SULFIDE) REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN. HYDROGEN SULFIDE HAS A CHARACTERISTIC 'ROTTEN EGG' ODOR.

EYE OR SKIN CONTACT:
IMMEDIATELY FLUSH EYES AND SKIN WITH PLENTY OF WATER (SOAP AND WATER FOR SKIN) FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN. THOROUGHLY CLEAN CLOTHING AND SHOES BEFORE REUSE OR DISCARD.

INGESTION:
IF CONSCIOUS, DRINK LARGE QUANTITIES OF WATER. THEN INDUCE VOMITING BY PLACING A FINGER FAR BACK IN THE THROAT. ADMINISTER ADDITIONAL WATER. TAKE IMMEDIATELY TO A HOSPITAL OR PHYSICIAN. IF UNCONSCIOUS, OR IN CONVULSIONS, TAKE IMMEDIATELY TO A HOSPITAL. DO NOT ATTEMPT TO INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTES TO PHYSICIAN (INCLUDING ANTIDOTES):
TREAT SYMPTOMATICALLY. IN CASES WHERE THERE IS EXPOSURE TO HYDROGEN SULFIDE, REFER TO ATTACHED PPG HYDROGEN SULFIDE MSDS.

SECTION 6 - REACTIVITY DATA

STABILITY:
STABLE
CONDITIONS TO AVOID:
AVOID CONCENTRATING SOLUTIONS--COULD CAUSE SPONTANEOUS IGNITION.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: NONE

INCOMPATIBILITY (MATERIALS TO AVOID):
AVOID CONTACT WITH STRONG OXIDIZING AGENTS AND ACIDS. SODIUM SULFIDE SOLUTIONS ATTACK ZINC, COPPER, ALUMINUM, AND ALLOYS OF THESE METALS.

HAZARDOUS DECOMPOSITION PRODUCTS:
CONTACT WITH ACIDS WILL LIBERATE FLAMMABLE AND POISONOUS HYDROGEN SULFIDE GAS.

SECTION 7 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS SPILLED OR RELEASED:
IMMEDIATELY EVACUATE AREA, REMOVE IGNITION SOURCES, AND PROVIDE MAXIMUM VENTILATION. ONLY PERSONNEL EQUIPPED WITH NIOSH/MSHA-APPROVED, SELF-CONTAINED BREATHING APPARATUS OF FULL FACEPIECE AIRLINE RESPIRATORS WITH AUXILIARY SCBA'S OPERATED IN THE PRESSURE/DEMAND MODE AND EYE/SKIN PROTECTION SHOULD BE PERMITTED IN AREA. SWEEP SPILLED MATERIAL INTO CONTAINERS FOR DISPOSAL. SPILLED SODIUM SULFIDE SHOULD BE RECLAIMED IF POSSIBLE. AFTER ALL VISIBLE TRACES HAVE BEEN REMOVED, THOROUGHLY WET VACUUM THE AREA. PRODUCT MUST NOT COME IN CONTACT WITH ACIDS. DO NOT FLUSH SPILLS TO SEWERS!

WASTE DISPOSAL METHOD:
MUST BE DISPOSED OF IN AN APPROVED HAZARDOUS WASTE MANAGEMENT FACILITY. CARE MUST BE TAKEN WHEN USING OR DISPOSING OF CHEMICAL MATERIALS AND/OR THEIR CONTAINERS TO PREVENT ENVIRONMENTAL CONTAMINATION. IT IS YOUR DUTY TO DISPOSE OF THE CHEMICAL MATERIALS AND/OR THEIR CONTAINERS IN ACCORDANCE WITH THE CLEAN AIR ACT, THE CLEAN WATER ACT, THE RESOURCE CONSERVATION AND RECOVERY ACT, AS WELL AS ANY OTHER RELEVANT FEDERAL, STATE, OR LOCAL LAWS/REGULATIONS REGARDING DISPOSAL.

SECTION 8 - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:
USE NIOSH/MSHA-APPROVED COMBINATION ACID GAS AND DUST/MIST CARTRIDGE OR CANISTER RESPIRATOR WITH FULL FACEPIECE WHENEVER VAPOR OR MIST GENERATION IS LIKELY. AIRLINE AND/OR SELF-CONTAINED BREATHING APPARATUS OPERATED IN A

POSITIVE PRESSURE DEMAND MODE SHOULD BE READILY AVAILABLE IN CASE OF HYDROGEN SULFIDE GENERATION. SEE SECTION 7 FOR RESPIRATORY PROTECTION IN THE EVENT OF A SPILL OR LEAK. RESPIRATOR USE LIMITATIONS MADE BY NIOSH/MSHA OR THE MANUFACTURER MUST BE OBSERVED. RESPIRATORY PROTECTION PROGRAMS MUST BE IN ACCORDANCE WITH 29 CFR 1910.134.

VENTILATION(TYPE):
LOCAL EXHAUST VENTILATION SUFFICIENT TO MINIMIZE EMPLOYEE EXPOSURES.

EYE PROTECTION:
CHEMICAL GOGGLES (MONOGOGGLES)

GLOVES:
IMPERVIOUS

OTHER PROTECTIVE EQUIPMENT:
BOOTS, APRONS, OR CHEMICAL SUITS MUST BE USED WHEN NECESSARY TO PREVENT SKIN CONTACT. PERSONAL PROTECTIVE CLOTHING AND USE OF EQUIPMENT MUST BE IN ACCORDANCE WITH 29 CFR 1910.132 AND 29 CFR 1910.133.

SECTION 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORING:
- STORE AWAY FROM STRONG OXIDIZING AGENTS.
- DO NOT ALLOW CONTACT WITH ACIDS. WILL LIBERATE FLAMMABLE HYDROGEN SULFIDE GAS.
- STORE IN COOL, VENTILATED AREA.
- WEAR NIOSH/MSHA-APPROVED RESPIRATORY PROTECTION WHENEVER EXPOSURE IS LIKELY
- STORE ONLY IN CLOSED, PROPERLY LABELED CONTAINERS.
- DO NOT STORE IN ZINC, ALUMINUM, OR COPPER CONTAINERS.
- KEEP SHIPPING CONTAINERS CLOSED WHEN NOT IN USE.
- WEAR GOGGLES, RUBBER GLOVES, APRON, AND BOOTS WHEN HANDLING.

OTHER PRECAUTIONS:
- DO NOT BREATHE DUST OR MISTS FROM SOLUTIONS. INDIVIDUALS WITH RESPIRATORY AND/OR CENTRAL NERVOUS SYSTEM DISEASES SHOULD NOT BE EXPOSED.
- DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. MAY CAUSE SEVERE BURNS AND PERMANENT DAMAGE. WASH THOROUGHLY AFTER HANDLING.
- USE WITH ADEQUATE VENTILATION. VENTILATION MUST BE SUFFICIENT TO MINIMIZE EMPLOYEE EXPOSURE.
- DO NOT SWALLOW.
- DO NOT EAT, DRINK, OR SMOKE IN WORK AREA.

COMMENTS:
NOTE: SINCE A POTENTIALLY CRITICAL HAZARD IN WORKING WITH THIS PRODUCT MAY RESULT BECAUSE OF THE GENERATING OF HYDROGEN SULFIDE GAS UNDER CERTAIN

PRODUCT: SODIUM SULFIDE

ORDER NO:
PROD NO :

CONDITIONS, PPG RECOMMENDS YOU CONSIDER THE INSTALLATION OF A CONTINUOUS MONITORING HYDROGEN SULFIDE GAS DETECTION AND ALARM SYSTEM IN ANY AREA WHERE GENERATION OF SULFIDE GAS MAY OCCUR. DETAILS PERTAINING TO THE OPERATION AND MAINTENANCE OF THE HYDROGEN SULFIDE GAS MONITORING SYSTEM, AS WELL AS EMPLOYEE TRAINING ARE OUTLINED BY NIOSH.

TSCA - SODIUM SULFIDE IS ON THE TSCA INVENTORY UNDER CAS NO. 1313-82-2.

SARA TITLE III - 311/312 CATEGORIES - ACUTE AND REACTIVITY, B) NOT LISTED IN SECTION 313, C) NOT LISTED AS AN "EXTREMELY HAZARDOUS SUBSTANCE" IN SECTION 302.

CANADA WHMIS - A) SENSITIZATION TO PRODUCT: NONE KNOWN, B) REPRODUCTIVE TOXICITY: NONE KNOWN, C) ODOR THRESHOLD: NOT KNOWN, D) PRODUCT USE: CHEMICAL PROCESSING, E) REQUIRES CORROSIVE SYMBOL (CLASS E).

AS ADDITIONAL INFORMATION TO BE CONSIDERED WHEN HANDLING THIS PRODUCT, PPG'S HYDROGEN SULFIDE MSDS IS ATTACHED.

REVISIONS MADE TO 8/30/89, 5TH EDITION - DATE, EDITION, DOT SHIPPING INFORMATION UPDATED, IMO DESCRIPTION ADDED, PERCENT UNDER INGREDIENTS SECTION UPDATED.

PRODUCT: SODIUM SULFIDE

ORDER NO:
PROD NO :

FOR ADDITIONAL INFORMATION

CONTACT: MSDS COORDINATOR VAN WATERS & ROGERS INC.
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

07/19/95 09:30 PRODUCT: CUST NO: ORDER NO:

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*** E N D O F M S D S ***

10999

CHEM REPORT
05/23/1986

CHEM ID	CHEM NAME
007440-61-1	URANIUM

ENTRY INFORMATION
05/23/1986

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

DOE CHEMICAL HAZARDS EMERGENCY MANAGEMENT SYSTEM
05/23/1986

HEALTH AND SAFETY INFORMATION AUTHORITY

CHEMICAL NAME OR SYNONYM

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

DOT

TWA .2 mg/m³ STEL .6

DISPOSAL

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

DECOMPOSITION PRODUCTS

THERMAL DECOMPOSITION - URANIUM OXIDES.

ENVIRONMENTAL EFFECTS

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

EMERGENCY PROCEDURES

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

FIRST AID

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

FIRE HAZARD

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

8819

CARBON DIOXIDE.

HEALTH HAZARD

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

CHEMICAL INCOMPATIBILITIES

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

MEDICAL RECCOMMENDATIONS

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

PHYSICAL DESCRIPTION

A HARD, SILVERY WHITE RADIOACTIVE METAL

PROTECTION MEASURES

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

SAMPLING METHODS

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

SHIPPING INFORMATION

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

STORAGE RECOMMENDATIONS

STORE AS RADIOACTIVE MATERIAL. KEEP FROM EXPOSURE TO AIR, MOISTURE, CO2 HALOGENS, ACIDS, AMMONIA, SULFUR. SCRAP URANIUM SHOULD BE COVERED WITH

USE

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

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

CHEM NAME* URANIUM

CHEMICAL ATTRIBUTES
05/23/1986

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

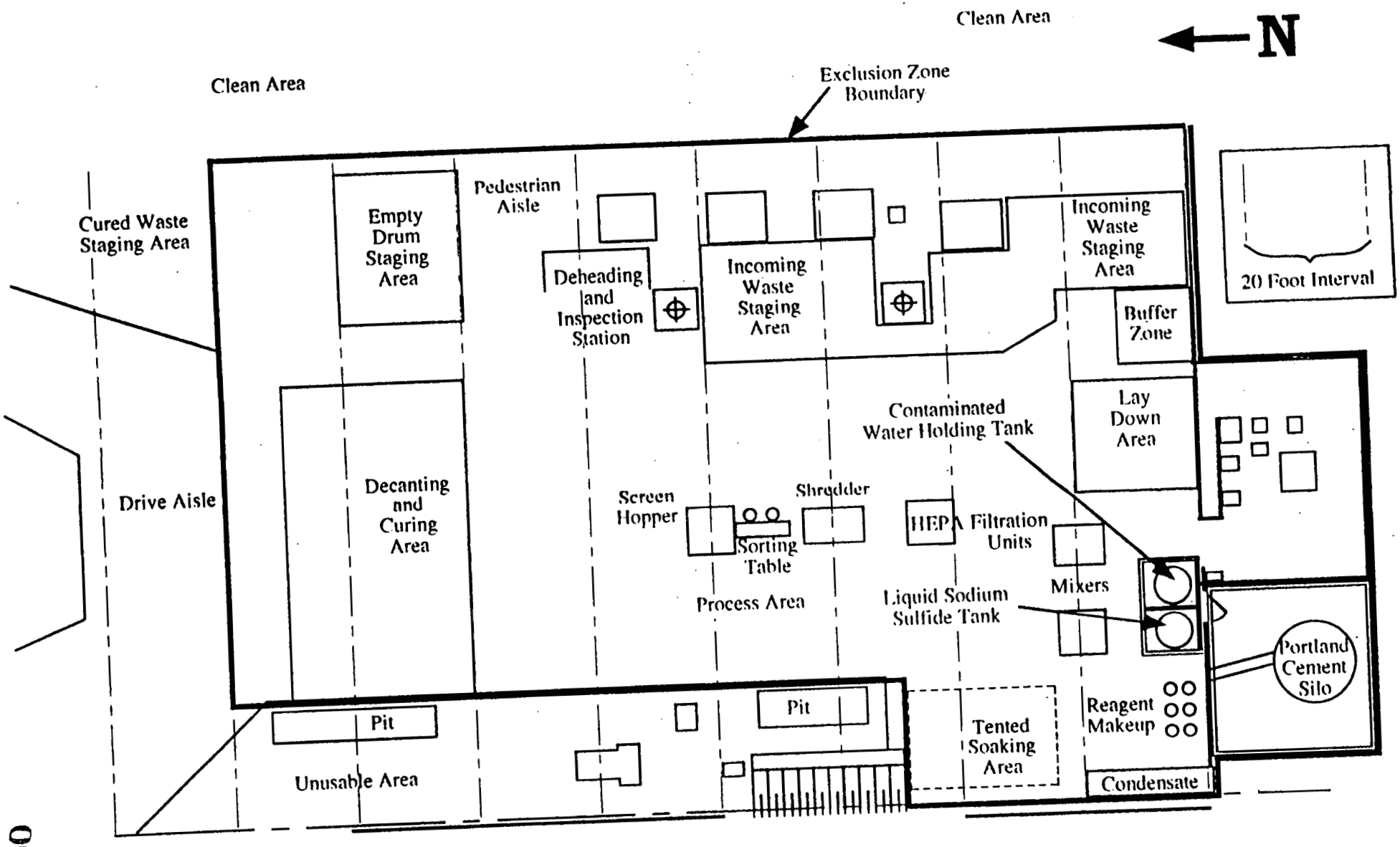
SELECTED MATERIALS THAT ARE RELATED TO OR CONTAIN THE SUBSTANCE
05/23/1986

CHEM NAME* URANIUM

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

ATTACHMENT F

WORK AREA MAP



9520-BSB HD-7/26/95

Figure 6A
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

292000

8912168

ATTACHMENT G

OSHA AND DOE EMPLOYEE RIGHTS POSTER

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

- 7168

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 5480 1A for details.

DOE Contractors:

DOE has determined that

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. The Order and the standards are available for employee review at

_____ SAFETY & HEALTH BULLETIN P53 _____

As delineated by the Order DOE 5480.1A, 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 5480 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 biological 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 biological 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 establishment procedures.

Inspections:

All activities under this contract are subject to inspection by DOE When an inspection under the Order DOE 5480 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 that 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 to eliminate the hazard As soon as practicable 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 5480 1A

Inquiries:

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

— J. Phil Harmic —

— Fernald Office —
— U S. Department of Energy —
— P O. Box 398705 —
— Cincinnati, Ohio 45239-8705 —

Posting Requirements:

Copies of this notice must be posted in 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

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000123

ATTACHMENT H

ACKNOWLEDGMENT FORM

ACKNOWLEDGEMENT STATEMENT FOR THE MIXED WASTE STABILIZATION PROJECT

The undersigned persons have been orientated on the Project Specific Health and Safety Plan for the Fernald Mixed Waste Stabilization Project and agree to abide by all provisions

NAME (printed)	*SIGNATURE*	*DATE*
Team Leader		
Job Site Safety Officer		

APPENDIX E

WASTE DESCRIPTION

INFORMATION

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
517	W506621	R050 137 P 003 9349	000001	OIL DRY CONTAMINATED W/OIL FROM BALER	324.00	.01	.50	D007 D008
	W506622	R050 137 P 003 9349	000002	OIL DRY CONTAMINATED W/OIL FROM BALER	382.00	.01	.50	D007 D008
	W506623	R050 137 P 003 9349	000003	OIL DRY CONTAMINATED W/OIL FROM BALER	306.00	.01	.50	D007 D008
Total number of drums per MEF =: 6								
757	W514906	R050 732 P 003 5350	000001	CONCRETE, CERAMICS, SOIL	220.00	.01	.50	D004 D011 D007 D008 D010
Total number of drums per MEF =: 5								
817	W506873	R050 700 P 049 0355	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	389.00	.01	.50	D008
	W514339	R050 700 P 049 0379	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	211.00	.01	.50	D008
	W514706	R050 719 P 049 0382	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	111.00	.01	.50	D008
	W514715	R050 700 P 049 0383	000002	PAINT CHIPS FROM SAND FILTERS AT WATER	39.00	.01	.50	D008
	W514747	R050 700 P 049 0383	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	149.00	.01	.50	D008
	W514750	R050 700 P 049 0382	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	97.00	.01	.50	D008
	W514841	R050 700 P 049 0384	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	102.00	.01	.50	D008
	W514867	R050 700 P 049 0386	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	76.00	.01	.50	D008
	W514869	R050 700 P 049 0386	000002	PAINT CHIPS FROM SAND FILTERS AT WATER	24.00	.01	.50	D008
	W515145	R050 766 P 049 0396	000001	PAINT CHIPS FROM SAND FILTERS AT WATER	37.00	.01	.50	D008
Total number of drums per MEF =: 10								
1363	W514904	D690 655 D 041 0350	000001	OILY SLUDGES FROM WWTS AREA	705.00	20.00	.20	D005 D006 D007 D008 D009

000263

2168

000269

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W515005	D690 655 D 041 0351	000001	OILY SLUDGES FROM WWTS AREA	519.00	40.00	.20	D005 D008 D009 D007 D006
Total number of drums per MEF =: 10								
1380	W076704	R050 800 D 042 0356	000002	NON-OILY CLEANOUT SLUDGES	773.00	.01	.50	D007 D008
	W076705	R050 800 D 042 0356	000001	NON-OILY CLEANOUT SLUDGES	660.00	.01	.50	D007 D008
	W076706	R050 800 D 042 0357	000001	NON-OILY CLEANOUT SLUDGES	420.00	.01	.50	D007 D008
Total number of drums per MEF =: 6								
1421	W506506	R020 503 P 003 6348	000001	OILY RAGS, PADS, GLOVES & PLASTIC WITH	140.00	.01	.20	D008
	W506834	R020 503 P 003 6354	000001	OILY RAGS, PADS, GLOVES & PLASTIC WITH	126.00	.01	.20	D008
Total number of drums per MEF =: 2								
1430	W514822	R071 100 1 001 0350	000001	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	532.00	.20	.71	D010
	W514823	R071 100 1 001 0350	000002	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	167.00	.20	.71	D010
	W514824	R071 100 1 001 0350	000003	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	362.00	.20	.71	D010
	W514825	R071 100 1 001 0350	000004	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	364.00	.20	.71	D010
	W514826	R071 100 1 001 0350	000005	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	524.00	.20	.71	D010
	W514827	R071 100 1 001 0350	000006	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	382.00	.20	.71	D010
	W514828	R071 100 1 001 0350	000007	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	271.00	.20	.71	D010
	W514829	R071 100 1 001 0350	000008	PLASTIC SHEETING,GLOVES,FLOOR SWEEPINGS	431.00	.20	.71	D010
Total number of drums per MEF =: 8								
2021	W506634	R095 245 V 001 0309	000001	BARIUM CARBONATE	515.00	.01	.50	D005
	W513980	R095 200 V 052 0372	000001	BARIUM CARBONATE	210.00	.01	.50	D005

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W513981	R095 200 V 052 0372	000002	BARIUM CARBONATE	308.00	.01	.50	D005
	W513982	R095 200 V 052 0372	000003	BARIUM CARBONATE	210.00	.01	.50	D005
	W513983	R095 200 V 052 0372	000004	BARIUM CARBONATE	229.00	.01	.50	D005
	W513984	R095 200 V 052 0372	000005	BARIUM CARBONATE	209.00	.01	.50	D005
	W513985	R095 200 V 052 0372	000006	BARIUM CARBONATE	264.00	.01	.50	D005
	W513986	R095 200 V 052 0372	000007	BARIUM CARBONATE	257.00	.01	.50	D005
	W513987	R095 200 V 052 0372	000008	BARIUM CARBONATE	125.00	.01	.50	D005
	W513988	R095 200 V 052 0372	000009	BARIUM CARBONATE	203.00	.01	.50	D005
	W513989	R095 200 V 052 0372	000010	BARIUM CARBONATE	250.00	.01	.50	D005
	W513990	R095 200 V 052 0372	000011	BARIUM CARBONATE	282.00	.01	.50	D005
	W513991	R095 200 V 052 0372	000012	BARIUM CARBONATE	421.00	.01	.50	D005
	W513992	R095 200 V 052 0372	000013	BARIUM CARBONATE	352.00	.01	.50	D005
	W513993	R095 200 V 052 0372	000014	BARIUM CARBONATE	411.00	.01	.50	D005
	W513994	R095 200 V 052 0372	000015	BARIUM CARBONATE	390.00	.01	.50	D005
Total number of drums per MEF =: 16								
2443	W515028	R050 107 P 003 9353	000001	NON RECOVERABLE TRASH	22.00	.01	.50	D008
	W515029	R050 107 P 003 9353	000002	NON RECOVERABLE TRASH	69.00	.01	.50	D008
	W515030	R050 107 P 003 9353	000003	NON RECOVERABLE TRASH	76.00	.01	.50	D008
	W515031	R050 107 P 003 9355	000001	NON RECOVERABLE TRASH	54.00	.01	.50	D008
	W515032	R050 107 P 003 9358	000001	NON RECOVERABLE TRASH	124.00	.01	.50	D008
Total number of drums per MEF =: 5								
2483	W051274	W095 900 V 003 A379	000004	HEPA FILTERS/WOOD/PLASTIC	0.00	.01	.95	D007 D011
	W090033	W095 900 V 003 A379	000002	HEPA FILTERS/WOOD/PLASTIC	0.00	.01	.95	D007 D011
	W090922	W095 900 V 003 A379	000003	HEPA FILTERS/WOOD/PLASTIC	0.00	.01	.95	D007 D011
	W090923	W095 900 V 003 A379	000001	HEPA FILTERS/WOOD/PLASTIC	0.00	.01	.95	D007 D011
Total number of drums per MEF =: 8								

042000

9128

000271

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
10013	W500739	R020 362 D 002 0291	000020	SUMP CAKE	666.00	.01	.20	D005 D007
	W500740	R020 362 D 002 0291	000023	SUMP CAKE	687.00	.01	.20	D005 D007
	W500741	R020 362 D 002 0291	000018	SUMP CAKE	698.00	.01	.20	D005 D007
	W500742	R020 362 D 002 0291	000011	SUMP CAKE	530.00	.01	.20	D005 D007
	W500743	R020 362 D 002 0291	000012	SUMP CAKE	678.00	.01	.20	D005 D007
	W500744	R020 362 D 002 0291	000024	SUMP CAKE	589.00	.01	.20	D005 D007
	W500745	R020 362 D 002 0291	000005	SUMP CAKE	632.00	.01	.20	D005 D007
	W500746	R020 362 D 002 0291	000019	SUMP CAKE	708.00	.01	.20	D005 D007
	W500747	R020 362 D 002 0291	000016	SUMP CAKE	680.00	.01	.20	D005 D007
	W500748	R020 362 D 002 0291	000014	SUMP CAKE	463.00	.01	.20	D005 D007
	W500749	R020 362 D 002 0291	000013	SUMP CAKE	680.00	.01	.20	D005 D007
	W500750	R020 362 D 002 0291	000017	SUMP CAKE	609.00	.01	.20	D005 D007
	W500786	R020 362 D 002 0291	000015	SUMP CAKE	718.00	.01	.20	D005 D007
	W500787	R020 362 D 002 0291	000001	SUMP CAKE	448.00	.01	.20	D005 D007
	W500788	R020 362 D 002 0291	000004	SUMP CAKE	600.00	.01	.20	D005 D007
	W500789	R020 362 D 002 0291	000022	SUMP CAKE	667.00	.01	.20	D005 D007
	W500790	R020 362 D 002 0291	000008	SUMP CAKE	654.00	.01	.20	D005

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W500791	R020 362 D 002 0291	000007	SUMP CAKE	498.00	.01	.20	D007 D005
	W500792	R020 362 D 002 0291	000003	SUMP CAKE	538.00	.01	.20	D007 D005
	W500793	R020 362 D 002 0291	000002	SUMP CAKE	505.00	.01	.20	D007 D005
	W500978	R020 362 D 002 0291	000006	SUMP CAKE	599.00	.01	.20	D007 D005
	W504600	R020 362 D 002 0291	000009	SUMP CAKE	520.00	.01	.20	D007 D005
	W504601	R020 362 D 002 0291	000010	SUMP CAKE	675.00	.01	.20	D007 D005
	W504602	R020 362 D 002 0291	000021	SUMP CAKE	381.00	.01	.20	D007 D005 D007

Total number of drums per MEF =: 48

10022	W501342	R050 700 P 008 0001	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	690.00	.01	.50	D008
	W501343	R050 700 P 008 0001	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	683.00	.01	.50	D008
	W501344	R050 700 P 008 0001	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	812.00	.01	.50	D008
	W501345	R050 700 P 008 0001	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W501346	R050 700 P 008 0001	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	748.00	.01	.50	D008
	W501347	R050 700 P 008 0001	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	760.00	.01	.50	D008
	W501348	R050 700 P 008 0001	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	907.00	.01	.50	D008
	W501349	R050 700 P 008 0001	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	926.00	.01	.50	D008
	W501350	R050 700 P 008 0001	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,006.00	.01	.50	D008
	W501351	R050 700 P 008 0001	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	640.00	.01	.50	D008
	W501352	R050 700 P 008 0001	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	774.00	.01	.50	D008
	W501353	R050 700 P 008 0001	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	790.00	.01	.50	D008
	W501354	R050 700 P 008 0001	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,006.00	.01	.50	D008
	W501355	R050 700 P 008 0001	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	987.00	.01	.50	D008
	W501356	R050 700 P 008 0001	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	758.00	.01	.50	D008
	W501357	R050 700 P 008 0001	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	795.00	.01	.50	D008
	W501358	R050 700 P 008 0001	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	907.00	.01	.50	D008

000272

000273

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501359	R050 700 P 008 0001	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	834.00	.01	.50	D008
	W501360	R050 700 P 008 0001	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	810.00	.01	.50	D008
	W501361	R050 700 P 008 0001	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	765.00	.01	.50	D008
	W501362	R050 700 P 008 0001	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	794.00	.01	.50	D008
	W501363	R050 700 P 008 0001	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	758.00	.01	.50	D008
	W501364	R050 700 P 008 0001	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	669.00	.01	.50	D008
	W501365	R050 700 P 008 0001	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	801.00	.01	.50	D008
	W501366	R050 700 P 008 0001	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	578.00	.01	.50	D008
	W501367	R050 700 P 008 0001	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	696.00	.01	.50	D008
	W501368	R050 700 P 008 0001	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	815.00	.01	.50	D008
	W501369	R050 700 P 008 0001	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	893.00	.01	.50	D008
	W501370	R050 700 P 008 0001	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	949.00	.01	.50	D008
	W501371	R050 700 P 008 0001	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	969.00	.01	.50	D008
	W501372	R050 700 P 008 0001	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	840.00	.01	.50	D008
	W501373	R050 700 P 008 0001	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	952.00	.01	.50	D008
	W501374	R050 700 P 008 0001	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,005.00	.01	.50	D008
	W501375	R050 700 P 008 0001	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	877.00	.01	.50	D008
	W501376	R050 700 P 008 0001	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	880.00	.01	.50	D008
	W501377	R050 700 P 008 0001	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	874.00	.01	.50	D008
	W501378	R050 700 P 008 0001	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	832.00	.01	.50	D008
	W501379	R050 700 P 008 0001	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	805.00	.01	.50	D008
	W501380	R050 700 P 008 0001	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008
	W501381	R050 700 P 008 0001	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	798.00	.01	.50	D008
	W501382	R050 700 P 008 0002	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,019.00	.01	.50	D008
	W501383	R050 700 P 008 0002	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	897.00	.01	.50	D008
	W501384	R050 700 P 008 0002	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	864.00	.01	.50	D008
	W501385	R050 700 P 008 0002	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	883.00	.01	.50	D008
	W501386	R050 700 P 008 0002	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,026.00	.01	.50	D008
	W501387	R050 700 P 008 0002	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	920.00	.01	.50	D008
	W501388	R050 700 P 008 0002	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	876.00	.01	.50	D008
	W501389	R050 700 P 008 0002	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	950.00	.01	.50	D008
	W501390	R050 700 P 008 0002	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	699.00	.01	.50	D008
	W501391	R050 700 P 008 0002	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	742.00	.01	.50	D008
	W501392	R050 700 P 008 0002	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	745.00	.01	.69	D008
	W501393	R050 700 P 008 0002	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	868.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501394	R050 700 P 008 0002	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	919.00	.01	.50	D008
	W501395	R050 700 P 008 0002	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	897.00	.01	.50	D008
	W501396	R050 700 P 008 0002	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	990.00	.01	.50	D008
	W501397	R050 700 P 008 0002	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	983.00	.01	.50	D008
	W501398	R050 700 P 008 0002	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	932.00	.01	.50	D008
	W501399	R050 700 P 008 0002	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,018.00	.01	.50	D008
	W501400	R050 700 P 008 0002	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	866.00	.01	.50	D008
	W501401	R050 700 P 008 0002	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	901.00	.01	.50	D008
	W501402	R050 700 P 008 0002	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	905.00	.01	.50	D008
	W501403	R050 700 P 008 0002	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	817.00	.01	.50	D008
	W501404	R050 700 P 008 0002	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	919.00	.01	.50	D008
	W501405	R050 700 P 008 0002	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	938.00	.01	.50	D008
	W501406	R050 700 P 008 0002	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	892.00	.01	.50	D008
	W501407	R050 700 P 008 0002	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	887.00	.01	.50	D008
	W501408	R050 700 P 008 0002	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	905.00	.01	.50	D008
	W501409	R050 700 P 008 0002	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	794.00	.01	.50	D008
	W501410	R050 700 P 008 0002	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	806.00	.01	.50	D008
	W501411	R050 700 P 008 0002	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	924.00	.01	.50	D008
	W501412	R050 700 P 008 0002	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	836.00	.01	.50	D008
	W501413	R050 700 P 008 0002	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	844.00	.01	.50	D008
	W501414	R050 700 P 008 0002	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	909.00	.01	.50	D008
	W501415	R050 700 P 008 0002	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	823.00	.01	.50	D008
	W501416	R050 700 P 008 0002	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	893.00	.01	.50	D008
	W501417	R050 700 P 008 0002	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	927.00	.01	.50	D008
	W501418	R050 700 P 008 0002	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	785.00	.01	.50	D008
	W501419	R050 700 P 008 0002	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	897.00	.01	.50	D008
	W501420	R050 700 P 008 0002	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	938.00	.01	.50	D008
	W501421	R050 700 P 008 0002	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	951.00	.01	.50	D008
	W501422	R050 700 P 008 0003	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,044.00	.01	.50	D008
	W501423	R050 700 P 008 0003	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	874.00	.01	.50	D008
	W501424	R050 700 P 008 0003	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	811.00	.01	.50	D008
	W501425	R050 700 P 008 0003	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	733.00	.01	.50	D008
	W501426	R050 700 P 008 0003	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	948.00	.01	.50	D008
	W501427	R050 700 P 008 0003	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	730.00	.01	.50	D008
	W501428	R050 700 P 008 0003	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	766.00	.01	.50	D008

000279

7168

000275

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501429	R050 700 P 008 0003	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	805.00	.01	.50	D008
	W501430	R050 700 P 008 0003	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	815.00	.01	.50	D008
	W501431	R050 700 P 008 0003	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	914.00	.01	.50	D008
	W501432	R050 700 P 008 0003	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	927.00	.01	.50	D008
	W501433	R050 700 P 008 0003	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	841.00	.01	.50	D008
	W501434	R050 700 P 008 0003	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	792.00	.01	.50	D008
	W501435	R050 700 P 008 0003	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	926.00	.01	.50	D008
	W501436	R050 700 P 008 0003	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	928.00	.01	.50	D008
	W501437	R050 700 P 008 0003	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	701.00	.01	.50	D008
	W501438	R050 700 P 008 0003	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W501439	R050 700 P 008 0003	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	711.00	.01	.50	D008
	W501440	R050 700 P 008 0003	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	725.00	.01	.50	D008
	W501441	R050 700 P 008 0003	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W501442	R050 700 P 008 0003	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	674.00	.01	.50	D008
	W501443	R050 700 P 008 0003	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	643.00	.01	.50	D008
	W501444	R050 700 P 008 0003	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	615.00	.01	.50	D008
	W501445	R050 700 P 008 0003	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	713.00	.01	.50	D008
	W501446	R050 700 P 008 0003	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W501447	R050 700 P 008 0003	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W501448	R050 700 P 008 0003	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	714.00	.01	.50	D008
	W501449	R050 700 P 008 0003	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	817.00	.01	.50	D008
	W501450	R050 700 P 008 0003	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	860.00	.01	.50	D008
	W501451	R050 700 P 008 0003	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W501452	R050 700 P 008 0003	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	900.00	.01	.50	D008
	W501453	R050 700 P 008 0003	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	828.00	.01	.50	D008
	W501454	R050 700 P 008 0003	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	824.00	.01	.50	D008
	W501455	R050 700 P 008 0003	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	929.00	.01	.50	D008
	W501456	R050 700 P 008 0003	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	963.00	.01	.50	D008
	W501457	R050 700 P 008 0003	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	950.00	.01	.50	D008
	W501458	R050 700 P 008 0003	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	920.00	.01	.50	D008
	W501459	R050 700 P 008 0003	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	877.00	.01	.50	D008
	W501460	R050 700 P 008 0003	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	911.00	.01	.50	D008
	W501461	R050 700 P 008 0003	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	796.00	.01	.50	D008
	W501462	R050 700 P 008 0004	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	787.00	.01	.50	D008
	W501463	R050 700 P 008 0004	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	785.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501464	R050 700 P 008 0004	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	867.00	.01	.50	D008
	W501465	R050 700 P 008 0004	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	920.00	.01	.50	D008
	W501466	R050 700 P 008 0004	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	813.00	.01	.50	D008
	W501467	R050 700 P 008 0004	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	918.00	.01	.50	D008
	W501468	R050 700 P 008 0004	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	897.00	.01	.50	D008
	W501469	R050 700 P 008 0004	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	799.00	.01	.50	D008
	W501470	R050 700 P 008 0004	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	892.00	.01	.50	D008
	W501471	R050 700 P 008 0004	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	930.00	.01	.50	D008
	W501472	R050 700 P 008 0004	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	885.00	.01	.50	D008
	W501473	R050 700 P 008 0004	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	814.00	.01	.50	D008
	W501474	R050 700 P 008 0004	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	929.00	.01	.50	D008
	W501475	R050 700 P 008 0004	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	852.00	.01	.50	D008
	W501476	R050 700 P 008 0004	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	696.00	.01	.50	D008
	W501477	R050 700 P 008 0004	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	703.00	.01	.50	D008
	W501478	R050 700 P 008 0004	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	756.00	.01	.50	D008
	W501479	R050 700 P 008 0004	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	904.00	.01	.50	D008
	W501480	R050 700 P 008 0004	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	927.00	.01	.50	D008
	W501481	R050 700 P 008 0004	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	892.00	.01	.50	D008
	W501482	R050 700 P 008 0004	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	928.00	.01	.50	D008
	W501483	R050 700 P 008 0004	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	769.00	.01	.50	D008
	W501484	R050 700 P 008 0004	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	710.00	.01	.50	D008
	W501485	R050 700 P 008 0004	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	744.00	.01	.50	D008
	W501486	R050 700 P 008 0004	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	713.00	.01	.50	D008
	W501487	R050 700 P 008 0004	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W501488	R050 700 P 008 0004	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W501489	R050 700 P 008 0004	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	708.00	.01	.50	D008
	W501490	R050 700 P 008 0004	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W501491	R050 700 P 008 0004	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	773.00	.01	.50	D008
	W501492	R050 700 P 008 0004	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	762.00	.01	.50	D008
	W501493	R050 700 P 008 0004	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	774.00	.01	.50	D008
	W501494	R050 700 P 008 0004	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W501495	R050 700 P 008 0004	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	700.00	.01	.50	D008
	W501496	R050 700 P 008 0004	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	690.00	.01	.50	D008
	W501497	R050 700 P 008 0004	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	644.00	.01	.50	D008
	W501498	R050 700 P 008 0004	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	693.00	.01	.50	D008

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501499	R050 700 P 008 0004	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W501500	R050 700 P 008 0004	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	709.00	.01	.50	D008
	W501501	R050 700 P 008 0004	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W501502	R050 700 P 008 0005	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	707.00	.01	.50	D008
	W501503	R050 700 P 008 0005	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W501504	R050 700 P 008 0005	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	661.00	.01	.50	D008
	W501505	R050 700 P 008 0005	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	669.00	.01	.50	D008
	W501506	R050 700 P 008 0005	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	668.00	.01	.50	D008
	W501507	R050 700 P 008 0005	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	815.00	.01	.50	D008
	W501508	R050 700 P 008 0005	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	683.00	.01	.50	D008
	W501509	R050 700 P 008 0005	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W501510	R050 700 P 008 0005	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	705.00	.01	.50	D008
	W501511	R050 700 P 008 0005	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W501512	R050 700 P 008 0005	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	696.00	.01	.50	D008
	W501513	R050 700 P 008 0005	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	682.00	.01	.50	D008
	W501514	R050 700 P 008 0005	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	872.00	.01	.50	D008
	W501515	R050 700 P 008 0005	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	856.00	.01	.50	D008
	W501516	R050 700 P 008 0005	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W501517	R050 700 P 008 0005	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	746.00	.01	.50	D008
	W501518	R050 700 P 008 0005	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	814.00	.01	.50	D008
	W501519	R050 700 P 008 0005	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	674.00	.01	.50	D008
	W501520	R050 700 P 008 0005	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W501521	R050 700 P 008 0005	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	687.00	.01	.50	D008
	W501522	R050 700 P 008 0005	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	682.00	.01	.50	D008
	W501523	R050 700 P 008 0005	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	716.00	.01	.50	D008
	W501524	R050 700 P 008 0005	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	751.00	.01	.50	D008
	W501525	R050 700 P 008 0005	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W501526	R050 700 P 008 0005	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	788.00	.01	.50	D008
	W501527	R050 700 P 008 0005	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	791.00	.01	.50	D008
	W501528	R050 700 P 008 0005	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	642.00	.01	.50	D008
	W501529	R050 700 P 008 0005	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	660.00	.01	.50	D008
	W501530	R050 700 P 008 0005	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	687.00	.01	.50	D008
	W501531	R050 700 P 008 0005	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	664.00	.01	.50	D008
	W501532	R050 700 P 008 0005	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	729.00	.01	.50	D008
	W501533	R050 700 P 008 0005	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	622.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501534	R050 700 P 008 0005	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	812.00	.01	.50	D008
	W501535	R050 700 P 008 0005	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	741.00	.01	.50	D008
	W501536	R050 700 P 008 0005	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	777.00	.01	.50	D008
	W501537	R050 700 P 008 0005	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	765.00	.01	.50	D008
	W501538	R050 700 P 008 0005	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	772.00	.01	.50	D008
	W501539	R050 700 P 008 0005	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	689.00	.01	.50	D008
	W501540	R050 700 P 008 0005	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	806.00	.01	.50	D008
	W501541	R050 700 P 008 0005	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	836.00	.01	.50	D008
	W501542	R050 700 P 008 0006	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	741.00	.01	.50	D008
	W501543	R050 700 P 008 0006	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008
	W501544	R050 700 P 008 0006	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W501545	R050 700 P 008 0006	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	711.00	.01	.50	D008
	W501546	R050 700 P 008 0006	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W501547	R050 700 P 008 0006	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	771.00	.01	.50	D008
	W501548	R050 700 P 008 0006	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	760.00	.01	.50	D008
	W501549	R050 700 P 008 0006	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	709.00	.01	.50	D008
	W501550	R050 700 P 008 0006	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	815.00	.01	.50	D008
	W501551	R050 700 P 008 0006	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W501552	R050 700 P 008 0006	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	843.00	.01	.50	D008
	W501553	R050 700 P 008 0006	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	849.00	.01	.50	D008
	W501554	R050 700 P 008 0006	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	818.00	.01	.50	D008
	W501555	R050 700 P 008 0006	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	628.00	.01	.50	D008
	W501556	R050 700 P 008 0006	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W501557	R050 700 P 008 0006	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	756.00	.01	.50	D008
	W501558	R050 700 P 008 0006	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W501559	R050 700 P 008 0006	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	762.00	.01	.50	D008
	W501560	R050 700 P 008 0006	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	756.00	.01	.50	D008
	W501561	R050 700 P 008 0006	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W501562	R050 700 P 008 0006	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	657.00	.01	.50	D008
	W501563	R050 700 P 008 0006	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	808.00	.01	.50	D008
	W501564	R050 700 P 008 0006	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W501565	R050 700 P 008 0006	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	625.00	.01	.50	D008
	W501566	R050 700 P 008 0006	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	626.00	.01	.50	D008
	W501567	R050 700 P 008 0006	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008
	W501568	R050 700 P 008 0006	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501569	R050 700 P 008 0006	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	726.00	.01	.50	D008
	W501570	R050 700 P 008 0006	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	714.00	.01	.50	D008
	W501571	R050 700 P 008 0006	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	749.00	.01	.50	D008
	W501572	R050 700 P 008 0006	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	693.00	.01	.50	D008
	W501573	R050 700 P 008 0006	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008
	W501574	R050 700 P 008 0006	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	689.00	.01	.50	D008
	W501575	R050 700 P 008 0006	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W501576	R050 700 P 008 0006	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	726.00	.01	.50	D008
	W501577	R050 700 P 008 0006	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	751.00	.01	.50	D008
	W501578	R050 700 P 008 0006	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	682.00	.01	.50	D008
	W501579	R050 700 P 008 0006	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008
	W501580	R050 700 P 008 0006	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	762.00	.01	.50	D008
	W501581	R050 700 P 008 0006	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W501582	R050 700 P 008 0007	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	745.00	.01	.50	D008
	W501583	R050 700 P 008 0007	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	700.00	.01	.50	D008
	W501584	R050 700 P 008 0007	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	591.00	.01	.50	D008
	W501585	R050 700 P 008 0007	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W501586	R050 700 P 008 0007	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W501587	R050 700 P 008 0007	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W501588	R050 700 P 008 0007	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	684.00	.01	.50	D008
	W501589	R050 700 P 008 0007	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	907.00	.01	.50	D008
	W501590	R050 700 P 008 0007	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	795.00	.01	.50	D008
	W501591	R050 700 P 008 0007	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	854.00	.01	.50	D008
	W501592	R050 700 P 008 0007	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	862.00	.01	.50	D008
	W501593	R050 700 P 008 0007	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	907.00	.01	.50	D008
	W501594	R050 700 P 008 0007	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W501595	R050 700 P 008 0007	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	661.00	.01	.50	D008
	W501596	R050 700 P 008 0007	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	627.00	.01	.50	D008
	W501597	R050 700 P 008 0007	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	710.00	.01	.50	D008
	W501598	R050 700 P 008 0007	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	807.00	.01	.50	D008
	W501599	R050 700 P 008 0007	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	839.00	.01	.50	D008
	W501600	R050 700 P 008 0007	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	853.00	.01	.50	D008
	W501601	R050 700 P 008 0007	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	746.00	.01	.50	D008
	W501602	R050 700 P 008 0007	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	694.00	.01	.50	D008
	W501603	R050 700 P 008 0007	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W501604	R050 700 P 008 0007	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	761.00	.01	.50	D008
	W501605	R050 700 P 008 0007	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	694.00	.01	.50	D008
	W501606	R050 700 P 008 0007	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	898.00	.01	.50	D008
	W501607	R050 700 P 008 0007	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,002.00	.01	.50	D008
	W501608	R050 700 P 008 0007	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	965.00	.01	.50	D008
	W501609	R050 700 P 008 0007	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	971.00	.01	.50	D008
	W501610	R050 700 P 008 0007	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	939.00	.01	.50	D008
	W501611	R050 700 P 008 0007	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	960.00	.01	.50	D008
	W501612	R050 700 P 008 0007	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	952.00	.01	.50	D008
	W501613	R050 700 P 008 0007	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	940.00	.01	.50	D008
	W501614	R050 700 P 008 0007	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	829.00	.01	.50	D008
	W501615	R050 700 P 008 0007	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	706.00	.01	.50	D008
	W501616	R050 700 P 008 0007	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	763.00	.01	.50	D008
	W501617	R050 700 P 008 0007	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	902.00	.01	.50	D008
	W501618	R050 700 P 008 0007	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	987.00	.01	.50	D008
	W501619	R050 700 P 008 0007	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	998.00	.01	.50	D008
	W501620	R050 700 P 008 0007	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,052.00	.01	.50	D008
	W501621	R050 700 P 008 0007	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	846.00	.01	.50	D008
	W501622	R050 700 P 008 0008	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W501623	R050 700 P 008 0008	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	922.00	.01	.50	D008
	W501624	R050 700 P 008 0008	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	792.00	.01	.50	D008
	W501625	R050 700 P 008 0008	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	798.00	.01	.50	D008
	W501727	R050 700 P 008 GRSP	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	57.00	.01	.50	D008
	W501728	R050 700 P 008 GRSP	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	27.00	.01	.50	D008
	W501755	R050 700 P 008 0328	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	270.00	.01	.50	D008
	W501756	R050 700 P 008 0328	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	193.00	.01	.50	D008
	W501757	R050 700 P 008 0328	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	489.00	.01	.50	D008
	W501758	R050 700 P 008 0328	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	479.00	.01	.50	D008
	W501759	R050 700 P 008 0328	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	741.00	.01	.50	D008
	W501760	R050 700 P 008 0328	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	671.00	.01	.50	D008
	W501761	R050 700 P 008 0328	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W501944	R050 700 P 008 0330	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	731.00	.01	.50	D008
	W501945	R050 700 P 008 0330	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	270.00	.01	.50	D008
	W501946	R050 700 P 008 0330	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	402.00	.01	.50	D008
	W501947	R050 700 P 008 0330	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	370.00	.01	.50	D008

000280

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W502039	R050 700 P 008 0330	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	480.00	.01	.50	D008
	W502040	R050 700 P 008 0330	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	615.00	.01	.50	D008
	W502041	R050 700 P 008 0330	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	604.00	.01	.50	D008
	W502762	R050 700 P 008 0331	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	660.00	.01	.50	D008
	W502763	R050 700 P 008 0331	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	606.00	.01	.50	D008
	W502764	R050 700 P 008 0331	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W502765	R050 700 P 008 0331	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	714.00	.01	.50	D008
	W502766	R050 700 P 008 0331	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W502767	R050 700 P 008 0331	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	787.00	.01	.50	D008
	W502768	R050 700 P 008 0331	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	412.00	.01	.50	D008
	W502769	R050 700 P 008 0331	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	613.00	.01	.50	D008
	W502770	R050 700 P 008 0331	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	755.00	.01	.50	D008
	W502771	R050 700 P 008 0331	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	801.00	.01	.50	D008
	W502772	R050 700 P 008 0331	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W502773	R050 700 P 008 0331	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	741.00	.01	.50	D008
	W502774	R050 700 P 008 0331	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	701.00	.01	.50	D008
	W502775	R050 700 P 008 0331	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	700.00	.01	.50	D008
	W502776	R050 700 P 008 0331	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	461.00	.01	.50	D008
	W502777	R050 700 P 008 0331	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	513.00	.01	.50	D008
	W502778	R050 700 P 008 0331	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	172.00	.01	.50	D008
	W503016	R050 700 P 008 0331	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	660.00	.01	.50	D008
	W503017	R050 700 P 008 0331	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503018	R050 700 P 008 0331	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503019	R050 700 P 008 0331	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503020	R050 700 P 008 0331	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	656.00	.01	.50	D008
	W503021	R050 700 P 008 0331	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	678.00	.01	.50	D008
	W503022	R050 700 P 008 0331	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W503023	R050 700 P 008 0331	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	626.00	.01	.50	D008
	W503024	R050 700 P 008 0331	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W503025	R050 700 P 008 0331	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	661.00	.01	.50	D008
	W503026	R050 700 P 008 0331	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503027	R050 700 P 008 0331	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	677.00	.01	.50	D008
	W503028	R050 700 P 008 0331	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	655.00	.01	.50	D008
	W503029	R050 700 P 008 0331	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	638.00	.01	.50	D008
	W503030	R050 700 P 008 0331	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	624.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503031	R050 700 P 008 0331	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	673.00	.01	.50	D008
	W503032	R050 700 P 008 0331	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	579.00	.01	.50	D008
	W503033	R050 700 P 008 0331	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	680.00	.01	.50	D008
	W503034	R050 700 P 008 0331	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	639.00	.01	.50	D008
	W503035	R050 700 P 008 0331	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	701.00	.01	.50	D008
	W503036	R050 700 P 008 0331	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	631.00	.01	.50	D008
	W503037	R050 700 P 008 0331	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	619.00	.01	.50	D008
	W503038	R050 700 P 008 0331	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W503039	R050 700 P 008 0331	000041	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	656.00	.01	.50	D008
	W503040	R050 700 P 008 0331	000042	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	693.00	.01	.50	D008
	W503041	R050 700 P 008 0331	000043	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W503042	R050 700 P 008 0331	000044	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	689.00	.01	.50	D008
	W503043	R050 700 P 008 0331	000045	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	655.00	.01	.50	D008
	W503044	R050 700 P 008 0331	000046	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	635.00	.01	.50	D008
	W503045	R050 700 P 008 0331	000047	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	631.00	.01	.50	D008
	W503046	R050 700 P 008 0331	000048	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	668.00	.01	.50	D008
	W503047	R050 700 P 008 0331	000049	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	626.00	.01	.50	D008
	W503048	R050 700 P 008 0331	000050	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	607.00	.01	.50	D008
	W503049	R050 700 P 008 0331	000051	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	633.00	.01	.50	D008
	W503050	R050 700 P 008 0331	000052	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	653.00	.01	.50	D008
	W503051	R050 700 P 008 0331	000053	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W503052	R050 700 P 008 0331	000054	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W503053	R050 700 P 008 0331	000055	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	654.00	.01	.50	D008
	W503054	R050 700 P 008 0331	000056	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	684.00	.01	.50	D008
	W503055	R050 700 P 008 0331	000057	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	619.00	.01	.50	D008
	W503056	R050 700 P 008 0331	000058	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503057	R050 700 P 008 0331	000059	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	695.00	.01	.50	D008
	W503058	R050 700 P 008 0331	000060	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503059	R050 700 P 008 0331	000061	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503060	R050 700 P 008 0331	000062	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	739.00	.01	.50	D008
	W503061	R050 700 P 008 0331	000063	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	699.00	.01	.50	D008
	W503062	R050 700 P 008 0331	000064	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	668.00	.01	.50	D008
	W503063	R050 700 P 008 0331	000065	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	602.00	.01	.50	D008
	W503064	R050 700 P 008 0331	000066	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	662.00	.01	.50	D008
	W503065	R050 700 P 008 0331	000067	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008

000282

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000283

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503066	R050 700 P 008 0331	000068	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	623.00	.01	.50	D008
	W503067	R050 700 P 008 0331	000069	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	579.00	.01	.50	D008
	W503068	R050 700 P 008 0331	000070	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W503069	R050 700 P 008 0331	000071	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W503070	R050 700 P 008 0331	000072	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	618.00	.01	.50	D008
	W503071	R050 700 P 008 0331	000073	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	610.00	.01	.50	D008
	W503072	R050 700 P 008 0331	000074	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	639.00	.01	.50	D008
	W503073	R050 700 P 008 0331	000075	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W503074	R050 700 P 008 0331	000076	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W503075	R050 700 P 008 0331	000077	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	704.00	.01	.50	D008
	W503076	R050 700 P 008 0331	000078	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	679.00	.01	.50	D008
	W503077	R050 700 P 008 0331	000079	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	653.00	.01	.50	D008
	W503078	R050 700 P 008 0331	000080	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	654.00	.01	.50	D008
	W503079	R050 700 P 008 0331	000081	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	685.00	.01	.50	D008
	W503080	R050 700 P 008 0331	000082	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	670.00	.01	.50	D008
	W503081	R050 700 P 008 0331	000083	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	633.00	.01	.50	D008
	W503082	R050 700 P 008 0331	000084	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	662.00	.01	.50	D008
	W503083	R050 700 P 008 0331	000085	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	659.00	.01	.50	D008
	W503084	R050 700 P 008 0331	000086	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	614.00	.01	.50	D008
	W503085	R050 700 P 008 0331	000087	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	598.00	.01	.50	D008
	W503086	R050 700 P 008 0331	000088	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	673.00	.01	.50	D008
	W503087	R050 700 P 008 0331	000089	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	697.00	.01	.50	D008
	W503088	R050 700 P 008 0331	000090	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	635.00	.01	.50	D008
	W503089	R050 700 P 008 0331	000091	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W503090	R050 700 P 008 0331	000092	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	682.00	.01	.50	D008
	W503091	R050 700 P 008 0331	000093	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	641.00	.01	.50	D008
	W503092	R050 700 P 008 0331	000094	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	743.00	.01	.50	D008
	W503093	R050 700 P 008 0331	000095	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W503094	R050 700 P 008 0331	000096	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W503095	R050 700 P 008 0331	000097	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	678.00	.01	.50	D008
	W503096	R050 700 P 008 0331	000098	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	790.00	.01	.50	D008
	W503097	R050 700 P 008 0331	000099	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	811.00	.01	.50	D008
	W503098	R050 700 P 008 0331	000100	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	761.00	.01	.50	D008
	W503099	R050 700 P 008 0331	000101	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	791.00	.01	.50	D008
	W503100	R050 700 P 008 0331	000102	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	761.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503101	R050 700 P 008 0331	000103	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	753.00	.01	.50	D008
	W503102	R050 700 P 008 0331	000104	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	810.00	.01	.50	D008
	W503103	R050 700 P 008 0331	000105	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	772.00	.01	.50	D008
	W503104	R050 700 P 008 0331	000106	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	776.00	.01	.50	D008
	W503105	R050 700 P 008 0331	000107	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	791.00	.01	.50	D008
	W503106	R050 700 P 008 0331	000108	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503107	R050 700 P 008 0331	000109	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	635.00	.01	.50	D008
	W503108	R050 700 P 008 0331	000110	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	660.00	.01	.50	D008
	W503109	R050 700 P 008 0331	000111	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	650.00	.01	.50	D008
	W503110	R050 700 P 008 0331	000112	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	778.00	.01	.50	D008
	W503111	R050 700 P 008 0331	000113	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	821.00	.01	.50	D008
	W503112	R050 700 P 008 0331	000114	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	768.00	.01	.50	D008
	W503113	R050 700 P 008 0331	000115	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	783.00	.01	.50	D008
	W503114	R050 700 P 008 0331	000116	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	746.00	.01	.50	D008
	W503115	R050 700 P 008 0331	000117	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503116	R050 700 P 008 0331	000118	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	789.00	.01	.50	D008
	W503117	R050 700 P 008 0331	000119	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	765.00	.01	.50	D008
	W503118	R050 700 P 008 0331	000120	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503119	R050 700 P 008 0331	000121	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	645.00	.01	.50	D008
	W503120	R050 700 P 008 0331	000122	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	794.00	.01	.50	D008
	W503121	R050 700 P 008 0331	000123	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	781.00	.01	.50	D008
	W503122	R050 700 P 008 0331	000124	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W503123	R050 700 P 008 0331	000125	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	677.00	.01	.50	D008
	W503124	R050 700 P 008 0331	000126	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	696.00	.01	.50	D008
	W503125	R050 700 P 008 0331	000127	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W503126	R050 700 P 008 0331	000128	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	788.00	.01	.50	D008
	W503127	R050 700 P 008 0331	000129	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	766.00	.01	.50	D008
	W503128	R050 700 P 008 0331	000130	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	798.00	.01	.50	D008
	W503129	R050 700 P 008 0331	000131	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	830.00	.01	.50	D008
	W503130	R050 700 P 008 0331	000132	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W503131	R050 700 P 008 0331	000133	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	663.00	.01	.50	D008
	W503132	R050 700 P 008 0331	000134	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	768.00	.01	.50	D008
	W503133	R050 700 P 008 0331	000135	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	771.00	.01	.50	D008
	W503134	R050 700 P 008 0331	000136	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	790.00	.01	.50	D008
	W503135	R050 700 P 008 0331	000137	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	783.00	.01	.50	D008

000284

2189

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503136	R050 700 P 008 0331	000138	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	802.00	.01	.50	D008
	W503137	R050 700 P 008 0331	000139	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	813.00	.01	.50	D008
	W503138	R050 700 P 008 0331	000140	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503139	R050 700 P 008 0331	000141	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	716.00	.01	.50	D008
	W503140	R050 700 P 008 0331	000142	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	634.00	.01	.50	D008
	W503141	R050 700 P 008 0331	000143	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	614.00	.01	.50	D008
	W503142	R050 700 P 008 0331	000144	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	796.00	.01	.50	D008
	W503143	R050 700 P 008 0331	000145	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	806.00	.01	.50	D008
	W503144	R050 700 P 008 0331	000146	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	725.00	.01	.50	D008
	W503145	R050 700 P 008 0331	000147	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	715.00	.01	.50	D008
	W503146	R050 700 P 008 0331	000148	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	756.00	.01	.50	D008
	W503147	R050 700 P 008 0331	000149	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	778.00	.01	.50	D008
	W503148	R050 700 P 008 0331	000150	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	726.00	.01	.50	D008
	W503149	R050 700 P 008 0331	000151	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	699.00	.01	.50	D008
	W503150	R050 700 P 008 0331	000152	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	703.00	.01	.50	D008
	W503151	R050 700 P 008 0331	000153	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	729.00	.01	.50	D008
	W503152	R050 700 P 008 0331	000154	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	785.00	.01	.50	D008
	W503153	R050 700 P 008 0331	000155	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	781.00	.01	.50	D008
	W503154	R050 700 P 008 0331	000156	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	728.00	.01	.50	D008
	W503155	R050 700 P 008 0331	000157	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008
	W503156	R050 700 P 008 0331	000158	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	745.00	.01	.50	D008
	W503157	R050 700 P 008 0331	000159	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	733.00	.01	.50	D008
	W503158	R050 700 P 008 0331	000160	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W503159	R050 700 P 008 0331	000161	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	747.00	.01	.50	D008
	W503160	R050 700 P 008 0331	000162	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	695.00	.01	.50	D008
	W503161	R050 700 P 008 0331	000163	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	734.00	.01	.50	D008
	W503162	R050 700 P 008 0331	000164	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	708.00	.01	.50	D008
	W503163	R050 700 P 008 0331	000165	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	746.00	.01	.50	D008
	W503164	R050 700 P 008 0331	000166	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	732.00	.01	.50	D008
	W503165	R050 700 P 008 0331	000167	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	715.00	.01	.50	D008
	W503166	R050 700 P 008 0331	000168	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	754.00	.01	.50	D008
	W503167	R050 700 P 008 0331	000169	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	740.00	.01	.50	D008
	W503168	R050 700 P 008 0331	000170	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503169	R050 700 P 008 0331	000171	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	726.00	.01	.50	D008
	W503170	R050 700 P 008 0331	000172	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	760.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503171	R050 700 P 008 0331	000173	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	747.00	.01	.50	D008
	W503172	R050 700 P 008 0331	000174	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	689.00	.01	.50	D008
	W503173	R050 700 P 008 0331	000175	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	673.00	.01	.50	D008
	W503174	R050 700 P 008 0331	000176	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W503175	R050 700 P 008 0331	000177	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503176	R050 700 P 008 0331	000178	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	690.00	.01	.50	D008
	W503177	R050 700 P 008 0331	000179	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	708.00	.01	.50	D008
	W503178	R050 700 P 008 0331	000180	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	733.00	.01	.50	D008
	W503179	R050 700 P 008 0331	000181	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	748.00	.01	.50	D008
	W503180	R050 700 P 008 0331	000182	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	731.00	.01	.50	D008
	W503181	R050 700 P 008 0331	000183	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	721.00	.01	.50	D008
	W503182	R050 700 P 008 0331	000184	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	711.00	.01	.50	D008
	W503183	R050 700 P 008 0331	000185	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	694.00	.01	.50	D008
	W503184	R050 700 P 008 0331	000186	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503185	R050 700 P 008 0331	000187	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008
	W503186	R050 700 P 008 0331	000188	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	683.00	.01	.50	D008
	W503187	R050 700 P 008 0331	000189	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W503188	R050 700 P 008 0331	000190	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W503189	R050 700 P 008 0331	000191	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	735.00	.01	.50	D008
	W503190	R050 700 P 008 0331	000192	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	730.00	.01	.50	D008
	W503191	R050 700 P 008 0331	000193	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	674.00	.01	.50	D008
	W503192	R050 700 P 008 0331	000194	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W503193	R050 700 P 008 0331	000195	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	690.00	.01	.50	D008
	W503194	R050 700 P 008 0331	000196	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	698.00	.01	.50	D008
	W503195	R050 700 P 008 0331	000197	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	732.00	.01	.50	D008
	W503196	R050 700 P 008 0331	000198	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	751.00	.01	.50	D008
	W503197	R050 700 P 008 0331	000199	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008
	W503198	R050 700 P 008 0331	000200	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	734.00	.01	.50	D008
	W503199	R050 700 P 008 0331	000201	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	760.00	.01	.50	D008
	W503200	R050 700 P 008 0331	000202	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	744.00	.01	.50	D008
	W503201	R050 700 P 008 0331	000203	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	750.00	.01	.50	D008
	W503202	R050 700 P 008 0331	000204	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	725.00	.01	.50	D008
	W503203	R050 700 P 008 0331	000205	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W503204	R050 700 P 008 0331	000206	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503205	R050 700 P 008 0331	000207	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	725.00	.01	.50	D008

000285

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503206	R050 700 P 008 0331	000208	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W503207	R050 700 P 008 0331	000209	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	706.00	.01	.50	D008
	W503208	R050 700 P 008 0331	000210	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	749.00	.01	.50	D008
	W503209	R050 700 P 008 0331	000211	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W503210	R050 700 P 008 0331	000212	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008
	W503211	R050 700 P 008 0331	000213	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W503212	R050 700 P 008 0331	000214	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	690.00	.01	.50	D008
	W503213	R050 700 P 008 0331	000215	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008
	W503214	R050 700 P 008 0331	000216	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	705.00	.01	.50	D008
	W503215	R050 700 P 008 0331	000217	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	725.00	.01	.50	D008
	W503216	R050 700 P 008 0331	000218	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503217	R050 700 P 008 0331	000219	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W503218	R050 700 P 008 0331	000220	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	669.00	.01	.50	D008
	W503219	R050 700 P 008 0331	000221	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W503220	R050 700 P 008 0331	000222	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008
	W503221	R050 700 P 008 0331	000223	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W503222	R050 700 P 008 0331	000224	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W503223	R050 700 P 008 0331	000225	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008
	W503224	R050 700 P 008 0331	000226	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	680.00	.01	.50	D008
	W503225	R050 700 P 008 0331	000227	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	695.00	.01	.50	D008
	W503226	R050 700 P 008 0331	000228	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	742.00	.01	.50	D008
	W503227	R050 700 P 008 0331	000229	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	707.00	.01	.50	D008
	W503228	R050 700 P 008 0331	000230	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	726.00	.01	.50	D008
	W503229	R050 700 P 008 0331	000231	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	706.00	.01	.50	D008
	W503230	R050 700 P 008 0331	000232	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	742.00	.01	.50	D008
	W503231	R050 700 P 008 0331	000233	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W503232	R050 700 P 008 0331	000234	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W503233	R050 700 P 008 0331	000235	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503234	R050 700 P 008 0331	000236	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W503235	R050 700 P 008 0331	000237	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	657.00	.01	.50	D008
	W503236	R050 700 P 008 0331	000238	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	642.00	.01	.50	D008
	W503237	R050 700 P 008 0331	000239	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	746.00	.01	.50	D008
	W503238	R050 700 P 008 0331	000240	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	695.00	.01	.50	D008
	W503239	R050 700 P 008 0331	000241	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503240	R050 700 P 008 0331	000242	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503241	R050 700 P 008 0331	000243	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	740.00	.01	.50	D008
	W503242	R050 700 P 008 0331	000244	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W503243	R050 700 P 008 0331	000245	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W503244	R050 700 P 008 0331	000246	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W503245	R050 700 P 008 0331	000247	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503246	R050 700 P 008 0331	000248	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	637.00	.01	.50	D008
	W503247	R050 700 P 008 0331	000249	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503248	R050 700 P 008 0331	000250	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503249	R050 700 P 008 0331	000251	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	681.00	.01	.50	D008
	W503250	R050 700 P 008 0331	000252	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	751.00	.01	.50	D008
	W503251	R050 700 P 008 0331	000253	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W503252	R050 700 P 008 0331	000254	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	765.00	.01	.50	D008
	W503253	R050 700 P 008 0331	000255	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	704.00	.01	.50	D008
	W503254	R050 700 P 008 0331	000256	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008
	W503255	R050 700 P 008 0331	000257	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	854.00	.01	.50	D008
	W503256	R050 700 P 008 0331	000258	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	741.00	.01	.50	D008
	W503257	R050 700 P 008 0331	000259	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W503258	R050 700 P 008 0331	000260	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	810.00	.01	.50	D008
	W503259	R050 700 P 008 0331	000261	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	907.00	.01	.50	D008
	W503260	R050 700 P 008 0331	000262	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	896.00	.01	.50	D008
	W503261	R050 700 P 008 0331	000263	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	761.00	.01	.50	D008
	W503262	R050 700 P 008 0331	000264	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W503263	R050 700 P 008 0331	000265	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W503264	R050 700 P 008 0331	000266	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	793.00	.01	.50	D008
	W503265	R050 700 P 008 0331	000267	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503266	R050 700 P 008 0331	000268	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	732.00	.01	.50	D008
	W503267	R050 700 P 008 0331	000269	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	828.00	.01	.50	D008
	W503268	R050 700 P 008 0331	000270	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008
	W503269	R050 700 P 008 0331	000271	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	800.00	.01	.50	D008
	W503270	R050 700 P 008 0331	000272	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	732.00	.01	.50	D008
	W503271	R050 700 P 008 0331	000273	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	753.00	.01	.50	D008
	W503272	R050 700 P 008 0331	000274	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W503273	R050 700 P 008 0331	000275	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	734.00	.01	.50	D008
	W503274	R050 700 P 008 0331	000276	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	710.00	.01	.50	D008
	W503275	R050 700 P 008 0331	000277	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008

000288

2168

000289

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503276	R050 700 P 008 0331	000278	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008
	W503277	R050 700 P 008 0331	000279	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	704.00	.01	.50	D008
	W503278	R050 700 P 008 0331	000280	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503279	R050 700 P 008 0331	000281	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	656.00	.01	.50	D008
	W503280	R050 700 P 008 0331	000282	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	802.00	.01	.50	D008
	W503281	R050 700 P 008 0331	000283	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	790.00	.01	.50	D008
	W503282	R050 700 P 008 0331	000284	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	833.00	.01	.50	D008
	W503283	R050 700 P 008 0331	000285	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W503284	R050 700 P 008 0331	000286	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	764.00	.01	.50	D008
	W503285	R050 700 P 008 0331	000287	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	716.00	.01	.50	D008
	W503286	R050 700 P 008 0331	000288	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	722.00	.01	.50	D008
	W503287	R050 700 P 008 0331	000289	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	716.00	.01	.50	D008
	W503288	R050 700 P 008 0331	000290	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	678.00	.01	.50	D008
	W503289	R050 700 P 008 0331	000291	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	565.00	.01	.50	D008
	W503290	R050 700 P 008 0331	000292	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	820.00	.01	.50	D008
	W503291	R050 700 P 008 0331	000293	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008
	W503292	R050 700 P 008 0331	000294	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	670.00	.01	.50	D008
	W503293	R050 700 P 008 0331	000295	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008
	W503294	R050 700 P 008 0331	000296	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	658.00	.01	.50	D008
	W503295	R050 700 P 008 0331	000297	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	644.00	.01	.50	D008
	W503296	R050 700 P 008 0331	000298	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	813.00	.01	.50	D008
	W503297	R050 700 P 008 0331	000299	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	750.00	.01	.50	D008
	W503298	R050 700 P 008 0331	000300	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	716.00	.01	.50	D008
	W503299	R050 700 P 008 0331	000301	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	726.00	.01	.50	D008
	W503300	R050 700 P 008 0331	000302	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	891.00	.01	.50	D008
	W503301	R050 700 P 008 0331	000303	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	730.00	.01	.50	D008
	W503302	R050 700 P 008 0331	000304	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W503303	R050 700 P 008 0331	000305	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	706.00	.01	.50	D008
	W503304	R050 700 P 008 0331	000306	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	766.00	.01	.50	D008
	W503305	R050 700 P 008 0331	000307	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	928.00	.01	.50	D008
	W503306	R050 700 P 008 0331	000308	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W503307	R050 700 P 008 0331	000309	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W503308	R050 700 P 008 0331	000310	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W503309	R050 700 P 008 0331	000311	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	768.00	.01	.50	D008
	W503310	R050 700 P 008 0331	000312	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	762.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503311	R050 700 P 008 0331	000313	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	734.00	.01	.50	D008
	W503312	R050 700 P 008 0331	000314	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	802.00	.01	.50	D008
	W503313	R050 700 P 008 0331	000315	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	763.00	.01	.50	D008
	W503314	R050 700 P 008 0331	000316	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	758.00	.01	.50	D008
	W503315	R050 700 P 008 0331	000317	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	884.00	.01	.50	D008
	W503316	R050 700 P 008 0331	000318	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	772.00	.01	.50	D008
	W503317	R050 700 P 008 0331	000319	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	899.00	.01	.50	D008
	W503318	R050 700 P 008 0331	000320	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008
	W503319	R050 700 P 008 0331	000321	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	885.00	.01	.50	D008
	W503320	R050 700 P 008 0331	000322	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	670.00	.01	.50	D008
	W503321	R050 700 P 008 0331	000323	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	708.00	.01	.50	D008
	W503322	R050 700 P 008 0331	000324	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	776.00	.01	.50	D008
	W503323	R050 700 P 008 0331	000325	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	698.00	.01	.50	D008
	W503324	R050 700 P 008 0331	000326	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	657.00	.01	.50	D008
	W503325	R050 700 P 008 0331	000327	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	673.00	.01	.50	D008
	W503326	R050 700 P 008 0331	000328	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	685.00	.01	.50	D008
	W503327	R050 700 P 008 0331	000329	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	663.00	.01	.50	D008
	W503328	R050 700 P 008 0331	000330	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1,016.00	.01	.50	D008
	W503329	R050 700 P 008 0331	000331	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	674.00	.01	.50	D008
	W503330	R050 700 P 008 0331	000332	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	777.00	.01	.50	D008
	W503331	R050 700 P 008 0331	000333	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503332	R050 700 P 008 0331	000334	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	948.00	.01	.50	D008
	W503333	R050 700 P 008 0331	000335	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	680.00	.01	.50	D008
	W503334	R050 700 P 008 0331	000336	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	940.00	.01	.50	D008
	W503335	R050 700 P 008 0331	000337	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	702.00	.01	.50	D008
	W503336	R050 700 P 008 0331	000338	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	689.00	.01	.50	D008
	W503337	R050 700 P 008 0331	000339	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	649.00	.01	.50	D008
	W503338	R050 700 P 008 0331	000340	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	647.00	.01	.50	D008
	W503339	R050 700 P 008 0331	000341	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	681.00	.01	.50	D008
	W503340	R050 700 P 008 0331	000342	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	588.00	.01	.50	D008
	W503341	R050 700 P 008 0331	000343	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	930.00	.01	.50	D008
	W503342	R050 700 P 008 0331	000344	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	576.00	.01	.50	D008
	W503343	R050 700 P 008 0331	000345	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	810.00	.01	.50	D008
	W503344	R050 700 P 008 0331	000346	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	908.00	.01	.50	D008
	W503345	R050 700 P 008 0331	000347	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	654.00	.01	.50	D008

000290

000291

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503346	R050 700 P 008 0331	000348	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	638.00	.01	.50	D008
	W503347	R050 700 P 008 0331	000349	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503348	R050 700 P 008 0331	000350	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	664.00	.01	.50	D008
	W503349	R050 700 P 008 0331	000351	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503350	R050 700 P 008 0331	000352	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	659.00	.01	.50	D008
	W503351	R050 700 P 008 0331	000353	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	693.00	.01	.50	D008
	W503352	R050 700 P 008 0331	000354	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	1.003.00	.01	.50	D008
	W503353	R050 700 P 008 0331	000355	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	647.00	.01	.50	D008
	W503354	R050 700 P 008 0331	000356	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503355	R050 700 P 008 0331	000357	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	656.00	.01	.50	D008
	W503356	R050 700 P 008 0331	000358	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	580.00	.01	.50	D008
	W503358	R050 700 P 008 0331	000359	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	736.00	.01	.50	D008
	W503359	R050 700 P 008 0331	000360	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	698.00	.01	.50	D008
	W503360	R050 700 P 008 0331	000361	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	664.00	.01	.50	D008
	W503361	R050 700 P 008 0331	000362	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	645.00	.01	.50	D008
	W503362	R050 700 P 008 0331	000363	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	739.00	.01	.50	D008
	W503363	R050 700 P 008 0331	000364	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W503364	R050 700 P 008 0331	000365	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008
	W503365	R050 700 P 008 0331	000366	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	741.00	.01	.50	D008
	W503377	R050 240 P 008 0332	000004	GRIT BLAST RESIDUE	582.00	.50	.50	D008
	W503378	R050 240 P 008 0332	000001	GRIT BLAST RESIDUE	712.00	.50	.50	D008
	W503379	R050 240 P 008 0332	000002	GRIT BLAST RESIDUE	280.00	.50	.50	D008
	W503381	R050 240 P 008 0332	000003	GRIT BLAST RESIDUE	731.00	.50	.50	D008
	W503382	R050 240 P 008 0332	000005	GRIT BLAST RESIDUE	540.00	.50	.50	D008
	W503383	R050 240 P 008 0332	000006	GRIT BLAST RESIDUE	398.00	.50	.50	D008
	W503384	R050 240 P 008 0332	000007	GRIT BLAST RESIDUE	714.00	.50	.50	D008
	W503385	R050 240 P 008 0332	000008	GRIT BLAST RESIDUE	338.00	.50	.50	D008
	W503386	R050 240 P 008 0332	000009	GRIT BLAST RESIDUE	575.00	.50	.50	D008
	W503433	R050 700 P 008 0332	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W503434	R050 700 P 008 0332	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503435	R050 700 P 008 0332	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	665.00	.01	.50	D008
	W503436	R050 700 P 008 0332	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	694.00	.01	.50	D008
	W503437	R050 700 P 008 0332	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	695.00	.01	.50	D008
	W503438	R050 700 P 008 0332	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	666.00	.01	.50	D008
	W503439	R050 700 P 008 0332	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	683.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503440	R050 700 P 008 0332	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	695.00	.01	.50	D008
	W503441	R050 700 P 008 0332	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	731.00	.01	.50	D008
	W503442	R050 700 P 008 0332	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008
	W503443	R050 700 P 008 0332	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W503444	R050 700 P 008 0332	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	772.00	.01	.50	D008
	W503445	R050 700 P 008 0332	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	818.00	.01	.50	D008
	W503446	R050 700 P 008 0332	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	782.00	.01	.50	D008
	W503447	R050 700 P 008 0332	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W503448	R050 700 P 008 0332	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	706.00	.01	.50	D008
	W503449	R050 700 P 008 0332	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	728.00	.01	.50	D008
	W503450	R050 700 P 008 0332	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	738.00	.01	.50	D008
	W503451	R050 700 P 008 0332	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	624.00	.01	.50	D008
	W503452	R050 700 P 008 0332	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	870.00	.01	.50	D008
	W503453	R050 700 P 008 0332	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	828.00	.01	.50	D008
	W503454	R050 700 P 008 0332	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	734.00	.01	.50	D008
	W503455	R050 700 P 008 0332	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	613.00	.01	.50	D008
	W503456	R050 700 P 008 0332	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	624.00	.01	.50	D008
	W503457	R050 700 P 008 0332	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	793.00	.01	.50	D008
	W503458	R050 700 P 008 0331	000367	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	834.00	.01	.50	D008
	W503459	R050 700 P 008 0332	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	794.00	.01	.50	D008
	W503460	R050 700 P 008 0332	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	904.00	.01	.50	D008
	W503461	R050 700 P 008 0332	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	884.00	.01	.50	D008
	W503462	R050 700 P 008 0332	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	924.00	.01	.50	D008
	W503463	R050 700 P 008 0332	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	970.00	.01	.50	D008
	W503464	R050 700 P 008 0332	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	872.00	.01	.50	D008
	W503573	R050 700 P 008 0333	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	900.00	.01	.50	D008
	W503574	R050 700 P 008 0333	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	800.00	.01	.50	D008
	W503575	R050 700 P 008 0333	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	844.00	.01	.50	D008
	W503576	R050 700 P 008 0333	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008
	W503578	R050 700 P 008 0333	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	826.00	.01	.50	D008
	W503579	R050 700 P 008 0333	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	837.00	.01	.50	D008
	W503580	R050 700 P 008 0333	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	718.00	.01	.50	D008
	W503581	R050 700 P 008 0333	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	729.00	.01	.50	D008
	W503583	R050 700 P 008 0333	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	680.00	.01	.50	D008
	W503584	R050 700 P 008 0333	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	644.00	.01	.50	D008

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MEF #	INV #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503585	R050 700 P 008 0333	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	606.00	.01	.50	D008
	W503586	R050 700 P 008 0333	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	642.00	.01	.50	D008
	W503587	R050 700 P 008 0333	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	639.00	.01	.50	D008
	W503588	R050 700 P 008 0333	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	621.00	.01	.50	D008
	W503589	R050 700 P 008 0333	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	616.00	.01	.50	D008
	W503590	R050 700 P 008 0333	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	406.00	.01	.50	D008
	W503599	R050 700 P 008 0333	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	552.00	.01	.50	D008
	W503600	R050 700 P 008 0333	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	540.00	.01	.50	D008
	W503601	R050 700 P 008 0333	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	582.00	.01	.50	D008
	W503602	R050 700 P 008 0333	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	583.00	.01	.50	D008
	W503603	R050 700 P 008 0333	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	581.00	.01	.50	D008
	W503604	R050 700 P 008 0333	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	574.00	.01	.50	D008
	W503605	R050 700 P 008 0333	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	595.00	.01	.50	D008
	W503606	R050 700 P 008 0333	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	585.00	.01	.50	D008
	W503607	R050 700 P 008 0333	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	647.00	.01	.50	D008
	W503608	R050 700 P 008 0333	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	674.00	.01	.50	D008
	W503609	R050 700 P 008 0333	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	666.00	.01	.50	D008
	W503610	R050 700 P 008 0333	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	681.00	.01	.50	D008
	W503611	R050 700 P 008 0333	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W503612	R050 700 P 008 0333	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W503613	R050 700 P 008 0333	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	648.00	.01	.50	D008
	W503614	R050 700 P 008 0333	000041	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W503615	R050 700 P 008 0333	000042	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	611.00	.01	.50	D008
	W503616	R050 700 P 008 0333	000043	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	635.00	.01	.50	D008
	W503617	R050 700 P 008 0333	000044	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	604.00	.01	.50	D008
	W503618	R050 700 P 008 0333	000045	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	606.00	.01	.50	D008
	W503629	R050 700 P 008 0333	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W503630	R050 700 P 008 0333	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	790.00	.01	.50	D008
	W503631	R050 700 P 008 0333	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	720.00	.01	.50	D008
	W503632	R050 700 P 008 0333	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	654.00	.01	.50	D008
	W503636	R050 700 P 008 0333	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	585.00	.01	.50	D008
	W503637	R050 700 P 008 0333	000047	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	553.00	.01	.50	D008
	W503638	R050 700 P 008 0333	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	544.00	.01	.50	D008
	W503639	R050 700 P 008 0333	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	563.00	.01	.50	D008
	W503640	R050 700 P 008 0333	000048	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	597.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503641	R050 700 P 008 0333	000046	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	345.00	.01	.50	D008
	W503661	R050 700 P 008 0333	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	544.00	.01	.50	D008
	W503662	R050 700 P 008 0333	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	488.00	.01	.50	D008
	W503663	R050 700 P 008 0333	000049	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	555.00	.01	.50	D008
	W503664	R050 700 P 008 0333	000050	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	541.00	.01	.50	D008
	W503670	R050 700 P 008 0333	000051	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	723.00	.01	.50	D008
	W503671	R050 700 P 008 0333	000052	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	263.00	.01	.50	D008
	W503672	R050 700 P 008 0333	000053	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	677.00	.01	.50	D008
	W503673	R050 700 P 008 0333	000054	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	251.00	.01	.50	D008
	W503674	R050 700 P 008 0333	000055	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	945.00	.01	.50	D008
	W503675	R050 700 P 008 0334	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	416.00	.01	.50	D008
	W503676	R050 700 P 008 0334	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	350.00	.01	.50	D008
	W503715	R050 700 P 008 A334	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	724.00	.01	.50	D008
	W503716	R050 700 P 008 A334	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	820.00	.01	.50	D008
	W503717	R050 700 P 008 A334	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	815.00	.01	.50	D008
	W503718	R050 700 P 008 A334	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503719	R050 700 P 008 A334	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	863.00	.01	.50	D008
	W503720	R050 700 P 008 A334	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	759.00	.01	.50	D008
	W503721	R050 700 P 008 A334	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	742.00	.01	.50	D008
	W503722	R050 700 P 008 A334	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	780.00	.01	.50	D008
	W503723	R050 700 P 008 A334	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	801.00	.01	.50	D008
	W503724	R050 700 P 008 A334	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	773.00	.01	.50	D008
	W503725	R050 700 P 008 A334	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	709.00	.01	.50	D008
	W503726	R050 700 P 008 A334	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	684.00	.01	.50	D008
	W503727	R050 700 P 008 A334	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008
	W503728	R050 700 P 008 A334	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	790.00	.01	.50	D008
	W503729	R050 700 P 008 A334	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	717.00	.01	.50	D008
	W503730	R050 700 P 008 A334	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	727.00	.01	.50	D008
	W503731	R050 700 P 008 A334	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	686.00	.01	.50	D008
	W503732	R050 700 P 008 A334	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503733	R050 700 P 008 A334	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008
	W503734	R050 700 P 008 A334	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W503737	R050 700 P 008 A334	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	751.00	.01	.50	D008
	W503738	R050 700 P 008 A334	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	737.00	.01	.50	D008
	W503739	R050 700 P 008 A334	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008

000294

7168

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503740	R050 700 P 008 A334	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	653.00	.01	.50	D008
	W503741	R050 700 P 008 0334	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	334.00	.01	.50	D008
	W503742	R050 700 P 008 0334	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	283.00	.01	.50	D008
	W503743	R050 700 P 008 0334	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	740.00	.01	.50	D008
	W503744	R050 700 P 008 0334	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	728.00	.01	.50	D008
	W503747	R050 700 P 008 A334	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	681.00	.01	.50	D008
	W503748	R050 700 P 008 A334	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	704.00	.01	.50	D008
	W503749	R050 700 P 008 A334	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	703.00	.01	.50	D008
	W503750	R050 700 P 008 A334	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	714.00	.01	.50	D008
	W503751	R050 700 P 008 A334	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	698.00	.01	.50	D008
	W503752	R050 700 P 008 A334	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	712.00	.01	.50	D008
	W503753	R050 700 P 008 A334	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	707.00	.01	.50	D008
	W503754	R050 700 P 008 A334	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	688.00	.01	.50	D008
	W503755	R050 700 P 008 A334	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	670.00	.01	.50	D008
	W503756	R050 700 P 008 A334	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	719.00	.01	.50	D008
	W503757	R050 700 P 008 A334	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W503758	R050 700 P 008 A334	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	687.00	.01	.50	D008
	W503759	R050 700 P 008 A334	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	643.00	.01	.50	D008
	W503760	R050 700 P 008 A334	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	652.00	.01	.50	D008
	W503761	R050 700 P 008 A334	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	663.00	.01	.50	D008
	W503762	R050 700 P 008 A334	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503763	R050 700 P 008 A334	000041	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	667.00	.01	.50	D008
	W503764	R050 700 P 008 A334	000042	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	652.00	.01	.50	D008
	W503765	R050 700 P 008 A334	000043	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	645.00	.01	.50	D008
	W503766	R050 700 P 008 A334	000044	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	633.00	.01	.50	D008
	W503767	R050 700 P 008 A334	000045	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	651.00	.01	.50	D008
	W503768	R050 700 P 008 A334	000046	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W503769	R050 700 P 008 A334	000047	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	670.00	.01	.50	D008
	W503770	R050 700 P 008 A334	000048	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	646.00	.01	.50	D008
	W503785	R050 700 P 008 A335	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	642.00	.01	.50	D008
	W503786	R050 700 P 008 A335	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	671.00	.01	.50	D008
	W503787	R050 700 P 008 A335	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	656.00	.01	.50	D008
	W503788	R050 700 P 008 A335	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	648.00	.01	.50	D008
	W503789	R050 700 P 008 A335	000005	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008
	W503790	R050 700 P 008 A335	000006	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	678.00	.01	.50	D008

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503791	R050 700 P 008 A335	000007	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	632.00	.01	.50	D008
	W503792	R050 700 P 008 A335	000008	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	710.00	.01	.50	D008
	W503793	R050 700 P 008 A335	000009	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	666.00	.01	.50	D008
	W503794	R050 700 P 008 A335	000010	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	703.00	.01	.50	D008
	W503795	R050 700 P 008 A335	000011	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	730.00	.01	.50	D008
	W503796	R050 700 P 008 A335	000012	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	699.00	.01	.50	D008
	W503797	R050 700 P 008 A335	000013	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	675.00	.01	.50	D008
	W503798	R050 700 P 008 A335	000014	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W503799	R050 700 P 008 A335	000015	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	669.00	.01	.50	D008
	W503800	R050 700 P 008 A335	000016	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	690.00	.01	.50	D008
	W503801	R050 700 P 008 A335	000017	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	681.00	.01	.50	D008
	W503802	R050 700 P 008 A335	000018	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	659.00	.01	.50	D008
	W503803	R050 700 P 008 A335	000019	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	653.00	.01	.50	D008
	W503804	R050 700 P 008 A335	000020	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	629.00	.01	.50	D008
	W503805	R050 700 P 008 A335	000021	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	759.00	.01	.50	D008
	W503806	R050 700 P 008 A335	000022	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	761.00	.01	.50	D008
	W503807	R050 700 P 008 A335	000023	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	752.00	.01	.50	D008
	W503808	R050 700 P 008 A335	000024	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	778.00	.01	.50	D008
	W503809	R050 700 P 008 A335	000025	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	781.00	.01	.50	D008
	W503810	R050 700 P 008 A335	000026	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	733.00	.01	.50	D008
	W503811	R050 700 P 008 A335	000027	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	709.00	.01	.50	D008
	W503812	R050 700 P 008 A335	000028	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	713.00	.01	.50	D008
	W503813	R050 700 P 008 A335	000029	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	715.00	.01	.50	D008
	W503814	R050 700 P 008 A335	000030	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	705.00	.01	.50	D008
	W503815	R050 700 P 008 A335	000031	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	697.00	.01	.50	D008
	W503816	R050 700 P 008 A335	000032	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	694.00	.01	.50	D008
	W503817	R050 700 P 008 A335	000033	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	488.00	.01	.50	D008
	W503859	R050 700 P 008 A335	000034	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	672.00	.01	.50	D008
	W503860	R050 700 P 008 A335	000035	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	698.00	.01	.50	D008
	W503861	R050 700 P 008 A335	000036	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	683.00	.01	.50	D008
	W503862	R050 700 P 008 A335	000037	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	674.00	.01	.50	D008
	W503863	R050 700 P 008 A335	000038	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	670.00	.01	.50	D008
	W503864	R050 700 P 008 A335	000039	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	692.00	.01	.50	D008
	W503865	R050 700 P 008 A335	000040	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	700.00	.01	.50	D008
	W503866	R050 700 P 008 A335	000041	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	632.00	.01	.50	D008

000295

89168

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W503867	R050 700 P 008 A335	000042	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	691.00	.01	.50	D008
	W503868	R050 700 P 008 A335	000043	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	703.00	.01	.50	D008
	W503869	R050 700 P 008 A335	000044	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	663.00	.01	.50	D008
	W503870	R050 700 P 008 A335	000045	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	685.00	.01	.50	D008
	W503871	R050 700 P 008 A335	000046	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	663.00	.01	.50	D008
	W503872	R050 700 P 008 A335	000047	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	676.00	.01	.50	D008
	W503873	R050 700 P 008 A335	000048	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	647.00	.01	.50	D008
	W503874	R050 700 P 008 A335	000049	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	707.00	.01	.50	D008
	W504592	R050 700 P 008 A338	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	524.00	.01	.50	D008
	W504593	R050 700 P 008 A338	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	708.00	.01	.50	D008
	W504594	R050 700 P 008 A338	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	744.00	.01	.50	D008
	W504595	R050 700 P 008 A338	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	678.00	.01	.50	D008
	W506648	R050 700 P 008 0341	000004	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	491.00	.01	.50	D008
	W506836	R050 700 P 008 0341	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	249.00	.01	.50	D008
	W506837	R050 700 P 008 0341	000002	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	211.00	.01	.50	D008
	W506838	R050 700 P 008 0341	000003	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	153.00	.01	.50	D008
	W514727	R050 700 P 008 0377	000001	GRITBLAST RESIDUES W/LEADED PAINT CHIPS	11.00	.01	.50	D008

Total number of drums per MEF =: 874

20007	W300491	R095 HXA 0 068 0024	000031	SUMP OR FILTER CAKE	314.00	15.12	.94	D011
	W504912	R072 HXA 0 068 0022	000025	SUMP OR FILTER CAKE	144.00	20.71	.72	D011
	W504961	R072 HXA 0 068 0022	000024	SUMP OR FILTER CAKE	228.00	20.71	.72	D011
	W504986	R095 HXA 0 068 0024	000007	SUMP OR FILTER CAKE	104.00	15.12	.94	D011
	W504987	R095 HXA 0 068 0024	000008	SUMP OR FILTER CAKE	189.00	15.12	.94	D011
	W504988	R095 HXA 0 068 0024	000009	SUMP OR FILTER CAKE	255.00	15:12	.94	D011
	W504989	R095 HXA 0 068 0024	000010	SUMP OR FILTER CAKE	185.00	15.12	.94	D011
	W504990	R095 HXA 0 068 0024	000012	SUMP OR FILTER CAKE	185.00	15.12	.94	D011
	W504991	R095 HXA 0 068 0024	000022	SUMP OR FILTER CAKE	139.00	15.12	.94	D011
	W504992	R095 HXA 0 068 0024	000023	SUMP OR FILTER CAKE	175.00	15.12	.94	D011
	W504993	R095 HXA 0 068 0024	000026	SUMP OR FILTER CAKE	178.00	15.12	.94	D011
	W504994	R095 HXA 0 068 0024	000027	SUMP OR FILTER CAKE	356.00	15.12	.94	D011
	W504995	R095 HXA 0 068 0024	000028	SUMP OR FILTER CAKE	199.00	15.12	.94	D011
	W504996	R095 HXA 0 068 0024	000029	SUMP OR FILTER CAKE	160.00	15.12	.94	D011
	W504997	R095 HXA 0 068 0024	000030	SUMP OR FILTER CAKE	49.00	15.12	.94	D011

000292

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W504998	R095 HXA 0 068 0024	000031	SUMP OR FILTER CAKE	314.00	15.12	.94	D011
	W504999	R095 HXA 0 068 0024	000032	SUMP OR FILTER CAKE	245.00	15.12	.94	D011
	W506000	R095 HXA 0 068 0024	000037	SUMP OR FILTER CAKE	268.00	15.12	.94	D011
	W506001	R095 HXA 0 068 0024	000043	SUMP OR FILTER CAKE	243.00	15.12	.94	D011
	W506002	R095 HXA 0 068 0024	000044	SUMP OR FILTER CAKE	180.00	15.12	.94	D011
	W506003	R095 HXA 0 068 0024	000045	SUMP OR FILTER CAKE	263.00	15.12	.94	D011
	W506004	R095 HXA 0 068 0024	000046	SUMP OR FILTER CAKE	234.00	15.12	.94	D011
	W506005	R095 HXA 0 068 0024	000047	SUMP OR FILTER CAKE	288.00	15.12	.94	D011
	W506006	R095 HXA 0 068 0024	000049	SUMP OR FILTER CAKE	239.00	15.12	.94	D011
	W506007	R095 HXA 0 068 0024	000050	SUMP OR FILTER CAKE	262.00	15.12	.94	D011
	W506008	R095 HXA 0 068 0024	000052	SUMP OR FILTER CAKE	193.00	15.12	.94	D011
	W506038	R072 HXA 0 068 0022	000021	SUMP OR FILTER CAKE	229.00	20.71	.72	D011
	W506039	R072 HXA 0 068 0022	000020	SUMP OR FILTER CAKE	213.00	20.71	.72	D011
	W506040	R072 HXA 0 068 0022	000018	SUMP OR FILTER CAKE	160.00	20.71	.72	D011
	W506041	R072 HXA 0 068 0022	000017	SUMP OR FILTER CAKE	263.00	20.71	.72	D011
	W506042	R072 HXA 0 068 0022	000004	SUMP OR FILTER CAKE	221.00	20.71	.72	D011
	W506043	R072 HXA 0 068 0022	000003	SUMP OR FILTER CAKE	198.00	20.71	.72	D011
	W506044	R072 HXA 0 068 0022	000002	SUMP OR FILTER CAKE	158.00	20.71	.72	D011
	W506045	R072 HXA 0 068 0022	000001	SUMP OR FILTER CAKE	199.00	20.71	.72	D011
	W506046	R095 HXA 0 068 0024	000053	SUMP OR FILTER CAKE	297.00	15.12	.94	D011
	W506047	R095 HXA 0 068 0024	000041	SUMP OR FILTER CAKE	206.00	15.12	.94	D011
	W506048	R095 HXA 0 068 0024	000036	SUMP OR FILTER CAKE	117.00	15.12	.94	D011
	W506049	R095 HXA 0 068 0024	000035	SUMP OR FILTER CAKE	199.00	15.12	.94	D011
	W506050	R095 HXA 0 068 0024	000034	SUMP OR FILTER CAKE	223.00	15.12	.94	D011
	W506051	R095 HXA 0 068 0024	000033	SUMP OR FILTER CAKE	164.00	15.12	.94	D011
	W506052	R095 HXA 0 068 0024	000025	SUMP OR FILTER CAKE	204.00	15.12	.94	D011
	W506053	R095 HXA 0 068 0024	000024	SUMP OR FILTER CAKE	119.00	15.12	.94	D011
	W506054	R095 HXA 0 068 0024	000021	SUMP OR FILTER CAKE	260.00	15.12	.94	D011
	W506055	R095 HXA 0 068 0024	000005	SUMP OR FILTER CAKE	211.00	15.12	.94	D011
	W506056	R095 HXA 0 068 0024	000003	SUMP OR FILTER CAKE	359.00	15.12	.94	D011
	W506088	R095 HXA 0 068 0024	000001	SUMP OR FILTER CAKE	189.00	15.12	.94	D011
	W506089	R095 HXA 0 068 0024	000011	SUMP OR FILTER CAKE	240.00	15.12	.94	D011
	W506090	R095 HXA 0 068 0024	000038	SUMP OR FILTER CAKE	290.00	15.12	.94	D011
	W506091	R095 HXA 0 068 0024	000039	SUMP OR FILTER CAKE	378.00	15.12	.94	D011
	W506092	R095 HXA 0 068 0024	000040	SUMP OR FILTER CAKE	267.00	15.12	.94	D011

000293

E 2168

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W506093	R095 HXA 0 068 0024	000042	SUMP OR FILTER CAKE	184.00	15.12	.94	D011
	W506094	R095 HXA 0 068 0024	000048	SUMP OR FILTER CAKE	263.00	15.12	.94	D011
	W506143	R095 HXA 0 068 0024	000002	SUMP OR FILTER CAKE	200.00	15.12	.94	D011
	W506144	R095 HXA 0 068 0024	000004	SUMP OR FILTER CAKE	235.00	15.12	.94	D011
	W506145	R095 HXA 0 068 0024	000006	SUMP OR FILTER CAKE	276.00	15.12	.94	D011
	W506146	R095 HXA 0 068 0024	000013	SUMP OR FILTER CAKE	206.00	15.12	.94	D011
	W506147	R095 HXA 0 068 0024	000014	SUMP OR FILTER CAKE	344.00	15.12	.94	D011
	W506148	R095 HXA 0 068 0024	000015	SUMP OR FILTER CAKE	161.00	15.12	.94	D011
	W506149	R095 HXA 0 068 0024	000016	SUMP OR FILTER CAKE	217.00	15.12	.94	D011
	W506150	R095 HXA 0 068 0024	000017	SUMP OR FILTER CAKE	157.00	15.12	.94	D011
	W506151	R095 HXA 0 068 0024	000018	SUMP OR FILTER CAKE	256.00	15.12	.94	D011
	W506152	R095 HXA 0 068 0024	000019	SUMP OR FILTER CAKE	149.00	15.12	.94	D011
	W506153	R095 HXA 0 068 0024	000020	SUMP OR FILTER CAKE	79.00	15.12	.94	D011
	W506154	R095 HXA 0 068 0024	000051	SUMP OR FILTER CAKE	234.00	15.12	.94	D011
	W506179	R072 HXA 0 068 0022	000005	SUMP OR FILTER CAKE	347.00	20.71	.72	D011
	W506180	R072 HXA 0 068 0022	000006	SUMP OR FILTER CAKE	199.00	20.71	.72	D011
	W506181	R072 HXA 0 068 0022	000007	SUMP OR FILTER CAKE	252.00	20.71	.72	D011
	W506182	R072 HXA 0 068 0022	000008	SUMP OR FILTER CAKE	180.00	20.71	.72	D011
	W506183	R072 HXA 0 068 0022	000009	SUMP OR FILTER CAKE	192.00	20.71	.72	D011
	W506184	R072 HXA 0 068 0022	000010	SUMP OR FILTER CAKE	246.00	20.71	.72	D011
	W506185	R072 HXA 0 068 0022	000011	SUMP OR FILTER CAKE	282.00	20.71	.72	D011
	W506186	R072 HXA 0 068 0022	000012	SUMP OR FILTER CAKE	173.00	20.71	.72	D011
	W506187	R072 HXA 0 068 0022	000013	SUMP OR FILTER CAKE	267.00	20.71	.72	D011
	W506188	R072 HXA 0 068 0022	000014	SUMP OR FILTER CAKE	100.00	20.71	.72	D011
	W506189	R072 HXA 0 068 0022	000015	SUMP OR FILTER CAKE	218.00	20.71	.72	D011
	W506190	R072 HXA 0 068 0022	000016	SUMP OR FILTER CAKE	232.00	20.71	.72	D011
	W506191	R072 HXA 0 068 0022	000019	SUMP OR FILTER CAKE	164.00	20.71	.72	D011
	W506192	R072 HXA 0 068 0022	000022	SUMP OR FILTER CAKE	187.00	20.71	.72	D011
	W506193	R072 HXA 0 068 0022	000023	SUMP OR FILTER CAKE	137.00	20.71	.72	D011
	W515269	R095 HXA 0 068 0019	000013	SUMP OR FILTER CAKE	278.00	21.28	.94	D011
	W515270	R125 HXA 0 068 0013	000016	SUMP OR FILTER CAKE	215.00	23.62	1.24	D011
	W515271	R125 HXA 0 068 0005	000042	SUMP OR FILTER CAKE	173.00	18.26	1.24	D011
	W515272	R125 HXA 0 068 0005	000043	SUMP OR FILTER CAKE	240.00	18.26	1.24	D011
	W515276	R095 HXA 0 068 0024	000039	SUMP OR FILTER CAKE	378.00	.00	.00	D011
	W515278	R125 HXA 0 068 0005	000029	SUMP OR FILTER CAKE	249.00	.00	.00	D011

000393

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W515286	R095 HXA 0 068 0022	000006	SUMP OR FILTER CAKE	327.00	.00	.00	D011
Total number of drums per MEF =: 86								
20015	W507662	X888 643 M 066 0252	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	483.00	2.64	1.10	D007
	W507682	R054 643 D 066 0277	000002	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	188.00	.01	.50	D007
	W507684	R025 643 D 066 0274	000003	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	438.00	.01	.50	D007
	W507685	R025 643 D 066 0274	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	300.00	.01	.50	D007
	W507686	R025 643 D 066 0274	000002	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	549.00	.01	.50	D007
	W507687	R054 643 D 066 0277	000011	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	271.00	.01	.50	D007
	W507688	R054 643 D 066 0277	000008	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	227.00	.01	.50	D007
	W507689	R054 643 D 066 0277	000007	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	244.00	.01	.50	D007
	W507690	R025 643 D 066 0274	000004	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	318.00	.01	.50	D007
	W507691	R054 643 D 066 0277	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	80.00	.01	.50	D007
	W507692	R054 643 D 066 0277	000005	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	303.00	.01	.50	D007
	W507693	R058 643 D 066 0254	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	77.00	.01	.50	D007
	W507694	R048 643 D 066 0262	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	267.00	.01	.50	D007
	W507695	R062 643 D 066 0263	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	282.00	.01	.50	D007
	W507696	R058 643 D 066 0254	000002	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	196.00	.01	.50	D007
	W507697	R054 643 D 066 0277	000006	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	327.00	.01	.50	D007
	W507698	R054 643 D 066 0277	000004	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	194.00	.01	.50	D007
	W507699	R054 643 D 066 0277	000003	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	292.00	.01	.50	D007
	W507700	R054 643 D 066 0295	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	257.00	.01	.50	D007
	W507704	R050 643 D 066 0292	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	260.00	.01	.50	D007
	W507706	R036 643 D 066 0278	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	199.00	.01	.50	D007
	W507707	R053 643 D 066 0282	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	97.00	.01	.50	D007
	W507717	R062 643 D 066 0273	000001	SCRAP SALTS AND FLOOR SWEEPINGS, LOW FL	153.00	.01	.50	D007
Total number of drums per MEF =: 23								
20024	W081693	S060 FYC D 065 0117	000013	SCRAP SALTS, HIGH FLUORIDE, INCLUDING F	1,203.00	77.40	.57	D007 D008
	W507661	R086 FYC 0 065 0117	000001	SCRAP SALTS, HIGH F	873.00	13.60	.95	D007 D008
	W507663	X884 FYC 0 065 0452	000003	SCRAP SALTS, HIGH F	94.00	6.00	.75	D007

000300

7168

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W507664	X884 FYC 0 065 0452	000004	SCRAP SALTS, HIGH F	59.00	6.00	.75	D008 D007
	W507665	X884 FYC 0 065 0452	000001	SCRAP SALTS, HIGH F	61.00	6.00	.75	D008 D007
	W507666	X884 FYC 0 065 0452	000002	SCRAP SALTS, HIGH F	76.00	6.00	.75	D008 D007
	W507683	X948 FYC D 065 0451	000002	SCRAP SALTS, HIGH F	172.00	6.18	.58	D008 D007
	W507708	X948 FYC D 065 0451	000001	SCRAP SALTS, HIGH F	93.00	6.18	.58	D008 D007
	W507709	X948 FYC D 065 0451	000003	SCRAP SALTS, HIGH F	54.00	6.18	.58	D008 D007 D008
Total number of drums per MEF =: 18								
20027	W507678	R119 732 0 062 0285	000001	DUST COLLECTOR RESIDUES	473.00	54.32	1.19	D004 D011
	W507705	R034 732 D 062 0305	000001	DUST COLLECTOR RESIDUES	31.00	.01	.50	D004 D011
	W507781	X125 732 M 062 0342	000001	DUST COLLECTOR RESIDUES	35.00	3.00	1.25	D004 D011
Total number of drums per MEF =: 6								
20033	W506496	X500 620 0 001 0315	000002	DRY DUST COLLECTOR POWDER	154.00	1.00	.95	D008
Total number of drums per MEF =: 1								
20035	W506841	R071 332 1 062 0304	000101	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	129.00	11.26	.71	D007
	W506842	H093 332 D 062 0327	000001	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	498.00	1.79	.26	D007
	W506843	H093 332 D 062 0327	000002	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	327.00	1.79	.26	D007
	W506846	R135 332 0 062 0307	000001	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	277.00	22.41	1.35	D007
Total number of drums per MEF =: 4								

000501

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
20041	W062722	X948 FTA D 047 0318	000001	SAMPLES, NON-METALLIC, MISCELLANEOUS	113.00	50.00	.20	D007
	W065617	X110 FTA 1 047 0318	000001	SAMPLES, NON-METALLIC, MISCELLANEOUS	146.00	50.00	.71	D007
Total number of drums per MEF =: 2								
20046	W506492	H082 731 D 047 0292	000001	SAMPLES, NON-METALLIC	42.00	22.37	.25	D007
	W506500	S082 731 0 047 0296	000001	SAMPLES, NON-METALLIC	36.00	18.04	.82	D007
Total number of drums per MEF =: 2								
20047	W506839	R065 610 D 066 0264	000001	SCRAP SALTS, LOW FLUORIDE	223.00	.01	.50	D004 D008
	W506840	R026 610 D 066 0303	000101	SCRAP SALTS, LOW FLUORIDE	284.00	.01	.50	D004 D008
Total number of drums per MEF =: 4								
20058	W506845	X888 101 0 062 0296	000002	DUST COLLECTOR RESIDUES	6.00	2.08	.75	D006 D008
Total number of drums per MEF =: 2								
30027	W507491	R125 212 0 011 0257	000004	U-CONTAMINATED SOIL, ROCKS, ETC.	752.00	.01	.50	D004 D008 D010 D011 D007 D005
	W507492	R125 212 0 011 0257	000005	U-CONTAMINATED SOIL, ROCKS, ETC.	604.00	.01	.50	D004 D007 D008 D011 D010

000302

7168

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W507493	R125 212 0 011 0257	000006	U-CONTAMINATED SOIL, ROCKS, ETC.	657.00	.01	.50	D005 D004 D011 D010
	W507494	R125 212 0 011 0257	000008	U-CONTAMINATED SOIL, ROCKS, ETC.	790.00	.01	.50	D005 D008 D007 D004 D008 D011 D010
	W507576	R125 212 0 011 0257	000001	U-CONTMAINATED SOIL, ROCKS, ETC.	712.00	.01	.50	D005 D007 D004 D008 D010 D011
	W507577	R125 212 0 011 0257	000002	U-CONTAMINATED SOIL, ROCKS, ETC.	876.00	.01	.50	D007 D005 D004 D007 D008 D011 D010
	W507578	R125 212 0 011 0257	000003	U-CONTAMINATED SOIL, ROCKS, ETC.	945.00	.01	.50	D005 D004 D011 D010
	W507579	R125 212 0 011 0257	000007	U-CONTAMINATED SOIL, ROCKS, ETC.	516.00	.01	.84	D005 D008 D007 D004 D008 D011 D010

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W507581	R125 212 4 011 0262	000001	U-CONTAMINATED SOIL, ROCKS, ETC.	462.00	.01	.50	D005 D007 D004 D008 D010 D011 D007 D005
Total number of drums per MEF =: 54								
30036	W506854	R069 665 D 062 0301	000001	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	338.00	58.34	.69	D006 D008
	W506855	X948 665 D 062 0321	000001	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	198.00	5.00	.21	D006 D008
	W506856	X948 665 D 062 0331	000001	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	164.00	5.00	.21	D006 D008
	W506857	X500 665 0 062 0289	000001	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	274.00	66.28	.75	D006 D008
	W506858	R044 665 D 062 0295	000002	DUST COLLECTOR RESIDUES, HIGH FLUORIDE	239.00	.01	.50	D006 D008
Total number of drums per MEF =: 10								
30039	W507495	R125 211 0 011 0258	000001	U-CONTAMINATED SOIL, ROCKS, ETC.	454.00	.01	.50	D011
	W507496	R125 211 4 011 0261	000001	U-CONTAMINATED SOIL, ROCKS, ETC.	279.00	.01	.50	D011
	W507498	R125 211 4 011 0264	000001	U-CONTAMINATED SOIL, ROCKS, ETC.	256.00	.01	.50	D011
Total number of drums per MEF =: 3								
30047	W500132	S070 732 D 043 0257	000001	SOLVENT SLUDGE, TRICHLOR, PERCHLOR, ETC	79.00	2.00	.70	D007 D011
Total number of drums per MEF =: 2								

000304

21688

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
30060	W500980	S020 362 D 069 0298	000001	WET SUMP OR FILTER CAKE, NON-OILY, NON-	113.00	3.00	.20	D005
	W507521	R020 362 D 069 0291	000001	WET SUMP OR FILTER CAKE, NON-OILY, NON-	429.00	.01	.50	D005
Total number of drums per MEF =: 2								
50031	W509688	X888 900 0 025 0268	000001	CONTAMINATED METALLIC FILTER ELEMENTS	344.00	.01	.50	D008 D010
	W510804	X888 900 0 025 0268	000002	CONTAMINATED METALLIC FILTER ELEMENTS	193.00	.01	.50	D008 D010
Total number of drums per MEF =: 4								
50058	W079273	W095 732 V 029 0362	000001	DUST COLLECTOR BAGS	198.00	.01	.95	D007
	W088629	X500 732 0 029 0281	000001	DUST COLLECTOR BAGS	229.00	.01	.95	D007
Total number of drums per MEF =: 2								
50102	W510865	X888 610 0 001 0295	000002	DISCARD PROCESS RESIDUE	71.00	9.34	.73	D006 D008
	W510866	X888 610 0 001 0295	000001	DISCARD PROCESS RESIDUE	47.00	9.34	.73	D006 D008
Total number of drums per MEF =: 4								
50173	W509298	H093 642 D 044 0275	000101	SALT SLUDGE, CHLORIDE	332.00	25.51	.20	D007
	W509299	H093 642 D 044 0275	000102	SALT SLUDGE, CHLORIDE	467.00	25.51	.20	D007
	W509300	H093 642 D 044 0275	000103	SALT SLUDGE, CHLORIDE	765.00	25.51	.20	D007
	W509301	H093 642 D 044 0302	000001	SALT SLUDGE, CHLORIDE	779.00	15.10	.20	D007
	W509302	H093 642 D 044 0302	000002	SALT SLUDGE, CHLORIDE	708.00	15.10	.20	D007
	W509303	H093 642 D 044 0302	000003	SALT SLUDGE, CHLORIDE	722.00	15.10	.20	D007
	W509304	H093 642 D 044 0302	000004	SALT SLUDGE, CHLORIDE	132.00	15.10	.20	D007
	W509305	H093 642 D 044 0302	000005	SALT SLUDGE, CHLORIDE	686.00	15.10	.20	D007
	W510440	H093 642 D 044 0275	000104	SALT SLUDGE, CHLORIDE	773.00	25.51	.20	D007
	W510809	H093 642 D 044 0281	000006	SALT SLUDGE, CHLORIDE	323.00	21.44	.20	D007

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W510934	H093 642 D 044 0275	000105	SALT SLUDGE, CHLORIDE	753.00	25.51	.20	D007
	W510935	H093 642 D 044 0275	000106	SALT SLUDGE, CHLORIDE	821.00	25.51	.20	D007
	W510936	H093 642 D 044 0288	000001	SALT SLUDGE, CHLORIDE	754.00	11.26	.22	D007
	W510937	H093 642 D 044 0288	000004	SALT SLUDGE, CHLORIDE	763.00	11.26	.22	D007
	W511756	H093 642 D 044 0288	000002	SALT SLUDGE, CHLORIDE	861.00	11.26	.22	D007
	W511779	H093 642 D 044 0288	000003	SALT SLUDGE, CHLORIDE	931.00	11.26	.22	D007
Total number of drums per MEF =: 16								
50174	W148511	R044 643 D 044 0270	000003	SLUDGES, SALT, SOFT, CHLORIDE (FOR PLAN	699.00	.00	.00	D007
	W514118	R034 643 D 044 0229	000001	HIGH CHLORIDE SALT SLUDGE (SOFT)	319.00	.01	.50	D007
	W514119	R034 643 D 044 0229	000002	HIGH CHLORIDE SALT SLUDGE (SOFT)	242.00	.01	.50	D007
	W514120	R034 643 D 044 0229	000003	HIGH CHLORIDE SALT SLUDGE (SOFT)	269.00	.01	.50	D007
	W514121	R034 643 D 044 0229	000004	HIGH CHLORIDE SALT SLUDGE (SOFT)	348.00	.01	.50	D007
	W514122	R034 643 D 044 0229	000006	HIGH CHLORIDE SALT SLUDGE (SOFT)	220.00	.01	.50	D007
	W514123	R034 643 D 044 0229	000007	HIGH CHLORIDE SALT SLUDGE (SOFT)	394.00	.01	.50	D007
	W514124	R038 643 D 044 0266	000101	HIGH CHLORIDE SALT SLUDGE (SOFT)	318.00	.01	.50	D007
	W514125	R034 643 D 044 0274	000002	HIGH CHLORIDE SALT SLUDGE (SOFT)	437.00	.01	.50	D007
	W514126	R034 643 D 044 0274	000003	HIGH CHLORIDE SALT SLUDGE (SOFT)	450.00	.01	.50	D007
	W514127	R034 643 D 044 0274	000004	HIGH CHLORIDE SALT SLUDGE (SOFT)	537.00	.01	.50	D007
	W514128	R038 643 D 044 0278	000001	HIGH CHLORIDE SALT SLUDGE (SOFT)	565.00	.01	.50	D007
	W514129	R038 643 D 044 0278	000002	HIGH CHLORIDE SALT SLUDGE (SOFT)	280.00	.01	.50	D007
	W514130	R038 643 D 044 0278	000003	HIGH CHLORIDE SALT SLUDGE (SOFT)	596.00	.01	.50	D007
	W514131	R038 643 D 044 0278	000004	HIGH CHLORIDE SALT SLUDGE (SOFT)	529.00	.01	.50	D007
	W514132	R038 643 D 044 0278	000007	HIGH CHLORIDE SALT SLUDGE (SOFT)	31.00	.01	.50	D007
	W514133	R044 643 D 044 0270	000001	HIGH CHLORIDE SALT SLUDGE (SOFT)	125.00	.01	.50	D007
	W514134	R044 643 D 044 0270	000004	HIGH CHLORIDE SALT SLUDGE (SOFT)	565.00	.01	.50	D007
	W514135	R044 643 D 044 0270	000005	HIGH CHLORIDE SALT SLUDGE (SOFT)	571.00	.01	.50	D007
	W514136	R049 643 D 044 0287	000031	HIGH CHLORIDE SALT SLUDGE (SOFT)	355.00	.01	.50	D007
	W514137	R049 643 D 044 0287	000032	HIGH CHLORIDE SALT SLUDGE (SOFT)	272.00	.01	.50	D007
	W514138	R049 643 D 044 0287	000033	HIGH CHLORIDE SALT SLUDGE (SOFT)	259.00	.01	.50	D007
	W514139	R049 643 D 044 0287	000034	HIGH CHLORIDE SALT SLUDGE (SOFT)	213.00	.01	.50	D007
	W514140	X500 643 0 044 0309	000005	HIGH CHLORIDE SALT SLUDGE (SOFT)	476.00	2.08	.94	D007
	W514141	X500 643 0 044 0309	000007	HIGH CHLORIDE SALT SLUDGE (SOFT)	437.00	2.08	.94	D007
	W514142	X500 643 0 044 0309	000009	HIGH CHLORIDE SALT SLUDGE (SOFT)	523.00	2.08	.94	D007

000309
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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W514166	R038 643 D 044 0266	000103	HIGH CHLORIDE SALT SLUDGE (SOFT)	268.00	.01	.50	D007
	W514167	R038 643 D 044 0266	000104	HIGH CHLORIDE SALT SLUDGE (SOFT)	81.00	.01	.50	D007
	W514168	R044 643 D 044 0270	000002	HIGH CHLORIDE SALT SLUGE (SOFT)	303.00	.01	.50	D007
	W514169	R049 643 D 044 0287	000024	HIGH CHLORIDE SALT SLUDGE (SOFT)	478.00	.01	.50	D007
	W514170	R049 643 D 044 0287	000025	HIGH CHLORIDE SALT SLUDGE (SOFT)	598.00	.01	.50	D007
	W514171	R049 643 D 044 0287	000026	HIGH CHLORIDE SALT SLUDGE (SOFT)	670.00	.01	.50	D007
	W514172	R049 643 D 044 0287	000027	HIGH CHLORIDE SALT SLUDGE (SOFT)	614.00	.01	.50	D007
	W514173	R049 643 D 044 0287	000029	HIGH CHLORIDE SALT SLUDGE (SOFT)	237.00	.01	.50	D007
	W514174	R049 643 D 044 0287	000030	HIGH CHLORIDE SALT SLUDGE (SOFT)	357.00	.01	.50	D007
	W514175	X500 643 0 044 0309	000001	HIGH CHLORIDE SALT SLUDGE (SOFT)	582.00	2.08	.94	D007
	W514176	X500 643 0 044 0309	000002	HIGH CHLORIDE SALT SLUDGE (SOFT)	491.00	2.08	.94	D007
	W514177	X500 643 0 044 0309	000003	HIGH CHLORIDE SALT SLUDGE (SOFT)	565.00	2.08	.94	D007
	W514178	X500 643 0 044 0309	000004	HIGH CHLORIDE SALT SLUDGE (SOFT)	275.00	2.08	.94	D007
	W514179	X500 643 0 044 0309	000008	HIGH CHLORIDE SALT SLUDGE (SOFT)	563.00	2.08	.94	D007
	W514180	X500 643 0 044 0309	000010	HIGH CHLORIDE SALT SLUDGE (SOFT)	470.00	2.08	.94	D007
	W514191	R034 643 D 044 0229	000005	HIGH CHLORIDE SALT SLUDGE (SOFT)	385.00	.01	.50	D007
	W514192	R050 643 D 044 0256	000001	HIGH CHLORIDE SALT SLUDGE (SOFT)	153.00	.01	.50	D007
	W514193	R050 643 D 044 0256	000002	HIGH CHLORIDE SALT SLUDGE (SOFT)	346.00	.01	.50	D007
	W514194	R026 643 D 044 0315	000101	HIGH CHLORIDE SALT SLUDGE (SOFT)	364.00	.01	.50	D007
	W514195	R038 643 D 044 0278	000005	HIGH CHLORIDE SALT SLUDGE (SOFT)	360.00	.01	.50	D007
	W514196	R038 643 D 044 0278	000006	HIGH CHLORIDE SALT SLUDGE (SOFT)	275.00	.01	.50	D007
	W514283	R038 643 D 044 0266	000002	HIGH CHLORIDE SALT SLUDGE (SOFT)	258.00	.01	.50	D007
	W514284	R034 643 D 044 0274	000001	HIGH CHLORIDE SALT SLUDGE (SOFT)	530.00	.01	.50	D007
	W514285	R049 643 D 044 0287	000028	HIGH CHLORIDE SALT SLUDGE (SOFT)	361.00	.01	.50	D007
	W514286	X500 643 0 044 0309	000006	HIGH CHLORIDE SALT SLUDGE (SOFT)	427.00	2.08	.94	D007
	W514322	R044 643 D 044 0270	000003	HIGH CHLORIDE SALT SLUDGE (SOFT)	0.00	.01	.50	D007

Total number of drums per MEF =: 52

50180	W509017	H093 620 D 061 0294	000101	FURNACE SALT, NON-CHLORIDE	565.00	.02	.20	D007 D008 D010
	W509018	H093 620 D 061 0294	000102	FURNACE SALT, NON-CHLORIDE	655.00	.02	.20	D007 D008 D010

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W509019	H093 620 D 061 0294	000103	FURNACE SALT, NON-CHLORIDE	825.00	.02	.20	D007 D008 D010
	W509020	H093 620 D 061 0294	000104	FURNACE SALT, NON-CHLORIDE	639.00	.02	.20	D007 D008 D010
	W509021	H093 620 D 061 0294	000105	FURNACE SALT, NON-CHLORIDE	192.00	.02	.20	D007 D010 D008
	W509022	H093 620 D 061 0294	000106	FURNACE SALT, NON-CHLORIDE	715.00	.02	.20	D007 D008 D010
Total number of drums per MEF =: 18								
50351	W511454	X948 313 D 062 0267	000101	DUST COLLECTOR RESIDUE, HIGH F	588.00	62.53	.55	D004 D008
Total number of drums per MEF =: 2								
50367	W511778	R125 201 V 003 4304	000020	NON-RECOVERABLE TRASH	428.00	.01	1.25	D008
Total number of drums per MEF =: 1								
50387	W511443	R020 730 P 044 0331	000001	SALT SLUDGE, CHLORIDE	197.00	.01	.20	D005
	W511444	R020 730 P 044 0331	000002	SALT SLUDGE, CHLORIDE	516.00	.01	.20	D005
Total number of drums per MEF =: 2								
50405	W514113	R050 600 P 003 4281	000001	NON-RECOVERABLE TRASH	144.00	.01	.50	D006 D007
	W514114	R050 600 P 003 4281	000003	NON-RECOVERABLE TRASH	178.00	.01	.50	D006 D007
	W514115	R050 600 P 003 4304	000001	NON-RECOVERABLE TRASH	174.00	.01	.50	D006 D007

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W514321	R050 600 P 003 4281	000002	NON-RECOVERABLE TRASH	160.00	.01	.50	D006 D007
Total number of drums per MEF =:		8						
50406	W514083	H093 642 D 060 0344	000005	FURNACE SALT, CHLORIDE	230.00	.10	.20	D004 D011
	W514084	H093 642 D 060 0344	000006	FURNACE SALT, CHLORIDE	359.00	.10	.20	D004 D011
	W514085	H093 642 D 060 0344	000007	FURNACE SALT, CHLORIDE	260.00	.10	.20	D004 D011
	W514086	H093 642 D 060 0344	000008	FURNACE SALT, CHLORIDE	226.00	.10	.20	D004 D011
	W514087	H093 642 D 060 0344	000009	FURNACE SALT, CHLORIDE	242.00	.10	.20	D004 D011
	W514088	H093 642 D 060 0344	000010	FURNACE SALT, CHLORIDE	206.00	.10	.20	D004 D011
	W514089	H093 642 D 060 0344	000011	FURNACE SALT, CHLORIDE	212.00	.10	.20	D004 D011
	W514090	H093 642 D 060 0344	000012	FURNACE SALT, CHLORIDE	226.00	.10	.20	D004 D011
	W514091	H093 642 D 060 0344	000013	FURNACE SALT, CHLORIDE	223.00	.10	.20	D004 D011
	W514092	H093 642 D 060 0344	000014	FURNACE SALT, CHLORIDE	368.00	.10	.20	D004 D011
	W514093	H093 642 D 060 0344	000015	FURNACE SALT, CHLORIDE	213.00	.10	.20	D004 D011
	W514094	H093 642 D 060 0344	000016	FURNACE SALT, CHLORIDE	261.00	.10	.20	D004 D011
	W514095	H093 642 D 060 0344	000017	FURNACE SALT, CHLORIDE	240.00	.10	.20	D004 D011
	W514096	H093 642 D 060 0344	000018	FURNACE SALT, CHLORIDE	259.00	.10	.20	D004 D011
	W514097	H093 642 D 060 0344	000019	FURNACE SALT, CHLORIDE	218.00	.10	.20	D004 D011

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W514098	H093 642 D 060 0344	000020	FURNACE SALT, CHLORIDE	220.00	.10	.20	D004 D011
	W514099	H093 642 D 060 0344	000025	FURNACE SALT, CHLORIDE	272.00	.10	.20	D004 D011
	W514100	H093 642 D 060 0344	000026	FURNACE SALT, CHLORIDE	226.00	.10	.20	D004 D011
	W514101	H093 642 D 060 0344	000027	FURNACE SALT, CHLORIDE	236.00	.10	.20	D004 D011
	W514143	H093 642 D 060 0344	000001	FURNACE SALT, CHLORIDE	254.00	.10	.20	D004 D011
	W514144	H093 642 D 060 0344	000002	FURNACE SALT, CHLORIDE	249.00	.10	.20	D004 D011
	W514145	H093 642 D 060 0344	000003	FURNACE SALT, CHLORIDE	228.00	.10	.20	D004 D011
	W514146	H093 642 D 060 0344	000004	FURNACE SALT, CHLORIDE	225.00	.10	.20	D004 D011
	W514147	H093 642 D 060 0344	000021	FURNACE SALT, CHLORIDE	241.00	.10	.20	D004 D011
	W514148	H093 642 D 060 0344	000022	FURNACE SALT, CHLORIDE	224.00	.10	.20	D004 D011
	W514149	H093 642 D 060 0344	000023	FURNACE SALT, CHLORIDE	312.00	.10	.20	D004 D011
	W514150	H093 642 D 060 0344	000024	FURNACE SALT, CHLORIDE	56.00	.10	.20	D004 D011
Total number of drums per MEF =: 54								
50408	W514151	A500 323 5 061 0201	000001	FURNACE SALT, NON-CHLORIDE	194.00	16.73	.86	D008 D010
	W514152	A500 323 5 061 0201	000002	FURNACE SALT, NON-CHLORIDE	334.00	16.73	.86	D008 D010
	W514153	A500 323 5 061 0201	000003	FURNACE SALT, NON-CHLORIDE	481.00	16.73	.86	D008 D010
	W514154	A500 323 5 061 0201	000004	FURNACE SALT, NON-CHLORIDE	355.00	16.73	.86	D008 D010

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W514184	A500 323 5 061 0201	000005	FURNACE SALT, NON-CHLORIDE	663.00	16.73	.86	D008 D010
	W514185	A500 323 5 061 0201	000006	FURNACE SALT, NON-CHLORIDE	154.00	16.73	.86	D008 D010
Total number of drums per MEF =: 12								
60107	W027100	W050 660 P 028 0348	000001	CONTAMINATED ASBESTOS MATERIALS	51.00	.50	.50	D008
	W027101	W050 660 P 028 0348	000004	CONTAMINATED ASBESTOS MATERIALS	34.00	.50	.50	D008
	W027102	W050 660 P 028 0348	000003	CONTAMINATED ASBESTOS MATERIALS	128.00	.50	.50	D008
	W027103	W050 660 P 028 0348	000002	CONTAMINATED ASBESTOS MATERIALS	120.00	.50	.50	D008
	W027127	W050 660 P 028 0348	000005	CONTAMINATED ASBESTOS MATERIALS	246.00	.50	.50	D008
	W503909	R050 660 P 028 0337	000001	ASBESTOS ABATEMENT DEBRIS	67.00	.01	.50	D008
Total number of drums per MEF =: 6								
60140	W067527	R020 132 D 053 0332	000001	NON-BURNABLE METAL WITH U CONTENT	435.00	.01	.50	D010
	W067575	R020 132 D 053 0339	000001	NON-BURNABLE METAL WITH U CONTENT	512.00	.01	.50	D010
	W070790	R020 132 D 053 0315	000009	NON-BURNABLE METAL WITH U CONTENT	397.00	.01	.50	D010
	W504510	H093 132 D 053 0288	000001	STEEL SHOT	1,014.00	5.00	.20	D010
	W504521	H093 132 D 053 0288	000002	STEEL SHOT	1,108.00	5.00	.20	D010
	W514834	R020 132 D 053 0315	000005	STEEL SHOT	363.00	.05	.20	D010
	W514835	R020 132 D 053 0315	000006	STEEL SHOT	356.00	.05	.20	D010
	W514836	R020 132 D 053 0315	000007	STEEL SHOT	376.00	.05	.20	D010
	W514837	R020 132 D 053 0315	000008	STEEL SHOT	385.00	.05	.20	D010
	W514858	R020 132 D 053 0315	000001	STEEL SHOT	364.00	.05	.20	D010
	W514859	R020 132 D 053 0315	000002	STEEL SHOT	374.00	.05	.20	D010
	W514860	R020 132 D 053 0315	000003	STEEL SHOT	419.00	.05	.20	D010
	W514861	R020 132 D 053 0315	000004	STEEL SHOT	254.00	.05	.20	D010
	W514862	R020 132 D 053 0288	000002	STEEL SHOT	825.00	.01	.50	D010
	W514863	R020 132 D 053 0288	000003	STEEL SHOT	1,113.00	.01	.50	D010
	W514902	R020 132 D 053 0288	000001	STEEL SHOT	710.00	.01	.50	D010
Total number of drums per MEF =: 16								

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
60305	W039005	S047 FTA D 041 0045	001685	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	328.00	7.47	.47	
	W039109	S020 FTA D 041 0042	002035	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	453.00	66.64	.20	
	W039110	S020 FTA D 041 0042	002033	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	467.00	66.64	.20	
	W039111	S021 FTA D 041 0042	001963	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	235.00	67.45	.21	
	W039160	S020 FTA D 041 1094	002216	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	375.00	71.65	.20	
	W039206	S020 FTA D 041 0045	002070	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	246.00	61.35	.20	
	W039207	S020 FTA D 041 0045	002067	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	498.00	61.35	.20	
	W039263	S045 FTA D 041 1034	005061	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	311.00	3.41	.45	
	W039327	S020 FTA D 041 0032	001680	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	448.00	66.89	.20	
	W039328	S020 FTA D 041 0032	001700	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	199.00	66.89	.20	
	W039335	S020 FTA D 041 1081	002187	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	282.00	73.88	.20	
	W045306	S020 FTA D 041 0032	001621	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	267.00	66.89	.20	
	W045307	S020 FTA D 041 0032	001620	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	466.00	66.89	.20	
	W045340	S022 FTA D 041 0046	002077	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	347.00	50.06	.22	
	W045341	S022 FTA D 041 0046	002082	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	456.00	50.06	.22	
	W045342	S020 FTA D 041 0046	002105	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	396.00	60.61	.20	
	W045343	S022 FTA D 041 0046	002081	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	500.00	50.06	.22	
	W045400	S020 FTA D 041 1116	002245	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	483.00	69.10	.20	
	W045459	S022 FTA D 041 0046	002111	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	247.00	50.06	.22	
	W045464	S020 FTA D 041 0046	002109	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	220.00	60.61	.20	
	W049270	S020 FTA D 041 0037	001867	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	464.00	65.54	.20	
	W049272	S020 FTA D 041 0037	001868	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	293.00	65.54	.20	
	W049445	S020 FTA D 041 0037	001857	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	474.00	65.54	.20	
	W049446	S020 FTA D 041 0037	001860	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	490.00	65.54	.20	
	W049447	S020 FTA D 041 0037	001826	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	432.00	65.54	.20	
	W049452	S020 FTA D 041 0037	001873	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	394.00	65.54	.20	
	W049459	S021 FTA D 041 0037	001865	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	320.00	61.90	.21	
	W050170	S021 FTA D 041 0032	001623	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	481.00	68.03	.21	
	W050297	S021 FTA D 041 0032	001622	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	522.00	68.03	.21	
	W050378	S020 FTA D 041 0042	001966	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	507.00	66.64	.20	
	W050379	S020 FTA D 041 0042	001965	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	535.00	66.64	.20	
	W050380	S020 FTA D 041 0042	002005	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	1,017.00	66.64	.20	
	W050412	S020 FTA D 041 0037	001788	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	487.00	65.54	.20	
	W053239	S020 FTA D 041 0037	001795	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	519.00	65.54	.20	

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W053240	S020 FTA D 041 0037	001789	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	398.00	65.54	.20	
	W053242	S020 FTA D 041 0037	001797	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	490.00	65.54	.20	
	W053243	S020 FTA D 041 0037	001840	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	498.00	65.54	.20	
	W053245	S020 FTA D 041 0037	001821	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	618.00	65.54	.20	
	W053246	S020 FTA D 041 0037	001792	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	506.00	65.54	.20	
	W053247	S020 FTA D 041 0037	001831	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	521.00	65.54	.20	
	W053254	S020 FTA D 041 0037	001794	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	498.00	65.54	.20	
	W053255	S020 FTA D 041 0037	001801	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	394.00	65.54	.20	
	W053258	S020 FTA D 041 0037	001793	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	494.00	65.54	.20	
	W053259	S020 FTA D 041 0037	001790	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	496.00	65.54	.20	
	W054224	S034 FTA D 041 0045	001722	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	398.00	9.16	.34	
	W054267	S020 FTA D 041 0042	002006	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	809.00	66.64	.20	
	W054268	S022 FTA D 041 0042	001976	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	480.00	58.32	.22	
	W054269	S047 FTA D 041 0045	001688	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	249.00	7.47	.47	
	W054276	S047 FTA D 041 0045	001686	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	624.00	7.47	.47	
	W054277	S047 FTA D 041 0045	001687	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	269.00	7.47	.47	
	W054278	S038 FTA D 041 0045	001716	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	274.00	6.42	.38	
	W054281	S022 FTA D 041 0042	001975	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	488.00	58.32	.22	
	W054282	S038 FTA D 041 0045	001719	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	400.00	6.42	.38	
	W054283	S038 FTA D 041 0045	001715	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	367.00	6.42	.38	
	W054284	S038 FTA D 041 0045	001718	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	411.00	6.42	.38	
	W056505	S021 FTA D 041 0037	001864	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	377.00	61.90	.21	
	W056572	S020 FTA D 041 1093	002212	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	510.00	72.24	.20	
	W056576	S020 FTA D 041 1095	002238	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	470.00	72.96	.20	
	W056577	S046 FTA D 041 1117	005932	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	253.00	8.53	.46	
	W056579	S020 FTA D 041 1095	002239	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	463.00	72.96	.20	
	W056583	S020 FTA D 041 1093	002213	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	301.00	72.24	.20	
	W056584	S020 FTA D 041 0032	001696	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	493.00	66.89	.20	
	W056586	S020 FTA D 041 0032	001635	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	463.00	66.89	.20	
	W056587	S020 FTA D 041 0032	001634	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	470.00	66.89	.20	
	W056588	S020 FTA D 041 0046	002078	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	367.00	60.61	.20	
	W056591	S020 FTA D 041 0046	002106	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	282.00	60.61	.20	
	W056592	S021 FTA D 041 0032	001705	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	471.00	68.03	.21	
	W056593	S021 FTA D 041 0032	001704	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	452.00	68.03	.21	
	W056594	S020 FTA D 041 0032	001701	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	488.00	66.89	.20	

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W056595	S020 FTA D 041 0032	001619	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	474.00	66.89	.20	
	W056602	S019 FTA D 041 1092	002194	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	523.00	74.50	.19	
	W056604	S020 FTA D 041 1093	002210	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	476.00	72.24	.20	
	W056605	S020 FTA D 041 1094	002218	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	435.00	71.65	.20	
	W056606	S046 FTA D 041 1117	005921	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	248.00	8.53	.46	
	W056607	S020 FTA D 041 1094	002220	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	368.00	71.65	.20	
	W056608	S020 FTA D 041 0040	001946	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	464.00	65.73	.20	
	W056609	S020 FTA D 041 0040	001929	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	382.00	65.73	.20	
	W056610	S021 FTA D 041 0040	001937	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	470.00	55.60	.21	
	W056611	S020 FTA D 041 0040	001931	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	352.00	65.73	.20	
	W056708	S020 FTA D 041 0037	001849	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	459.00	65.54	.20	
	W056709	S020 FTA D 041 0037	001858	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	465.00	65.54	.20	
	W056710	S020 FTA D 041 0037	001796	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	315.00	65.54	.20	
	W056724	S020 FTA D 041 0032	001625	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	463.00	66.89	.20	
	W056725	S020 FTA D 041 0032	001617	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	463.00	66.89	.20	
	W056726	S020 FTA D 041 0032	001624	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	465.00	66.89	.20	
	W056727	S020 FTA D 041 0032	001677	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	464.00	66.89	.20	
	W056745	S021 FTA D 041 1047	002149	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	475.00	68.80	.21	
	W056746	S020 FTA D 041 1045	002127	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	215.00	72.74	.20	
	W056747	S020 FTA D 041 1046	002146	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	431.00	70.80	.20	
	W056796	S020 FTA D 041 0032	001707	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	465.00	66.89	.20	
	W056797	S022 FTA D 041 0032	001682	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	541.00	63.38	.22	
	W056798	S020 FTA D 041 0032	001616	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	385.00	66.89	.20	
	W056898	S020 FTA D 041 0042	002040	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	462.00	66.64	.20	
	W056899	S020 FTA D 041 0042	002047	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	377.00	66.64	.20	
	W056906	S020 FTA D 041 0037	001876	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	510.00	65.54	.20	
	W056909	S020 FTA D 041 0037	001823	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	467.00	65.54	.20	
	W056910	S020 FTA D 041 0037	001824	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	301.00	65.54	.20	
	W056911	S020 FTA D 041 0037	001825	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	350.00	65.54	.20	
	W056933	S021 FTA D 041 1047	002147	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	465.00	68.80	.21	
	W057003	S021 FTA D 041 0037	001863	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	420.00	61.90	.21	
	W057196	S022 FTA D 041 0042	001973	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	489.00	58.32	.22	
	W057197	S020 FTA D 041 0042	001957	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	477.00	66.64	.20	
	W057198	S020 FTA D 041 0042	001961	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	432.00	66.64	.20	
	W057199	S020 FTA D 041 0042	001955	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	486.00	66.64	.20	

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W057202	S022 FTA D 041 0032	001685	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	428.00	63.38	.22	
	W057208	S020 FTA D 041 0042	001968	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	496.00	66.64	.20	
	W057209	S020 FTA D 041 0042	001969	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	328.00	66.64	.20	
	W057210	S020 FTA D 041 0042	002046	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	459.00	66.64	.20	
	W057211	S021 FTA D 041 0042	001962	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	443.00	67.45	.21	
	W057213	S020 FTA D 041 0042	001956	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	446.00	66.64	.20	
	W057214	S020 FTA D 041 0045	002069	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	440.00	61.35	.20	
	W057220	S021 FTA D 041 0032	001706	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	423.00	68.03	.21	
	W057224	S020 FTA D 041 0037	001875	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	416.00	65.54	.20	
	W057225	S020 FTA D 041 0037	001832	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	379.00	65.54	.20	
	W057226	S020 FTA D 041 0037	001827	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	459.00	65.54	.20	
	W057227	S020 FTA D 041 0037	001874	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	458.00	65.54	.20	
	W057269	S031 FTA D 041 1109	005684	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	216.00	30.04	.31	
	W057275	S020 FTA D 041 1045	002130	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	447.00	72.74	.20	
	W057276	S021 FTA D 041 1047	002160	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	422.00	68.80	.21	
	W057277	S020 FTA D 041 1046	002133	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	324.00	70.80	.20	
	W057278	S020 FTA D 041 1045	002104	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	427.00	72.74	.20	
	W057292	S019 FTA D 041 1092	002191	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	460.00	74.50	.19	
	W057293	S019 FTA D 041 1092	002199	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	473.00	74.50	.19	
	W057295	S046 FTA D 041 1117	005931	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	240.00	8.53	.46	
	W057296	S038 FTA D 041 0045	001717	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	310.00	6.42	.38	
	W057297	S034 FTA D 041 0045	001720	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	353.00	9.16	.34	
	W057298	S020 FTA D 041 0045	002065	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	231.00	61.35	.20	
	W057299	S020 FTA D 041 0040	001924	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	367.00	65.73	.20	
	W057300	S020 FTA D 041 0040	001935	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	406.00	65.73	.20	
	W057301	S021 FTA D 041 0040	001936	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	470.00	55.60	.21	
	W057302	S020 FTA D 041 0040	001907	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	488.00	65.73	.20	
	W057303	S021 FTA D 041 0040	001903	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	464.00	55.60	.21	
	W057304	S020 FTA D 041 0040	001902	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	496.00	65.73	.20	
	W057305	S020 FTA D 041 0040	001945	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	471.00	65.73	.20	
	W057306	S021 FTA D 041 0040	001938	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	481.00	55.60	.21	
	W057307	S020 FTA D 041 0045	002066	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	256.00	61.35	.20	
	W057308	S034 FTA D 041 0045	001721	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	336.00	9.16	.34	
	W057312	S047 FTA D 041 0045	001682	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	167.00	7.47	.47	
	W057313	S047 FTA D 041 0045	001683	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	258.00	7.47	.47	

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W057339	S020 FTA D 041 1093	002208	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	453.00	72.24	.20	
	W057341	S046 FTA D 041 1117	005920	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	190.00	8.53	.46	
	W057343	S020 FTA D 041 1094	002217	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	424.00	71.65	.20	
	W057344	S020 FTA D 041 1093	002211	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	455.00	72.24	.20	
	W057345	S020 FTA D 041 1094	002214	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	424.00	71.65	.20	
	W057346	S019 FTA D 041 1092	002192	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	525.00	74.50	.19	
	W057347	S020 FTA D 041 1093	002209	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	290.00	72.24	.20	
	W057352	S020 FTA D 041 1094	002215	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	321.00	71.65	.20	
	W057353	S019 FTA D 041 1092	002193	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	488.00	74.50	.19	
	W057354	S028 FTA D 041 1096	002203	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	237.00	39.36	.28	
	W057355	S046 FTA D 041 1117	005933	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	159.00	8.53	.46	
	W057363	S020 FTA D 041 0042	002034	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	510.00	66.64	.20	
	W057364	S020 FTA D 041 0042	002025	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	494.00	66.64	.20	
	W057365	S020 FTA D 041 0042	002026	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	315.00	66.64	.20	
	W057366	S021 FTA D 041 0042	001964	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	421.00	67.45	.21	
	W057383	S020 FTA D 041 0037	001859	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	465.00	65.54	.20	
	W057435	S020 FTA D 041 0032	001708	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	396.00	66.89	.20	
	W057436	S020 FTA D 041 0032	001679	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	466.00	66.89	.20	
	W057438	S022 FTA D 041 0032	001681	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	466.00	63.38	.22	
	W057449	S020 FTA D 041 0032	001702	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	468.00	66.89	.20	
	W057450	S021 FTA D 041 0032	001703	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	385.00	68.03	.21	
	W057453	S021 FTA D 041 0032	001618	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	430.00	68.03	.21	
	W057455	S022 FTA D 041 0032	001684	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	406.00	63.38	.22	
	W057456	S021 FTA D 041 0040	001901	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	475.00	55.60	.21	
	W057457	S020 FTA D 041 0040	001942	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	458.00	65.73	.20	
	W057458	S020 FTA D 041 0040	001941	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	385.00	65.73	.20	
	W057466	S020 FTA D 041 0032	001694	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	441.00	66.89	.20	
	W057471	S020 FTA D 041 0040	001900	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	461.00	65.73	.20	
	W057607	S020 FTA D 041 0046	002121	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	439.00	60.61	.20	
	W057611	S020 FTA D 041 0046	002122	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	203.00	60.61	.20	
	W057612	S020 FTA D 041 0046	002094	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	387.00	60.61	.20	
	W057613	S020 FTA D 041 0046	002096	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	437.00	60.61	.20	
	W057614	S020 FTA D 041 0046	002095	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	444.00	60.61	.20	
	W057627	S020 FTA D 041 0032	001698	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	476.00	66.89	.20	
	W057628	S020 FTA D 041 0032	001699	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	473.00	66.89	.20	

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W057631	S020 FTA D 041 0032	001695	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	372.00	66.89	.20	
	W057635	S020 FTA D 041 1046	002132	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	340.00	70.80	.20	
	W057638	S020 FTA D 041 1045	002131	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	277.00	72.74	.20	
	W057655	S020 FTA D 041 0042	001958	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	450.00	66.64	.20	
	W057656	S020 FTA D 041 0042	001959	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	488.00	66.64	.20	
	W057657	S020 FTA D 041 0042	001960	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	496.00	66.64	.20	
	W057658	S022 FTA D 041 0042	001972	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	252.00	58.32	.22	
	W057943	S020 FTA D 041 0046	002113	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	441.00	60.61	.20	
	W057944	S020 FTA D 041 0046	002093	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	409.00	60.61	.20	
	W057945	S020 FTA D 041 0046	002083	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	454.00	60.61	.20	
	W057946	S020 FTA D 041 0046	002112	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	369.00	60.61	.20	
	W057951	S020 FTA D 041 0046	002108	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	368.00	60.61	.20	
	W057952	S020 FTA D 041 0046	002084	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	160.00	60.61	.20	
	W057953	S020 FTA D 041 0046	002110	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	520.00	60.61	.20	
	W057971	S020 FTA D 041 1052	002176	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	482.00	75.46	.20	
	W057972	S020 FTA D 041 1045	002129	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	450.00	72.74	.20	
	W057973	S020 FTA D 041 1046	002145	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	439.00	70.80	.20	
	W057974	S020 FTA D 041 1046	002144	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	509.00	70.80	.20	
	W057979	S020 FTA D 041 1052	002169	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	326.00	75.46	.20	
	W057981	S020 FTA D 041 1050	002167	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	351.00	75.04	.20	
	W057982	S021 FTA D 041 1047	002148	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	418.00	68.80	.21	
	W058264	S020 FTA D 041 0040	001927	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	311.00	65.73	.20	
	W058265	S020 FTA D 041 0040	001926	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	424.00	65.73	.20	
	W058266	S020 FTA D 041 0040	001930	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	478.00	65.73	.20	
	W058267	S020 FTA D 041 0040	001928	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	417.00	65.73	.20	
	W058276	S020 FTA D 041 0042	001999	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	440.00	66.64	.20	
	W058277	S020 FTA D 041 0042	002032	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	450.00	66.64	.20	
	W058278	S020 FTA D 041 0042	002041	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	461.00	66.64	.20	
	W058279	S020 FTA D 041 0042	002015	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	478.00	66.64	.20	
	W058280	S020 FTA D 041 0045	002063	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	420.00	61.35	.20	
	W058281	S020 FTA D 041 0045	002064	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	228.00	61.35	.20	
	W058283	S034 FTA D 041 0045	001723	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	416.00	9.16	.34	
	W058291	S045 FTA D 041 1034	005060	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	138.00	3.41	.45	
	W058292	S020 FTA D 041 0042	002024	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	407.00	66.64	.20	
	W058293	S020 FTA D 041 0042	002017	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	408.00	66.64	.20	

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W058294	S020 FTA D 041 0042	002016	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	465.00	66.64	.20	
	W058295	S020 FTA D 041 1094	002219	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	327.00	71.65	.20	
	W058297	S021 FTA D 041 0040	001905	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	484.00	55.60	.21	
	W058298	S020 FTA D 041 0040	001909	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	491.00	65.73	.20	
	W058304	S020 FTA D 041 1081	002186	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	439.00	73.88	.20	
	W058306	S043 FTA D 041 1043	005332	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	217.00	4.18	.43	
	W058311	S020 FTA D 041 0042	001970	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	233.00	66.64	.20	
	W058312	S020 FTA D 041 0042	001967	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	461.00	66.64	.20	
	W058313	S020 FTA D 041 0042	002014	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	487.00	66.64	.20	
	W058316	S020 FTA D 041 1052	002171	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	460.00	75.46	.20	
	W058317	S020 FTA D 041 1052	002173	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	396.00	75.46	.20	
	W058318	S020 FTA D 041 1052	002175	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	469.00	75.46	.20	
	W058324	S020 FTA D 041 0042	001997	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	134.00	66.64	.20	
	W058325	S020 FTA D 041 0042	001998	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	159.00	66.64	.20	
	W058326	S022 FTA D 041 0042	001978	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	482.00	58.32	.22	
	W058327	S022 FTA D 041 0042	001977	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	515.00	58.32	.22	
	W058370	S020 FTA D 041 0032	001636	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	454.00	66.89	.20	
	W058371	S020 FTA D 041 0032	001637	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	463.00	66.89	.20	
	W058555	S055 FTA D 041 0035	000210	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	214.00	38.30	.55	
	W058559	S043 FTA D 041 1043	005331	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	311.00	4.18	.43	
	W058921	S020 FTA D 041 1052	002174	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	368.00	75.46	.20	
	W058922	S021 FTA D 041 1047	002150	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	265.00	68.80	.21	
	W058923	S021 FTA D 041 1047	002161	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	382.00	68.80	.21	
	W058924	S020 FTA D 041 1045	002128	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	444.00	72.74	.20	
	W058934	S020 FTA D 041 0046	002080	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	435.00	60.61	.20	
	W058935	S020 FTA D 041 0046	002107	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	380.00	60.61	.20	
	W058936	S020 FTA D 041 0046	002079	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	412.00	60.61	.20	
	W058942	S022 FTA D 041 0032	001683	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	512.00	63.38	.22	
	W058951	S020 FTA D 041 0032	001693	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	463.00	66.89	.20	
	W058954	S020 FTA D 041 1116	002241	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	457.00	69.10	.20	
	W058955	S020 FTA D 041 1116	002240	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	456.00	69.10	.20	
	W058960	S021 FTA D 041 0040	001906	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	433.00	55.60	.21	
	W058964	S020 FTA D 041 0040	001908	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	453.00	65.73	.20	
	W059541	S020 FTA D 041 0032	001697	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	519.00	66.89	.20	
	W059550	S020 FTA D 041 0037	001848	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	483.00	65.54	.20	

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W059551	S020 FTA D 041 0037	001798	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	360.00	65.54	.20	
	W059552	S020 FTA D 041 0037	001822	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	530.00	65.54	.20	
	W059559	S023 FTA D 041 0035	000285	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	244.00	31.70	.23	
	W059560	S023 FTA D 041 0035	000284	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	276.00	31.70	.23	
	W059624	S021 FTA D 041 0040	001939	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	272.00	55.60	.21	
	W059625	S021 FTA D 041 0040	001940	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	522.00	55.60	.21	
	W059626	S020 FTA D 041 0040	001944	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	432.00	65.73	.20	
	W059627	S020 FTA D 041 0040	001943	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	500.00	65.73	.20	
	W059628	S020 FTA D 041 1081	002185	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	432.00	73.88	.20	
	W059629	S020 FTA D 041 1081	002184	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	452.00	73.88	.20	
	W059630	S022 FTA D 041 0042	001974	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	390.00	58.32	.22	
	W059631	S047 FTA D 041 0045	001684	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	364.00	7.47	.47	
	W059634	S021 FTA D 041 0037	001861	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	473.00	61.90	.21	
	W059635	S021 FTA D 041 0037	001862	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	449.00	61.90	.21	
	W059668	S021 FTA D 041 0040	001904	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	477.00	55.60	.21	
	W059669	S020 FTA D 041 0040	001892	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	488.00	65.73	.20	
	W059670	S020 FTA D 041 0040	001925	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	356.00	65.73	.20	
	W059671	S020 FTA D 041 0040	001910	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	461.00	65.73	.20	
	W059675	S020 FTA D 041 0045	002068	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	485.00	61.35	.20	
	W060378	S020 FTA D 041 1052	002172	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	458.00	75.46	.20	
	W060379	S020 FTA D 041 1050	002166	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	448.00	75.04	.20	
	W060380	S020 FTA D 041 1052	002170	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	499.00	75.46	.20	
	W060381	S020 FTA D 041 1050	002168	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	455.00	75.04	.20	
	W060822	S022 FTA D 041 0042	001971	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	500.00	58.32	.22	
	W060836	S023 FTA D 041 0035	000282	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	337.00	31.70	.23	
	W060840	S023 FTA D 041 0035	000283	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	292.00	31.70	.23	
	W062087	S020 FTA D 041 0037	001866	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	477.00	65.54	.20	
	W062099	S020 FTA D 041 0037	001799	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	486.00	65.54	.20	
	W062100	S020 FTA D 041 0037	001791	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	485.00	65.54	.20	
	W062101	S020 FTA D 041 0037	001802	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	533.00	65.54	.20	
	W062113	S020 FTA D 041 0037	001800	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	479.00	65.54	.20	
	W062810	X888 FTA 0 041 S303	000001	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	32.00	39.36	1.10	
	W065928	X500 FTA 0 041 0318	000001	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	103.00	36.20	.94	
	W076095	S034 FTA D 041 0045	001739	SLUDGES, OILY, FOR OXIDATION, HIGH FREE	204.00	9.16	.34	
	W500441	S050 FTA D 041 6391	000005	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	288.00	5.00	.50	

MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
	W500442	S050 FTA D 041 6391	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	371.00	5.00	.50	
	W500443	S050 FTA D 041 6391	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	239.00	5.00	.50	
	W500444	S050 FTA D 041 6391	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	245.00	5.00	.50	
	W500445	S045 FTA D 041 5159	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	271.00	74.57	.45	
	W500446	S045 FTA D 041 5159	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	452.00	74.57	.45	
	W500447	S045 FTA D 041 5159	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	449.00	74.57	.45	
	W500448	X948 FTA D 041 S303	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	295.00	.01	.50	
	W500449	S056 FTA D 041 6389	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	253.00	6.77	.55	
	W500450	S056 FTA D 041 6389	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	346.00	6.77	.55	
	W500451	S056 FTA D 041 6389	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	218.00	6.77	.55	
	W500452	S056 FTA D 041 6389	000004	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	162.00	6.77	.55	
	W500453	S049 FTA D 041 6652	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	109.00	27.24	.48	
	W500454	S070 FTA D 041 6530	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	171.00	41.00	.67	
	W500455	S049 FTA D 041 6652	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	155.00	27.24	.48	
	W500456	S070 FTA D 041 6530	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	337.00	41.00	.67	
	W500496	S062 FTA D 041 6391	000006	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	304.00	.41	.39	
	W500497	S062 FTA D 041 6391	000004	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	269.00	.41	.39	
	W500498	S062 FTA D 041 6391	000008	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	4.00	.41	.39	
	W500499	S062 FTA D 041 6391	000007	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	184.00	.41	.39	
	W500500	S059 FTA D 041 6651	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	125.00	11.73	.59	
	W500501	X948 FTA D 041 S303	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	261.00	.01	.50	
	W500502	S059 FTA D 041 6651	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	245.00	11.73	.59	
	W500503	S059 FTA D 041 6651	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	127.00	11.73	.59	
	W500504	S056 FTA D 041 6389	000007	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	8.00	6.77	.55	
	W500505	S056 FTA D 041 6389	000006	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	219.00	6.77	.55	
	W500506	S056 FTA D 041 6389	000005	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	346.00	6.77	.55	
	W500507	S054 FTA D 041 5158	000001	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	460.00	73.60	.41	
	W500508	S054 FTA D 041 5158	000002	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	435.00	73.60	.41	
	W500509	S054 FTA D 041 5158	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	301.00	73.60	.41	
	W500510	S054 FTA D 041 5158	000004	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	301.00	73.60	.41	
	W500514	S049 FTA D 041 6652	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	4.00	27.24	.48	
	W500515	S045 FTA D 041 5159	000004	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	4.00	74.57	.45	
	W500516	S054 FTA D 041 5158	000005	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	30.00	73.60	.41	
	W500517	S059 FTA D 041 6651	000004	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	6.00	11.73	.59	
	W500518	S070 FTA D 041 6530	000003	OILY SLUDGE FOR OXIDATION, HIGH FREE ME	4.00	41.00	.67	

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MEF #	Inv #	Lot Code ID #	Drum #	Inventory Description	Net Weight	Uranium	Uranium 235	EPA Codes
Total number of drums per MEF =: 314								
60450	W503704	R050 776 P 050 0333	000002	CRUCIBLE COATING POWDERS	137.00	.01	.50	D007
Total number of drums per MEF =: 1								

APPENDIX F

TREATABILITY STUDY REPORT FOR THE STABILIZATION OF FERMCO MIXED WASTE

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TREATABILITY STUDY REPORT FOR THE STABILIZATION OF FERMCO MIXED WASTE

FERMCO

COPY 1 OF 3

NFS-SP-WST-005, Rev. 0

August 9, 1995

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000323

TREATABILITY STUDY REPORT FOR THE STABILIZATION OF FERMCO MIXED WASTE

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TREATABILITY STUDY REPORT FOR THE STABILIZATION OF FERMCO MIXED WASTE

1.0 SUMMARY

This report documents the treatability studies performed by Nuclear Fuel Services, Inc. (NFS), Erwin, Tennessee on samples of Fernald Environmental Management Project (FEMP) mixed wastes. These studies were performed in accordance with NFS-SP-WST-001, Rev. 1, Treatability Study Work Plan For The Stabilization Of Mixed Waste on the following FERMCO waste types:

- Grit Blast - Sand blasting residue contaminated with lead based paint chips.
- FMPC Furnace Salts - Slightly above limits for inorganic metals.
- Sump Cakes - Slightly above limits for inorganic metals.
- Construction Rubble - Slightly above limits for inorganic metals.
- Miscellaneous Trash - Slightly above limits for inorganic metals.

The objective of the treatability studies was to establish treatment methods to stabilize the hazardous constituents of the waste such that the solidified product complies with the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1) for the burial of Low Level Radioactive Waste (LLRW).

The waste is contaminated with uranium and one or more hazardous constituents identified by Environmental Protection Agency (EPA) codes D004-D011. Subpart D of 40 CFR Part 268 does not specify a required treatment technology for these waste types. A review of existing technologies for treatment of these waste types indicates that solidification is the treatment of choice for stabilization of these waste types.

The treatability samples were received at NFS, taken to the work area and were processed by qualified personnel under the conditions and requirements as described in the approved work plan, NFS-SP-WST-001, Revision 1, *Treatability Study Work Plan For The Stabilization Of Mixed Waste.*

After the samples arrived in the Research and Development (R&D) Laboratory, the waste material was visually inspected and a grab sample for performing a TCLP metals analysis was collected from each FERMCO supplied sample. Results indicated that none of the samples exceeded the TCLP limits for land disposal as identified in 40 CFR Part 268. Records from previous sampling of the waste at the FEMP indicated that some of the waste contains sufficient moisture to fail the paint filter liquid test (PFLT) and that some of the waste fails TCLP analysis for RCRA hazardous metals.

Based on the visual inspection, information supplied by FERMCO, results of the TCLP analyses, and other information, the NFS R&D Project Engineer determined the specific treatment conditions for each waste as outlined in Appendix A of the work plan referenced above. A Stabilization Test Plan Specifications Sheet was completed for each material type tested. The Stabilization Test Plan Specifications Sheet provided guidance to NFS R&D personnel who preformed the tests.

Treatability scoping tests with each waste stream was conducted according to NFS-SP-WST-001, Revision 1. Samples of grit blast, furnace salts, construction rubble and miscellaneous trash were screened through a 3/8-inch opening sieve with the greater than 3/8 inch fraction size reduced to less than 3/8 inch using physical means. Rocks or other hard materials which could not be easily size reduced were rejected. Once size reduction was completed, these samples were blended and aliquots from each waste type were collected for solidification testing. Sump cake could not be screened or blended due to high moisture content.

The solidification process consisted of slurrying the waste aliquot with water for approximately five minutes with a mechanical mixer. A solidification agent such as Portland Type I cement was then added and mixed for an additional five minutes. Sufficient water was added to the mixture to allow the mix to be pourable. The mixture was poured into two-inch plastic cube molds and allowed to set for approximately seven days. Samples from each mix were analyzed for the following:

- Density (g/cc),
- TCLP metals (according to SW-846 Method 1311), and
- Structural integrity according to the modified ASTM C-39 using manual crush strength determinations.

Based on the results of the scoping tests and on recommendations from FERMCO, proof of concept tests were conducted. Samples from the proof test mixes were analyzed to determine compliance to the Waste Acceptance Criteria (WAC).

Data generated from sample analyses of the samples generated from testing indicate that stabilization of these waste types by solidification results in a waste form that complies with the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1) for disposal as LLRW.

2.0 INTRODUCTION

Approximately 8000 drums of legacy mixed waste are stored at the Fernald Environmental Management Project (FEMP). The Mixed Waste Mobile Stabilization project was developed to support a goal to treat and ship approximately 2000 of the drums with EPA waste codes D004 to D011 for off-site disposal. Stabilization of the hazardous constituents by solidification methods such that the solidified waste passes TCLP analysis criteria will permit disposal as Low Level Radioactive Waste (LLRW). Disposal of radioactive waste at the Nevada test site requires that a waste comply with the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1). This criteria

requires that the treated waste pass TCLP analysis prior to disposal. The objective of these studies was to establish treatment methods to stabilize the hazardous constituents of the waste such that the waste meets this proof of principle.

3.0 CONCLUSIONS

Based on results and observations made during bench-scale testing, following are conclusions for each waste stream tested:

3.1 Grit Blast

- The treatability sample received from FERMCO was non-RCRA hazardous for metals.
- The treatability sample consisted of approximately 99% soil and rocks and approximately 1% grit blast and paint chips.
- The seven day crush strength drops from 1179 psi to 284 psi as the waste to binder ratio increases from 0.7 to 0.8.
- The percent volume increase drops from 18.2% to 9.2% as the waste to binder ratio increases from 0.7 to 0.8.
- The stabilization process was effective in reducing soluble lead.
- The solidified product with a waste to binder ratio of 0.8 met all of the requirements of the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1).

3.2 Furnace Salts

- The treatability sample received from FERMCO was non-RCRA hazardous for metals.
- Ammonia evolved when the pH of the waste slurry was raised to approximately 12.
- The seven day crush strength drops from 1158 psi to 350 psi as the waste to binder ratio increases from 0.3 to 0.4.
- The percent volume increase drops from 128% to 113.7% as the waste to binder ratio increases from 0.3 to 0.4.
- A solidification mix of 0.3 waste to binder ratio that was pretreated with ferrous sulfate and sodium sulfide failed to cure to a hard cube.

- The solidified product with a waste to binder ratio of 0.3 met all of the requirements of the NTS Waste Acceptance Criteria (NVO-325, Revision 1).

3.3 Miscellaneous Trash

- The treatability sample received from FERMCO was non-RCRA hazardous for metals.
- The seven day crush strength drops from 632 psi to 136 psi as the waste to binder ratio increases from 0.54 to 0.7.
- The percent volume increase drops from 42.2% to 10.0% as the waste to binder ratio increases from 0.54 to 0.7.
- Ammonia evolved when the pH of the waste slurry was raised to approximately 12.
- Fibrous materials were present in the waste which may affect mixing of the full scale batches for treatment.
- The stabilization process was effective in reducing soluble lead and chromium.
- A solidification mix of 0.6 waste to binder ratio that was pretreated with ferrous sulfate and sodium sulfide produced cured cubes with significantly lower strength than a mix of 0.54 waste to binder ratio that was not pretreated.
- The solidified product with a waste to binder ratio of 0.6 met all of the requirements of the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1).

3.4 Sump Cake

- The treatability sample received from FERMCO was non-RCRA hazardous for metals.
- The seven-day crush strength drops from 462 psi to 86 psi as the waste to binder ratio increases from 0.7 to 0.8.
- The percent volume increase drops from 55.3% to 35.9% as the waste to binder ratio increases from 0.7 to 0.8.
- Ammonia evolved when the pH of the waste slurry was raised to approximately 12.

- The sump cake contains a high moisture content. Size reduced material recombined to make a solid putty-like mass due to moisture content.

- The stabilization process was effective in reducing soluble lead, arsenic, selenium, and chromium.

- A solidification mix of 0.6 waste to binder ratio that was pretreated with ferrous sulfate and sodium sulfide produced cured cubes with significantly lower strength than a mix of 0.6 waste to binder ratio that was not pretreated.

- The solidified product with a waste to binder ratio of 0.7 met all of the requirements of the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1).

3.5 Construction Rubble

- The treatability sample received from FERMCO was non-RCRA hazardous for metals.

- The seven-day crush strength drops from 466 psi to 72 psi as the waste to binder ratio increases from 0.6 to 0.7.

- The percent volume increase drops from 25% to 7.2% as the waste to binder ratio increases from 0.6 to 0.7.

- A four hour soak at pH 12 eliminated expansion of the mix during the set time.

- Ammonia is evolved when the pH of the waste slurry is raised to approximately 12.

- The stabilization process was effective in reducing soluble lead, arsenic, and cadmium.

- A solidification mix of 0.5 waste to binder ratio that was pretreated with ferrous sulfate and sodium sulfide produced cured cubes with significantly lower strength than a mix of 0.5 waste to binder ratio that was not pretreated.

- The solidified product met all of the requirements of the Nevada Test Site Waste Acceptance Criteria (NVO-325, Revision 1).

4.0 RECOMMENDATIONS

Based on results and observations made during bench scale testing, the following are recommendations for each waste stream tested:

4.1 Grit Blast

- Portland Type I cement should be used as the binder for full scale work.
- The total percent moisture of the mix should be approximately 25 percent by weight for a pourable mixture.
- Pretreatment of the slurry such as reaction with sodium sulfide is not required.
- A waste to binder ratio of 0.7-0.8 is recommended for full scale work.
- Size reduction is not necessary unless required by mixing equipment.
- The waste should be slurried with the appropriate amount of water prior to addition of the binder.

4.2 Furnace Salts

- Portland Type I cement should be used as the binder for full scale work.
- Size reduction will be required. A crusher capable of crushing to less than 3/8 inch is recommended.
- The total moisture content of the mix should be approximately 25 percent by weight for a pourable mixture.
- Pretreatment of the slurry such as reaction with sulfide is not required.
- A waste to binder ratio of approximately 0.3 is recommended for full scale work if waste is treated separately.
- The waste should be slurried with the appropriate amount of water prior to addition of the binder.

4.3 Miscellaneous Trash

- Portland Type I cement should be used as the binder for full scale work.
- Size reduction is required. A size reduction unit capable of cutting the material into approximately 2- or 3-inch pieces maximum is recommended.
- The waste should be slurried with the appropriate amount of water prior to addition of the binder.

- A reversible mixer blade may reduce the amount of waste which is likely to become wrapped around the mixer blade. Frequent cleaning of the mixer blade is expected during full scale operations which will reduce processing efficiency.

- The total moisture content of the mix should be approximately 33 percent by weight for a pourable mixture.

- A waste to binder ratio of approximately 0.6 is recommended for full scale work.

4.4 Sump Cake

- Portland Type I cement should be used as the binder for full scale work.

- The total moisture content of the mix should be approximately 29 percent by weight for a pourable mixture.

- Size reduction will not be necessary since the material is damp and tends to form a solid putty-like mass after size reduction.

- The waste should be slurried with the appropriate amount of water prior to addition of the binder.

- A waste to binder ratio of approximately 0.7 is recommended for full scale work.

4.5 Construction Rubble

- Portland Type I cement should be used as the binder for full scale work.

- The total moisture content of the mix should be approximately 25 percent by weight for a pourable mixture.

- A waste to binder ratio of 0.6-0.7 is recommended for full scale work.

- Based upon the sample received at NFS, size reduction would not be required; however, based upon the category description "Construction Rubble" and the belief that the sample received at NFS was probably not representative of the total population, size reduction equipment should be available.

- The waste should be slurried with the appropriate amount of water prior to addition of the binder.

- Pretreatment to pH 12 for 4 hours with NaOH will be required to eliminate expansion of the solidified product.

4.6 General

- Waste streams with high barium content should be mixed with aluminum sulfate or other sulfate source prior to the addition of binder.

- Waste streams with high chromium content should be pretreated with ferrous sulfate at pH 2 prior to addition of binder.

5.0 DISCUSSION OF RESULTS

The data generated from solidification testing of all waste types is discussed in the following paragraphs. The solidification testing was performed in the NFS R&D Laboratory at ambient temperatures (approximately 21 degrees centigrade). No testing was performed to determine the effects of temperature on the solidification process.

5.1 Grit Blast

The data generated from the tests performed on grit blast material is listed in Table I. A graphic illustration of waste loading vs. percent volume increase and strength is shown in Table VI. The data indicate that compliance with the NTS WAC for LLRW can readily be achieved by solidification with Portland Type I cement.

Because of the size of the equipment used in the bench scale tests, the solidification tests were performed on the less than 3/8-inch fraction of the FERMCO supplied waste material. Although not included in the test mixtures, the greater than 3/8-inch materials, mostly rocks, displayed no attributes that would indicate that these materials would be incompatible with Portland Type I cement or would significantly alter the results of the tests obtained with the less than 3/8-inch materials.

5.1.1 Scoping Tests

Tests performed with Portland Type I cement indicated that pretreatment of the grit blast waste would not be required for solidification on a production scale. Mixtures of up to 70% grit blast to cement ratios displayed crush strengths of greater than 500 psi with TCLP analysis results for the D004-D011 EPA code hazardous constituents well within the Land Disposal Restriction limits as stated in 40 CFR Subpart D - Treatment Standards. The results indicate that slurrying the waste in water and adding the specified amount of Portland Type I cement to form a pourable mixture and mixing thoroughly will produce solidified material that complies with NTS WAC.

Test mixtures with Petroset H indicate that it is not suitable for solidification of the FERMCO waste materials. Test results showed no significant improvement in performance in TCLP analyses relative to Portland Type I cement. Strength test results showed a vastly inferior performance compared to Portland Type I cement. Mixes with Petroset H had a much greater volume increase compared to mixes of the same waste to binder ratio using Portland Type I cement. Petroset H was not used for the remainder of the solidification tests.

5.1.2 Proving Test

FERMCO directed that the proving tests be performed using an 80% grit blast to Portland Type I cement ratio. This deviation from the original test plan was requested by FERMCO based upon favorable results using a 70% grit blast to Portland Type I cement ratio obtained in the scoping tests. The test results indicate that the strength of the material decreased to 284 psi using an 80% grit blast to Portland Type I cement ratio with TCLP analysis results for the D004-D011 EPA code hazardous constituents well within the Land Disposal Restriction limits as stated in 40 CFR Subpart D - Treatment Standards. The results indicate that slurrying the waste in water, adding the specified amount Portland Type I cement to form a pourable mixture, and mixing thoroughly will produce solidified material that complies with NTS WAC.

5.1.3 Surrogate Test Using Surrogate Soil Spiked With Cd, Pb, Ba, and Cr

The surrogate test solidification mixture was prepared using a surrogate material as is described in section 6.5.2 of this report. The test results indicate that pretreatment with ferrous sulfate and sodium sulfide has an adverse effect on strength. There was a yellowish/tan layer approximately 1/4-inch thick at the top of the cured cubes which appeared to be of a lower strength than the material in the remainder of the cube. A direct comparison with the scoping test results cannot be made since a surrogate material was used. However, if a crush strength of greater than 500 psi is desired, these results indicate that a much lower waste to binder ratio will be required than is indicated by the non pretreated mixtures used in the scoping tests.

Results from TCLP analysis indicate that the treatment was successful in reducing the soluble barium, chromium, cadmium, and lead to meet LDR. Results from testing are shown in Table I.

5.1.4 Recommendations

Portland Type I cement should be used for the solidification of the grit blast waste. A waste to binder ratio of 70-80% is recommended.

Pretreatment with ferrous sulfate does not appear to be required and is not recommended unless characterization data for a specific drum of waste indicate the presence of chromium. Pretreatment with sodium sulfide does not appear to be required and is not recommended unless characterization data for a specific drum of waste indicates the presence of mercury.

During the preparation of samples for solidification, a particle size distribution of grit blast was determined. The size distribution data is presented in Table I. Although the greater than 3/8-inch material was not included in the solidification mixes, no size reduction of grit blast is recommended during full scale operations.

5.2 Furnace Salts

The results of the data generated from the treatability tests on furnace salts are listed in Table III. A graphic illustration of waste loading vs. percent volume increase and strength is shown in Table VIII. The data indicate that compliance with the NTS WAC for LLRW can be achieved by solidification with Portland Type I cement.

This waste material contains lumps of material which are easily broken up by physical methods. The waste material used in the test mixtures contained both material of less than 3/8 inch and greater than 3/8-inch material that was easily pulverized to less than 3/8 inch.

5.2.1 Scoping Tests

Mixtures prepared with Portland Type I cement with waste to binder ratios of up to 35% displayed crush strengths of greater than 500 psi with TCLP analysis results for the D004-D011 EPA code hazardous constituents well within the Land Disposal Restriction limits as stated in 40 CFR Subpart D - Treatment Standards.

The pH of a waste slurry with water was determined to be approximately 4. In an effort to achieve higher crush strength, slurries of the waste were pretreated with 25% by weight aqueous sodium hydroxide to a measured pH of 12. This pretreatment did not increase the crush strength above 500 psi with mixtures at a waste to cement ratio of greater than 35%. It should be noted that the addition of Portland Type I cement will raise the pH of the mixture to pH 11.5 to pH 12.0 without pretreatment with sodium hydroxide.

A test mix prepared with Aquaset II H gave unsatisfactory results. The test cubes cracked during curing and could not be tested for strength. This test mix also had a high percent volume increase compared to

Portland Type I mixes. No other test mixes with Aquaset II H were attempted during the solidification testing.

5.2.2 Proving Test

The proving test solidification mixture was prepared as described in section 6.5.5 of this report. The test results show that the pretreatment with ferrous sulfate and sodium sulfide reduced the strength of the test cubes. Penetrometer testing at 24 and 48 hours showed no resistance to penetration. When the material was removed from the mold for the performance of a 7-day crush test, the cube was soft and could be deformed with low pressure.

5.2.3 Recommendations

Portland Type I cement should be used for the full scale solidification of furnace salts. To achieve the results on a production scale as were achieved by the treatability tests, size reduction prior to mix preparations will be required. A strengthening effect of the pretreatment of the waste slurry to a pH of 12 was not clearly demonstrated. Therefore, the value of this slurry pretreatment is suspect. The effect on strength of the pretreatment with ferrous sulfate and sodium sulfide was clearly demonstrated. The proving test mix, 30% waste to binder, did not cure to a solid material while a 35% waste to binder mix, not pretreated with ferrous sulfate or sodium sulfide resulted in greater than 500 psi crush strength. Pretreatment with ferrous sulfate or sodium sulfate is not recommended for the materials represented by the sample supplied by FERMCO. Furnace salts for which the characterization documents indicate that pretreatment is required will require solidification using a much lower waste to binder ratio than that used in the proving test.

5.3 Sump Cake

The results of the data generated from the treatability tests on sump cake is listed in Table IV. A graphic illustration of waste loading vs. percent volume increase and strength is shown in Table IX. The data indicate that compliance with the NTS WAC for LLRW can be achieved by solidification with Portland Type I cement.

The sump cake sample supplied by FERMCO had a high moisture content which did not allow sizing or mixing of the material for testing. Portions of the supplied sample were taken from various locations of the container to obtain representative aliquots for testing.

5.3.1 Scoping Tests

Mixtures prepared using Portland Type I cement with waste to cement ratios of up to 60% displayed crush strengths of greater than 500 psi with TCLP analysis results for the D004-D011 EPA code hazardous constituents well within the Land Disposal Restriction limits as stated in 40 CFR Subpart D - Treatment Standards. A mixture with a waste to cement ratio of 70% had a crush strength of slightly less than 500 psi with TCLP analysis results within the limits.

The pH of the waste slurried with water was determined to be in a range of approximately 4 to 7. In an effort to achieve higher crush strength, slurries of the waste were pretreated with 25% by weight aqueous sodium hydroxide to a measured pH of 12. The data does not indicate that pretreatment with sodium hydroxide to pH 12 improved crush strength. Ammonia was noted to be evolved after the pH was raised to approximately 12 but was not measured.

5.3.2 Proving Test

A 60% waste to Portland Type I ratio solidification mix was prepared as described in section 6.5.3 of this report. Ammonia evolved after the adjustment of the slurry to pH 12 and after addition of the Portland Type I cement. The testing results indicate that the pretreatment with ferrous sulfate and sodium sulfide has an adverse effect on strength. The cured cubes had a yellow/tan layer on top that appeared to be of lower strength than the rest of the cube. The crush strength was determined to be significantly less than the scoping test mixes.

5.3.3 Recommendations

Portland Type I cement should be used in the full scale solidification of sump cake. A mix of 70% waste to binder appears to provide sufficient strength. Pretreatment with ferrous sulfate or sodium sulfide is not recommended unless the characterization data for a specific drum of waste indicates that it is necessary. If waste is pretreated with ferrous sulfate or sodium sulfide, a waste to binder ratio lower than that used for the proving test will be required to achieve the desired strength.

5.4 Construction Rubble

The results of the data generated from the treatability testing on construction rubble is listed in Table V. A graphic illustration of waste loading vs. percent volume increase and strength is shown in Table X. The data indicate that compliance with the NTS WAC for LLRW can be achieved by solidification with Portland Type I cement.

The construction rubble sample supplied by FERMCO contained a layer of large (2 to 3 inches square) paint chips that were approximately 25% of the sample by volume and approximately 10% of the sample by weight. The paint chips were included in the test mixes in proportion to their content in the supplied sample. The paint chips were mechanically size reduced for inclusion in the test mixtures.

5.4.1 Scoping Tests

Mixtures prepared with Portland Type I cement of all waste to cement ratios tested achieved TCLP analysis results for the D004-D011 EPA code hazardous constituents well within the Land Disposal Restriction limits as stated in 40 CFR Subpart D - Treatment Standards. A mixture with a waste to cement ratio of 60% had a crush strength of slightly less than 500 psi. Mixtures with waste to cement ratios of less than 60% should achieve a crush strength of greater than 500 psi when the slurry is pretreated to a pH of 12 as described below.

Preliminary test mixtures revealed a tendency to expand during curing causing a decreased strength. A° slurry pretreatment with 25% by weight of aqueous sodium hydroxide with a 4-hour soak eliminated the expansion during curing resulting in a higher strength product. Ammonia was noted to be evolved after the pH was raised to approximately 12 but was not measured.

5.4.2 Proving Test

A 50% waste to Portland Type I mix was prepared as described in section 6.5.4 of this report. Ammonia was evolved after the waste slurry pH was adjusted to 12. Test results show that strength of the cured cubes was significantly lowered by the pretreatment with sodium sulfide.

5.4.3 Recommendations

Portland Type I cement is recommended as the binder for the full scale solidification of construction rubble. A 60-70% waste to binder ratio is recommended. To increase the product strength and minimize waste volume the waste should be slurried with water and the pH raised with NaOH for a 4-hour pretreatment soak time. The use of the sodium sulfide pretreatment is not required for the materials represented by the sample supplied by FERMCO. Pretreatment with sodium sulfide should only be performed when the characterization data for specific units of waste require it. For construction rubble pretreated with sodium sulfide, a lower waste to binder ratio is required to achieve desirable strength. The solidification methods determined for this waste in these tests may be wholly applicable to this waste-type only

to the degree that the sample supplied by FERMCO is representative of this waste type.

5.5 Miscellaneous Trash

The data generated from testing performed on miscellaneous trash material is listed in Table II. A graphic illustration of waste loading vs. % volume increase and strength is shown in Table VII. The data indicate that compliance with the NTS WAC for LLRW can be achieved by solidification with Portland Type I cement.

The miscellaneous trash sample supplied by FERMCO contained approximately 50% fine material and 50% trash material (paper, plastic, and a yarn-like material). The large materials were size reduced for testing using large shears. The sized reduced material was included in the test mixtures in the approximate proportion that was present in the FERMCO supplied sample.

5.5.1 Scoping Tests

Mixtures of up to approximately 60% waste to cement ratios displayed crush strengths of greater than 500 psi with TCLP analysis results for the D004-D011 EPA code hazardous constituents well within the Land Disposal Restriction limits as stated in 40 CFR Subpart D - Treatment Standards. Although size reduced, the trash materials tended to gather on the mixer paddle and jam the mixer. Ammonia evolved after the pH was raised to approximately 12 but was not measured.

5.5.2 Proving Test

A mixture of 60% waste to Portland Type I cement was prepared as described in section 6.5.7 of this report. The test results indicate that pretreatment with ferrous sulfate and sodium sulfide significantly reduced the strength of the cured cubes. The cured cubes had a layer on the top which had a higher strength than the material in the remainder of the cube. Comparison of penetrometer readings to crush strength indicates that the material on the top of the cube is considerably stronger than the underlying material which is why the penetrometer readings are higher than the crush strength.

5.5.3 Recommendations

Portland Type I cement should be used for the full scale solidification of the miscellaneous trash waste. The scoping tests indicate that a 60% waste to binder ratio will produce a mix that will comply with the NTS WAC. Size reduction of the large trash components of the waste to approximately 2-3 in pieces is recommended. The data indicate that pretreatment with ferrous sulfate and sodium sulfide is not required for

the waste represented by the FERMCO supplied sample. Pretreatment of this waste with ferrous sulfate and sodium sulfide is not recommended unless the characterization data for a specific drum of waste indicate that it is required.

6.0 TEST PROCEDURES

6.1 Preparation of Waste Samples for Solidification

6.1.1 Grit Blast

The waste sample material was mixed by rolling the container on the floor and a TCLP Metals sample was collected. The waste material was sized by screening with a 3/8-inch sieve. The greater than 3/8-inch material was mostly large and small rocks. The greater than 3/8-inch material was not included in the solidification sample due to incompatibility with the 2-inch square sample solidification molds. The less than 3/8 inch material was mixed and placed in 1/2-gallon plastic bottles. The waste material used in the solidification mixes was taken from the 1/2-gallon bottles.

Particle size distribution was determined for grit blast. The size distribution was performed by passing the material through a series of sieves, the finest used being 50 mesh (US standard). The data from this determination is presented in Table I.

6.1.2 Furnace Salts

The waste sample material was blended and a TCLP metals sample was collected. An aliquot of approximately 2500 grams was taken from the sample and sized using a 3/8-inch sieve. The greater than 3/8-inch material was reduced to less than 3/8 inch using a hammer. A second aliquot of approximately 2500 grams was removed from the sample. The material of the second aliquot was size reduced using a hammer. The two aliquots were placed in 1/2-gallon bottles. The waste material used in the solidification mixes was taken from the 1/2-gallon bottles.

6.1.3 Sump Cake

The waste material was damp and could not be readily sized, mixed or blended. A sample for TCLP Metals was collected by taking small portions from location throughout the container. Two aliquots of material were collected from the container and placed in 1/2-gallon bottles. The waste material used in the solidification mixes was taken from the 1/2-gallon bottles.

6.1.4 Construction Rubble

This sample contained paint chips, which made up approximately 25% of the sample volume, and a dark sandy material, which made up approximately 75% of the volume of the sample. The two materials were not blended or mixed in the container. The paint chips were remove from the container. The sandy material was passed through a 3/8-inch sieve for size reduction. The paint chips were physically reduced to a less than 3/8 inch size. Two aliquots for solidification testing were prepared by combining the two size-reduced material types in proportion to their representation in the original sample. The aliquots were placed in 1/2-gallon bottles. The waste material used in the solidification mixes was taken from the 1/2-gallon bottles. A sample was collected for TCLP Metals.

6.1.5 Miscellaneous Trash

The sample supplied by FERMCO contained approximately 50% fine material and 50% trash materials (paper, plastic, yarn-like material, etc.). The large trash was separated from the fines and placed in a pan. The large trash was reduced to approximately 1/4-3/8 inch using large shears. An aliquot of the fine material was placed in a 1/2-gallon bottle. A 1/2-gallon bottle was filled with the size-reduced trash. The trash material types were included in the same proportions as the original sample. A sample was collected for TCLP Metals.

The material types in the sample could not be blended to form a homogeneous mixture. Therefore, an aliquot for a solidification mixture was generated by measuring an equal volume from each of the fines and trash 1/2-gallon bottles which would give the approximate weight needed for the mixture.

6.2 Determination of Waste Percent Moisture

The moisture content of each waste type was determined by the following procedure.

6.2.1 A sample of the waste was weighed and placed in a tare weighed beaker.

6.2.2 The waste sample was dried in an oven at 100° C to a constant weight.

6.2.3 The dried weight of the sample was determined.

6.2.4 The percent moisture was calculated by: [Original sample weight - (Dried sample weight ÷ Original sample weight)] x 100 = Percent Moisture.

6.3 Determination of Waste Bulk Density

The bulk density of each waste type was determined by the following procedure.

6.3.1 A volume of the waste, typically 250 milliliters, was collected in a tare weighed graduated cylinder. Air pockets were minimized by tapping the cylinder to settle the waste.

6.3.2 The weight of the volume of waste was determined.

6.3.3 The bulk density of the sample was calculated by: Weight of sample ÷ Volume of sample = Bulk Density (g/cc)

6.4 Preparing Scoping Test Solidification Mixtures and Test Cubes

The solidification mixtures that produced the specimens resulting in the data of Tables I to V were prepared as follows:

6.4.1 A waste to binder ratio for each mix was determined.

6.4.2 The specified binder type (Portland Type I, Aquaset II H, or Petroset II H) and specified amounts of waste and binder were weighed and the weights recorded.

6.4.3 The waste was placed in the Kitchen Aid mixer stainless steel bowl and slurried while mixing with sufficient water to form a slurry.

6.4.4 The slurry was mixed for approximately 5 minutes.

6.4.5 The pH of the slurry was measured and adjusted while mixing to a pH of approximately 12. (This step was not performed on grit blast waste.)

6.4.6 For construction rubble only, the slurry was allowed to soak for approximately 4 hours.

6.4.7 The specified amount of binder was added to the slurry.

6.4.8 The mixture was mixed for approximately 5 minutes.

6.4.9 Additional water was added while mixing as required to form a pourable mixture.

6.4.10 The amount of water used was totaled and recorded.

6.4.11 The mixture, having reached the desired pourable consistency, was placed in 2-inch cube plastic molds to cure.

6.5 Preparation of Proving Test Solidification Mixtures and Test Cubes

At the request of FERMCO the proving tests were performed under the direction of FERMCO and Permafix. The testing performed was a FERMCO approved deviation from the original test plan and involved the pretreatment of the solidification waste slurries with ferrous sulfate (except for construction rubble) and sodium sulfide. The evolution of ammonia during the solidification mixture preparation was also investigated.

In addition to the tests with waste solidification, comparison mixes with three Portland Type I cements and a Koch slag, that are available from Cincinnati, Ohio area suppliers, were made and evaluated.

6.5.1 Monitoring for Evolution of NH_3 and H_2S

During the preparation of solidification mixes, ammonia evolved when solidification mix slurries were adjusted to a pH of 12. A goal of this additional testing was to obtain measurements to quantify the amount of ammonia being evolved and to determine if hydrogen sulfide might be evolved upon treating waste with sodium sulfide.

To trap and measure the evolved gases the mixer was placed in a plastic bag. A hose was inserted into the bag and was supplied with 15 standard cubic feet per hour nitrogen flow. A short piece of hose was placed in the bag to exhaust the nitrogen flow and to afford a point where measurements could be taken. After the required reagents were added, the top of the bag was taped shut. Measurements were taken from the exhaust hose at the stated times using a Gastec Multi-Stroke Gas Sampling Pump and Sensidyne detector tubes in the range of 0-60 ppm NH_3 and 0.025-500 ppm H_2S.

6.5.2 Grit Blast Surrogate Proving Test

Testing with the grit blast had been completed and excess material had been shipped to FERMCO prior to NFS' notification of the desire for the additional grit blast testing. To conduct this additional testing, a surrogate grit blast material was prepared from soil supplied by Permafix. To demonstrate the effectiveness of the treatment method, the surrogate material was spiked with barium, cadmium, chromium and lead. The surrogate material was mixed and a sample for TCLP analysis taken. The TCLP results of samples taken after solidification were compared with the results of the spiked TCLP sample to evaluate the effectiveness of treatment.

A 70% waste to Portland Type I mix of the surrogate grit blast was prepared. The surrogate grit blast material was slurried in water and the pH determined to be less than 1. The material was acidic due to

the acid used to dissolve the spike materials. Ferrous sulfate was added and the slurry mixed. The pH was adjusted to 11 and the sodium sulfide was added. Sodium sulfide was added until lead acetate paper indicated the presence of free sulfide. The purge flow was checked for H_2S; none was detected. The Portland Type I binder was added and the mixture mixed. The mixture was placed in the 2x2 cube molds to cure. Three of the cubes were placed in a plastic bag and the bag sealed. After a few minutes in the bag, measurement indicated greater than 60 ppm NH_3.

6.5.3 Sump Cake Proving Test

A 60% waste to Portland Type I mix of sump cake was prepared. The waste was slurried in water and the pH measured at 7.5. The pH was adjusted to pH 6 with sulfuric acid while mixing. Addition of the acid caused foaming. Ferrous sulfate was then added with mixing for five minutes. The pH was then adjusted to 10 with sodium hydroxide. Sodium sulfide was added. A measurement was made for NH_3 result in a reading beyond the range of measurement or greater than 60 ppm in the purge flow. The slurry was mixed for five minutes. Portland Type I cement was added and the purge flow measured for NH_3. Again, the value indicated for NH_3 was off the scale or greater than 60 ppm. A test with lead acetate paper indicated the absence of free sulfide. Sodium sulfide was added and a test indicated that free sulfide was present. The mixture was placed in 2x2 cube molds to cure.

6.5.4 Construction Rubble Proving Test

A 50% waste to Portland Type I mix of construction rubble was prepared. As this was the material that had been identified as evolving NH_3, a number of measurements were made to determine the extent of the gas evolution. The waste was slurried in water and the pH determined to be 7.5. The pH was adjusted to 12 with 25% sodium hydroxide. Measurements of NH_3 concentration in the purge flow were made for construction rubble, sump cake, miscellaneous trash, and furnace salts. These readings are presented in Table XII.

After the NH_3 readings were completed, sodium sulfide was added. A test for H_2S indicated that none was being evolved. A test with lead acetate paper indicated the presence of free sulfides. A measurement for NH_3 found 0.4 ppm in the purge flow. The Portland Type I cement was added and the mixture stirred. A measurement for H_2S indicated 2.5 ppm. A test for NH_3 found 70 ppm in the purge flow. The pH was measured to be 12. After mixing was completed, a NH_3 measurement was made after three minutes standing. This measurement found 40 ppm NH_3 in the purge flow. The mixture was placed in 2x2 cube molds to cure.

6.5.5 Furnace Salts Proving Test

A 30% waste to Portland Type I mixture of furnace salts was prepared. The waste was slurried in water, mixed five minutes and the pH determined to be 4. Ferrous sulfate was added and mixing continued for five minutes. The pH was adjusted to 10 with sodium hydroxide. Sodium sulfide was added and the mixture mixed for five minutes. While mixing a NH_3 measurement found 10 ppm in the purge flow. Testing with lead acetate paper determined the presence of free sulfide. The Portland Type I cement was added and the mixture mixed for five minutes. A measurement for NH_3 determined that 10 ppm was present in the purge flow. The mixture was placed in cube molds to cure.

6.5.6 Miscellaneous Trash Proving Test

A 60% waste to Portland Type I mixture of miscellaneous trash was prepared. The waste was slurried in water, mixed for five minutes and the pH determined to be 8. The pH was adjusted to 6 and ferrous sulfate added. After five minutes mixing, the pH was adjusted to 12. Mixing continued for five and A measurement of NH_3 in the purge flow gave a reading of 2 ppm. Sodium sulfide was added. After five minutes mixing, a test for sulfide indicated sufficient free sulfide. The Portland Type I binder was added and mixing continued for five minutes. A test for NH_3 found 5 ppm in the purge flow. As the mix was very stiff, additional water was added. The mix was still relatively stiff. The mix was placed in the cube molds to cure. Because of the stiffness of the mix, voids in the molds had to be filled by manipulating the mix with a spatula.

6.5.7 Portland Type I Comparison Tests Using Pretreatment With Sulfide and Iron

Three samples of Portland Type I cements and a sample of Koch slag were supplied by Permafix for comparison of strength of cured mixes. For the purpose of this comparison, each Portland Type I cement and a blend of 20% of the Koch slag with one of the cements was mixed with sump cake at a waste to binder ratio of 60%. The recipe for these comparison mixes was the same as that given for the sump cake proving test. No tests for NH_3 were conducted during the preparation of these comparison mixes. The data resulting from strength testing of the cubes from these mixes is presented in Table XI.

6.6 Penetrometer Testing of the Test Cubes

Penetrometer tests using a Soiltest Penetrometer CT-421-A were made of one of the test cubes of each waste type after curing 24 hours and after 48 hours by the following procedure.

6.6.1 Place the penetrometer probe on the sample with the red band snug against the upper handle of the unit.

6.6.2 With a steady downward thrust, push the handle down over the probe.

6.6.3 When the crust breaks or the handle is extended downward as far as it will go, remove the probe from the sample and take the reading.

6.6.4 The reading is taken from the edge of the red band next to the handle.

6.7 Crush Testing, Density Determination and TCLP Sampling of the Test Cubes

After a 7 day curing period, an average density was determined and a strength test was performed on cured cubes of each type of waste. A 28-day strength test was performed on some of the waste test cubes as shown in the data presented in Attachment 1. The strength tests were performed by crushing the cubes on a Carver Laboratory Press per the following procedure.

6.7.1 The cured cubes were removed from the plastic molds.

6.7.2 The average density of 3 cubes was determined and recorded. (Nominal volume of the cubes = 131 cc.)

6.7.3 The average crush strength of 3 cubes was determined, recorded, and a sample for TCLP analysis was taken per the following:

6.7.3.1. A cured cube was placed on the calibrated Carver Laboratory Press to determine an initial crush load. (See Calibration of Carver Laboratory Press in this Report section) Pressure was applied with the hydraulic jack until the load indicator backed off the gauge applied load. This was the applied load.

6.7.3.2 After the determination of the initial crush load, the cube was crushed completely. One hundred fifty grams of the rubble was placed in a sample bottle and submitted to the laboratory for TCLP metals analysis.

6.7.3.3 Three of the cubes were crushed on the Carver Laboratory Press by applying pressure in increments of 10 percent of the initial crush applied load determined in step 6.7.3.2 above. A pause of approximately ten minutes was observed between increments.

6.7.3.4 The applied loads determined for the three cubes was averaged and the average actual load was determined from

the calibration curve generated from the calibration of the Carver Laboratory Press.

6.7.3.5 The crush strength expressed in pounds per square inch (psi) was calculated by dividing the determined actual load, applied to the 4 square inch cube surface area, by 4.

6.8 Calibration of the Carver Laboratory Press

A Soiltest Proving Ring - Pr Series was used to calibrate the Carver Laboratory Press. The function of the proving ring is provide a relationship of the press load scales to a load reading in pounds so that a calibration chart for the press can be developed.

The proving ring is manufactured from a special high strength hardened steel. Each proving ring has a serial number for identification and correlation with its calibration chart. The steel provides a proportional deflection for a given stress applied within the limits of its strength characteristics. In other words, the small compact system of the proving ring will compress in a known way for a given load, and will when the load is removed, return to its initial shape. The deflection of the proving ring is measured by means of a dial indicator. The dial indicator reading is referred to the calibration chart to obtain the corresponding load reading in pounds.

6.8.1 Calibration Procedure

6.8.1.1 Remove the floating crush head and bolt from the upper portion of the Carver Laboratory Press.

6.8.1.2 Attach the proving ring with the bolt to the upper portion of the press. Jack the bottom of the press up until it fits securely against the bottom of the proving ring.

6.8.1.3 Adjust the proving ring to zero before starting the calibration. (Zeroing the dial indicator is very important. If it is not properly zeroed, all readings will be in error.) The Indicator Adjustment Screw is located below and touching the tip of the dial indicator. Use the adjustment screw to set the dial indicator to zero.

6.8.1.4 Apply a load setting to the proving ring using the press jack and gauges. Record the applied load as indicated on the jack gauges.

6.8.1.5 Take a reading from the dial indicator. An example of this reading would be, if the large pointer is indicating "66" divisions on the outside dial and the small pointer is indicating "2" divisions on the inside dial, the reading is 266 divisions. Record the proving ring reading with the corresponding press gauge reading.

NOTE: When exceeding any of the press gauges capacities, valve off those gauges.

6.8.1.6 Repeat steps 6.8.1.4 and 6.8.1.5 until a minimum of four press gauge load readings and corresponding proving ring indicator reading have been obtained.

NOTE: Calibration loads are chosen such that sample measurements are within the range of calibration.

6.8.1.7 Convert the proving ring readings to force in pounds using the calibration chart.

6.8.1.8 Prepare a calibration curve for the press by graphing the press gauge readings vs. the determined actual load forming a linear regression calibration line. Actual load in pounds of samples are determined by converting press gauge readings using this calibration chart.

6.9 Calculation of Mix Total Percent Moisture

The total percent moisture was calculated for each mixture. This calculation accounted for the moisture contained in the waste as supplied by FERMCO. The calculation included all water added in preparing the test mixture. For the purposes of this calculation, it was assumed that the weight of one milliliter of water is one gram. The total percent moisture of a mixture was calculated by: [(Weight of waste x Waste % Moisture) + Weight of water added + Weight of water added in reagents] ÷ (Weight of waste + Weight of binder + Weight of water added + Weight of water added in reagents) x 100 = Total Percent Moisture.

6.10 Calculation of Percent Volume Increase

The percent volume increase of the mixture compared to the waste was calculated for each mixture. The volume of the waste was determined from the bulk density. The volume of the mixture was determined from the cubes generated form the mixture. The percent volume increase was calculated by: [Volume of the mixture ÷ (Weight of waste ÷ Waste bulk density)] x 100 = Percent Volume Increase.

7.0 EQUIPMENT LIST

A list of test equipment and supplies used to perform treatability testing is shown below:

- Carver Laboratory Press Model C (rated at 24000 pounds)
- Soiltest Model PR Series Proving Ring PR-20

7.0 EQUIPMENT LIST

A list of test equipment and supplies used to perform treatability testing is shown below:

- Carver Laboratory Press Model C (rated at 24000 pounds)
- Soiltest Model PR Series Proving Ring PR-20
- Mettler PE6000 Top Loading Balance (capacity of 6000 grams to 0.1 gram)
- Kitchen Aid Mixer (variable speed)
- American Cube Mold - The Cube Maker
- American Cube Mold - Plastic Mold (2x2x2)
- Fisher Scientific Accumet 950 pH/ion Meter
- Qorpak Specially Cleaned Container (9 ounce clear)
- Soiltest Penetrometer CT - 421A
- Gastec Multi-Stroke Gas Sampling Pump

8.0 REFERENCES

NFS-ACC-90, *Operation of the Environmental At-Line Sample Assay System*

NFS-C-3-70, *Nonvolatile Toxicity Characteristic Leaching for HEURF*

NFS-C-3-84, *Microwave Assisted Acid Digestion of Aqueous Samples*

NFS-EC-1, *Calibration of Weight or Mass Measuring Systems*

NFS-ENG-007, *Preparation and Issuance of Work Instructions and Letters of Authorization*

NFS-HS-GH-01, *Contamination Control*

NFS-HS-GH-03, *Radiation Work Permits*

NFS-HS-GH-07, *Respiratory Protection Program*

NFS-HS-GH-08, *Collecting Urine Specimens*

NFS-HS-GH-19, *Protective Clothing*

NFS-HS-GH-28, *Personal Monitoring*

NFS-HS-GH-29, *Proper Use and Handling of Lapel Air Samplers*

NFS-HS-GH-41, *Time for Exposure*

NFS-SC-56, *Determination of PPM Quantities of Selected Elements*

SOP 387, Sections 1-7, *Research and Development Laboratories Standard Operating Procedures*

U.S. EPA Publication NO. SW-846, *Test Methods For Evaluating Solid Wastes, Physical/Chemical Methods, Third Edition*, September 1986

Plan for Reducing Radiation Exposure to As Low as Reasonably Achievable (ALARA), Latest Revision

Emergency Plan, Latest Revision

Spill Prevention and Countermeasure Plan, Latest Revision

State of Tennessee Radioactive Material License R-86008-D97

Training and Qualification System Users Manual

TABLE I

FERMCO GRIT BLAST SOLIDIFICATION TEST SUMMARY

Mix Number	Waste to Binder Ratio	Waste (g)	Binder (g)	Water (ml)	Total wt% Moisture of Mix	% Increase (vol)	pH	Density (g/cc)	7 Day Strength (PSI)	TCLP As (PPM)	TCLP Ba (PPM)	TCLP Cd (PPM)	TCLP Cr (PPM)	TCLP Pb (PPM)	TCLP Hg (PPM)	TCLP Se (PPM)	TCLP Ag (PPM)	COMMENTS
Portland Type I										TCLP LIMITS 5	100	1	5	5	2	1	5	
GB1-M1	0.4	467	700	305	22.8	96.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
GB1-M1B	0.4	800	1200	550	23.6	107.8	12.5	1.97	3456	<.003	2.18	<.001	.176	<.002	<.002	<.001	.005	
GB1-M2	0.5	1000	1000	500	22.7	65.4	12.5	1.96	2792	<.003	1.92	<.001	0.24	<.002	<.002	<.001	.007	
GB1-M3	0.6	1200	800	475	22.4	37.8	12.4	1.96	2003	<.009	1.21	<.001	0.348	<.015	<.002	<.012	<.006	
GB1-M4	0.7	1400	600	465	22.6	18.2	12.8	1.86	1179	<.003	1.5	<.001	0.699	<.002	<.002	<.001	.010	
PETROSET H																		
GB1-M5	0.5	1000	1000	1375	42.7	146.3	12.4	1.50	191	<.003	.604	<.001	0.206	<.002	<.002	<.001	.003	
GB1-M6	0.6	1200	800	1020	36.4	117.5	12.0	1.57	227	<.003	0.591	<.001	0.186	<.002	<.002	<.001	0.004	
GB1-M7	0.7	1400	600	925	34.8	73.5	11.7	1.60	197	.011	.546	.011	.142	<.002	<.002	<.001	.013	
GB1-M8	0.8	1600	400	890	34.5	44.8	NR	1.65	83.5	<.007	1.13	<.008	0.093	0.331	<.004	<.017	<.008	
Proving Test		(BINDER TYPE PORTLAND TYPE I)																
GB1-M9	0.8	1600	400	535	25.3	9.2	NA	1.85	284	<.007	0.616	<.008	0.735	<.007	<.004	<.017	<.008	
Standard Concrete		(BINDER TYPE PORTLAND TYPE I)																
BLANK			2000	600	23.1			2.02	5684	<.009	1.379	<.001	.061	0.017	<.004	<.008	<.020	
Initial Waste Characterization																		
all size frac.					6.64			1.47		<.003	1.69	<.001	.012	.802	<.002	<.001	<.002	
<3/8 INCH										<.003	1.69	<.001	.018	.838	<.002	<.001	<.002	
Proving Test With Extra Water																		
GB1-M9A										<.009	0.982	<.001	0.601	<.015	<.004	0.01	<.020	
Surrogate Test																		
INITIAL										0.181	35.2	21	38.1	86.8	NA	<.015	<.001	
TREATED	0.7	700	300	300	31	52	11	1.49	81 a	<.014	0.834	<.001	0.005	<.006	NA	<.015	<.001	

Size Distribution of Waste - +3/8" - 25.4% ; +1/4" - 9.2% ; +#10 mesh US - 22.1% ; +#20 mesh US - 23.8% ; +#30 mesh US - 5.0% ; -#30 mesh US - 13.7%

NOTE: TEST GB1-M3 28-DAY CRUSH STENGTH = 2400PSI
NA - NOT ANALYZED
a) A hard crust formed on top of the specimen causing the penetrometer strength to be higher than the crush strength.

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TABLE II

FERMCO MISCELLANEOUS TRASH SOLIDIFICATION TEST SUMMARY

Mix Number	Waste to Binder Ratio	Penetrometer 24 HR (psi)	Penetrometer 48 HR (psi)	Total wt% Moisture of Mix	% Increase (vol)	pH slurry	pH mix	Density (g/cc)	7 Day Strength (PSI)	TCLP As (PPM)	TCLP Ba (PPM)	TCLP Cd (PPM)	TCLP Cr (PPM)	TCLP Pb (PPM)	TCLP Hg (PPM)	TCLP Se (PPM)	TCLP Ag (PPM)	COMMENTS
Portland Type I										TCLP LIMITS 5	100	1	5	5	.2	1	5	
MT1-M1	0.46	>700	>700	32.2	43.9	6	12	1.47	778	<.011	3.396	<.002	<.003	<.018	0.004	<.014	<.002	
MT1-M2	0.54	>700	>700	32.3	42.2	5	12	1.46	632	<.010	1.222	<.001	0.102	<.010	0.008	<.020	<.002	
MT1-M3	0.46	>700	>700 a	31.1	46.5	5	12	1.54	687	0.03	2.468	<.002	0.081	<.013	<.004	<.014	0.005	
MT1-M4	0.7	600	>700 a	33.9	10	5	12	1.31	136	0.031	2.458	<.002	0.147	<.013	<.004	<.014	<.003	
MT1-M5	0.8	500	>700 a	33.3	4.5	5	12	1.22	83	0.036	1.819	<.002	0.176	<.013	<.004	<.014	0.006	
Proving Test		(BINDER TYPE -PORTLAND TYPE I)																
MT1-M6	0.6	>700	>700	31	29.7	6	12	1.60	88 b		TCLP's NOT REQUESTED							
Standard Concrete		(BINDER TYPE - PORTLAND TYPE I)																
BLANK	>700	>700	NA	23.1		NA	NA	2.02	5684	<.009	1.379	<.001	.061	0.017	<.004	<.008	<.020	
Initial Waste Characterization																		
sample				1.84				0.88		0.039	2.109	<.002	1.064	0.042	<.004	<.015	<.002	

a) 96 hour penetrometer due to weekend

b) A hard crust formed on top of the specimen causing the penetrometer strength to be higher than the crush strength.

NA - NOT ANALYZED

TABLE III

FERMCO FURNACE SALTS SOLIDIFICATION TEST SUMMARY

Mix Number	Waste to Binder Ratio	Penetrometer 24 HR (psi)	Penetrometer 48 HR (psi)	Total wt% Moisture of Mix	% Increase (vol)	pH slurry	pH mix	Density (g/cc)	7 Day Strength (PSI)	TCLP As (PPM)	TCLP Ba (PPM)	TCLP Cd (PPM)	TCLP Cr (PPM)	TCLP Pb (PPM)	TCLP Hg (PPM)	TCLP Se (PPM)	TCLP Ag (PPM)	COMMENTS
													TCLP	LIMITS				
Portland Type I										5	100	1	5	5	.2	1	5	
FS1-M1	0.6	0	0	24.4	23.5	3.1 a	NA	NA	c	0.013	2.569	<.001	0.28	<.010	<.004	<.014	<.002	
FS1-M1A	0.6	0	0	20.8	18.8	b	12	NA	c	0.014	2.076	<.001	0.042	<.010	<.004	<.014	0.002	PRETREAT
FS1-M2	0.4	200	350	23.4	113.7	4 b	12	NA	e	<.009	1.618	<.001	0.364	<.010	<.004	<.014	<.002	PRETREAT
FS1-M3	0.25	>700	>700	24.2	173.6	4 b	12	1.93	1562	<.009	4.192	<.001	0.439	<.010	<.004	<.014	0.002	PRETREAT
FS1-M4	0.3	>700	>700	23.1	128	5 b	12	1.98	1158	0.038	2.049	<.002	0.252	<.013	<.004	<.014	0.004	PRETREAT
FS1-M5	0.35	>700	>700	28.2	95.4	4 b	12	1.95	513	TCLP's NOT REQUESTED								PRETREAT
Aquaset II H																		
FS2-M1	0.5	d	d	56.8	190	5 b	12	NA	NA	0.062	0.589	<.001	0.051	0.032	<.004	<.020	0.041	CRACKED
Proving Test		(BINDER TYPE -PORTLAND TYPE I)																
FS1-M7	0.2	NA	NA	22.5	227.5	4	10	1.97	90 f		TCLP's NOT REQUESTED							
Standart Concrete		(BINDER TYPE - PORTLAND TYPE I)																
BLANK	>700	>700		23.1				2.02	5684	<.009	1.379	<.001	.061	0.017	<.004	<.008	<.020	
Initial Waste Characterization																		
sample				8.83				1.14		0.357	0.672	<.002	2.45	0.576	<.004	0.081	1.698	

a) pH probe malfunctioned
b) Slurry was pretreated with NaOH to pH 12
c) 7 day penetrometer - 0 psi
d) 96 hour penetrometer - 0 psi
e) 7 day penetrometer - 350 psi
f) A hard crust formed on top of the specimen causing the penetrometer strength to be higher than the crush strength.
NA - NOT ANALYZED

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TABLE IV

FERMCO SUMP CAKE SOLIDIFICATION TEST SUMMARY

Mix Number	Waste to Binder Ratio	Penetrometer 24 HR (psi)	Penetrometer 48 HR (psi)	Total wt% Moisture of Mix	% Increase (vol)	pH slurry	pH mix	Density (g/cc)	7 Day Strength (PSI)	TCLP As (PPM)	TCLP Ba (PPM)	TCLP Cd (PPM)	TCLP Cr (PPM)	TCLP Pb (PPM)	TCLP Hg (PPM)	TCLP Se (PPM)	TCLP Ag (PPM)	COMMENTS
Portland Type I										5	100	1	TCLP 5	LIMITS 5	.2	1	5	
SC1-M1	0.6	>700 a	>700	29.1	57	3 b	12	1.63	703	<.013	3.758	0.002	0.1	<.008	<.004	<.026	0.015	
SC1-M1A	0.6	>700	>700	28.6	51	7 c	12	1.64	541	<.013	3.114	0.002	0.122	<.008	<.004	<.026	0.018	PRETREAT
SC1-M2	0.7	230	>700d	28.2	55.3	4 c	12	1.62	462	<.010	2.431	<.001	0.088	<.010	<.004	<.020	<.002	PRETREAT
SC1-M3	0.8	300	600 d	25.9	35.9	5 c	12	1.62	86	<.014	1.42	0.002	0.115	<.013	<.004	<.013	<.017	PRETREAT
SC1-M2A	0.7	120	680	30.1	35.7	5 c	12	1.38	72		TCLP NOT REQUESTED							PRETREAT
Proving Test		(BINDER TYPE -PORTLAND TYPE I)																
SC-M4	0.6	>700	>700	31.9	20.1	7.5	10	1.69	78 f		TCLP NOT REQUESTED							
Standard Concrete		(BINDER TYPE - PORTLAND TYPE I)																
BLANK		>700	>700	23.1				2.02	5684	<.009	1.379	<.001	.061	0.017	<.004	<.008	<.020	
Initial Waste Characterization																		
Sample				28.8				1.45		0.291	1.276	<.002	0.212	0.435	<.004	0.099	<.002	

a)12 hr penetrometer reading - 250 psi
b) probe malfunctioned
c) slurry was pretreated with NaOH to pH 12
d) 96 hour penetrometer due to the weekend
e) 28 day crush - 897 psi
f) A hard crust formed on top of the specimen causing the penetrometer strength to be higher than the crush strength.

TABLE V

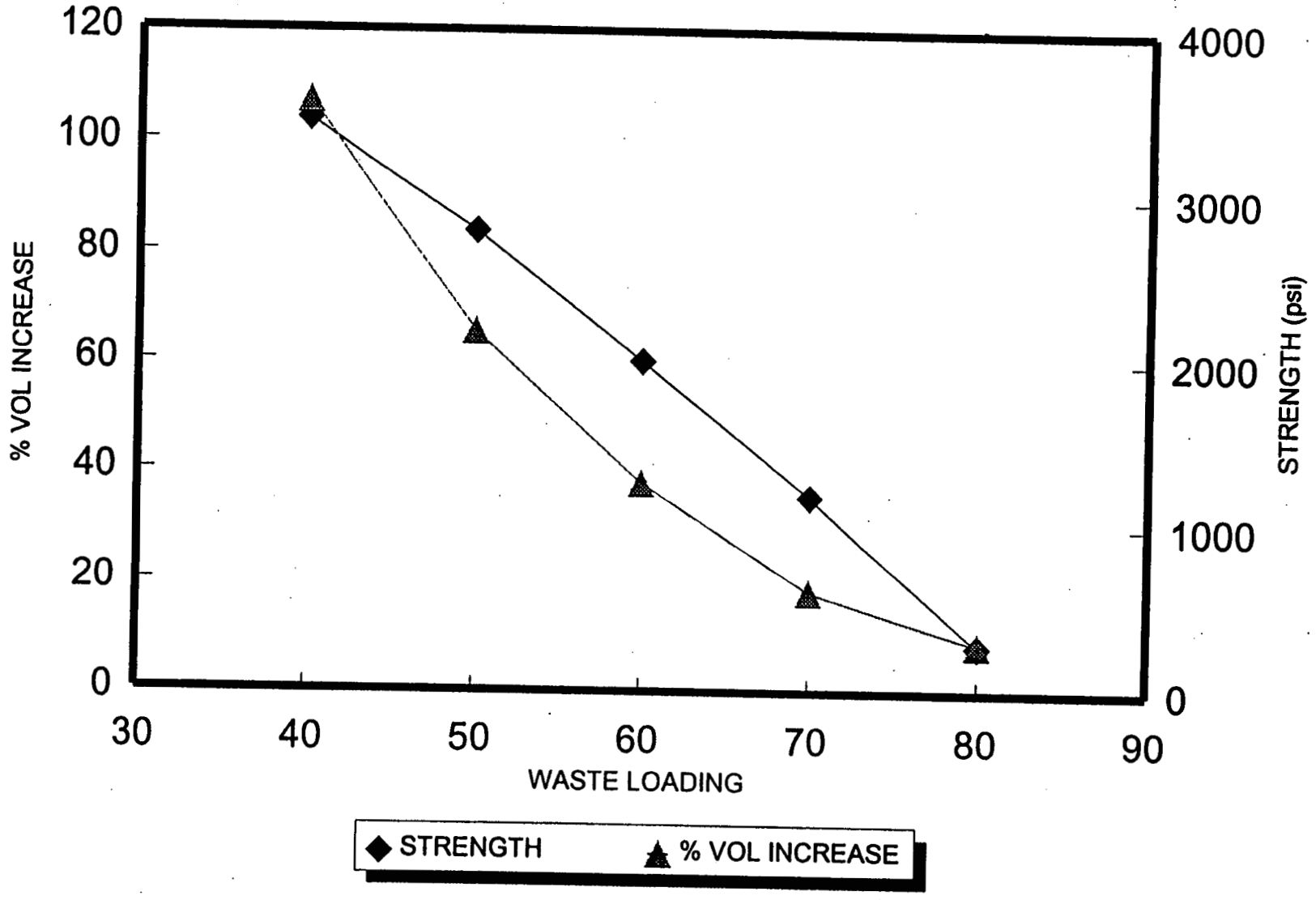
FERMCO CONSTRUCTION RUBBLE SOLIDIFICATION TEST SUMMARY

Mix Number	Waste to Binder Ratio	Penetrometer 24 HR (psi)	Penetrometer 48 HR (psi)	Total wt% Moisture of Mix	% Increase (vol)	pH slurry	pH mix	Density (g/cc)	7 Day Strength (PSI)	TCLP								COMMENTS
										As (PPM)	Ba (PPM)	Cd (PPM)	Cr (PPM)	Pb (PPM)	Hg (PPM)	Se (PPM)	Ag (PPM)	
										5	100	1	TCLP 5	LIMITS 5	.2	1	5	
Portland Type I																		
CR1-M1	0.5	>700	>700	22.8	55	6.1	12	1.65	327	<.011	3.338	<.002	0.616	0.139	<.004	<.014	<.002	EXPANDED
CR1-M1A	0.6	NA	>700	19	25	7 a	12	1.56	466	<.011	3.364	<.002	1.13	0.134	<.004	<.014	<.002	NO EXPANSION
CR1-M2	0.7	450b	>700	19.9	7.2	8 d	12	1.46	80	<.010	2.13	<.001	2.486	<.010	<.004	<.020	<.002	EXPANDED - c
CR1-M3	0.8	220	>700 e	21	12.5	5 a	12	1.26	60	<.009	2.718	<.001	1.778	<.010	<.004	<.014	<.002	NO EXPANSION
CR1-M2A	0.7	520	>700	19.5	7.2	7 a	12	1.38	72	<.014	1.722	0.003	4.69	0.086	<.004	<.013	0.017	
Proving Test		(BINDER TYPE -PORTLAND TYPE I)																
CR1-M4	0.5	>700	>700	22.8	99	7.5	12	1.35	75 f		TCLP NOT REQUESTED							
Standard Concrete		(BINDER TYPE - PORTLAND TYPE I)																
BLANK		>700	>700	23.1				2.02	5684	<.009	1.379	<.001	.061	0.017	<.004	<.008	<.020	
Initial Waste Characterization																		
Sample				13.97				1.20		0.048	3.79	0.037	0.166	2.744	<.004	<.015	<.002	

a) Slurry was pretreated with NaOH to pH 12 for 4 hrs
b) 12 hr penetrometer - 200psi
c) Slight expansion noted <2%
d) Slurry was pretreated with NaOH to pH 12 for 1 hr
e) 96 hour penetrometer due to the weekend
f) A hard crust formed on top of the specimen causing the penetrometer strength to be higher than the crush strength.

TABLE VI

FERMCO GRIT BLAST WASTE LOADING VS. PERCENT VOLUME INCREASE AND STRENGTH

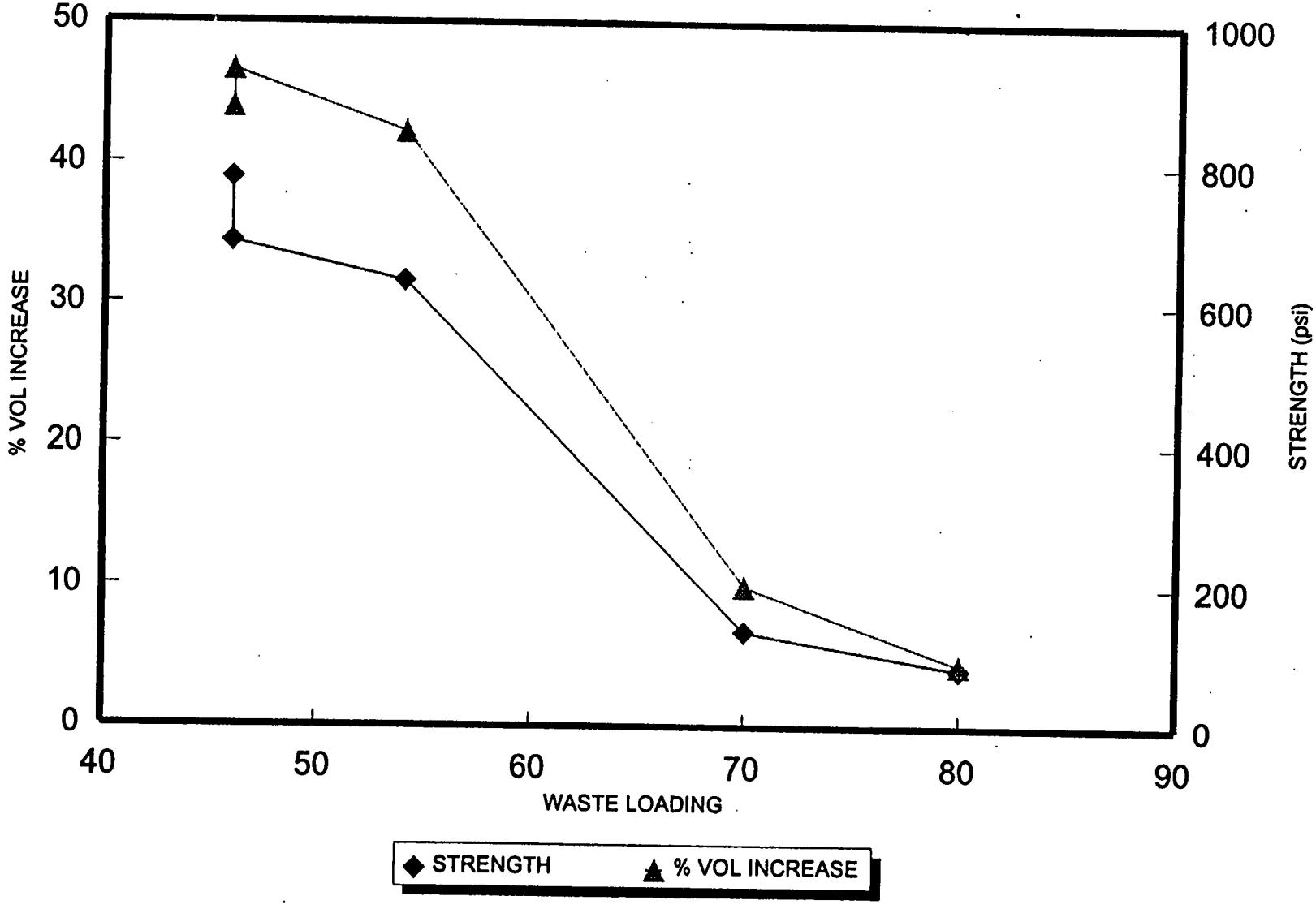


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TABLE VII

FERMCO MISCELLANEOUS TRASH WASTE LOADING VS. PERCENT VOLUME INCREASE AND STRENGTH



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TABLE VIII

FERMCO FURNACE SALTS WASTE LOADING VS. PERCENT VOLUME INCREASE AND STRENGTH

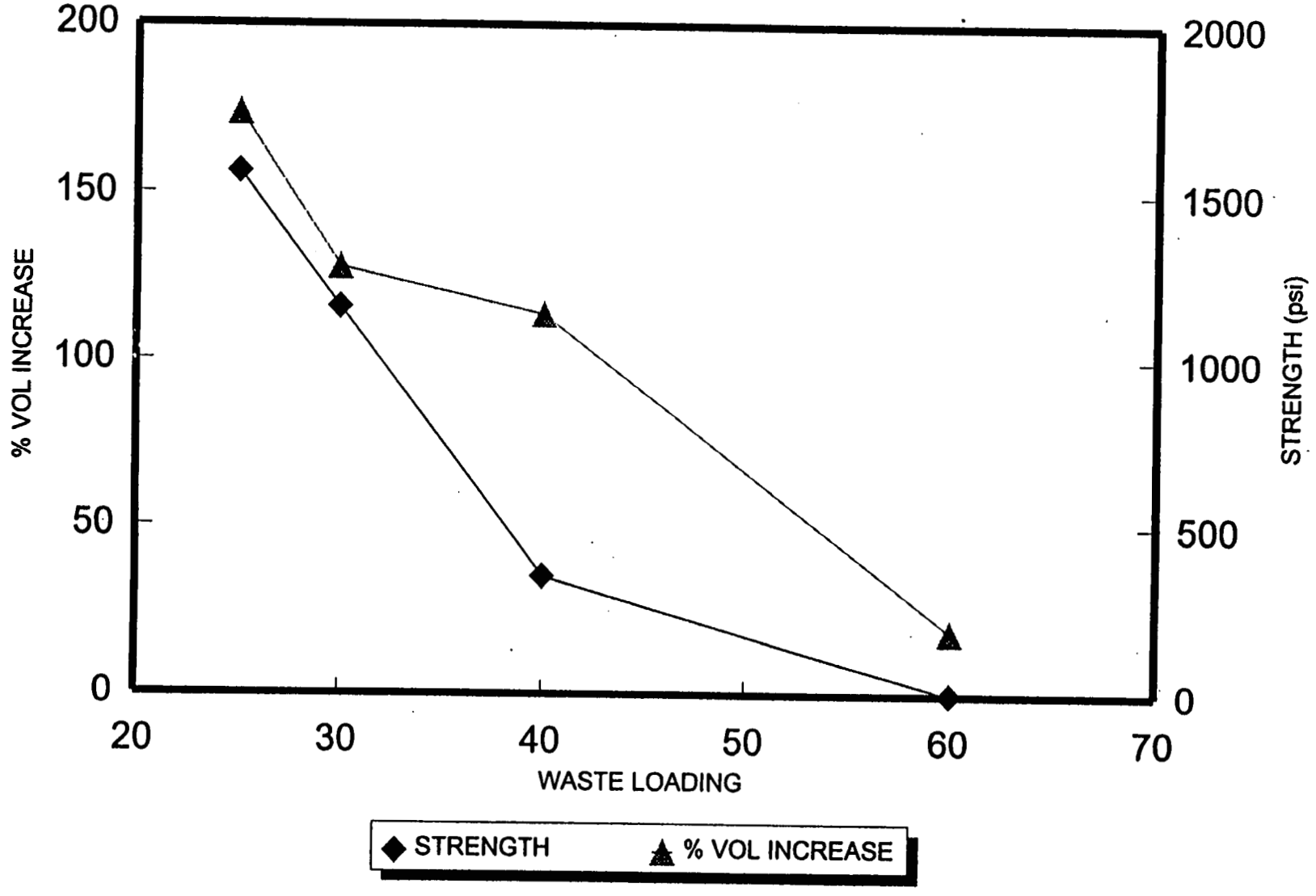
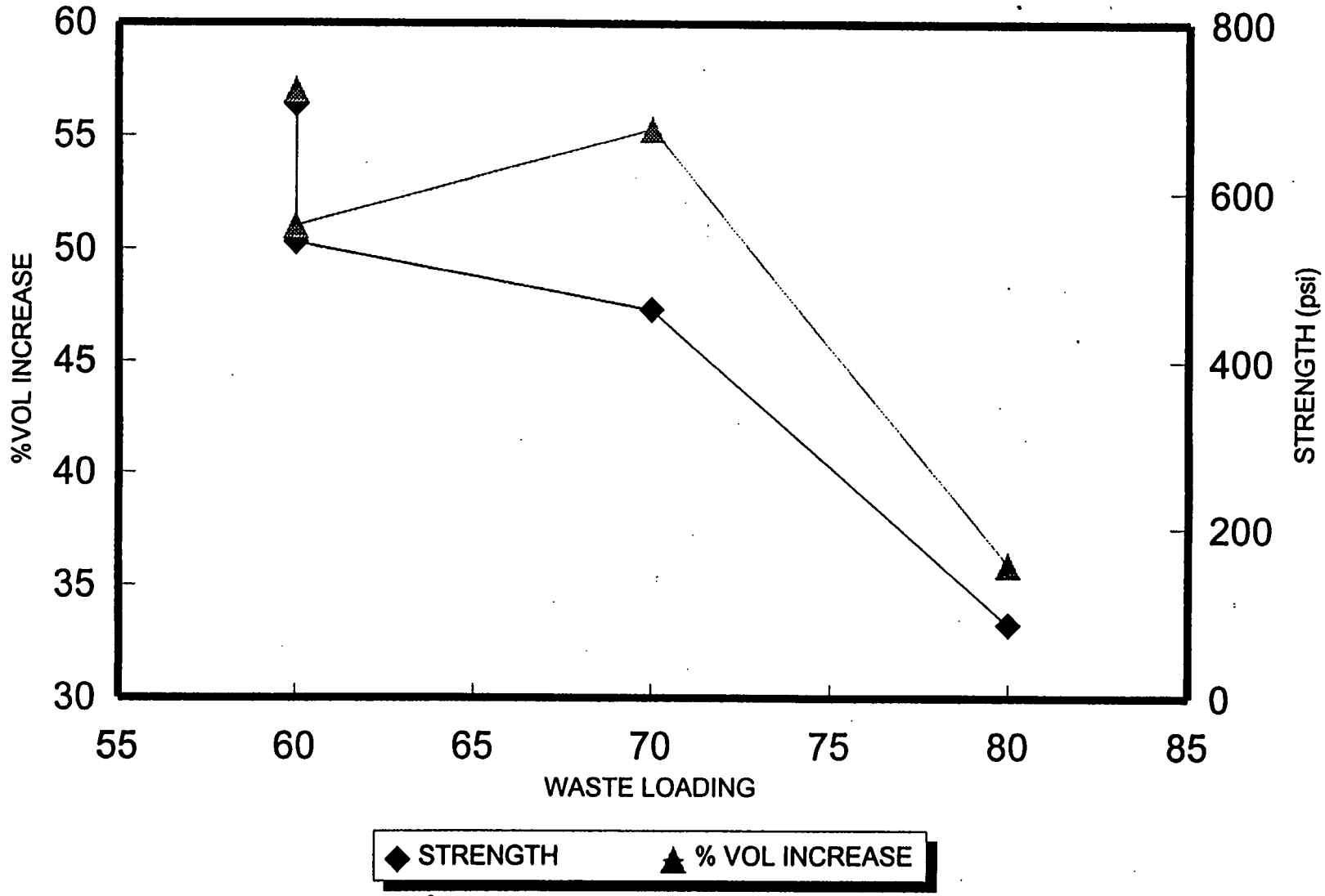


TABLE IX

FERMCO SUMP CAKE WASTE LOADING VS. PERCENT VOLUME INCREASE AND STRENGTH

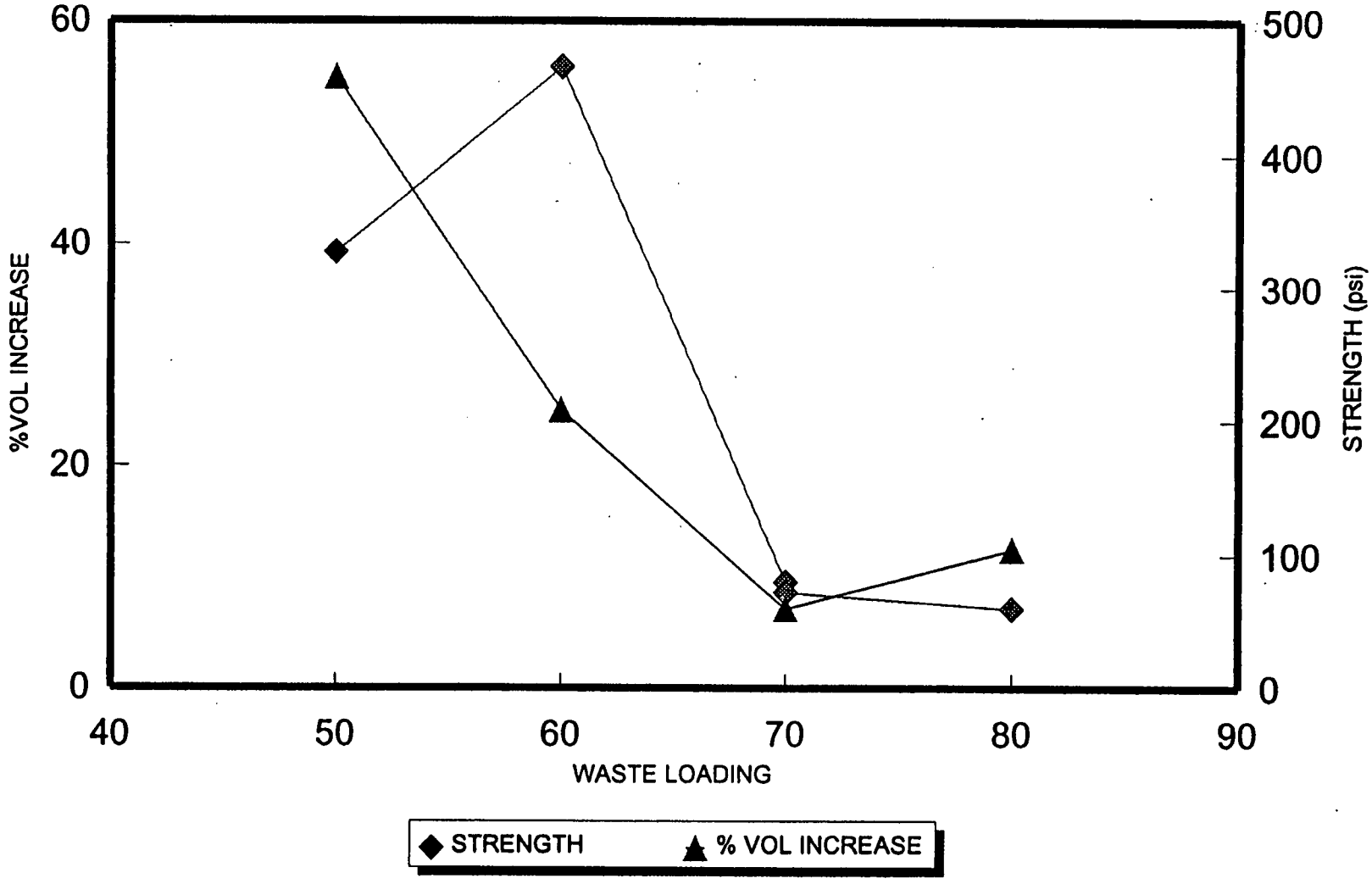


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TABLE X

FERMCO CONSTRUCTION RUBBLE WASTE LOADING VS. PERCENT VOLUME INCREASE AND STRENGTH



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TABLE XI

PORTLAND TYPE I CEMENT STRENGTH COMPARISON DATA

VENDOR	WASTE TO BINDER RATIO	PENETROMETER 24 HR (psi)	PENETROMETER 48 HR (psi)	TOTAL % MOISTURE OF MIX	% INCREASE (vol)	pH SLURRY	pH MIX (ADJ)	pH FERROUS SULFATE	7 DAY CRUSH
LEHIGH	0.6	>700	>700	18.9	120.1	7.5	5	9.5	82 *
SW	0.6	>700	>700	21.8	120.1	6.5	5	9	85 *
HOLMAN	0.6	>700	>700	20.4	120.1	7	5	9.5	90 *
KOCH SLAG	0.6	>700	>700	22.9	131.0	7	4.5	9.5	81 *

* A HARD CRUST FORMED ON THE TOP OF SPECIMENS CAUSING PENETROMETER STRENGTH TO BE HIGHER THAN CRUSH STRENGTH

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TABLE XII

PROVING TEST AMMONIA DATA

Waste Stream	Mix Number	Ammonia at Mix	NH_3 Bag 24 Hours	NH_3 Bag 48 Hours
Construction Rubble	CR1-M4	50 ppm	>60 ppm	>60 ppm
Sump Cake	SC1-M4	>60 ppm	>60 ppm	>60 ppm
Furnace Salts	FS1-M6	10 ppm	14 ppm	11 ppm
Miscellaneous Trash	MT1-M6	5 ppm	24 ppm	18 ppm

APPENDIX A

LABORATORY NOTEBOOK

A copy of the laboratory notebook used to record data and observations is attached.

FERMCO treatability study to be performed per ADA # 1622A-001 using "Treatability Study Work Plan for the Stabilization of Mixed Waste" # NFS-SP-WST-001, Rev. 1

FERMCO contact - Dick Kasparek Phone - 513-738-9419
FAX - 513-738-6958

NFS SO# FOR All FERMCO WORK - 1622A

NFS R&D Project Engineer - Steve M. Duncan
NFS Quality Manager - Wade Tilson
NFS R&D Project Manager - Mike A. Rush

Signoff on All Required procedures for S Duncan & M. Rush completed.

PROCESS ID - 30101D

Material Code - R4

Batch # will be ~~SD~~ 95TXXX where XXX is IDS sample #

Container Type - I 20S

SO# 1622A

A - TCLP Metals

Sample Type - RTN

Unit of Measure -

Continued on Page 2

Read and Understood By

S. M. Duncan 1/18/95 000363
Signed Date Signed Date

1/19/95
Waste drum containing 22.23 Kg of Grit Blast Residue Received on 1/19/95. Hazardous Waste Logs were filled out for Building

1/20/95

Lab hood Cleaned with HNO_3. Drum of Waste moved to clean hood & Opened. Seal from drum was # 3195. Chain of custody papers Signed @ 1140 on 1/20/95 by S. Duncan

Inspection - By. S. Duncan - Container is Approximately 3/4 Full Material inside appears to be a damp Soil with Large to small Rocks. There are some small Black coal like particles + probably grit Blast. Actual Amount of grit Blast ≈ 1% estimated. There is a small Amount of plant material.

Sampling will be done when sample bottles from Fisher Scientific are Received.

Currently Awaiting All addressed materials to

Continued on Page

Read and Understood By

S. M. Duncan — 1/19/95 — Signed — Date — Signed — Date

95 Crush Strength Calibration

ring Ring # LC-2 Serial # 22833

Ase - 10,000#

ad (Y)	Proving Ring #	PR 20 #
200#	550	1070
	530	1032
	536	1043
	533	1038
	538	1028
	$\bar{X}$ =	1042 #
00#	780	1510
	783	1516
	785	1520
	$\bar{X}$ =	1515
00#	380	745
	381	747
	383	751
	$\bar{X}$ =	1515 # 748 #
		SD 22.95
00#	180	362
	182	366
	184	370
	$\bar{X}$ =	366 #

Plot Load (Press Guage Reading) (Y Axis) Vs PR # 20 # (Crush Strength) (X Axis)

Lotus 1-2-3 was used to plot graph

To get crush strength of 2" cube divide crush strength obtained by 4 (2"x2" = 4" square area)

Procedure:

1) Obtain specimen & place on press.
2) Slowly increase pressure on block until crush occurs. Record crush pressure
3) Obtain new specimen and increase pressure on block in 10% increments of max crush strength obtained in first test crush.
4) Hold each increment for a few seconds (≈ 10-15 sec.) Before slowly proceeding to new increment. The slow increase in pressure will eliminate shock crush which would give false readings

Continued on Page

Read and Understood By

Signed _____ Date 1/23/95

Signed _____ Date _____

PROJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

1/25/95 Sampling of Initial Material

Certified I-Chem Sample Bottles used - Sample Bottle size 250ml wide mouth containers, glass with Teflon lids
Product # 423501B Item # 320-0250

Certificate of Analysis to be given to Quality Control to hold for duration of Project. (W.C. Tilson)

Sample Collection -

New stainless scoop used to collect sample. A yellow band of was placed on handle to denote exclusive use for FERMCO mixed waste use only.

Sample Bottle + Sample Gross wt - 545.1g
Sample Bottle Tare Weight - 213.2g
Sample Net Weight - 331.9g

Sample ID - 95-MW-001
Analysis Requested - TCLP Metals

Sample Collection method - Container (5 gallon can) was rolled back & forth to mix up container contents. Scoops of material were removed using new SS scoop at random locations within the pail. Large rocks were intentionally not included in sample since lead is most likely in fines.

Chain of custody seal was placed on lid

Continued on Page

Read and Understood By

D. M Duncan
Signed

1/25/95
Date

Signed

D

000366

95 Percent Moisture - Scoops of material were removed From Random locations using New Scoop. Large rocks were not included in Sample. Sample was placed in A new 600ml glass beaker

Before drying gross - 887.3g
tare - 230.7g
net - 656.6g

Sample placed in drying oven @ 10:20 AM on 2/6/95

Size Distribution - Scoops of material were removed from random Locations using a Large scoop. The sample was weighed and placed in a set of sieves consisting of 3/8", 1/4", and #10 and #20 U.S. Standard.

Material prior to separation:
gross weight 1842.9 g
tare 390.1 g
Net 1452.8 g

Material was hand shaken for 3-5 mins.

+3/8" fraction(s) gross - 759.1 g
tare - 390.1 g
Net 369.0 g

+1/4" fraction gross - 524.3 g
tare - 390.1 g
net 134.2 g

Continued on Page 6

Read and Understood By

C. H. Williams 2/6/95 Signed Date
L. M. Duncan 3/6/95 Signed Date

2/6/95 continuation of size distribution testing
MW

+ #10 U.S. Standard

gross - 710.5 g
tare - 390.1 g
net - 320.4 g

+ #20 U.S. Standard

gross - 736.1 g
tare - 390.1 g
net - 346.0 g

- #20 U.S. Standard

gross - 664.1 g
tare - 390.1 g
net - 274.0 g

Since a significant amount of material was found in -#20 U.S. Standard, this material was separated using a #30 U.S. Standard sieve. The sample was shaken 3-5 minutes by hand.

#30 mesh U.S. Standard

gross - 463.3 g
tare ~~net~~ - 390.1 g
net - 73.2 g

The -30 mesh material was placed in a #50 U.S. Standard sieve and hand shaken for 3-5 minutes.

+ #50 mesh U.S. Standard

gross - 529.2 g
tare - 390.1 g
net - 139.1 g

Continued on Page 7

Read and Understood By

Christopher H. Williams — 2/6/95
Signed — Date

D. M. Dixon — 3/6/95
Signed — Date

95 continuation of size distribution testing.
- #50 U.S. Standard

gross - 449.3g
tare - 390.1g
59.2g

/95 Bulk Density Determination - Scoops of material were removed from random locations using same scoop used for percent moisture. The material was placed in a new preweighed 500 mL graduated cylinder (glass).

Weight of sample: gross - 1015.5g
tare - 278.2g
net - 737.3g

Volume of material: 500 mL or 500 cc

Calculated density: ~~1015~~ Corr 3/6/95

737.3g ÷ 500 cc = 1.47 g/cc

Preparation of samples for solidification

Material was scooped out of original container using a large scoop. The material was placed into a 3/8" sieve to separate the + 3/8" material. The + 3/8" material will not be used in solidification testing due to its size in comparison to the 2" x 2" x 2" sample solidification testing blocks. The - 3/8" material was placed into 0.5 gallon plastic bottles. Prior to placement in bottles, the material was mixed to produce a homogeneous mixture by placing it in a ~~gallon~~ 1 gallon plastic bag and shaking.

Continued on Page

Read and Understood By

Christopher Williams 2/6/95 — Signed — Date
S. M. Dunn 3/6/95 — Signed — Date

PROJECT Fernco Mixed Waste

Notebook No.

Continued From Page

2/6/95 Material in plastic bottles was identified as containing orange paint chips.

Bulk density of -3/8" material - Material was ren from Bottle #1 of -3/8" material labeled "Grit Blast Re A 500 mL graduated cylinder was used for density.

Material from Bottle #1

gross 925.2 g
tare 278.2 g
net 647.0 g

Volume of material - 500 cc

Calculated Density -

647.0 g ÷ 500 cc = 1.29 g/cc

TCLP Sample - Sample # ~~95-MW-001~~ 95-MW-002

A sample was pulled from Bottle # 1 of -3/8" Grit Blast Residue for TCLP analysis.

Weight of material for TCLP: gross - 414.9 g
tare - 214.0 g
net - 252.9 g

Sample # 95-MW-002 was sent to the lab 2/6/95
Sample was sealed by Steve Duncan.

*105 Sample # 1355287

Continued on

Read and Understood By

Christal Williams
Signed

2/6/95
Date

D. M. Duncan
Signed

3

/95 Per Human Resources-all TCLP samples will be sent to 105 Lab For Extraction. All extracts except Hg will be done by 105 Lab. Hg Extract will be done by R Slagle in 11B or 13.

ID Sample # 95-MW-001 → 105 Sample # 1355279
95-MW-002 → 1355287

0/95 % Moisture continued from pg. 5
tw

Weight of sample @ 1:25pm

gross = 844.0g
tare = 230.7g
net = 613.3g

Sample returned to oven at 1:26pm

0/95 Preparation of Mixes

Test Number: GB-1 Sample #'s GB-1-M1

Mix 1 - Use Portland type I at 40% waste by weight and 60% binder.

Weight of sample (MW) = 400g
Weight of Portland Type I = 600g

The 400g of Mixed waste were added to the mixing bowl. The mixer was turned on low and 100 mL of DI water was added. The 600g of Portland Type I and remaining water (200mL) were added slowly in increments (random). The mix time was 5 min. The mix appears to be smaller in volume than desired so more waste, binder and water will be added

Continued on Page 10

Read and Understood By

Signed 2/10/95 Date — Signed 3/6/95 Date

2/10/95 Weight of waste added - 67.0 g
Weight of binder added - 100.0 g
Amount of water added - 5mL DI

The mixture was mixed for 5 minutes and poured into 2 cubic inch plastic molds. The mixture only produced 5 cubes.

This Mix will be repeated using more material. The amount of extra water, 5mL, was added because the mixture appeared to be too dry. When the water was added the mixture changed from a dull dark gray to a shiny dark gray. Although the mixture appeared to be wet enough, additional water will make the mixture pourable. The two mixes will be compared in the potentiometer and strength tests.

Mix 1b
Sample: GB-1-M1b

Weight of waste: 800 g
Weight of Portland Type I - 1200 g
Amount of DI Water added - 400 mL, 150 mL

The 800 g of waste was added to the mixing bowl. The 400 mL of DI water was added and the mixer was turned on slow speed. The waste and water were allowed to mix for 5 mins. The mixture appeared to be too dry. An extra 150 mL of DI water was added. (150 mL added 2/10/95) The mixture was mixed for 5 minutes and then poured into molds. (Produced 9 molds) (150 to

Continued on

Read and Understood By

Christa Williams — Signed
2/10/95 — Date
S. M. Duncan — Signed

2/10/95 Mix 2: Portland Type I, 0.5 waste to binder ratio.
Sample: GB1-M2
Weight of waste: 1000g
Weight of Portland Type I: 1000g
Amount of DI water: 300 mL, 200mL

The waste, 1000g, and 300 mL of DI water were mixed for 5 minutes. The Portland Type I was added and an additional 200mL of DI water. The mixture was mixed for 5 min. and then poured into molds. Less water was added to this mixture to account for the additional moisture added from the increase in waste.

Mix 3: Portland Type I, 0.6 waste to binder ratio
Sample - GB-1-M3

Weight of waste: 1200g
Weight of Portland Type I: 800g
Amount of DI water: 400 mL, 75mL

The waste, 1200g and 400 mL of DI water were mixed for 5 mins. The Portland Type I 800g was added with an additional 75mL DI water. The mixture was mixed an additional 5 min. and poured into 9 molds.

Continued on Page

Read and Understood By

Christof Williams 2/10/95 S. M. Duncan 3/6/95
Signed Date Signed Date

2/13/95 RHW

% Moisture continued from page 9

weight of sample at 9:55 am

gross - 843.7g
tare - 230.7g
613.0g

Since only a 0.3g change in weight over a 2 day period the sample was considered dry.

2/13/95

Mix 4 Portland Type I, 0.7 waste to binder ratio.
Sample - GB1-M4, time 9:30 am (poured molds)

Weight of waste - 1400 g
Weight of Portland Type I - 600g
Amount of DI water - 465 mL

The 1400g of waste and 465 mL of water was mixed for 5 minutes in the mixing bowl. The binder was added, 600g and mixed for 5 minutes. The mixture was then poured into 9 2cu.in. plastic molds. The molds were placed in a plastic bag with a damp piece of cheese cloth and the bag was closed and taped.

Prior to testing Petroset H binding agent. More waste was required. The waste was separated using a 3/8" sieve. All +3/8" material was set aside. The -3/8" material was collected for testing in 0.5 gallon bottles.

Continued on Page 13

Read and Understood By

Christof Williams 2/13/95 — Signed / Date
S.M. 3/6/95 — Signed / Date

The bottles were labelled #1, #2, #3 Fermco Mixed Waste. -3/8" Grit Blast Residue.

Weight of bottle #1: gross - 2772.3 g
tare - 204.3 g
net 2568.0 g

bottle #2: gross - 2095.9 g
tare - 203.1 g
net 2492.8 g

bottle #3: gross - 2591.5 g
tare - 204.1 g
net 2387.4 g

continued below

2/13/95 CHW Amount of +3/8" material collected from entire waste sample as sent from FERNCO.

Bottle # 1 +3/8" - 3,186.7 g
Bottle # 2 +3/8" - 3,110.0 g
Bottle # 3 +3/8" - 1,027.4 g
Total +3/8" material - 7,324.1 g

2/13/95 CHW -3/8" material continued from above.

Weight of bottle #4 gross - 1340.2 g
tare - 204.3 g
net - 1,135.9 g

Continued on Page

Read and Understood By

Signed Date Signed Date

Walter Williams 2/13/95 L. M. Duncan 3/6/95

2/13/95

Mix 5: Petroset H, 0.5 waste to binder ratio
Sample: GBI-M5 time: 10:55am (poured molds)
Weight of waste - 1000g
Weight of binder - 1000g
Amount of DI water - 500mL, 500mL, 375mL

Waste, 1000g, and 500 mL of water were added to mixing bowl and mixed for 5 minutes. The binding agent was added slowly and as it was added the mix became very dry. 500 mL of DI water was added. The rest of the binding agent was slowly added along with 375 mL of DI water. The mixture seems to be thinner than the Portland mixes. After mixing 5 minutes, the mixture was placed into 9, 2 cu.in. plastic molds by the use of a small scoop. This mix produced an excess of material, almost 50% more material than needed for molds. The next mix will be made using smaller quantities if necessary.

Mix 6: Petroset H, 0.6 waste to binder ratio
Sample: GBI-M6 time: 11:00am

Weight of waste: - 1200g
Weight of binder - 800g
Amount of DI water - 600mL, 520mL

The waste, 1200g, and 600mL of DI water were added to the mixing bowl and mixed for 5 mins. The binding agent was added

Continued on Page

Read and Understood By

Christopher Williams 2/13/95 D. M. Duncan 3/6/
Signed Date Signed D

slowly along with 520 mL of DI water. The mixture was mixed ~~for~~ CHW 2/13/95 for 5 mins.

1/13/95 GBI-M6 pH of mixture - 12.0
GBI-M5 pH of mixture - 12.4
GBI-MH pH of mixture - 12.8

pH was taken using new probe calibrated with standards of pH 7 and pH 10. The mix was placed in 9 2 cu.in plastic molds. An excess of 650 mL of material was left.

2/13/95 Mix 7: Petroset H, 0.7 waste to binder ratio
Sample GBI-M7 time prepared:

Weight of waste - 1400 g
Weight of binder - 600 g
Amount of DI water - 500 mL, 425

Waste, 1400g, and 500 mL were added to mixing bowl. The mix was mixed for 2 minutes and the pH of the waste and water was obtained.

pH = 2.3

The mixture was mixed for 3 more minutes. The binding agent was added along with 425 (total) mL water. The waste was mixed for 5 minutes. The pH of the mixture was measured.

pH = 11.7

The mixture was then poured into 9 plastic molds. Time 2:00 pm. 500 mL of mixture was left over after pouring molds.

Continued on Page

Read and Understood By

Stef. Williams 2/13/95 — Signed / Date
D. M. Duncan 3/6/95 — Signed / Date

2/13/95 The pH was not measured for samples
GB1-M1
GB1-M2
GB1-M3

A small sample of each batch will be simulated to measure the pH.

For Batch GB1-M1b:
Weight of waste - 25g, 25g*
Weight of Portland Type I - 37.5g
Amount of DI water - 17 mL
* A second sample had to be made, due to set up of mix.
A new pH probe will be used calibrated by standards of pH 7 and pH 10.

pH of GB1-M1b = 12.5 2/13/95

For Batch GB1-M2
Weight of waste - 25g
Weight of Portland Type I - 25g
Amount of DI water - 12.5mL

pH of GB1-M2: 12.5

For Batch GB1-M3
Weight of waste - 25g
Weight of Portland Type I - 16.7g
Amount of DI water - 10 mL
Added just enough water to test pH, approx. 1-2mL
pH of GB1-M3: 12.4

Continued on Page

Read and Understood By

Christal Williams — Signed — 2/13/95 — Date
S. M. Duncan — Signed — 3/6/95 — Date

2/13/95 Penetrometer Readings
Time 3:00 pm

GB1-M4 (5.5 hour test) Readings = 220 psi
120 psi
180 psi
130 psi
180 psi

GB1-M5 (4 hour test) Reading = 60 psi
80 psi
70 psi

GB1-M6 (4 hour test) Reading = 60 psi (corner)
80 psi (center)
140 psi (corner)
140 psi (corner)
90 psi (corner)

2/17/95 CNW Determination of Density of cubes.

Sample: GB1-M3 Volume of each cube: 8 cu. in.
Measured three cubes.
Weight: 255.1 g
258.6 g
257.7 g
Σ 771.4 g
Avg. Weight = 771.4 ÷ 3
= 257.1 g

Sample: GB1-M2 Volume: 8 cu. in.
Weight: 256.6 g
260.8 g
254.2 g
Σ 771.6 g
Avg. Weight = 771.6 ÷ 3
= 257.2 g

Continued on Page 18

Read and Understood By

Linda F. Williams 2/17/95 — Signed / Date
S. M. Duncan 3/6/95 — Signed / Date

Sample GBI-M1b Volume: 8 cu.in.

Weight: 254.1g
262.5g
258.2g
= 774.8g

Avg. Weight = 774.8 ÷ 3
= 258.3g

2/17/95 Crush Strength Testing:

Sample: GBI-M2

One cube of Sample batch GBI-M2 was placed on Carver Laboratory Press to determine initial pressure to apply to remaining cubes. The sample was placed in a plastic bag to collect the material when it breaks. Press was slowly added to the cube.

Break point Applied Load is 10,000# Applied
The next sample is placed on the Press and pressure is applied in increments of 1/10 of the Applied Load and held for 15 seconds at each load. Incremental Load: 1000# Applied Load

Cube 1
Break Point = 8700# Applied Load

Cube 2
Break Point = 10,000# Applied Load

Cube 3
Break Point = 13,000# Applied Load

A TCLP sample, 95-MW-003 was collected from Cube 1, GBI-M2.

Continued on Page

Read and Understood By

Christa Williams — Signed — 2/17/95 — Date — S. M. — Signed — 3/6/

Sample GBI-M3
Same procedure is used as for GBI-M2.

Initial Break Point: 6000# Applied Load

For remaining samples Load will be applied in increments of 100# Applied Load and held for 15 secs.

Cube 1
Break point: 6700# Applied Load

Cube 2 Break Point: 6100# Applied Load

Cube 3 Break Point: 10,000# Applied Load

A TCLP sample, 95-MW-004, was collected from Cube 1, GBI-M3 and Cube 2, GBI-M3.

Sample GBI-M1b
Same procedure as above.

Initial Break Point: 11,000 # Applied Load

For Remaining samples Load will be applied in increments of 1,100 # Applied Load and held for 15 secs.

Cube 1: Break Point: 13,300 # Applied Load
Cube 2: Break Point: 15,600 # Applied Load
Cube 3: Break Point: 10,300 # Applied Load

A TCLP sample, 95-MW-005, was collected from Cube 1, GBI-M1b and Cube 2, GBI-M1b

Continued on Page

Read and Understood By

Kristal Williams 2/17/95
Signed Date

S. M. Duncan 3/6/95
Signed Date

2/17/95

Calculation of Density for Cubes.
(Information obtained from pages 16-17)

Sample GB1-M1b

Volume of cube = $8\ in^3 \times \frac{(2.54\ cm)^3}{in^3} = 131.1\ cm^3$

Average Weight = 258.3 g

Density = 258.3 g ÷ 131.1 cc = 1.97 g/cc

Sample GB1-M2

Volume of cube = 131 cc
Average Weight = 257.2 g

Density = 257.2 g ÷ 131 cc = 1.96 g/cc

Sample GB1-M3

Volume of cube = 131 cc
Average Weight = 257.1 g

Density = 257.1 g ÷ 131 cc = 1.96 g/cc

Densities appear to be constant regardless of waste to binder ratio.

Continued on Page

Read and Understood By

Christ J Williams — Signed — 2/17/95 — Date

D. M. Dennis — Signed — 3/6/ — Da

000582

2/17/95 Calculated Results of Crush Strength Tests
(Information obtained from pages 17-18)

Sample GB1-M1b

Average Applied Load = 13300 #
15600 #
10300 #
Σ 39200 #
Average = 13,067 #

Using calibration information from page 3, the actual load is 13,824 #.

Force per unit area = 13,824# ÷ 4 in² = 3,456 psi

Sample GB1-M2

Average Applied Load = 8700 #
10000 #
13000 #
Σ = 31,700 #
Average = 10,567 #

Actual Load from calibration curve = 11,167 #
Force per unit area = 11,167# ÷ 4 in² = 2,792 psi

Sample GB1-M3
Average Applied Load = 6700 #
6100 #
10000 #
Σ = 22,800 #
Average = 7,600 #

Continued on Page 22

Read and Understood By

Christopher Williams 2/17/95 L. M. Simcox 3/6/95
Signed Date Signed Date

Sample GBI-MB (continued)
Actual Load from Calibration Curve = 8,013 #

Force per unit area = 8013# ÷ 4in² = 2003 psi

2/20/95 Density of Cubes (Determination)

Sample GBI-M4 Volume of cube: 8 in³

Weight			
	Cube 1	:	239.9 g
	Cube 2	:	249.4 g
	Cube 3	:	242.2 g
	Σ		731.5 g

Avg: 243.8 g

Sample GBI-M5 Volume of cube: 8 in³

Weight			
	Cube 1	:	193.8 g
	Cube 2	:	198.9 g
	Cube 3	:	196.5 g
	Σ		589.2 g

Avg: 196.4 g

Sample GBI-M6 Volume of cube: 8 in³

Weight			
	Cube 1	:	202.4 g
	Cube 2	:	207.2 g
	Cube 3	:	202.6 g
	Σ		612.2 g

Avg.: 204.1 g

Sample GBI-M7 Volume of cube: 8 in³

Weight			
	Cube 1	:	212.5 g
	Cube 2	:	205.5 g
	Cube 3	:	210.8 g
	Σ		628.8 g

Avg: 209.6 g

Continued on Page

Read and Understood By

Signed Date Signed

2/20/95

3/6

2/20/95 Crush Strength Testing

One cube of sample batch GBI-M16 was placed on the press. Pressure was added slowly until initial break point was reached.
Break point : 1000 # Applied Load.

The samples remaining will be placed on the press one at a time. An applied load will be applied in increments of 1/10 of the initial break point load. Each increment of added pressure will be held constant for 15 seconds.

Incremental Load : 100 # Applied Load

Cube 1 : 900 # Applied Load

Cube 2 : 1000 # Applied Load

Cube 3 : 850 # Applied Load

A TCLP sample was collected from cube 1.
TCLP sample # 95-MW-0016

Sample GBI-M4

Same method for crushing as noted above.
Break Point : 4500 # Applied Load

Incremental Load : 450 # Applied Load

Continued on Page 24

Read and Understood By

Christof Williams 2/20/95
Signed Date

S. M. Duran 3/6/95
Signed Date

A TCLP sample was taken from initial testing cube, 95-MW-007. Additional material added from cubes 1, 2, and 3.

Cube 1: 4600 # Applied ~~Pressure~~ Load (MW 2/20/95)

Cube 2: 5000 # Applied ~~Pressure~~ Load (MW 2/20/95)

Cube 3: 3900 # Applied ~~Pressure~~ Load (MW 2/20/95)

Sample GBI-M5

Same testing method as previous.

Initial Break point: 900 # Applied Load

Incremental Load: 90 # Applied Load

Cube 1: 1080 # Applied Load
Cube 2: 790 # Applied Load
Cube 3: 900 # Applied Load

TCLP Sample was collected from all four of the crushed cubes. Sample No: 95-MW-008

Sample GBI-M7

Same testing method as previous.

Initial Break point: 700 # Applied Load

Incremental Load: 70 # Applied Load

Continued on Page

Read and Understood By

Christafor Williams 2/20/95 — Signed / Date

S. M. Duncan 3/6/ — Signed / Da

Sample GBI-M7 (cont.)
Cube 1: 850 # Applied Load
Cube 2: 700 # Applied Load
Cube 3: 860 # Applied Load

TCLP samples (4 jars) was gathered from all four crushed cubes, 95-MW-009.

Observations: Petroset samples are much softer than the Portland Type I mixes. The petroset cubes are lighter in color and appear more chalky.

2/20/95 Crush Strength TCLP Samples Sent to Lab on 2/20/95. The following tables summarizes sample numbers. Samples 95-MW-001 & 95-MW-002 were submitted 2/6/95.

R&D Sample #	185 LAB Sample #	Description
95-MW-001	1355279	Grit Blast "As Received"
95-MW-002	1355287	Grit Blast -3/8" Material
95-MW-003	1356224	GBI-M2 Crush
95-MW-004	1356267	GBI-M3 Crush
95-MW-005	1356259	GBI-M1b Crush
95-MW-006	1356240	GBI-M6 Crush
95-MW-007	1356216	GBI-M4 Crush
95-MW-008	1356232	GBI-M5 Crush
95-MW-009	1356275	GBI-M7 Crush

Continued on Page

Read and Understood By

Crystal Williams 2/20/95 — Signed / Date
S. M. Duncan 3/6/95 — Signed / Date

2/20/95 CALCULATION OF DENSITY OF CUBES:

VOLUME OF CUBES = 8 in^3 or 131.1 cm^3

Sample GB1-M4

AVERAGE WEIGHT: 243.8 g

DENSITY: 243.8 g ÷ 131.1 cm^3 = 1.86 g/cc

Sample GB1-M5

AVERAGE WEIGHT: 196.4 g

DENSITY: 196.4 g ÷ 131.1 cm^3 = 1.50 g/cc

SAMPLE GB1-M6

AVERAGE WEIGHT: 204.1 g

DENSITY: 204.1 g ÷ 131.1 cm^3 = 1.57 g/cc

SAMPLE GB1-M7

AVERAGE WEIGHT: 209.6 g

DENSITY: 209.6 g ÷ 131.1 cm^3 = 1.60 g/cc

Continued on Page

Read and Understood By

Christal Williams 2/20/95 — Signed / Date

L. M. Duncan 3/6 — Signed / Date

2/20/95

Calculation of Crush Strength
(Information obtained from pages 23-25.)

Sample GBi-M4

AVERAGE LOAD: 4600 # Applied Load
5000 # Applied Load
3900 # Applied Load
Σ 13,500 # Avg Load: 4,500 #

Actual Load from calibration of press: 4,718#
(Information found on page 3.)

Force per unit area: 4,718# ÷ 4 in² = 4,179 psi

Sample GBi-M5

AVERAGE LOAD: 1050 # Applied Load
790 # Applied Load
900 # Applied Load
Σ 2,340 # Avg. Load: 780#

Actual Load from calibration curve: 764 #

Force per unit area: 764# ÷ 4 in² = 191 psi

Sap CHW 2/20/95

Continued on Page 28

Read and Understood By

Krista Williams 2/20 Signed / Date

L. M. Duncan 3/6/95 Signed / Date

2/20/95 Sample GB1-M6

AVERAGE LOAD: 900 # Applied Load
1000 # Applied Load
850 # Applied Load
Σ 2750 # Avg. Load: 917 #

Actual Load from Calibration: 909 #

Force per unit area: 909 # ÷ 4 in² = 227 psi

Sample GB1-M7

AVERAGE LOAD: 850 # Applied Load
700 # Applied Load
810 # Applied Load
Σ 2,410 # Avg Load: 803 #

ACTUAL LOAD from CALIBRATION: 788 #

Force per unit area: 788 # ÷ 4 in² = 197 psi

2/21/95 Calculation of % Moisture from page 12:

Initial sample weight: 656.6 g
Final weight after drying: 613.0 g
Weight of water: 43.6 g

% moisture: 43.6 g ÷ 656.6 g × 100 = 6.64 %

Continued on Page

Read and Understood By

Christof Williams — Signed — 2/21/95 — Date
S M Duncan — Signed — 3/6/9[illegible] — Date

000390

2/21/95 Tabulation of addition of water to mixes. Reporting % moisture of each mix prior to placement in cube molds.

Sample	Waste to Binder Ratio	Waste Amount (g) @ 6.64% moisture	Initial Water in Waste (g)	Amount Dry Waste (g)	Amount Water Added (g)	% moisture prior to molds Amt. of Binder (g)	% Moisture Prior to molds
Portland Type I						700	
GBI-M1	0.4	467	31	436	305	43.5%	22.8%
GBI-M1b	0.4	800	53	747	550	1200	23.6%
GBI-M2	0.5	1000	66.4	933.6	500	1000	22.7%
GBI-M3	0.6	1200	80	1,120	475	800	22.4%
GBI-M4	0.7	1400	93	1,307	465	600	22.6%
Petroset H							
GBI-M5	0.5	1000	66.4	933.6	1375	1000	42.7%
GBI-M6	0.6	1200	80	1,120	1050	800	36.4%
GBI-M7	0.7	1400	93	1,307	925	600	34.8%
GBI-M8	0.8						

SAMPLE CALCULATIONS:

Initial Water in Waste = 0.0664 × Waste Amount
= 0.0664 × 467g = 31 g

Amount Dry Waste = Waste Amount − Initial Water in Waste
= 467 g − 31 g = 436 g

% Moisture = Amount of water [Initial + Added] ÷ Total weight of waste [Waste amount + Water Added + Amount of Binder] × 100%
= [31g + 305g] / [467 + 305 + 700] × 100% = 22.8%

Continued on Page

Read and Understood By

Crystal Williams 2/21/95
Signed Date

L. M. Duncan 3/6/95
Signed Date

PROJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

2/28/95 Preparation of Mix 8: PETROSET H 0.8 wt% waste

Sample: FMB1-M8

Amount of waste: 1600 g

~~Amount of binder: 8 g~~ CHW 2/28/95

Amount of binder: 400 g

Amount of DI water: 500 mL, ~~400 mL~~ CHW 2/28/95, 390 mL

~~890 mL~~ CHW 2/28/95

~~800 mL~~ 500 mL CHW 2/28/95

The waste, 1600 g, and ~~500 mL~~ of DI water were added to the mixing bowl and mixed for 2 minutes. The mix was stirred for 3 more minutes. The pH of the mixture was measured

pH = 5.1

The 400 g of Petroset H binding agent was added and mixed for 5 minutes. The pH of the mixture was then measured.

pH = 7.1*

* Note: had some trouble with pH probe The probe calibrated correctly however the pH was expected to be higher than the observed.

The mix was placed in nine 2"x2"x2" plastic molds, placed in a plastic bag with a moist towel and allowed to set for seven days. The towel used was a piece of cheese cloth. The plastic bag was taped closed. A volume of 450 mL of mix was left in excess after the nine molds were filled.

Continued on Page

Read and Understood By

Chuck Williams 2/28/95 S. M. Duncan 3/6/

Signed Date Signed Dat

/95 Preparation of verification tests.
Per meeting with Dick Kasperalk and Mellissa Thomas it was decided to use Portland Type I with a waste to binder ratio of 0.9. (FERMCO visit 2/28/95)

Mix 9: Sample GB1-M9

Amount of waste: 11600g* 2/28/95 cwb
Amount of binder: 4008
Amount of DI water: 300 mL, 175 mL, 160 mL 2/28/95 cwb
*Note 11600g of waste was rejected due to the use of a scoop that was not identified for this project. A new batch of 11600g was measured.

The waste, 11600g and 300 mL of D.I water was placed in the mixing bowl and mixed for 5 minutes. The binding agent, 400g was added and mixed. An additional 235 mL of water was added slowly while mixing for 5 minutes. The mix was placed into 9 - 2"x2"x2" plastic molds. The molds were placed in a plastic bag with a moist piece of cheese cloth. The bag was taped closed and allowed to cure for seven days.

After the nine molds were prepared, some material was left in mixing bowl. To test the affects of additional water, 10 mL of DI water was added. The mix was mixed by hand and ~~poured~~ 2/28/95 scooped into a 2"x2"x2" mold labeled "GB1-M9 extra H_2O". The mix only filled approximately one half of the mold. The mold was placed in the plastic bags with the other GB1-M9 samples.

Continued on Page

Read and Understood By

t/ Williams 2/28/95 S. M. Duncan 3/6/95
Signed Date Signed Date

3/7/95

7-Day Crush tests - Sample GB1-M8

One cube of sample batch GB1-M8 was placed on the press. Pressure was added slowly to determine initial break point.

MW 3/7/95

Break point = 400 # Applied ~~Pressure~~ Load

The remaining cubes will be tested at increments of applied pressure equal to 1/10 of the break point pressure.

Incremental Load: 40 # Applied Load

Cube 1: Break point - 400 # Applied Load
Cube 2: Break point - 370 # Applied Load
Cube 3: Break point - 350 # Applied Load

$\bar{x} = 373^{\#} - 334 \div 4 = 83.$

A TCLP sample was collected from crushed material of all four cubes combined. The R&D Sample number assigned to the TCLP metals sample is 95-MW-010. The sample will be sent to 105 lab after computer generation of unique sample number.

Continued on Page

Read and Understood By

Christof Williams 3/7/95
Signed Date

D M. Duncan 3/8/9
Signed Date

00065

3/7/95

Density Measurements of Solid Cubes

Sample: GBI-M8:

Cube 1: 210.2 g
Cube 2: 221.1 g
Cube 3: 218.1 g

$\bar{x} = 216.4$ g ÷ 8 = 27.05 g/in³ = 1.65 g/cc

Volume of each cube is 8 in³.

Sample: GBI-M9:

Cube 1: 242.3 g
Cube 2: 241.9 g
Cube 3: 244.3 g

$\bar{x} = 242.8$ g Density = 30.3 g/in³ = 1.85 g/cc

Volume of each cube is 8 in³

3/7/95

7-day Crush tests - Sample GBI-M9
Proving tests

One cube of sample batch GBI-M9 was placed on the press. Pressure was added slowly to determine the initial break point.

Break point: 1200 # Applied Load

The remaining cubes will be tested at increments of 1/10 of the break point pressure.

Continued on Page

Read and Understood By

Christopher Williams — 3/7/95 (Signed / Date)

L. M. Duncan — 3/8/95 (Signed / Date)

PROJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

3/7/95 Incremental Load: 120 pounds Applied Pressur

The incremental pressure will be applied for duration of 15 seconds at that constant pressure.

	Break point
Cube 1:	1300 # Applied Load
Cube 2:	1100 # Applied Load
Cube 3:	1000 # Applied Load

$\bar{x} = 1133^{\#} \rightarrow 1138 \div 4 = 284 psi$

A TCLP sample was collected from crushed material of all four cubes. This sample will be sent to 105 lab for TCLP metals analysis. R&D sample #: 95-MW-011.

A second TCLP sample was collected from crushed material of all four cubes this sample will be sent to a contract laboratory offsite. R&D sample # 95-MW-0

3/7/95 Crush Strength Samples Sent to Labs

R&D Sample #	Samples were not submitted for testing
95-MW-010	
95-MW-011	
95-MW-012	

Continued on Page

Read and Understood By

Christy Williams 3/7/95 — Signed / Date

J M. Dunson 3/8/9 — Signed / D

0/95 Will use incremental load from 7day crush
D Load = 600# since init Break = 6000#

Cube 1 - 9000#

Cube 2 - 8100#

Cub 3 - 10300#

X = 9133#

Strength → 9598 ÷ 4 = 2400

0/95 Standard Concrete mix - NO waste
nD

2000g Portland Type I + 400ml H_2O: After mixing ~2min 800g Portland Type I + 200 ml H_2O was added

total Portland Type I - 3000g
total H_2O - 600 ml

15/95 Sample "GBI-M9 Extra H_2O" → GBI-M9A

A strength integrity test was not conducted on the sample since the size was only 1/2 of the original cube molds. Reference page 31 of this lab book for preparation of this sample.

The sample was crushed and collected for a TCLP sample. The R+D lab number for this sample is 95-MW-013

Continued on Page

Read and Understood By

J M Duncan 3/10/95 J M Duncan 3/16/95
Signed Date Signed Date

PROJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

3/15/95 Crush strength test for Standard Concrete M

A standard concrete mix sample was crushed for collection of TCLP sample after a 5 day curing period. The crush strength of the sample is noted to be 23,500 # Applied Load.

A TCLP sample was collected from the crushed material. The cube did not produce enough material for sample (material means small material).

A second cube was crushed. The break point was 17,000 # Applied Load. This material was also used to collect TCLP sample.

A third cube was crushed. The break point was 18,200 # Applied Load. This material was also used for collection of the TCLP sample.

Standard Concrete Mix - Portland Type I as prepared on page 35 of this ~~labook~~ lab book, was given the R+D Sample # 95-MW-014 for material collected and submitted as TCLP sample.

(dtw 3/15/95)

Continued on Page

Read and Understood By

Christa Williams 3/15/95 — Signed / Date

D M Duncan 3/16 — Signed / D

3/15/95 Submission of TCLP Samples to lab:

Sample Cont. #	RMI lab #	IDS lab #	Requested Analysis	Description
2219913	95-MW-010	1558588	TCLP-metals	Crush - GBI-M8
	95-MW-011	offsite lab*	TCLP-metals	Crush - GBI-M9
2219905	95-MW-012	1558596	TCLP-metals	Crush - GBI-M9
2219897	95-MW-013	1358600	TCLP-metals	Crush - GBI-M9 - Extra Hal
2219889	95-MW-014	1358618	TCLP-metals	Crush - Standard Concrete Portland Type I

Offsite lab will be approved by FERMCO or recommended by FERMCO or other direction from FERMCO.

3/17/95 Standard Concrete Density

1) 267.6
2) 265.2
3) 261.6
4) 267.3
$\bar{X} = 265.42$

$265.42 \div 8 = 33.178$ #/in³
$= 2.102$ #/cc

Crush strengths - 7day

Test Crush → 18000# ÷ 10 = 1800# and Material is Brittle & seems to FRACTURE

1) greater than 24000#
Scale only goes to 24000#, Material did not splinter or FRACTURE at All

2) 23,500#

3) 20,000#

$\bar{X} = 22,500\#$ — SD 3/17/95 ~~2314~~ ÷ 4 = ~~578#/in²~~ — SD 3/17/95
23735 ÷ 4 = 5684

Continued on Page

Read and Understood By

Steve Duncan — Signed — 3/17/95 — Date

Jerry Feather — Signed — 4/09/95 — Date

4/4/95 TCLP Results

105 Lab#	As	Ba	Cd	Cr	Pb	Se	Ag
135858 8	<.007	1.13	<.008	.083	.331	<.017	<.008
135859 6	<.007	.616	<.008	.735	<.007	<.017	<.008
135860 0	<.001	.982	<.001	.601	<.015	.010	<.020
135861 8	<.001	1.34	<.001	.061	.017	<.008	<.020

4/6/95 Calculation of % Moisture of samples GBI-M8 and GBI-M9.

Sample GBI-M8 information obtained from page 30 of this labbook.

% moisture of "as received" waste is 6.64% per calculations on page 28 of this lab book.

Total weight of material input to sample GBI-M8 = 2890
Weight of "as received" waste in GBI-M8 = 1600g
Weight of water in "as received" waste in GBI-M8:
~~total~~ cw 4/6/95
6.64% of 1600g waste = 106.24g water

Total weight of water in GBI-M8 = 890g added + 106.24g
= 996.24g total wat

% moisture of GBI-M8:

996.24g water ÷ 2890g total x 100 = 34.5% mois

Continued on P

Read and Understood By

Chantal Williams — Signed — 4/6/95 — Date — J M Duncan — Signed — 4/

000400

4/6/95

% Moisture calculation for sample GBI-M9

Information obtained from page 31 of this lab book.

% moisture of "as received" waste is 6.64% per page 28 of this lab book.

Total weight of material input to sample GBI-M9 = 2535 g
Weight of "as received" waste in GBI-M9 = 1600 g
Weight of water in "as received" waste in GBI-M9:

6.64% of 1600 g waste = 106.24 g water

Total weight of water in GBI-M9 = 535 g added + 106.24 g water
= 641.24 g water

% moisture of GBI-M9:

641.24 g water ÷ 2535 g total × 100 = 25.3% moisture

Continued on Page

Read and Understood By

S M Duncan — Signed — 4/6/95 Date

Jerry Scatter — Signed — 8/10/95 Date

PROJECT Inspection of FE-05-95-01, 02, & 03 Notebook No._____

Continued From Page_____

5/18/95 Inner container Gross wt - 23529g Furnace Salts
This is ~~Sump Cake~~ 5/18/95 Furnace Salts material. Seal #2910 UTSJ FE-05-95-

Container was opened - Visual inspection material was mostly Dark chunky material with some white chunks. Material looks damp.

- Note: Shipping documents indicated that this material was for Sump Cake, however the inner container label indicated that it was Furnace Salts. D. Kasprzak looked at material & confirmed that it was Furnace Salts.

Inspection of FE-05-95-02 Gross wt - 25392g (Inner Co
Seal # 2987 label on inner container indicates material is Sump Cake
Visual inspection -
Material is Sump Cake, material is soft, moist, lumpy. It is dark in color with flecks of yellow (probably Yellow Cake). Material stuck to scoop. Clumps are easily broken up with scoop. There are a few pieces of wood, beam bristles, paper, plastic

Material appears to be uniform.

Inspection of FE-05-95-03 Gross wt of inner Cont - 20825
This is construction rubble Seal # 2974 Visual inspection → material on top is large pieces of peeled paint (paint chips) mostly ≈ 2" X ½ inches in size. Some paint is orange & some is silver paint. The back of the paint chips appear to have rust from the equipment. (Rusty equipment was probably painted over) After stirring to the bottom there appears to be soil materia

Continued on Page

Read and Understood By

Steve Duncan Signed — 5/18/95 Date — T R W Signed — 5/19 Da

000502

JECT Inspection of FE-05-95-04

5/95 Inner Cont gross wt - 11138g - ~~Construction Rubble~~ Misc TRASH
SAA1 # 2959 AD 5/19/95

Visual Inspection - Fine dirt, cardboard, paper, Rubber, Rubber glove pieces, strands of Fibrous material (probably from some Filter). Material is dusty. Probably from sweeping the Floor. Material is light weight. Pieces of leather from gloves, green tape, wipers, Filter material (paper),

5/19/95 - Opened Furnace salts. Found Large green soft chunk of material (maybe UO_2) Put 14.8g in Crucible & will Fire to oxide

151.6g wt - Hard piece of material probably a brick piece. will try to wash with Some N_2O - Was able to dissolve with Water.

Filled 2 - 2ℓ Bottles of Grab samples from 5gallon pail.

Bottle 1 → Gross - 2718.0g
Tare - 203.6g
Net 2514.4g

Bottle 2 → Gross - 2553.4g
Tare - 203.4g

Sieve Analysis is Bottle # 1

> 3/8" -	1079.8g
> 1/4" -	154.3g
> 0.078" -	371.0g
< 0.078" -	909.3g
	2514.4g

Performed size reduction with hammer on > 3/8" size fraction.
Crush test - 272.1g used (introduced into process)

5/19/95 Bottle # 2 - Did not perform A screen analysis. But, size Reduced to less than 3/8" using Hammer.

Continued on Page

Read and Understood By

Signed Date Signed Date

5/19/95 5/19/95

Notebook No.

PROJECT Misc TRASH - Size Reduction

Continued From Page

5/19/95 SD — Started size Reduction of Misc TRASH. The SAMPLE CAN WAS ± 50% Fines ± 50% TRASH. (Paper, Plastic, et

A screen ANALYSIS was not performed due to presence of so much large trash & YARN like m A lot of the dirt in bottom is Fine. Mabe from sweeping up.

SCISORS worked well for size Reduction. ~~All of the bucket was poured into A pan &~~ SD 5/ most All of the large TRASH was Removed & placed A pan.

5/22/95 SD — A CAMERA was obtained & Pictures of TRASH A F were taken.

A two liter bottle of the Fines were collected. Th TRASH was size reduced to ≈ 1/4" to 3/8" size & Plac in A 2-liter bottle. 2 2liters were collected. Size Reduction was performed with large SHEARS. T TRASH was sorted through & pieces of materia was selected & Size Reduced. An Attempt was m to select MATERIAL based on the Amount present. For example: There was A MAJORITY of the TRASH made up of YARN like Material, therefore most of the size reduced material is made up YARN like material.

Material Collected —

1 each — 2 liter bottle of Fines

1 each — 2 liter bottle of size reduced TRAS

Continued on Pa

Read and Understood By

S. M Duncan — Signed — 5/22/95 — Date — Jerry Feathers — Signed — 5/

ECT Sump Cake - Size Reduction

22 SD 5/23/95
5/19/95 Container was opened and material removed from top layer. Material was screened through 3/8" sieve. Bottom layers were wet sticky material which would not pass through screen.

Material size fraction was not performed because material was too wet to screen.

Material was removed from various layers & placed in a 5gal bag. Bag was tumbled to mix & TCLP sample was collected

Sample # 95-~~GB-001~~ MW SD 5/23/95 015 Initial TCLP (95-MW-015)

Material was so wet that the sample balled up upon shaking.

Pictures of this material were taken.

Material Collected -

2 each - 4 liter Bottles

20 5/24/95
5/23/95 ~~Construction Rubble~~

Container opened & Print chips removed. Estimated Volume of print chips ≈ 25% of 5gal pail. The Remaining material was a dark sandy material. The material was damp & stuck together. The sandy material was passed through a 3/8" Sieve to break it up.

Pictures were taken of this material.

Continued on Page

Read and Understood By

Signed 5/22/95 Date

Signed 5/23/95 Date

PROJECT 5/23/95 Fernco Mixed Waste

Notebook No.

Continued From Page

5/19/95

SD The Paint chips were broken up to pass 3/8" screen By placing in 4-l Plastic beaker & hit using SS Flat sta

The Paint chips were placed in A 2-l Bottle.
The Sandy material was placed in A seperate 2-l

This Material is not homogeneous due to the 2 material types - 1) Paint Chips ≈ 25% of Volume (est
2) Fines ≈ 75% of Volume (est

- A size FRACTion was not obtained since the pain chips were so large → 2-3 inches square and also because the fines were damp.

Total weight of the paint chips ≈ 2.02 Kg (All
Total weight of sandy material ≈ 18.16 Kg
20.18 Kg Tota

We collected 599g of paint chips For size reduction
We collected 2899g of Fines

Chips BY wt Calculation

5/20/95 The paint chips ARE ≈ 10% of total wt in bucket

∴ if we have 2899g fines - 2899 X
3899 ÷ 0.9 = 3221g total we

3221g − 2899 = 322g of Chips fines needed For 10% by wt
SD 5/20/95

Chips BY Vol Calculation

The 5gAl Bucket had ≈ 4.5 gallons in bucket

2.02 KG Chips = 1.12 gallons @ 25% BY Vol → Dens. 1K = 1.8 KG/gal = 0.4
18.16 Kg Fines = 3.37 gallons @ 75% BY Vol = 5.39 Kg/GAL

We have 2l of Fines 2l ÷ 0.75 = 2.667 litres tot → 0.67K chips nee

0.671 × 0.475 Kg / l = 0.318 Kg Chips needed
BY Volume
SD 5/20/95

Continued on Page

Read and Understood By

L. M. Duncan — 5/19/95 — Signed / Date

Jennifer Leathers — 6/23 — Signed / Date

000406

5/23/95

3
495 The calculation for the amount of chips per wt basis is 322g chips per 2l of fines

The calculation for the amount of chips per volume of total (25% of volume in original sample) is 318g of chips per 2l of fines.

This is a close agreement. We will use 322g of chips size Reduced to < 3/8" Blended with 2l of fines.

Initial TCLP of Blended Material From Construction Rubble →

Sample # ~~95-0~~ 95-MW-016

Furnace Salts Blended & Sampled

Blended Sample # 95-MW-017

Misc TRASH Sampled → 50% of sample by Vol from Fines
50% of sample by Vol from size Reduced TRASH

Sample # 95-MW-018

All samples put in Computer & sent to lab on 5/23/95

Requested ANALYSIS → TCLP Metals

Continued on Page

Read and Understood By

D Duncan 5/23/95 Signed Date

Jerry Leathers 5/23/95 Signed Date

5/23/95

[% H_2O :]

Construction Rubble 03	G	218.8	204.4	103.1		%
	T	115.7	115.7	88.7		
		103.1	88.7	14.4 ÷ 103.1 × 100 =		
Furnace Salts 01	G	218.9	209.9	101.9		
	T	117.0	117.0	92.9		
		101.9	92.9	9.0 ÷ 101.9 × 100 =		
Sump Cake 02	G	220.0	190.3	103.0		
	T	117.0	117.0	73.3		
		103.0	73.3	29.7 ÷ 103.3 × 100 =		
Misc. Trash 04	G	212.7	210.8	103.3		
	T	109.4	109.4	101.4		
		103.3	101.4	1.9 ÷ 103.3 × 100 =		

[BULK DENSITY]

Construction Rubble (250 ml) 03	G	577.7	298.9 g / 250 cc =	1.20 g/cc
	T	279.8		
		298.9		
Furnace Salts (250 ml) 01	G	673.4	284.4 g / 250 cc =	1.14 g/cc
	T	389.0		
		284.4		

Continued on Page

Jerry Fleetwood — Signed — 5/23/95 — Date

Read and Understood By
D. M. Duree — Signed — 5/2

BULK DENSITY (CONT.)

Slump Cake G 753.0
oz T 389.5
363.5

$\frac{363.5g}{250cc} = 1.45$ g/cc

Preparation of Mix 1 Sample SC 1-M1 - 60% Waste
Amount of Waste - 1200 g
Amount of Portland Cement - 800 g
Amount of H_2O - 475 ml

Waste Slurried with 275 ml H_2O pH 3.0 mixed 5 min

Waste mixed with Portland cement and 475 ml H_2O - pH 12.0
Mixed 5 minutes
- A good mix and appears to pour good - Would pour from drum without much difficulty

The mix was placed in 9 2"x2"x2" plastic molds, placed in a plastic bag with wet paper towel, taped shut to be allowed to set 7 days. A volume of 175 ml was the measured excess after the 9 molds had been filled. May 30, 1995 a seven day crush will be performed and TCLP samples taken.

Continued on Page

Read and Understood By

Jerry Fentress — Signed — 5/23/95 Date
S. M. Duncan — Signed — 5/24/95 Date

5/24/95
SD

Penetrometer Reading of Mix 1 - SC1-M1 indicates A Reading of 20 lbs/in². This is extremely low. An Ammonia smell was noticed when sealed bag was opened.

Preparation of Furnace Salt Mix 1 (FS1-M1)

Amount of waste - 1200g R&D Sample # 95-MW-023
Amount of Portland Cement - 800g
Amount of H_2O - 540 ml

- Waste slurried with 400 ml H_2O - Mix Time 5 min - pH 3.1
- ADDED Portland Cement Mixed 5 minutes - 140 ml H_2O Added - No pH obtainable - Maximum of Probe.
- The Mix was placed in 9 2"x2"x2" plastic molds, placed in a plastic bag with wet cheesecloth, Taped Shut to be allowed to set for 7 days. After the 9 molds were filled the excess mixture was 1448 grams
May 31, 1995 A seven day crush will be performed and TCLP samples taken.

Preparation of Furnace Salt Mix 2 (FS1-M2

Amount of Waste =
Amount of Portland Cement =
Amount of H_2O =

Not Done at this time

Continued on Page

Read and Understood By

S. M. Duncan — Signed — 5/24/95 — Date
Jerry Feather — Signed — 5/24/95 — Date

000410

5/24/95 50% Waste Loading

Preparation of Construction Rubble Mix 1 (CR1-M1)

Amount of Waste — 1200g
Amount of Portland Cement — 800g + 400g = 1200g
Amount of H_2O — 540 ml

- Waste Slurried with 400 ml H_2O Mix Time - 5 min - pH - 6.1
- Added Portland Cement + 100 ml H_2O mixed 5 min - pH - Not obtainable - Insta-Chek Jumbo pH paper pH 12.0
- The Mix had another 40 ml of H_2O added and mixed. The mixture was placed in 9 2"x2"x2" plastic molds, placed in a plastic bag wit wet cheesecloth, Taped shut to be stacked to set for 7 days. After the molds were filled there was an excess of 325 mls of the mixture. May 31, 1995 @ seven day crush will be performed and TCLP samples taken.
- Becomes 50-50 mixture
- Taken out of bag and left uncovered.

Preparation of Simp Cake Mix 1A (SC1-M1A, SC1-Mix 1A)

Amount of Waste — 600g — RD sample # 95-MW-026
Amount of Portland Cement — 400g
Amount of H_2O — ~~330 ml~~ of 230 ml

Slurried waste with 200 ml H_2O, Mix 5 minutes, pH 7.0

Continued on Page

Read and Understood By

Jerry McHatton Signed 5/24/95 Date — Steve Duncan Signed 6/14/95 Date

5/24/95

- Temp 70°F before neutralization
- Neutralized with 9 ml of 25% by weight NaOH Solution pH
- Temp 70.5°F After
- Added Portland Cement type I mixed 5 minutes pH- 12.0 with paper
- The mix was placed in Five 2"x2"x2" plastic molds. There was no excess mixture. Left uncovered, will set for 7 days. On May 31, 1995 a Seven day crush will be performed and TCLP samples taken. On May 31, 1995 a Seven day Crush will be performed and TCLP Samples Taken.

5/25/95

	Concrete Penetrometer Readings ↓	Setting Hours	
Mix FS1-ML-	80	24	
Mix SC1-M1A	270 200 280 x 250	12	
CR1-M1	> 700	24	Puffed up ≈ 1/4"
SC1-ML	> 700	36	

Continued on Page

Read and Understood By

Signed _____ Date 5/24/95 Signed _____ Date 6/19/95

5/25

Preparation of Miscellaneous Trash Mix (MTA-M1)

Amount of Waste = 800 ml (688g) see note below
Amount of Portland Cement = 800g
Amount of H_2O = 690 ml

382g Rejected material (rocks)

Note: 400 ml of < 3/8 material - 600 g
(see revised) 900 ml of > 3/8 Lightly packed - 88 g

- Waste slurried with 350 ml H_2O, Mixed 5 minutes, pH 6.0 paper ~~Fiber~~ Fiberous Material ~~were~~ balled up into compact wads, had to step and pull apart. Added 70 ml H_2O.

- Added Portland Cement, mixed 5 minutes, Added 240 ml H_2O, pH - 12.0 (paper).

- The mix was then placed in 9 2"x2"x2" plastic molds. ~~Then~~ THE molds were then placed in a fume hood to set for seven days. On June 1, 1995 a seven day crush will be performed and TCLP samples taken.

Preparation of Furnace Salts Mix (FSL-M1A)

Amount of Waste = 600g
Amount of Portland Cement = 400g
Amount of H_2O = 180 ml

Waste slurried with 150 ml H_2O pH adjust to 12.0 with 25% w/w NaOH and Mixed 5 minutes.

Continued on Page

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Signed: [illegible] Date: 5/25/95

Signed: J. M. Duran Date: 6/19/95

OJECT FERMCO Mixed Waste Notebook No._____

Continued From Page_____

5/25/95

- Added 400g Portland Cement, 30 ml H_2O, Mixed 5 minutes, pH 12.0 (paper).
- The mix was placed in four 2"x2"x2" plastic molds. There was 150 cc of excess mix. The molds were placed in a fume hood to set for 7 days. On June 1, 1995 a seven day crush will be performed and TCLP samples taken.

5/26/95

Preparation of Construction Rubble Mix (CRI-MIX)

Amount of Waste — 600g
Amount of Portland Cement — 400g
Amount of H_2O — 150ml

- Waste slurried with 125 ml of H_2O, Mixed 5 minutes, adjusted pH to 12.0 with 25% w/w NaOH. Allowed to soak for 4 hours (0810 - 1210). 5 cc of 25% NaOH - Mixed every 30 minutes for 1 minute.
- Added 400g Portland Cement, 25 ml H_2O, and Mixed for 5 minutes. The mix was placed in 5 2"x2"x2" plastic molds. There was no excess mix. The molds were placed in a fume hood to dry for 7 days. On June 2, 95 a seven day crush will be performed and TCLP samples Taken.

Continued on Page

Read and Understood By

Jerry Faulkner — Signed — 5/25/95 — Date

L M Duncan — Signed — 6/19/95 — Date

5/26/95

Concrete Penetrometer Reading's

Mix #	Reading	Hours Set	
SC1-M1	>700	48	
SC1-M1A	>700	24	
FS1-M1	80	36	
FS1-M1A	80	12	
CR1-M1	>700	36	(Buffed UP)
MT1-M1	>700	24	

833 CRUSH STRENGTH CALIBRATION Gauge - 10,000#

LOAD (Y)	Proving Ring #	PRDO#	
400	173	349	r = .9993
	175	393	
	174	351	
		$\bar{x}$ 351	
800	374	733	
	377	739	
	374	733	
		$\bar{x}$ 735	
1000	490	955	
	488	951	
	488	951	
		$\bar{x}$ 952	
1500	720	1395	
	716	1388	
	718	1391	
		$\bar{x}$ 1391	

Continued on Page

Read and Understood By

Signed 5/26/95 Date

Signed 6/19/95 Date

5/30/95

Concrete Penetrometer:

CR1-M1A > 700

Density (2"x2"x2" block):

SC1-M1 = $\frac{212.2}{125}$ = 1.70 g/cc

SC1-M1A = $\frac{218.1}{125}$ = 1.74 g/cc

CR1-M1 = $\frac{224.4}{125}$ = 1.79 g/cc

CR1-M1A = $\frac{211.3}{125}$ = 1.69 g/cc

MT1-M1 = $\frac{193.9}{125}$ = 1.55 g/cc

Bulk Density Initial

MTrash (200 ml) = $\frac{283.6}{108.1}$ $\frac{175.5}{175.5}$ $\frac{175.5}{200}$ = .88 g/cc

Will do remainder of densities on day of crush.

Continued on Page

Jerry Matthews Signed 5/30/95 Date

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J M Duncan Signed 6/19/95 Date

5/30/95

Preparation of Furnace Salts 2 Mix ~~2~~ 1 (FS2 - M1)

40% waste Load (FS1-M2)

Amount of Waste - 400g
Amount of ~~Cement~~ Portland Cement - 600g
Amount of H_2O - 270ml

RMD Sample # 95-MW-027

- Waste slurried with slurried with 110 ml of H_2O, mixed 5 minutes, pH - 11.0, Adjusted pH to 12.0 with 20cc of 25% w/v NaOH.

- Added 600 g Portland Cement (Type I), 160 ml H_2O, and mixed for five (5) minutes, pH 12.0. Mix was placed in six 2"x2"x2" plastic molds and placed in a fume hood to dry for 7 days. June 6, 1995 a seven day crush will be performed and TCLP Sample taken. No excess mix remained in plastic molds at 1050 hours.

SC1-M1 (2"x2"x2" blocks):

RMD Sample # 95-MW-014

wt — 211.2 g
216.8
212.6
$\bar{x}$ 213.5 = 1.71 g/cc

7 day Crush Initial ~~3700~~ 2600 psi

#1	3000	psi
#2	2900	psi
#3	3050	psi
$\bar{x}$	2983	psi

2812 lbs ÷ 4 in² = 703 PSI

Actual 2812 ~~PSI~~ in²

Continued on Page

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Signed	Date	Signed	Date
5/30/95		6/19/95	

JECT FERNCO Mixed Waste Notebook No.

Continued From Page

5/30/95

Ref: Preparation of Construction Rubble Mix (CR1-M2) 70% waste Load

Amount of waste = 700 g
Amount of Portland Cement (Type I) = 300 g
Amount of H_2O = 150 ml

- Waste Stirred with 125 ml H_2O, mix 5 min. pH 8.0. Adjusted pH to 12.0 with 25% w/w NaOH, soaked hour #5/31/95 3 cc 25% NaOH used. Soaked for one hour. Mix was then placed in 5 2"x2"x2" plastic molds and placed in a fume hood to dry for 7 days (152.5 hours). Before mix was placed in molds 300 g of Portland Cement Type I was mixed into slurry for 5 min. An Additional 25 ml of H_2O was added. June 6, 1995 a seven day crush will be performed and TCLP sample taken.

5/31/95

Concrete Penetrometer:

FS1-M2	24 hour	200	3 hr - 300	
CR1-M2	12 hour	200	24 hr - 450	

Do SC1-M2 70% waste loading

Do CR1-M3 30% waste loading with 4 hour soak

Continued on Page

Read and Understood By

my Signed 000418 5/30/95 Date

S M Duncan Signed 6/19/95 Date

5/31/95

CR1-M1 WT: 214.5 R&D Sample # 95-MW-02P
218.0
217.1
$\bar{x}$ 216.5 den $\frac{216.5}{125}$ = 1.73 g/cc

7 day Crush Initial - 1400 psi

#1 1300 psi
#2 1700 psi
#3 1200 psi
$\bar{x}$ 1400

Actual 1308 ~~PSI~~
1308 lbs ÷ 4 in^2 = 327 PSI

SC1-M1A WT: 212.0 R&D Sample # 95-MW-02I
213.6
219.8
$\bar{x}$ 215.1 den = $\frac{215.1}{125}$ = 1.72 g/cc

7 day Crush - Initial - 3200 psi

#1 2100 psi
#2 2000 psi
#3 2800 psi
$\bar{x}$ 2300

Actual 2163 ~~PSI~~
2163 lbs ÷ 4 in^2 = 541 PSI

prep of 25% waste loading furnace
Salts next page (5B)

Continued on Page

Read and Understood By

Jerry Feather 5/31/95 Signed Date
Jim Duncan 6/19/95 Signed Date

OJECT Mixed FERMON WASTE 1

Notebook No._____

Continued From Page_____

5/31/95

Preparation of Furnace Soil/Slag Mix (FS1-M3)

Amount of waste - 250 g
Amount of Portland Cement - 750 g
Amount of H_2O - 240 ml

Total of 1 kg Mixture

- Slurried waste with 50 ml H_2O - pH = 3.0 - Adjusted pH to 12.0 with 25% w/w NaOH and mixed 5 minutes. Used 5 cc NaOH.

- Added Portland cement (750g), 240 ml H_2O, and mixed for five minutes. Placed mixture in 5 2"x2"x2" plastic molds and placed in Fume Hood to dry for 7 days. June 7, 1995 a seven day crush will be performed and a hold sample taken.

Continued on Page

Signed Jerry Feather 5/31/95 Date

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Signed Jim Duncan 6/19 Date

000460

ECT FERMCO Mixed Waste Notebook No. _____ Continued From Page _____

95

Concrete Penetrometer 48 hrs:

FS1-M2 — 350

CR1-M2 — >700

Concrete Penetrometer 24 hrs:

FS1-M3 — >700

7 Day Crush:

R&D Sample # 95-MW-022

MT1-M1:

Initial - 4100

Wts			
1 - 195.0		#1 - 3700	3113 lbs ÷ 4 in² = 778 PSI
2 - 199.3		#2 - 3100	
3 - 189.0	1.54 lb/in³	#3 - 3100	
~~X 192.8 = 4.54 g/cc~~		9900	Actual = 3113 PSI
/125		3300	

Preparation of Construction Rubble Mix (CR1-M3)

Amount of Waste 800g
Amount of Portland cement 200g
Amount of H₂O 155 ml

0900 Slurried waste with 140 ml H₂O, pH 10.50 adjusted pH to 12.0 with 30-35% w/v NaOH. Measured vapor with Sensidyne/Gastec Tubes 50/a = 17 ppm ammonia
Allowed to soak until 1300 hours

Continued on Page 60

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Signed _____ Date 6/1/95

Signed _____ Date 6/14/95

OJECT FERNCO M.W.

Notebook No.

Continued From Page

6/1/95 - CRJ-M3

— Added 200g Portland cement (Type I), 15 ml H_2O, and mixed for 5 minutes. Placed mixture in 6 2"x2"x2" plastic molds. There was no excess mixture. The plastic molds were placed in a fume hood to set for 7 days. June 8, 1995 a seven day crush will be performed and a TCLP sample taken.

Preparation of Sump Cake Mix (SCJ-M2) 7th

Amount of waste — 700g
Amount of Portland Cement — 300g
Amount of H_2O — 190ml

- waste slurried with 80 ml H_2O, pH-4.0 (paper) after 5 min Mix. Adjusted pH 12.0 and mixed 5 min. pH was adjusted with 6cc 25% w/w NaOH.
- Added 300g of Portland Cement (Type I), 110 ml H_2O and mixed for 5 minutes. Mixture was then placed in 5 2"x2"x2" plastic molds and the molds were placed in a fume hood to set for 7 days. On June 8, 1995 a seven day crush will be performed and a TCLP sample taken.

Continued on Page

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Jerry Feather — Signed — 6/1/95 — Date

D M Duncan — Signed — 6/19/95 — Date

UUU-1606

'95

CR1-M1A:

R&D Sample 95-MW-023

Wt 1- 202.3
2- 206.1
3- 204.5
$\bar{x}$ 204.3

$\frac{204.3}{125} = 1.63$ g/cc

7 day crush:

Initial - 1950

#1 - 1950 psi
#2 - 2000 psi
#3 - 2000 psi
$\bar{x}$ 1983

Mod21 = 1862 PSI

1862 lbs ÷ 4 in² = 466 psi

Concrete Penetrometer:

FS1-M3 - 48 hours - >700

CR1-M3 - 24 hours - 220

SC1-M2 - 24 hours - 230

Preparation of Furnace Salts Mix (FS2-M1)

Amount of Waste - 500g
Amount of Aquaset II H - 500g
Amount of H_2O - 270 ml

Waste slurried with 50 ml H_2O, mixed 5 minutes, pH - 5.0, adjusted pH to 12.0 with 25% w/w NaOH.

Continued on Page 62

Read and Understood By

W Patterson
Signed
6/2/95
Date

J M Duncan
Signed
6/19/95
Date

6/2/95

Added 500g Aquaset II H, 1220 ml H_2O, and 5" mixe to pourable mixture. Placed mixture in nine (9) 2"x2"x2" plastic molds. There was an excess of 350 ml of mixture left over. The plastic molds were placed in a fume hood to set for 7 days. June 9, 1995 a seven day crush will be performed and a TCLP sample Taken.

6/5/95

Concrete Penetrometer:

CR1-M3 - 96 hrs - >700

SC1-M2 - 96 hrs - >700

FS2-M1 - 72 hrs - 0 # cracks in mixture

Preparation of MSC Trash Mix (MTL-M2)

Amount of waste used — 600 ml
Amount of Portland Cement (Type 1) — 400 g
Amount of H_2O — 370 ml

Note: 300 ml of < 3/8 material — 408g
Size reduced → 300 ml of > 3/8 material (lightly packed) — 56g

- Waste slurried with 200 ml H_2O, mixed 5 min, pH 5.0
- Added 400 g concrete, 370 ml H_2O, and mixed for 15 minutes, pH 12.0 (paper)

Continued on Page 63

Jerry Fletcher — Signed — 6/5/95 — Date
6/2/95
D M Duncan — Read and Understood By — Signed — 6/19/95 — Date

000423

6/5/95

MU-112 cont.

placed mixture in 6 2"x2"x2" plastic molds and placed in fume hood to set for seven days. June 12, 1995 a seven day crush will be performed and TCLP sample taken.

Preparation of Furnace Salts Mix (FS1-M4)

Amount of Waste — 300g
Amount of Portland Cement (type I) — 700g
Amount of H_2O — 275ml

— Slurried waste with 60 ml H_2O mixed 5 min, pH = 4.0. Adjusted pH to 12.0 with 25% w/w NaOH 9 ml.

— Added 700g of Portland cement 215 ml H_2O, and mixed for 5 minutes. Mixture was then placed in 5 2"x2"x2" plastic molds. The molds were then placed in fume hood to set for seven days. On June 12, 1995 a seven day crush will be performed and TCLP sample taken.

Continued on Page

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J M Duncan — Signed — 6/19/95 — Date

6/6/95

Concrete Penetrometer:

MT1-M2 - 24 hours - >700

FS1-M4 - 24 hours - >700

7 day Crush & Density

CR1-M2 R&D Sample # 95-MW-024

wt 1- 193.2
2- 191.0
3- 188.4
÷ 1909

190.9 / 125 = 1.53 g/cc

Initial Crush - 550 PSI

#1 - 310
#2 - 390
#3 - 380
÷ 360 PSI

~~Actual~~ Actual 321 ~~PSI~~

321 lbs ÷ 4 in² = 80 PSI

Four TCLP Metals samples sent to Lab:

FS1-M1
FS1-M1A
FS1-M2
CR1-M2

Continued on Page

Jerry Fratus
Signed

6/16/95
Date

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C L Duncan
Signed

6/19/95
Date

OJECT FERMCO M.W. Notebook No. Continued From Page

6/6/95

Preparation of Const. Rubble Mix (CR1-M2A)

Amount of Waste = 700g
Amount of Portland Cement = 300g
Amount of H_2O = 145 ml

- Waste slurried with 125 ml H_2O, mixed 5 minutes pH-7. Adjusted pH to 12 with 25% w/w NaOH. ~~Adjusted to~~ pH Let soak for 4 hours.

- Added 300g of Portland Cement (Type I), mixed 5 minutes with 20 ml H_2O. Mixture was then placed in 6 2"x2"x2" plastic molds. The 6 molds were then placed in a fume hood to set for 7 days. On June 13, 1995 a seven day crush will be performed and TCLP sample taken.

Continued on Page

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6/7/95

Concrete Penetrometer:

MJ1 - M12 - 48 hr - >700

FSJ - M4 - 48 hr - >700

7 Day Crush and Density

FSJ-M3: wt 1 - 249.0
2 - 252.6
3 - 254.3
$\bar{x}$ 253.3

R&D Sample # 95-MW-028

Den = 253.3 / 125 = 2.03 g/cc

Initial Crush - 5800

#1 6800 PSI
#2 6000
#3 7000
$\bar{x}$ 6600

(Actual) 6246 PSI

6246 lb ÷ 4 in² = 1562 PSI

Concrete Penetrometer:

CR1 - M2A - 24 hour - 520

Continued on Page

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6/19/95

PROJECT FERMCO M.W. Notebook No. 67 Continued From Page

6/8/95

Preparation of Sample Mix SA1-M3

Amount of Waste = 800g
Amount of Portland Cement (Type 1) = 200g
Amount of H_2O = 120ml

- Slurried waste with 50 ml H_2O, mixed 5 minutes, pH of 5. Adjusted pH to 12.0. Mixed 5 minutes used 7 ml of 25% w/w NaOH.
- Added Portland cement and 70 ml H_2O, Mixed Five minutes. Placed mixture in 5 2"x2"x2" plastic molds. Placed molds in fume hood to set for 7 days. June 15, 1995 a seven day crush will be performed and TCLP sample taken.

Preparation of Misc. Trash Mix ~~AE~~ MT1-M3

JF6K (MT1-M3)

Amount of ~~Waste~~ = ~~600g~~
Amount of Portland Cement = 400g
Amount of H_2O = 350 ml

Weighed ½ of 600 g ~~waste~~ waste from fines, took volume and then added that amount of Lightly packed size-reduced waste. WT 345.5 g

- Waste slurried with 150 ml H_2O & Mixed for 5 minutes. pH 5.0. Adjusted pH to 12.0 and mixed 5 minutes. Used ml 25% w/w NaOH
- Added Portland Cement, 150 ml H_2O, and Mixed

Continued on Page 68

Jerry Feather — Signed — 6/8/95 — Date

Read and Understood By

S M Duncan — Signed — 6/19/95 — Date

6/8/95

for 5 minutes. The mixture was then placed in 5 2"x2"x2" plastic molds. The molds were then placed in a fume hood to set. On June 15, 1995 a seven day crush will be performed and TCLP sample taken. Fifth mold was approx 60% full.

Preparation of Misc. Trash Mix MTI-M4

Amount of waste - 700g (matched fines fol with Trash M
Amount of Portland Cement - 300g
Amount of H_2O - 500

- Spiked waste with 225 ml H_2O, Mixed 5 minutes, pH - 6. Adjusted pH to 12.0 using 25% w/w NaOH.

- Added Portland cement, 225 ml H_2O, mixed 5 minutes. Placed mixture in 7 2"x2"x2" plastic molds. Molds were placed in fume hood to set for 7 days. June 15, 1995 a seven day crush will be performed and TCLP sample taken. Additional mix mixture 75 ml

Preparation of Misc. Trash Mix MTI-M5

Amount of waste - 800g (wt of trash & fines
Amount of Portland Cement - 300g
Amount of H_2O - 575 ml

Continued on Page 69

Signed — Date — Read and Understood By — Signed — Date

6/8/95 — 6/19/95

6/8/95

- Slurried Waste with 300 ml H_2O, mixed 5 minutes, pH = 9.0. Adjusted pH to 12 with 25% w/w NaOH.

- Added Portland Cement, 165 ml H_2O, mixed 5 minutes. Mixture was placed in 8 2"x2"x2" plastic molds. The molds were placed in a fume hood to set. On June 15, 1995 a seven day crush will be performed and TCLP sample Taken.

SD1-M2 Crush & Density

Density 1 211.9
2 214.8
3 212.2
$\bar{x}$ 213.0

R&D Sample # 95-MW-030

Den = 213 / 125 = 1.70 g/cc

Initial Crush - 1900 PSI

#1 - 2000 PSI
#2 - 1900
#3 - 2000
$\bar{x}$ 1967

Actual 1847 PSI

1847 ÷ 4 = 462 PSI

Continued on Page

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Signed 6/8/95 Date — Signed 6/19/95 Date

6/8/95

CR1-MW3 Crush & Density

Density

1	164.1
2	164.9
3	166.1
$\bar{x}$	164.9

S R&D Sample # 95-MW-0

$$Den = \frac{164.9}{126} = 1.32 \text{ g/cc}$$

Initial Crush – 300 PSI

#1 –	280
#2 –	290
#3 –	250
$\bar{x}$	273

Actual 238 PSI

$238 \div 4 = 60$ PSI

Continued on Page

Signed

6/8/95
Date

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S M Duncan
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6/19/95
Date

6/9/95

Concrete Penetrometer

SC1-M3 – 24 hour – 300 PSI

BMT1-M3 – 24 hour – >700 PSI

MT1-M4 – 24 hour – 600 PSI

MT1-M5 – 24 hour – 500 PSI

Sampled FS2-M1 for TCLP Metals R&D# 95-MW-03

6/12/95

Concrete Penetrometer

SC1-M3 – 96 hours – 640 PSI

MT1-M3 – 96 hours – >700 PSI

MT1-M4 – 96 hours – >700 PSI

MT1-M5 – 96 hours – >700 PSI

Mixes were made 6/8/95 - Twenty four hour reading was taken 6/9/95. Weekend fell on 6/10+11/95. Readings above were taken A.M. of 6/12/95 for 96 hours.

Continued on Page

6/12/95
Signed

6/9/95
Date

Read and Understood By

S M Duncan
Signed

6/19/95
Date

6/12/95

MT1-M2 Crush & Density | R&D Sample - 95-MW-03

Density: wt 1 - 194.1 g
2 - 191.4
3 - 189.2
x̄ 191.6

Den = 191.6 / 125 = 1.53g

Initial Crush - 2250 PSI

#1 - 2500 PSI
#2 - 2850 PSI
#3 - 2700 PSI
x̄ 2683

2527 ÷ 4 = 632 PSI

Actual = 2527 ~~PSI~~

FS1-M4 Crush & Density | R&D Sample - 95-MW-03

Density: wt 1 - 263.2 g
2 - 262.7
3 - 259.2
x̄ 259.7

Den = 259.7 / 125 = 2.08

Initial Crush - 4200

#1 - 4800
#2 - 4400
#3 - 5300
x̄ 4900

Actual = 4632 PS

4632 ÷ 4 = 1158 PS

Continued on Page

Jerry Feathers Signed 6/12/95 Date

000434

Read and Understood By

S M Duncan Signed 6/19/9 Date

PROJECT FERMCO M.W. Notebook No. _____ Continued From Page _____

6/13/95

CR1-M24 Crush & Density R&D Sample # 95-MW-034

Density WT 1 - 173.8
2 - 171.9
3 - 172.6
÷ 172.8

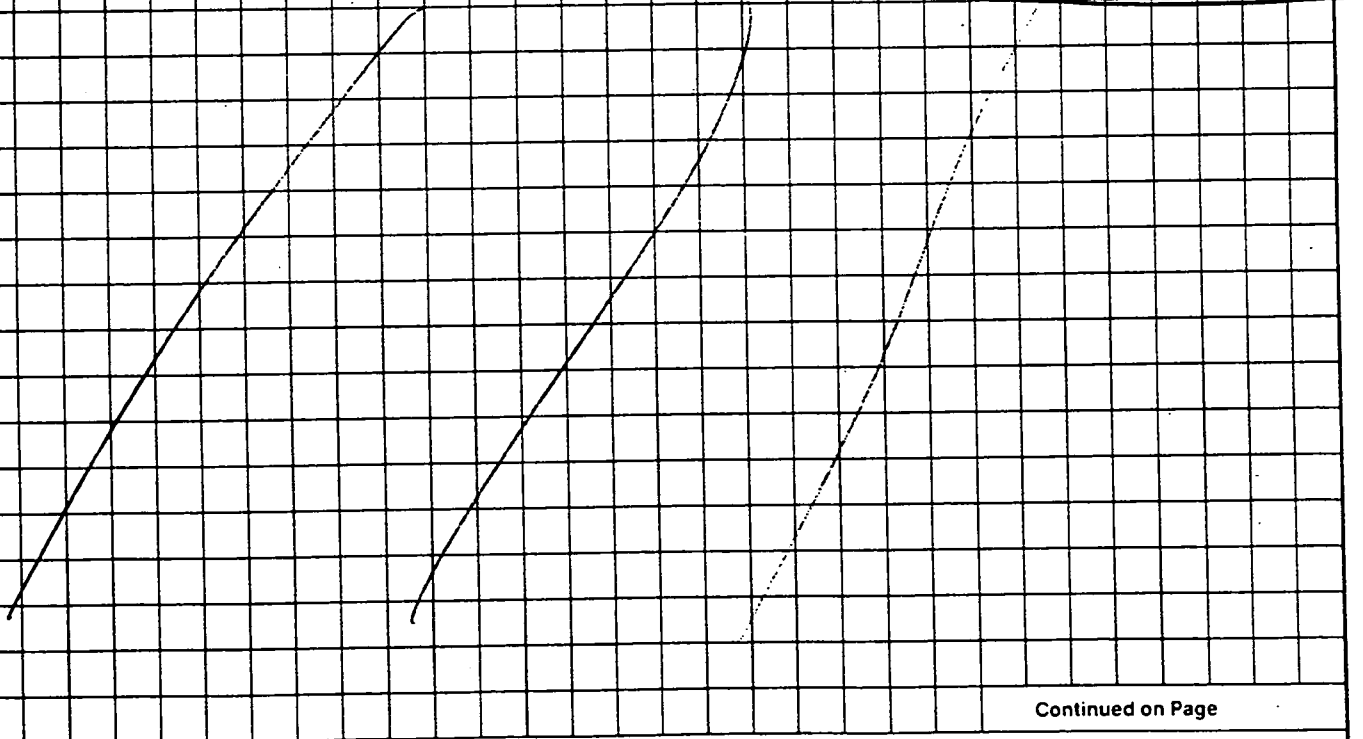
Dens = 172.8g / 125cc = 1.38 g/cc

Initial Crush - 400

1 - 300 PSI Applied
2 - 350
3 - 320
÷ 323 PSI Applied

Actual = 286 PSI

286 / 4 = 72 PSI



Continued on Page

Read and Understood By

Signed _____ Date 6/13/95

Signed D M Duncan Date 6/19/95

OJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

6/15/95

7 day Crush and Density SET-M3

R&D Sample # 95-MW-035

Density: wt 1 - 215.4
2 - 209.7
3 - 212.1
$\bar{x}$ 212.4

$\text{Den} = \frac{212.4\text{ g}}{125\text{ cc}} = 1.70\text{ g/cc}$

Initial Crush - 420 PSI

#1 400 PSI Applied
#2 360
#3 340
$\bar{x}$ 383

Actual = 343 PSI

343/4 = 86 PSI

7 Day Crush and Density MT1-M3

R&D Sample # 95-MW-036

Density: wt 1 - 195.0 g
2 - 202.1
3 - 206.3
$\bar{x}$ 201.1

$\text{Den} = \frac{201.1\text{ g}}{125\text{ cc}} = 1.61\text{ g/cc}$

Initial Crush - 2800 PSI

Applied load #1 - 3100 PSI
#2 - 2950
#3 2700
$\bar{x}$ - 2917

2749/4 = 687 PSI

Actual - 2749 PSI

Continued on Page

Read and Understood By

Signed 000136 6/15/95 Date

S M Duncan Signed 6/19/9 Date

6/15/95

7 day Crush and Density MT1-M4

R&D sample # 95-MW-037

Density & Wt #1 - 168.5 g
2 - 170.9 g
3 - 174.5 g
÷171.3

Den = 171.3 g / 125 cc = 1.37 g/cc

Initial Crush - 620 PSI

Applied Load #1 - 530
#2 - 650
#3 - 590
÷597

Actual = 546 ~~PSI~~

546/3 = 136 PSI

7 day Crush and Density MT1-M5

R&D Sample # 95-MW-038

Density: Wt. # 1 155.3 g
2 160.5
3 164.4
160.2

Den = 160.2 g / 125 cc = 1.28 g/cc

Initial Crush 400

Applied load #1 - 340 PSI
#2 - 370
#3 - 360
373

Actual = 333 ~~PSI~~

333/4 = 83 PSI

Continued on Page

Read and Understood By

Signed Date Signed Date

6/15/95 6/19/95

PROJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

6/20/95

Preparation of Furnace Salts Mix (FS1-MS)

Amount of Waste - 357g
Amount of Portland Cement - 650g
Amount of H_2O - 275 ml

Slurried waste with 55 ml H_2O pH - 4. Adjusted pH to 12 with 25% w/w NaOH with 12 ml of NaOH.

Added Portland Cement, 220 ml H_2O and mixed 5 minutes. Mixture was then placed into 5 2"x2"x2" plastic molds (wet with ~~water~~ ml). The plastic molds were then placed in a fume hood to ~~cure~~ cure seven days. On June 27, 1995 a 7 day crush will be performed and TCLP metals sample taken.

28 Day Crush SC1-M1

3800 PSI Applied

3587 PSI Actual

3587 ÷ 4 = 897 PSI

6/21/95

Concrete Penetrometer FS1-MS

> 700 PSI

Continued on Page

Read and Understood By

Signed — Date — Signed — Date

6/20/95 — 8/9/95

6/21/95

6/27/95 Preparation of Sump Cake ~~SMI-M2A~~ SG ✓

Amount of waste — 700g
Amount of Portland Cement — 300g
Amount of H_2O — 230 ml

Waste was slurried with 100 ml H_2O and ~~mixed~~ Mixed for 5 minutes, pH was 5. Slurry was pretreated to pH 12 and allowed to set in a closed bag for 5 minutes. A ~~analyne~~/Gastec reading for Ammonia was taken. The reading > 30ppm (immediate). Soaked for 3 hr 45 min. — Finish Mixing to clear mixer.
Added 300 g of Portland and 130 ml H_2O and mixed for 5 min and placed in 5 - 2 inch plastic cubes. Place in fume hood to cure. July 5 will perform crush and sample for TCLP Metals.

28 Day Crush [MTI-M1] - ~~4400~~ 4050 lbs Applied
Crush Strength = ~~1100~~ 1012.5 PSI = 3825/4 = [~~1012.5~~ PSI 956]

7 day Crush ~~MTI~~ FSI-M5 95-MW-139

Den WT# 1- 255.0 Initial Crush - 1800 Crush #1 - 2050
2- 257.3 #2 - 1900
3- 253.5 #3 - 2600
x 255.4 2050 2183 Applied

Den = 255.4 / 131 = 1.95 g/cc

Crush Strength = ~~2183~~ 2050 / 4 = ~~546~~ PSI 513

Continued on Page

Read and Understood By

Signed 6/07/95 Date — Signed 8/9/95 Date

6/27/95

Preparation of Construction Rubble Mix CCL-MA ✓

Amount of Waste — 500 g
Amount of Portland Cement — 500 g Portland Type I
Amount of H_2O — 270 ml

Waste Load was slurried with 270 ml H_2O mixed and pH Taken of 7.5. Adjusted Mix to pH of 5ml NaOH/12 Soak for 4 hours. Taking Ammonia readings occasionly. 1st reading 2 min — 25 ppm ammonia (mixer off)

Mixer was covered with plastic bag, had input line for N_2 and Ammonia reading were taken on off gas line

2nd reading 4 — > 30 ppm Ammonia (NH_3)
3rd reading 6 min — 50 ppm Ammonia
4th reading 10 min — 50 ppm Ammonia
5th reading 21 min — 50 ppm "
6th reading 41 min — 50 ppm
7th reading 51 min — 20 ppm 10 min after mixer turn
8th reading 61 min — 4 ppm 10 min after mixer turned b
9th reading 153 min — 5 ppm

pH 10

(Mixed 5% Solution of Sodium Sulfide (25 g) and Tap H_2O.

Added 10 g Sodium Sulfide flakes to mixture. Mixed & took H_2S reading — nothing. Plenty of free sulfides after mixing — Lead acetate paper reading —

0.4 ppm NH_3 after adding Na S @ 15 SFH N_2

Added 500 g Portland → 2.5 ppm H_2S
70 ppm NH_3 pH - 12

NH_3 & H_2S → Stirred

Stirred Off - Standing 3 min - NH_3 - 40 ppm

Made 6 1/3 cubes

Continued on Page

Signed [illegible] Date 6/27/95

Read and Understood By

Signed S M Duncan Date 8/9/95

6/27/95 Weights of Metals for Spiking Mixes

$BaCl_2$ - 1.783 g
$Cd(NO_3)_2$ - 1.388 g
Cr Metal - 1.008 g
Pb Metal - 5.014 g - 1.682 = 3.332 g
Cr (dichromate) - 2.863 g

Total weight of spiked earth
11289 g

70% of total — 7902 g

Grit Blast (Spiked) Mixture ~~GB1-SM1~~ GB1-SM1 70%
KB 6-27-95
~~444~~
KB ~~400~~ 300 g Portland Type I R&D Sample # 95-MW-040
6-27-95 Start of Mixture prep - 70% H_2O = 20% pH < 1
~~50~~ 50 g ~~Ferric~~ Ferrous Sulfate in 200 g H_2O Added
KB 6-27-95

Adjusted to pH - 11 130 mls 25% NaOH

Added Sodium Sulfide 25 g No H_2S detected
Additional 25 g Na S
Additional 25 g Na S

Added 300 g Portland Type I
No additional H_2O added

Made 7 cubes
0 - H_2S → 3 cubes in plastic bag 760 ppm H_2S

Continued on Page

Read and Understood By

Jerry Feather 6/27/95 S M Dunn 8/9/95
Signed Date Signed Date

6/28/95

SC1-M2 24 hour Concrete Penetrometer - 120 k

Preparation of Sump Coke Mix SC1-M4

KB 6-28-95
Amount of Waste - 600g
Portland Type I - 400g
H_2O Added 250 ml

Added 200 mls H_2O - pH - 7.5
Adjusted pH with H_2SO_4 (conc) 2 mls - Caused foaming - pH 6
Added 30g Ferrous Sulfate

Adjusted pH with 25% NaOH (20 mls) - pH ≥ 10 NH_3 evolved

Added 30g Na_2S - Measured NH_3 - > 60 ppm - Total off scale, N_2 purge 5CFH - 15'. Mixed 5 minutes

Added Portland NH_3 Measured - off scale
Tested for Free Sulfide - None
Added 15g Na_2S Added 50 mls H_2O
Free sulfide detected

Made stiff mix. Made 5½ cubes

Preparation of Furnace Salts Mix FS1-M6

Amount of Waste - 300g KB-6-29-95
Portland Type I - ~~600g~~ 700g KB 6-29-95
H_2O Added - 290 mls

Slurried in 290 mls H_2O

Continued on Page 81

Read and Understood By

Signed 8/10/95 Date — Signed 8/10/95 Date

6/95

Mixed 5 minutes pH - 4

Added 15g Ferrous Sulfate. Mixed 5 minutes

Adjusted pH with 15 mls 25% NaOH pH - 10

Added 30g NaS Mixed 5 minutes

Measure NH_3 - 10 ppm N_2 purge 15 SCFH

Tested for Free Sulfide - Plenty of Free Sulfide

KB 6-28-95
Mix Added Portland Type I - Mixed 5 minutes

Tested For NH_3 - 15 ppm

Made 5 cubes

GBS - M1 & CK1 - M4 24 hr NH_3 Measurement of 3 cubes each in plastic bag.
NH_3 - 0-5 scale > 60 ppm

Preparation of Miscellaneous Trash MT1 - M6

Amount of waste - 600g
Portland Type I - 400g
H_2O Added - ~~350~~ 450 ml

Slurried in 300 mls H_2O
Added 100 mls H_2O Mixed 5 minutes.
pH - 8
Adjusted to pH 6 with 2 mls H_2SO_4
Added 15g Ferrous Sulfate

Continued on Page 82

Read and Understood By

Jerry Rathbun 8/10/95 — Signed / Date

D M Duncan 8/10/95 — Signed / Date

Waste Tested pH after 5 min. mix pH - 6

Adjusted pH to 12 with 10 mls NaOH

KB 6-28-95 Added 30g Na$_2$S Mixed 5 minutes Measured NH$_3$ - 2

Added 30g Na$_2$S Mixed 5 minutes
Tested for Free Sulfide - Plenty of free Sulfide

Added Portland Type I Mixed 5 minutes

Tested for NH$_3$ - 5 ppm
Mix Stiff Added 50 mls H$_2$O

Mix is Stiff.

KB 6-26-95 Made KB 6-28-95 Made 6 3/4" Cubes

When placed in cubes left voids which had to be fill by manipulating the mix with a spatula

Cement Comparison Test using Slump Cake for Waste Component. All waste loading relative to cement = 60%

Lehigh Type I - CCT-M1

Amount of Waste - 600 g
Lehigh Type I - 400 g
H$_2$O Added - 250 ml

Slurried with 250 mls H$_2$O. Mixed 5 minutes
Tested pH - 7.5

Continued on Page 83

Signed 000444 Date 8/10/95 Read and Understood By Signed Date 8/10/95

6/23/95

Adjusted pH to 5 with 1ml Conc H_2SO_4

Added 30g Ferrous Sulfate Mixed for 5 Minutes

Adjusted pH to 9.5 with 20 mls 25% NaOH

KH 6-25-95

~~Adjusted~~ Added 45g NaS - Mixed 5 minutes

Added Lehigh Portland Type I - Mixed 5 minutes

6/24/95

NH_3 Reading 0810

Mix	Hrs	Reading (ppm)
SC1-M4	24	>60
FS1-M6	24	14
MT1-M6	24	24
GB1-SM1	48	>60
CR1-M4	48	>60

Concrete Penetrometer Readings 0830

Mix	Hrs	Reading (PSI)
SC1-M2A	45	690
CR1-M4	48	>700
GBL-SM1	48	>700
SC1-~~M2A~~ M4	24	>700
FS1-M6	24	0
MT1-M6	24	>700
CCT-M1	24	>700

Continued on Page

Read and Understood By

Signed — 6/26/95 Date — Signed — 8/9/95 Date

6/23/95

Preparation of SW Type 1 - CCT-M2 (Sump

Amount of Waste - 600g
Amount of Concrete Type 1 - 400g
Amount of H_2O - 300 ml

Stirred Waste (sump cake) with 250 ml H_2O, Mix 5 minutes. Tested pH - 6.5

Adjusted to pH 5 with ≈ 1 ml H_2SO_4

Added 30g Ferrous Sulfate. Mixed 5 minutes

Adjusted pH to 9 with 20 ml 25% NaOH

Added Na_2S 45g. Mixed 5 minutes.

Added Portland Type I. Mixed 5 minutes.

Mix extremely stiff added 50 ml H_2O Mixed 5 minutes.

Added waste mixture to 5 1/2 2 inch plastic molds and set in fume hood to cure.

Preparation of Holman Type 1 - CCT-M3 (Sump Ca

Amount of H_2O — 275
Amount of Waste — 600g
Amount of Concrete Type 1 — 400g

Stirred Waste (sump Cake) with 250 ml H_2O, Mix 5 Minutes. Tested pH 7

Continued on Page

Read and Understood By

Jerry Feather — Signed — 6/24/95 — Date

S M Duncan — Signed — 8/9/9 — Date

6/29/95

Adjusted pH to 5 with 1 ml H_2SO_4.
Added 30g Ferrous Sulfate. Mixed 5 minutes.
Adjusted pH to 9.5 with 20 ml of 25% NaOH
Added 45g Sodium Sulfide. Mixed 5 minutes
Added Portland Type I. Mixed 5 minutes
Added 25 ml H_2O. Mixture good ~~stiff~~ texture.
Added mixture to 5 1/2 2" cubes (plastic) & set in fume hood to cure.

Preparation of Iron Slag CCT-114 (Sump Cake)

Amount of Binder — 400 g
Amount of Waste — 600 g
Amount of H_2O — 250 ml

Slurried waste (sump cake) with 250 ml H_2O. Mixed 5 minutes. Tested pH - 7
Adjusted pH to 5 with 1 ml H_2SO_4
Added 30g Ferrous Sulfate. Mixed 5 minutes.
Adjusted pH to 10.0 with 21 ml of 25% NaOH
Added 45g Sodium Sulfide. Mixed 5 minutes
Added slag. Mixed 5 min. Placed mixture in 5 1/2 plastic 2" cubes and set to cure.

Continued on Page

Read and Understood By

Signed — Date — Signed — Date
6/29/95 — 8/9/95

6/30/95

Mixed waste sump cake slurry of ≈ 2:1 ratio to H_2O for TOC sample
R&D sample #: 95-MW-041

Concrete Penetrometer readings:

Mix	Hours	reading
SC1-M4	48	>700
FS1-M6	48	0
MT1-M6	48	>700
CCT-M1	48	>700
SC1-M2A	72	>700
CCT-M2	24	>700
CCT-M3	24	>700
CCT-M4	24	0

NH_3 Readings 0830:

Mix	Hours	reading
SC1-M4	48	>60 ppm
FS1-M6	48	11 ppm
MT1-M6	48	18 ppm
SB1-SM1	72	>60 ppm
CR1-M4	72	>60 ppm

Preparation of ~~Sump~~ Cake Mix M6

Continued on Page

Jerry Feather 000143 6/30/95
Signed Date

Read and Understood By
S M Duncan 8/9/9
Signed Date

30#s

Preparation of Furnace Salts (FS1-M7)

Amount of waste — 200g
Amount of Portland — 800g
Amount of H_2O — 290ml

Slurried waste with 290 ml H_2O Tested pH 4.
Added 30 g ferrous Sulfate mixed 5 minutes
Add Adjusted pH to 10 with 30 ml 25% NaOH
Added 45g Sodium Sulfide Mixed 5 minutes
Added Portland and Mixed 5 minutes
Mixture placed in 5 plastic cube molds

Preparation of Kiln Slag (20%) Mix 007-MIA

Amount of Waste (Scrap Coke) — 600g
Amount of Slag 50g Amount — 50g
Amount of Concrete — 320g
Amount of H_2O

- Slurried waste with 250 ml H_2O. Tested pH - 7
- Adjusted pH to 4.5 with 1 ml H_2SO_4
- Added 30g Ferrous Sulfate and mix 5 minutes
- Adjusted pH to 9.5 with 27 ml 25% NaOH
- Added 45 g Sodium Sulfide. Mixed 5 minutes
- Added 20% Slag 80% Portland and mixed 5 minutes

Continued on Page

Read and Understood By

Jerry Feather — Signed — 6/30/95 — Date
S M Duncan — Signed — 8/9/95 — Date

7/5/95

7 Day Crush

GB1-SM1
~~CR1-MM~~

wt - 189.1
201.1
193.7
÷ 194.6

Den = 194.6 / 131 = 1.49 g/cc

Initial Crush 480
1 352
2 350
3 340
÷ 347 Applied Actual = 324/4 = [illegible]

SC1-M4

wt - 221.9
224.9
218.3
÷ 221.7

Den 221.7 / 131 = 1.69 g/cc

Initial Crush - 390
1 320
2 350
3 340
Applied ÷ 353 Actual 314/4 = 78 PSI

CR1-M4

wt 175.9
177.9
177.7
÷ 177.2

Den 177.2 / 131 = 1.35 g/cc

Initial Crush - 360 (Hood
1 320
2 370
3 320
Applied ÷ 337 Actual = 249/4 = 75 PS

Bag
1 350
2 400
3 350
Applied ÷ 377 Actual 337/4 = 84 PSI

Continued on Page

Jerry Trudeau 7/5/95
Signed Date

Read and Understood By
S M Duncan 8/9/9
Signed Date

7/5/95 7 Day Crush

MT 1 - M6

Wt -	241.2
	240.8
	246.2
x̄	209.4

Den 209.4 / 131 = 1.60 g/cc

Initial Crush 380

1	410
2	380
3	340
Applied x̄	383

Actual 343 / 4 = 88 PSI

CRT - M1

Wt	251.3
	241.4
	233.5
x̄	238.1

Den = 238.1 / 131 = 1.82 g/cc

Initial Crush 350

1	340
2	370
3	370
Applied x̄	360

actual = 327 / 4 = 82 PSI

7/6/95

CRT - M2

Wt	227.6
	232.7
	226.3
x̄	228.9

Den = 228.9 / 131 = 1.75 g/cc

Initial Crush 350

1	370
2	420
3	350
Applied x̄	350

Actual = 340 / 4 = 85 PSI

CRT - M3

Wt	220.8
	224.5
	226.9
x̄	222.7

Den = 222.7 / 131 = 1.70 g/cc

Initial Crush 340

1	400
2	420
3	340
Applied x̄	403

Actual = 362 / 4 = 90 PSI

Continued on Page

Kenny Feathers 7/5/95 7/6/95
Signed Date

Read and Understood By
S M Duncan 8/9/95
Signed Date

PROJECT FERMCO Mixed Waste

Notebook No.

Continued From Page

7/7/95 7 DAY CRUSH

FS1 - M7

Initial Crush 350

WT 259.4
256.5
259.2
$\bar{x}$ 258.4

Dim 258.4 / 131 = 1.97 g/cc

	Applied
1	340
2	400
3	420
$\bar{x}$	403

Actual = 362 / 4 = 90 PSI

CCT - M4A

Initial Crush 360

WT 229.2
225.2
228.1
$\bar{x}$ 227.5

Dim = 227.5 / 131 = 1.74 g/cc

	Applied
1	350
2	360
3	350
$\bar{x}$	353

Actual = 324 / 4 = 81 PSI

Continued on Page

Jerry Scatterday
Signed

7/7/95
Date

Read and Understood By

S M Duncan
Signed

8/9/95
Date

000252

7168

FERNALD

MIXED WASTE

STABILIZATION PROJECT

PROJECT PLANS AND PROCEDURES

VOLUME II

PROJECT PROCEDURES

Copy No.: _____

Assigned To: _____

000453

FERNALD MIXED WASTE STABILIZATION PROJECT
PROJECT PLANS AND PROCEDURES

VOLUME II - PROJECT PROCEDURES

TABLE OF CONTENTS

Section

1.0 Project Management Procedures (PMP)

2.0 Process Operating Procedures (POP)

3.0 Facility and Equipment Specifications (FES)

4.0 Materials Management Procedures (MMP)

5.0 Environmental Management Procedures (EMP)

6.0 Emergency Preparedness Procedures (EPP)

7.0 Sample Management Procedures (SMP)

8.0 Quality Assurance Procedures (QAP)

9.0 Health and Safety Procedures (HSP)

10.0 Acronyms, Abbreviations, and Initialisms (AAI)

Note: Each section of this volume has its own controlled index and procedures.

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

PESI PROJECT MANAGEMENT PROCEDURES INDEX

NO.	TITLE	REV.	DATE
1.1	PESI Project Management Procedures Index	Draft OD	8/01/95
1.2	Preparation, Approval and Revision of PESI Project Procedures	Draft OB	8/01/95
1.3	Distribution and Control of PESI Project Procedures	Draft OB	8/01/95
1.4	Managing and Controlling Project Plans	Draft OB	8/08/95
1.5	Control of Project Procurement	Draft OB	6/07/95
1.6	Project Status Review and Reporting	Draft OB	7/27/95
1.7	Project Issues Tracking and Resolution	Draft OA	6/07/95
1.8	Management of Project Documents	Draft OA	6/15/95
1.9	Management of Quality Records	Draft OA	6/15/95
1.10	Management of Project Transmittals	Draft OA	8/01/95

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

PREPARATION, APPROVAL, AND REVISION OF PESI PROJECT PROCEDURES

I. POLICY

PESI policy is to develop and prepare project specific procedures in a uniform and consistent manner, utilize a common format, require senior management concurrence and approval for each procedure, and to use the same rigor and control for procedure revision as for procedure development. This procedure establishes guidelines for the preparation, review, approval, and revision of PESI project procedures. These control measures will ensure that accurate and usable procedures are issued, and that they are written in a user-friendly style and format.

II. DISCUSSION

PESI controls all company activities in a project that are important to quality. PESI employees and other project team members are responsible for carrying out their work activities according to both the spirit and the letter of the procedures that affect their work.

III. DEFINITIONS

None

IV. REFERENCES

PESI Project Procedure PMP 1.3 - Procedure Control and Distribution

V. PROCEDURE

A. Procedure Preparation and Review

Performer	Action
Manager of Project Support	1. Initiates the development of proposed PESI project procedures by defining their scope and recommending the procedure writer.
	2. Obtains approval from the Vice President for the scope and writer.

Performer		Action
Manager of Project Support (Cont'd)	3.	Assigns the task to the approved writer, and in the process, agrees upon a mutually acceptable set of dates for completing and issuing the final approved procedure.
	4.	Maintains a matrix that shows the status of all project procedures being prepared or revised. Issues periodic summary reports on them.
Procedure Writer	5.	Discusses procedure topic with appropriate staff performers and management to determine current practices and preferred approaches.
	6.	Researches existing procedures, as well as laws, regulations, and orders applicable to the procedure.
	7.	Organizes the information in a form that can be used to guide the writing of a draft procedure. Note: Flowcharts and outlines are acceptable ways of organizing this information.
	8.	Writes a draft procedure in accordance with the format described in Attachment A of this procedure.
	9.	Meets with appropriate staff performers and management as necessary to informally review the initial draft.
	10.	As needed, resolves comments from the informal review.
	11.	Using a memo, requests that all PESI managers and appropriate staff performers review the draft. Note: This is a formal review for technical content and clarity. Note: The Project Quality Assurance Advisor and ES&H Advisor is included in the list of managers to review the draft.
	12.	As needed, revises the draft to disposition comments.

Performer		Action
Procedure Writer (Cont'd)	13.	Repeats steps 11 and 12 if changes are significant.

B. Approval Cycle

Performer		Action
Procedure Writer	1.	Uses a "Procedure Review Form" (Attachment B) to obtain final concurrence of the Project Manager, Manager of Project Support, ES&H and Quality Assurance Manager, and the Vice President. Note: The procedure writer provides information on comment resolutions to those signing the Procedure Review Form.
	2.	Obtains Vice President's approval and signature on the final draft. Delivers the final signed procedure to the Manager of Project Support.

C. Revisions

Performer		Action
Manager of Project Support	1.	Initiates revisions to procedures by following the same steps used to develop the originals.
Procedure Writer	2.	During all draft stages, designates revised portions of the procedure with a vertical line in the margin. Note: Major revisions of a procedure (such as changes in scope, the addition or deletion of performers, etc.) Do not require revision bars. Note: When the final procedure is issued, all revision bars are removed and the procedure is issued in its entirety, not as page changes.

D. Annual Procedure Review

Performer		Action
Manager of Project Support	1.	Annually reviews those procedures not revised during the past twelve months. Lists those reviewed, along with those that need to be updated with the reason, on a memorandum to the Vice President.

E. Records

Performer		Action
Manager of Project Support	1.	Prepares the following as company records.
		a. The latest issue of PESI Project Procedures, including the travelers with the ES&H and Quality Assurance Manager's final concurrence
		b. Each revision of the PESI Project Procedures Index
		c. Memorandums documenting annual procedure review

VI. ATTACHMENTS

A. Attachment A - PESI Project Procedure Format

B. Procedure Review Form

ATTACHMENT A
PESI PROJECT PROCEDURE FORMAT

1. Procedure Subheadings

The subheadings for each section in each project procedure are as indicated below and are underlined. All subheadings are included even if there is no information given. The word "none" is placed directly under the subheading title in this case.

I. POLICY

This should be a concise statement of our basic policy. It should state what is important to us, what we require. It is not intended to be a place to put "motherhood" statements, but a place to state what it is that we expect. It should also indicate the end result that the procedure should produce. It is a statement of intended results, why we need the procedure.

II. DISCUSSION

Discussion should be used to provide background information. It should provide a tutorial on the subject of the procedure to create understanding before implementing the procedure steps.

III. DEFINITIONS

This section should state, as clearly as possible, what we mean by the terms used in the procedure.

IV. REFERENCES

This should contain a list of PESI project procedures or other documents that are referred to in the text of the procedure.

V. PROCEDURE

This section contains the definitive, step-by-step sequence of instructions (in the playscript format) that are required for implementing and executing the procedure.

VI. ATTACHMENTS

This should contain a list of the performance guidelines, forms, checklists, and similar items needed to supplement the procedure.

ATTACHMENT A
(Continued)

2. Paragraph Identification

a. Each paragraph within a section uses the following number/letter sequence:

(1) I.
(2) A.
(3) 1.
(4) a.
(5) 1)
(6) a)

3. Paragraph Notes

a. Notes may be added to clarify or provide detailed interpretations to various portions of the procedure. All notes are headed by the underlined word "Note."

4. Procedure Pages

a. The top of each procedure page contains a procedure number, page number, total number of pages, revision number, and approval date as shown in this procedure. The approval date is also the effective date.

Revision numbers are indicated by an Arabic number, with "0" representing the original issue.

b. The first page of each procedure also contains the procedure title block as shown in this procedure.

c. The Management Approval Signature Line appears on the first page as shown in this procedure.

d. Attachment pages contain an attachment identifier (e.g., "Attachment A") and title ("PESI Project Procedure Format") and are page numbered as a portion of the entire procedure. The attachment identifier is repeated on continuation pages; the attachment title is not repeated on continuation pages.

ATTACHMENT B

PROCEDURE REVIEW FORM

Subject: _____ Date: _____

Procedure Author: _____

Please review the attached procedure, mark with any recommended changes, sign and date this Procedure Review Form, and return to the Procedure Author by _____ (Due date).

Reviewer	Signature	Date	Concur	Change
Vice President				
Project Manager				
Project Support Manager				
ES&H & QA Manager				

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

DISTRIBUTION AND CONTROL OF PESI PROJECT PROCEDURES

I. POLICY

PESI's policy is to maintain PESI Project Procedures in an orderly, current, and accessible manner. This procedure establishes guidelines for controlling project procedures manual distribution and for destroying obsolete procedures.

II. DISCUSSION

The process described in this procedure for issuance, distribution, and control applies to the PESI Project Procedures Manual (this volume of the Project Plans and Procedures). PESI employees and other project team employees are not to photocopy any portion of a controlled project procedures manual. Uncontrolled copies of project procedures may be issued to subcontractors, vendors, or clients as required.

III. DEFINITIONS

None

IV. REFERENCES

PESI Project Procedure PMP 1.2 - *Procedure Preparation, Approval, and Revision of PESI Project Procedures*

V. PROCEDURE

A. Initial Distribution of Controlled Project Procedure Manual

Performer		Action
Manager of Project Support	1.	Issue controlled copy of PESI Project Procedures Manual to each new employee of PESI or other project team members.

Performer	Action
Manager of Project Support (Cont'd)	Note: The PESI Project Procedures Manual is distributed to any PESI employee or project team member at the request of his/her Function manager.
	2. Obtains the completed Controlled Document Receipt (Attachment A) from each recipient. Maintains receipts in a central file and places one copy of the receipt in each manual holder's personnel file.

B. Initial Distribution of Uncontrolled Project Procedures Manual

Performer	Action
Manager of Project Support	1. Upon approval of Senior Management, issues uncontrolled copy of PESI Project Procedures Manual, as directed.
	2. Maintain list of uncontrolled project procedures, the date of issue, and the recipient.
	Note: Uncontrolled project procedures are not updated or revised.

C. Distribution of New/Revised Procedures

Performer	Action
Manager of Project Support	1. Upon approval of new or revised procedures in accordance with PESI Project Procedure 1.2, prepares a new index for each distribution of procedures.
	Note: Each new index contains at least the following:
	• Procedure number and title
	• Procedure revision
	• Date of index issue or revision

Performer	Action
Manager of Project Support (Cont'd)	Note: The index is given a procedure number for control purposes; however, the reviews, approvals, and documentation given a normal procedure are not required.
	2. Prepares a Controlled Document Revision Transmittal/Receipt (Attachment B). Distributes Transmittal Receipt, the new/revised procedure, and the revised index to all holders of PESI Project Procedures Manuals.
	Note: The Transmittal/Receipt instructs manual holders to remove obsolete procedure in their entirety and to add new or revised procedures in their entirety. Individual pages within a procedure may not be deleted or revised.
	3. Obtains the completed Transmittal/Receipt from each recipient. Maintains completed receipts in a central file.

D. Surrender of PESI Project Procedures

Performer	Action
Manager of Project Support	1. In the event of the resignation, termination, retirement, or change in function responsibilities of any PESI project procedures holder, requests surrender of Controlled PESI project procedures.

VI. ATTACHMENTS

A. Controlled Document Receipt (Example)

B. Controlled Document Revision Transmittal/Receipt (Example)

ATTACHMENT A
CONTROLLED DOCUMENT RECEIPT - (EXAMPLE)

PERMA-FIX ENVIRONMENTAL SERVICES, INC.

CONTROLLED DOCUMENT RECEIPT

I acknowledge receipt of Controlled Copy No. _____ of the PESI Project Procedures Manual. I understand this manual remains the property of Perma-Fix Environmental Services, Inc. and I agree to carefully maintain it, and keep it readily available. I will return it to the Manager of Project Support upon request, or upon termination of employment with PESI or termination of project team assignment.

_____ _____

Signature Date

ATTACHMENT B

PERMA-FIX ENVIRONMENTAL SERVICES, INC.

CONTROLLED DOCUMENT REVISION TRANSMITTAL/RECEIPT - (EXAMPLE)

Attached are revisions for the PESI Project Procedures Manual.

Please take the following steps:

1. Remove and destroy the pages indicated (if applicable)	2. Insert the new pages.

3. Sign below and return to the Manager of Project Support.

I have updated Controlled Copy No. _____ of the PESI Project

Procedures Manual with the revisions referenced in this transmittal.

_____ _____

Signature Date

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

MANAGING AND CONTROLLING PROJECT PLANS

I. POLICY

PESI policy is to initiate each project with a thorough conceptualization of how the work will be accomplished and the necessary plans for carrying out that concept. The project plans are documented in Volume I of the Project Plans and Procedures, and are maintained current throughout the project.

The Project Plans serve as a "road map" for project execution and are developed by the project team and are followed by the project manager and all project participants from project start to completion. They also serve as a basis for Perma-Fix Project Team management to assess project status, and for reporting that status to corporate management and the client.

II. DISCUSSION

The process of developing, implementing and controlling project plans is outlined in Attachment A.

The most important part of project planning is the proper conceptualization of how the work will be accomplished. Often the results of this step are described in a "Technical Approach" or "Plan for Accomplishing the Work Scope," and are shown graphically in a Work Breakdown Structure (WBS). Frequently the Perma-Fix Team completes these items for inclusion in the technical proposal which preceded contract award.

After contract award, as the first step in preparation of the project plans, the project team obtains a copy of the technical proposal and reviews the technical approach. The existing technical approach is used or is modified as necessary to serve as the basis for project operations and the project plans. The project plans are normally comprised of a work plan, quality assurance plan, health and safety plan, and a sampling and analysis plan.

The completed project plans must provide a plan to accomplish all contractually required work and deliverables within contract technical, cost and schedule limits.

III. DEFINITIONS

Work Plan - The work plan describes the project and establishes baselines against which the project will be measured. The plan describes in detail what is going to be done and

how it will be accomplished in accordance with the project summary WBS. The plan describes each phase of the project activity including what is to be accomplished, the equipment involved, process unit controls, and the products resulting from each phase.

Quality Assurance Plan - The quality assurance plan presents in project-specific terms the policies, organization, objectives, functional activities, and specific quality assurance/ quality control activities designed to achieve the data quality goals of the project. The elements which must be included in the project quality assurance plan are described in the U.S. Environmental Protection Agency (EPA) guidance established in Interim Guidelines and Specifications for preparing Quality Assurance Projects Plans (EPA-60014-83-004, QA MS-005/80).

Safety and Health Plan - The project safety and health plan describes how the requirements of DOE Order 5480.9A, Construction Project Safety and Health Management, will be implemented on the project. The plan identifies those project personnel who are assigned safety and health duties, their qualifications and their respective duties. The plan also includes a detailed outline of the employee work site safety and health orientation.

Sampling and Analysis Plan - The sampling and analysis plan provides a process for obtaining data of sufficient quality and quantity to satisfy data needs. The plan describes the number, type and location of samples to be taken and the type of analyses to be performed.

Work Breakdown Structure - The WBS is a product-oriented family-tree type division of products and services which organizes, defines, and displays all the work to be performed in accomplishing project objectives.

Project Summary Work Breakdown Structure - The project summary WBS is a summary tailored to a specific project and used by all project participants. The project summary WBS is documented in the project work plan and identifies project elements through the third level for large projects and through the second level for small projects.

IV. REFERENCES

DOE Order 4700.1, *Project Management System*
DOE Order 5700.6C, *Quality Assurance*
DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*
Public Law 91-596, *Occupational Safety and Health Standards*
29 CFR 1910, *Occupational Safety and Health Standards*
29 CFR 1926, *Safety and Health Regulations for Construction*

V. PROCEDURE

A. Developing Project Plans

Performer Action

Manager of Project Support

1. Completes initial research and identifies requirements applicable to the scope of work. As a minimum, the research of applicable documents and requirements will include:

   - The client's statement of work and the Perma-Fix Team's technical proposal.
   - Federal and State regulations.
   - Client directives and regulations.
   - Federal facility agreements among the client and federal and state environmental protection agencies.
   - Work site location(s) and limitations
   - Waste stabilization process requirements
   - Health and safety
   - Quality assurance
   - Product sampling and testing

2. Develops project plans which will guide execution of project activities. Ensures that National Environmental Policy Act (NEPA) and Client environmental, safety and health requirements are appropriately integrated into all phases of the project.

   As a minimum, the following plans are developed:

   - Work Plan
   - Quality Assurance Plan
   - Health and Safety Plan
   - Sampling and Analysis Plan

Performer		Action
Manager of Project Support (continued)	3.	Submits the project plans to the Perma-Fix Team Project Manager and ESH&QA Manager for review.
Project Manager and ESH&QA Manager	4.	Performs a comprehensive review of the project plans and ensures that appropriate process, environmental, safety and health, quality, and sampling controls and requirements have been adequately addressed.
	5.	If the project plans are not acceptable, returns the plans to a Manager of Project Support for comment resolution.
Manager of Project Support	6.	Resolves comments with project manager and other project team reviewers, revises the appropriate plans and resubmits for approval.
Project Manager	7.	Ensures comment resolution and submits the project plans to the PESI Vice President for approval.
PESI Vice President	8.	Reviews the project plans. If the plans are not acceptable, returns them to the project team for revision. If the plans are acceptable, accepts them and submits them for client review, concurrence and approval as required by contract.
	9.	Resolves all client comments and acquires client approval as required.

B. Implementing Project Plans

Performer		Action
Project Manager	1.	Trains and/or orients the project work force on elements of the project plans with particular emphasis on health and safety, emergency preparedness, waste management and materials handling.

Performer		Action
Project Manager (Cont'd)	2.	Maintains the Project Plans (Volume I - Project Plans) on the work site and makes the plans available upon request to all client and Perma-Fix Team personnel who are either involved in the work or who have assigned oversight responsibilities.
	3.	Ensures that applicable elements of project plans are addressed in work instructions and procedures.
	4.	Manages work activities to the project plans.
Manager of Project Support	5.	Maintains the project work plan by updating the project WBS and schedule.
Project Manager	6.	Monitors project activities to ascertain that they are proceeding as planned. Measures the results of the project activities and identifies deviations from planned performance.
	7.	Takes appropriate action(s) to correct deviations from planned performance.

C. Controlling Project Plans

Performer		Action
Project Manager	1.	Assembles the project team to evaluate proposed changes.

Note: Changes which could impact the project plans include the following:

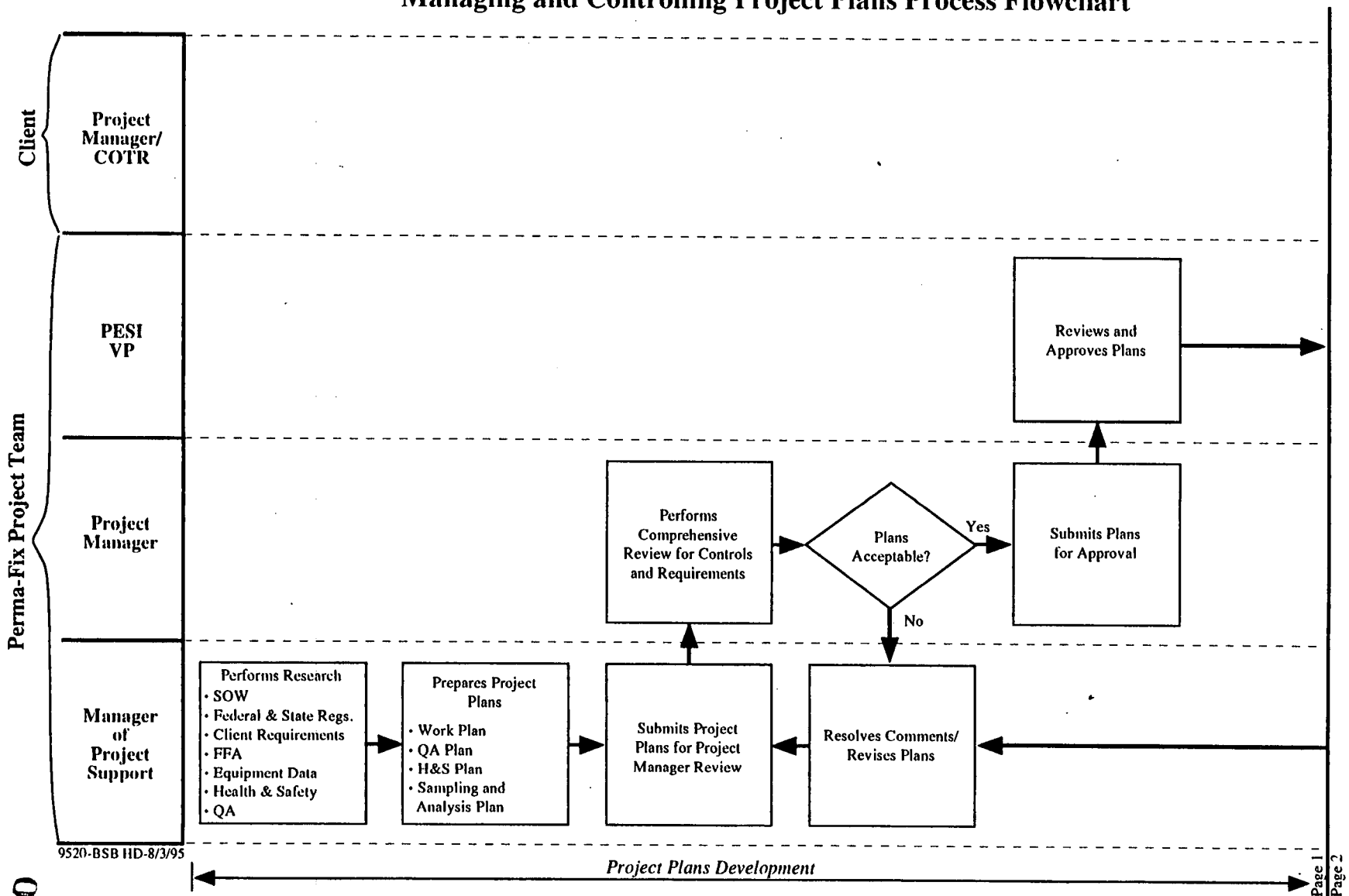
- Baseline Changes (Technical, cost and schedule)
- Client directed changes
- Process changes dictated by sampling and/or testing results
- Design Changes (i.e., waste characterization, waste treatment processes, processing facilities, process equipment, process equipment configuration, treatment activities)

Performer		Action
Project Team	2.	Evaluates repercussions of the proposed change on all aspects of the waste treatment processes and process equipment.
	3.	Approves the change for recommendation to the PESI Vice President.
Project Manager	4.	Submits the proposed change package to the PESI Vice President for approval.
PESI Vice President	5.	Reviews and approves the proposed change. If the proposed change is approved, forwards the change to the client for review, concurrence, or approval as appropriate. If the change is not approved, returns the change package to the project team for further evaluation.
	6.	Acquires review and concurrence or approval by the client with the change as required.
Project Manager	7.	If the change does not impact the project plans, implements the change. If the change impacts the project plans, directs revision of the affected project plans.
Manager of Project Support	8.	Revises the affected project plans based on the approved change package.
Project Manager	9.	Implements the revised project plans according to Section B above.
	10.	Notifies all affected parties of the revised plans.

VI. ATTACHMENTS

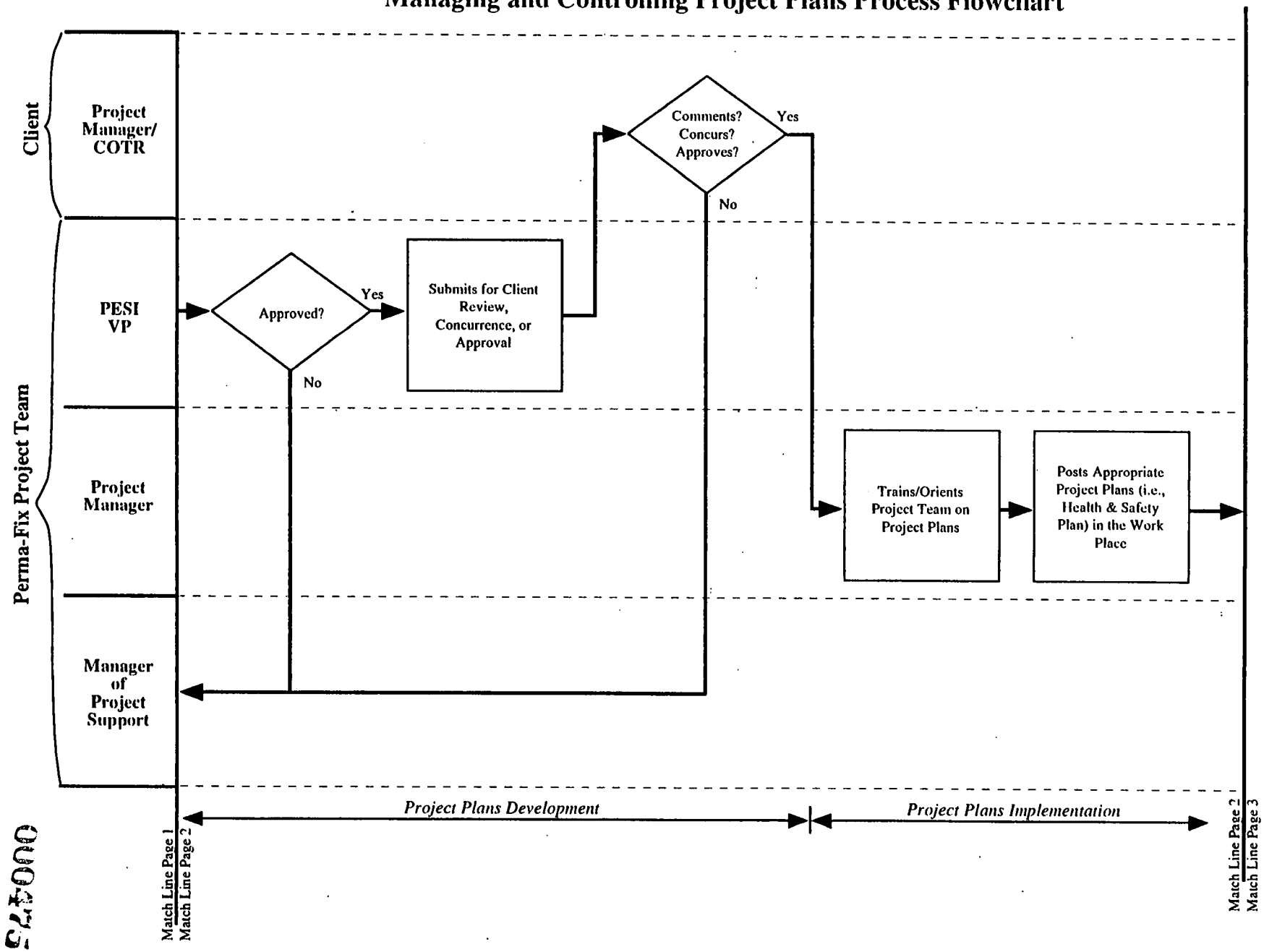
A. Attachment A - Managing and Controlling Project Plans Process Flowchart

Attachment A
Managing and Controlling Project Plans Process Flowchart



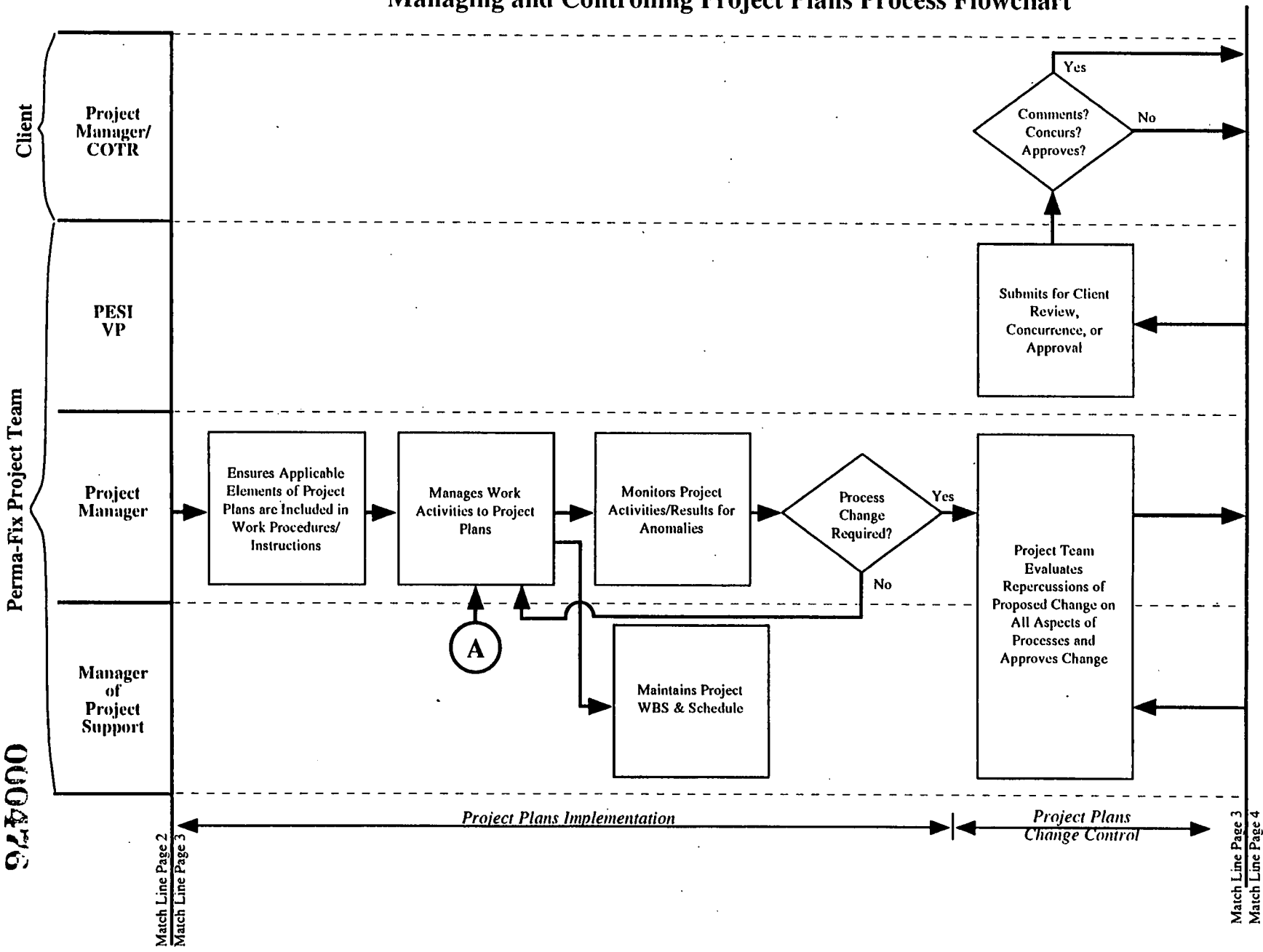
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Attachment A
Managing and Controlling Project Plans Process Flowchart



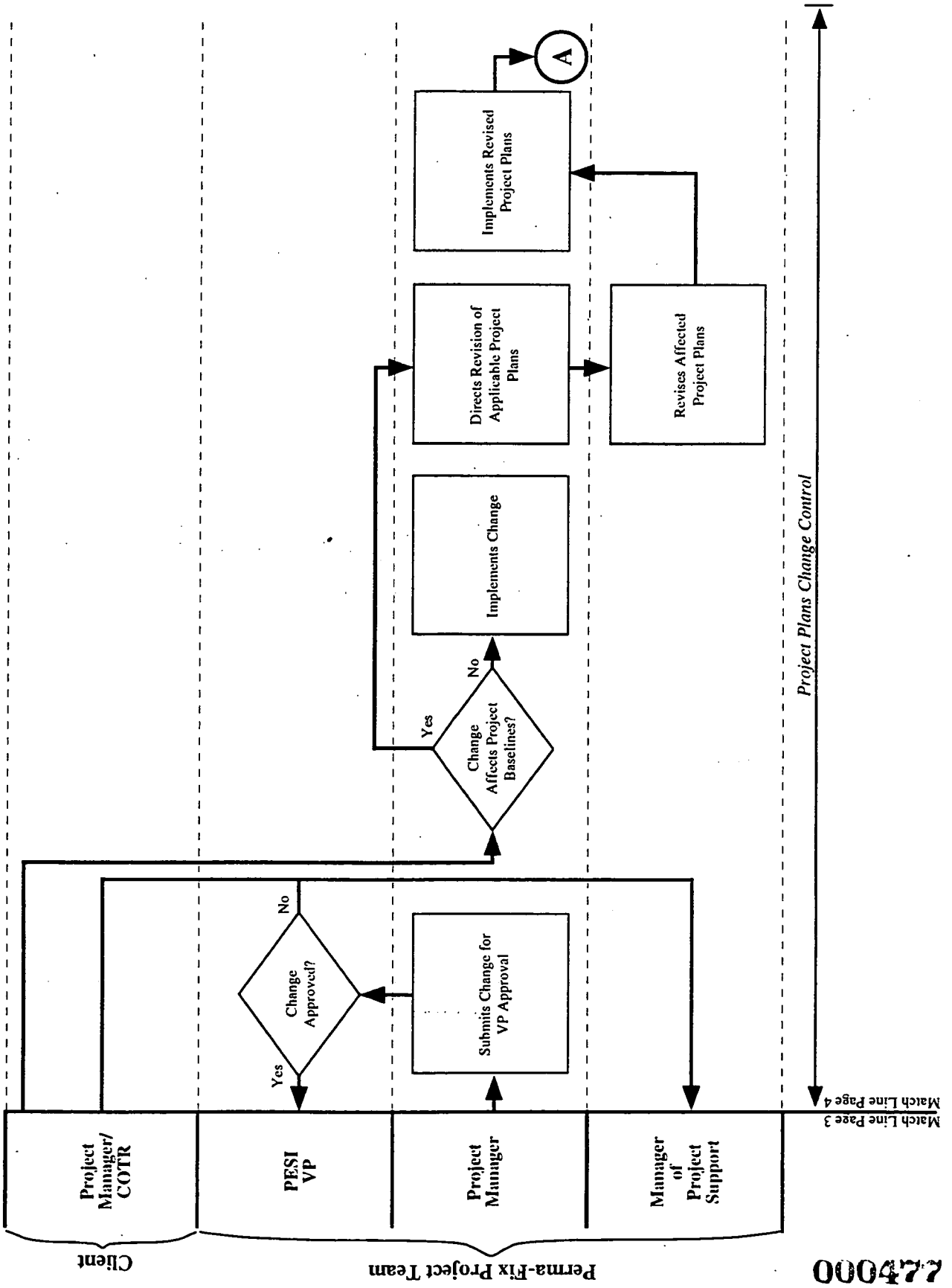
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Attachment A
Managing and Controlling Project Plans Process Flowchart



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Attachment A
Managing and Controlling Project Plans Process Flowchart



Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

CONTROL OF PROJECT PROCUREMENT

1. POLICY

PESI's policy is to use corporate resources to satisfy client requirements whenever possible. Occasionally, however, we procure the services of subcontractors or consultants, either to augment our in-house, direct charge staff or when the prime contract requires us to use a subcontractor or consultant. This procedure establishes guidelines for identifying, soliciting, evaluating, awarding, and managing subcontractors and consultants.

II. DISCUSSION

This procedure does not apply to the use of temporary clerical personnel.

III. DEFINITIONS

COTR (Contracting Officer's Technical Representative) - The PESI person responsible for providing technical direction to the subcontractor/ consultant, usually the Requestor or the Program Manager.

Prime Contract - The contract between PESI and PESI's client, administered by PESI contract administrator.

Request for Proposal (RFP) - A request for potential proposers to submit cost and technical proposals. Award is based on the most beneficial combination of cost and technical merit.

Requestor - The PESI person assigned by the Program Manager to take the required technical actions to obtain the subcontract. Acts as a focal point for technical issues.

Subcontract - PESI's agreement with a subcontractor/consultant, administered by PESI subcontract administrator.

Subcontractor/Consultant - An individual or firm from whom PESI procures services to augment our in-house expertise in direct support of a client.

IV. REFERENCES

PESI Procedure 1.08 "Managment of Project Documents and Records"

V. PROCEDURE

A. Preparing an RFP

Performer		Action
Requestor	1.	Identifies the need for a subcontractor or a consultant on a project.
	2.	Coordinates with the Contract Administrator to determine the requirements in PESI's prime contract that apply to subcontracting.
	3.	Obtains the Program Manager's concurrence before continuing the process.
	4.	Prepares a Statement of Work (SOW) (see Attachment A).
	5.	Completes a Requisition (see Attachment B).
	6.	Obtains approval from the following: • Vice President • Program Manager • Quality Assurance and ES&H Protection Manager • Manager of Project Management Support • Operations Manager Note: Each of the above indicates approval by signing in the appropriate place on the Requisition.

Performer		Action
Requestor (Cont'd)		Note: If the subcontract is for under $1000, the highest level of approval needed is from the Operations Manager for the project. If the subcontract is for $1000 or more, it must be approved by the Manager of Project Management Support. The Quality Assurance and ES&H Protection Manager must always review the Requisition.
	7.	Forwards SOW and Requisition via memo to the Subcontract Administrator.
Subcontract Administrator	8.	Incorporates the SOW into an RFP package.
	9.	Ensures that the RFP contains the following:

- All clauses that PESI's prime contract requires us to include in a subcontract.
- Requests for all appropriate representations and certifications.
- The quality assurance requirements PESI imposes on subcontractors. This includes requirements that the subcontractor/ consultant do the following:
  - Allow PESI to have access to work
  - Allow PESI to audit work in progress and completed work
  - Preserve quality assurance record material

Note: The RFP will state that the subcontractor/ consultant must work under PESI's quality assurance program, under its own quality assurance program if approved by PESI, or the RFP may state the specific controls which are to be applied to the subcontractor's/ consultant's work.

Performer		Action
Contract Administrator	10.	If required in the prime contract, notifies the client that PESI will be using a subcontractor or consultant. Obtains consent from the client, if required.
Subcontract Administrator	11.	Obtains Vice President's approval on the requisition, the RFP, and the list of potential proposers.
	12.	Signs and distributes the RFP (excluding the Requisition) to potential proposers.
	13.	Arranges for and conducts a pre-proposal meeting with potential proposers, if required.

B. Evaluating and Awarding a Proposal

Performer		Action
Subcontract Administrator	1.	Receives technical and cost proposals from proposers.
	2.	Ensures that the technical and cost proposals comply with the terms and conditions as stated in the RFP.
	3.	Evaluates the cost portion of each proposal. Compares the cost portion with the original estimate of the Requisition.
	4.	Forwards each cost evaluation and technical proposal, along with a copy of the Requisition attached to each proposal, to the Requestor for evaluation.
Requestor	5.	Evaluates each technical proposal for the following: • How well it meets the evaluation criteria (if not a sole source) • If it complies with other applicable standards • How well it meets quality assurance requirements

Performer		Action
Requestor (Cont'd)		• Whether the subcontractor/consultant will meet quality assurance requirements through its own or through PESI's quality assurance program
	6.	Considering both cost and technical content, determines which proposal represents the "best value" to PESI. Notes evaluation comments in appropriate place on the Requisition. Note: Proposals and Requisitions contain "sensitive information." Do not disclose the information contained in them outside of PESI.
	7.	Recommends a proposer in a memo to the Subcontract Administrator. Forwards the selection package (recommendation memo, proposals, and Requisitions) to the Subcontract Administrator. Note: Subcontractors or consultants cannot perform any work until released by the Subcontract Administrator.
Subcontract Administrator	8.	Reviews selection for completeness of required documentation and compliance with corporate policy.
	9.	Negotiates a "best-and-final" price with the selected proposer.
	10.	Prepares the subcontract for signature.
	11.	Obtains a final review of the subcontract from the Requestor, Manager of Project Management Support and the Vice President.
	12.	Forwards the subcontract to the winning proposer for signature.
	13.	Upon receipt of the signed subcontract, obtains the Vice President's signature.

Performer	Action
Subcontract Administrator (Cont'd)	14. Forwards a copy of the signed subcontract and applicable PESI quality assurance procedures to the winning proposer. Files original signed subcontract in the subcontract file.

C. Managing Subcontracts

Performer	Action
Program Manager	1. Designates a Contracting Officer's Technical Representative (COTR) for managing the subcontract.
COTR	2. Ensures that a "backup" person is knowledgeable of the subcontract effort, to perform in the COTR's absence.
	3. Reviews the work scope, deliverables, and schedules with the subcontractor/consultant to ensure complete understanding and agreement.
	4. Establishes the cost, schedule, and technical baselines against which PESI will evaluate the subcontractor's performance.
	5. Ensures that all subcontractor/consultant work is done in accordance with PESI standards and quality assurance requirements before acceptance by PESI and delivery to the client. Note: Subcontractors/consultants always submit their deliverables to PESI, never directly to PESI's client.
	6. Ensures that all subcontractor/consultant activities are reported in all required reports. Note: This could include the following reports: • Weekly Production Meeting Report • Monthly Report • Any other report requested by the client

Performer	Action
COTR (Cont'd)	7. Requests from the subcontractor/consultant periodic reports covering schedule progress, cost, and technical effort. Note: The reporting period and the amount of detail to be included in the report depend on the subcontract cost, duration, and significance.
	8. Obtains evaluation of the subcontractor's/ consultant's performance from other PESI personnel, as appropriate.
	9. Monitors the subcontractor's/consultant's performance. Periodically compares cost, schedule, and technical progress against standards.
	10. Presents the progress and status of the subcontract at appropriate project reviews, with emphasis on subcontractor/consultant quality.
	11. At the end of the project, prepares an evaluation memo concerning the subcontractor's/consultant's performance. Note: For longer projects, or if problems arise during the project, prepares the evaluation memo before the project ends.
	12. Forwards a copy of the performance evaluation to the Subcontract Administrator.
	13. Reviews the performance evaluation with the subcontractor/consultant. Works with the subcontractor/consultant to correct areas of substandard performance.
Subcontract Administrator	14. Maintains COTR's evaluation in the subcontract file.
	15. Recommends contractual actions to the Vice President for unacceptable performance from the subcontractor/ consultant.

D. Records

Performer		Action
Subcontract Administrator	1.	Maintains all contractual records in the subcontract file.
Program Manager	2.	Ensures that all subcontractor/consultant deliverables are maintained in the project files. Candidate Quality Records are identified and incorporated in accordance with PESI Procedure 1.08, "Management of Project Documents and Records."

VI. ATTACHMENTS

A. Recommended Outline for the Statement of Work

B. Requisition

ATTACHMENT A

Recommended Outline for the Statement of Work (SOW)

Title Page and Table of Contents

Provide a title page and table of contents for any SOW exceeding 10 pages. For SOWs of less than 10 pages, consider a table of contents if the content is complex or if you use numerous cross-references.

Section 1 - Scope

Briefly describe what the SOW covers. You may include an introduction and background, but limit background information to only that information needed to acquaint the prospective proposer with the scenario. Do not discuss deliverables or include directions to perform work tasks in this section.

Section 2 - Tasks to be Performed

The arrangement of this section is determined by the needs of the solicitation. Be sure that you arrange the content in a systematic and logical manner. The requirements you list may be mandatory, desirable, optional, or may have alternatives. In any case, list all tasks in chronological order to the degree possible, and in a manner and sequence that facilitates subcontract administration.

Section 3 - Deliverables

Use this section to specify items to be delivered by the subcontractor/ consultant, such as reports, analyses, studies, and plans. These deliverables should be a natural result of the tasks specified in Section 2. Explain any deliverables that do not have an established definition or that the prospective proposer may not understand.

Section 4 - Schedule

Provide in this section the broad milestones on which the proposed activity or task will be based. This section must be detailed enough to provide a chronology on which to structure the proposal, but must not be restrictive to the point of limiting the initiative of the prospective proposer.

Section 5 - Quality Assurance Requirements

Include in this section the quality assurance requirements appropriate to the work, as well as those required in PESI's prime contract with the client. Give the subcontractor/consultant the choice of performing the scope of work under PESI's quality assurance program or under the subcontractor's own program.

If the subcontractor/consultant chooses to work under PESI's program, its personnel must be trained in our program and they must use our procedures. If the subcontractor/consultant chooses to work under its own program, its Quality Assurance Program Description must be submitted for PESI review and approval for use on the contract.

Attachments and Exhibits

In cases where additional information is required (such as detailed specifications or examples), but including the information in the SOW itself would result in an overly complicated SOW, you may use attachments and/or exhibits. To define how they apply and to ensure that requirements are not overlooked in the rush of preparing the proposal, reference attachments and exhibits in either Section 2 or Section 3.

ATTACHMENT B

Requisition

Funding Source

Date

Vice President _____ Date _____

Manager of Program Management Support _____ Date _____

Manager, Contracts Department _____ Date _____

Operations Manager _____ Date _____

Quality Assurance & ES&H Manager _____ Date _____

Program Manager _____ Date _____

Requestor _____ Date _____

Estimated Cost: _____

Required placement date for subcontract: _____ Required Delivery date for prod/servs: _____

Potential Bidders(If sole source, include justification)

Evaluation Criteria (If sole source, write "NONE")

Proposal Review Comments

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

PROJECT PLANNING, STATUS REVIEW, AND REPORTING

I. POLICY

PESI policy is to closely monitor the progress and status of each project to ensure adequate planning and preparation, to keep management apprised of accomplishments or problems, and to allow management actions that are timely and appropriate. PESI also intends to keep its customer currently informed with progress and accomplishments so that customer involvement may also be timely and appropriate.

II. DISCUSSION

PESI projects are usually set up to accomplish a customer need. They are planned and executed by a project team assembled and empowered to support a project manager. The project manager is responsible for providing leadership and direction for the project team. Some project teams will include subcontractors and consultants as needed. When such occurs, project arrangements will provide that all team members will participate jointly in the team and support the project manager.

This procedure describes how the project team is to plan its Daily activities, plan and perform a review of project status on a weekly basis and report those results to corporate and customer management. The PESI project team will participate in their customer's project review meeting each week. The weekly report prepared by this procedure will be provided for and presented in that weekly meeting. The project monthly progress report and the project completion report will be compiled and issued to the customer as required by contract.

III. DEFINITIONS

None

IV. REFERENCES

None

V. PROCEDURE

A. Daily Planning

Performer	Action
Project Manager	1. Convenes a morning meeting of key project staff.
Operations Manager	2. Identifies production plans for the day and resolves any questions or problems.
ESH&QA Manager	3. Provides any safety and health orientation or instrumentation needed and resolves any questions or problems.
	4. Provides any environmental orientation or instruction needed and resolves any questions or problems.
	5. Provides any quality-related orientation or instruction needed and resolves any questions or problems.
Manager Project Support	6. Provides any general project orientation or instruction needed and tracks schedules, commitments, or issues resolutions.

B. Weekly Status Review and Reporting

Performer	Action
Manager Project Support	1. Issues a call on Wednesday morning of each week to project team members for project status information as of the end of shift Wednesday afternoon.
Operations Manager and ESH&QA Manager	2. Collects status information from project team members, consolidates information as appropriate, and passes the status information to the Manager of Project Support.
Manager of Project Support	3. Prepares the weekly project status report. Attachment A provides guidance in format and content for this report.
	4. Secures review and approval of the Project Manager for release of the report.

Performer	Action
Project Manager	5. Attends the customer project meeting on Thursday or as otherwise called and delivers status report.
	6. Provides copy of status report to PESI and PDC corporate management for information.
	7. Receives any feedback from customer or corporate management and provides guidance for direction to project team members as appropriate.
Manager of Project Support	8. Places a copy of the weekly status report in the project file in accordance with PESI project procedure PMP 1.08.

C. Monthly Project Progress Report

Performer	Action
Manager Project Support	1. Prepares a draft monthly project progress report. Attachment B provides evidence in format and content for this report.
	2. Secures review and concurrence in the draft report from the Project Manager, the Operations Manager, and the ESH&QA Manager.
	3. Prepares a transmittal letter issuing the report to the customer as required by project arrangements or contract. NOTE: The report should be issued by the 15th of the following month unless required otherwise.
	4. Places a copy of the monthly project progress report in the project file in accordance with PESI Project Procedure PMP: 1.08.

D. End of Project Report

Performer	Action
Manager of Project Support	1. Prepares a draft project completion report when all project activities have been completed.
	2. Distributes draft project completion report to project team members for review and comment.
	3. Secures comments or questions and resolves all comments, questions or problem areas in the report.
	4. Prepares final draft project completion report.
	5. Provides final draft project completion report to Project Manager for approval.
Project Manager	6. Approves final draft project completion report and issues to customer for review and comment.
	7. Provides copy of final draft project completion report to PESI and PDC corporate management for information.
	8. Receives any feedback from customer or corporate management and provides direction for completion of the report.
Manager of Project Support	9. Incorporates comments and direction, and prepares final project completion report.
	10. Secures Project Manager approval of project completion report.
	11. Issues final project completion report as required by contract.
	12. Places a copy of the project completion report in the project file in accordance with PESI project procedure PMP 1.08.

VI. ATTACHMENTS

A. Guidance for the Weekly Project Status Report

B. Guidance for the Monthly Project Status Report

ATTACHMENT A

GUIDANCE FOR WEEKLY PROJECT STATUS REPORT

PERIOD: This should reflect a period beginning start of shift Thursday morning and ending with end of shift the following Wednesday.

OPERATION STATUS: This should identify:

- Which material is being processed (campaign)
- Number of barrels processed
- Number of boxes prepared
- Number of cubic yards prepared
- Preliminary inspection results
- Preliminary test results
- Any problems encountered and status of resolution
- Any surprises or unexpected events and their significance

FACILITY STATUS: This should identify by exception:

- Adequacy of space
- Adequacy of arrangement
- Any equipment problems
- Any housekeeping problems
- Any materials acquisition or handling problems
- Any air handling or off-gas problems

ESH&QA STATUS: This should identify:

- Amount of waste generated
- Adequacy of air cleaning
- Adequacy of radiation health protection
- Any health physics problems
- Any exclusion zone violations
- Any hoisting or rigging violations
- Any Accidents
- Any documentation or data problems
- Any sampling and analysis problems

ATTACHMENT A
(Page 2)

VARIANCE STATUS: This should identify:

- Any variance from the project schedule
- Any variance from project plans
- Any significant nonconformance in product, process, or with procedure
- Any issues, problems, or commitments being tracked for resolution

ATTACHMENT B

GUIDANCE FOR MONTHLY PROJECT STATUS REPORT

Cover: Provide a cover that gives identity to the:
- Customer
- Project
- Performing Organization
- Period of Performance

Introduction: Provide a brief description of the project and the plan for accomplishment.

Accomplishments in (the month being reported):

Briefly summarize each of the specific activities accomplished during the month. It should identify progress in operations toward accomplishing the technical scope of work as well as progress against the schedule baseline for the project.

Expected Accomplishments in (the following month):

Briefly summarize the significant activities that are on the project schedule and that are expected to be accomplished during the period of the next month.

Problems: Provide a listing of significant problem areas or issues that could impact the accomplishment of the project and briefly summarize the actions planned or identified to resolve the situation.

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PROJECT ISSUES TRACKING AND RESOLUTION

I. POLICY

It is PESI's policy that requests to perform specific project actions that are defined and tracked until they are completed. All commitments are tracked until they are formally closed to ensure proper and adequate resources are allocated for complete, timely fulfillment.

II. DISCUSSION

Commitments include contract deliverables; actions resulting from client written or verbal requests; actions needed to follow-up and close out audits and surveillances; or other actions requested by PESI managers to support broader activities. Commitments are finite actions with definable completions. They are not ongoing activities, or tasks involving multiple actions.

III. DEFINITIONS

Commitment - An agreement between a Requestor and a Responsible Individual to complete a specific action and provide the results by a specific promised date.

Requestor - The PESI project manager requiring support actions which can be defined and tracked using the commitment procedure.

Responsible Individual - The management or non-management individual responsible for completing the commitment.

IV. REFERENCES

None

V. PROCEDURE

Performer Action	
Requestor	1. Determine commitments requiring tracking. Note: For actions requested by the client, the PESI Requestor must ensure that the internal PESI commitment is completely in accord with the client request. This may require that the Requestor take special steps to clarify the details (orally or in writing) with the client.
	2. Establishes the required completion date, making sure it meets existing contract or project schedules.
	3. Determines the appropriate Responsible Individual and makes arrangements with that individual for accomplishment of the work under a valid and authorized PESI job number.
	4. Obtains oral agreement from the Responsible Individual to complete the defined action by a promised date which is the same or earlier than the required completion date. Note: In the event this oral agreement cannot be reached, higher level management assistance is immediately requested.
	5. Determines if an need exists for weekly chronology summaries.
Responsible Individual	6. Notify management and the commitment Requestor immediately whenever any delays or proposed new work assignments would prevent meeting an existing commitment.
Program Manager	7. Resolve any problems concerning completion of commitment.
Responsible Individuals	8. Upon completing work and delivering it to the designated recipient, notify the Program Manager of work completion.

VI. ATTACHMENTS

None

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Project Management Procedure

Approval: _____

MANAGEMENT OF PROJECT DOCUMENTS

I. POLICY

The PESI policy is to establish a Project File for each project and to maintain it active and current until project completion. The primary purpose of the file is to facilitate access to existing documentation by PESI personnel during the life of the project, and for some projects, we maintain files for our clients. Portions of the file are retained after project completion for possible use by the contracts or accounting departments during audits or contract close-out. Quality Records shall be handled and stored in accordance with applicable requirements. The PESI Project Manager has primary responsibility for establishing and maintaining the project file, and for its integrity.

II. DISCUSSION

To facilitate access to documentation, some discretion is needed in deciding what to file and how to file it. If files are too large, access can be impeded. If they are too small, needed documents are not available. If filing procedures are written to achieve complete consistency among all projects, much time may be spent doing unneeded work. If procedures permit too much flexibility, individuals other than the project manager would have difficulty locating items filed.

This procedure is intended to provide a balance between these extremes. Certain aspects of the procedure are standard for all projects; others are left to the discretion of the project manager. As with any procedure, successful implementation requires that personnel become knowledgeable of the procedure, and perhaps more importantly, that they cooperate in its implementation. The latter point is particularly true in aspects such as using file "Out Cards" and replacing borrowed files promptly.

III. DEFINITIONS

Project File - Contains applicable documentation for the project except contract cost and accounting data. All contract technical documentation, technical correspondence, plans and schedules, reports and deliverables, and reference data will be included, but controlled distribution copies, cost proposals, non-technical portions of the contract, non-technical correspondence, etc. will not be included. The project file is located at the PESI site office where the project manager is located, and a copy of the project file is located at the PDC office in Oak Ridge, Tennessee.

Project Participant - As used in this procedure this term includes only the Project Manager, the Project File Administrator, and other individuals authorized by the project manager to direct documents to the file.

Stored Files - Project files which are no longer needed for project technical activities and which have been moved to a storage location.

Quality Records - Are defined in PESI Procedure 1.9 "Management of Quality Records". Working copies of quality records may be kept in the project files, but the quality records themselves are handled and filed in accordance with Procedure 1.9.

Candidate Quality Records - Documents generated by PESI (for our clients) which meet the criteria in client procedures for quality records. They are handled in the same manner as quality records, and are also addressed in Procedure 1.9.

Controlled Distribution Copies - Copies of documents which are distributed and controlled in accordance with PESI Procedure 1.3 "Distribution and Control of PESI Plans and Procedures," or an equivalent procedure from another organization. These procedures normally require delivery to a specific individual who must sign a receipt for them and destroy obsolete versions. They are retained by the individual and are not included in project files.

Project Completion - The completion of all support work of any kind for the client on a project, including the delivery of all deliverables. Project completion precedes contract close-out and does not include contract actions needed for close-out.

Contract Close-out - A formal agreement between the PESI contracts department and the client contracting officer stipulating that all work is complete and that all peripheral contract issues have been resolved.

Cost-Incurred Audit - A formal audit by DCAA or other approved government auditor to determine actual costs to be reimbursed by the client on cost reimbursable contracts. These audits normally occur several years after work is done, and are done on a calendar year basis. The main objectives are to determine actual indirect costs and any costs which might be unallowable under the Federal or DOE Acquisition Regulations.

IV. REFERENCES

PESI Procedure 1.3, "Distribution and Control of PESI Plans and Procedures"
PESI Procedure 1.9, "Management of Quality Records"

V. PROCEDURE

A. Establishing the Project File

While the following steps are normally done at or near the beginning of a project, they may be later redone to accommodate changing project conditions. Revisions should be minimized as they create the need for extra work.

Performer	Action
Project Manager	1. Makes a preliminary estimate of the size and make-up of the project file and determines if the Basic File Index (Attachment A) is adequate. On projects which, in the judgment of the project manager, are large enough to require it, the project manager makes a list of subdivisions for categories 6 and 7 on the index, ("Deliverables" and "Reference Data") limiting the number to those actually necessary. As a general guideline, separate subdivisions should contain ten to twenty five different documents although single-document subdivisions may be necessary in rare cases.
	2. If changes are needed, designs and has produced a modified version of the index and File Instruction Sheet (Attachment B) reflecting the specific changes for this project.
	3. Determines if the project will require logging of mail received by PESI from other participants. If so, decides if internal distribution is best accomplished by a form which combines it with filing instructions; modifies the file instruction sheet accordingly.
	4. If the new project is a continuation of a previous project, but with a different PESI job number, determines if the files are to be combined. If so, all of the job numbers are to appear on the file drawer(s) and on the index and instruction sheet. If the files are to be kept separate, indexes are to be annotated with cross references.

Performer	Action
Project Manager (cont'd)	5. Determines if any special filing requirements will apply to this project.
	6. Conveys the conclusions of these first five steps to any individuals the project manager decides to designate as authorized to direct documents to this project file.
	7. Establishes the location for the project file, and directs the preparation of sufficient folders and labels for initial filing needs. Send copy of all project files to PDC office in Oak Ridge, TN. Note: Do not actually create folders for all of the separate filing subdivisions until the number of documents in the file justifies creating them. Note: Use pendaflex folders. Do not use manilla folders with them, or top-tab-folders-with-fasteners unless the project manager determines that a special need justifies the added work, expense, and file space.

B. Filing Documents

Performer	Action
Project Participant	1. Fills out a filing instruction sheet for the project and staples it on the top of the document to be filed. Note: Alternatively, fills out the filing instruction portion of the document traveler form stapled to the top of the document. Whenever possible, all pages of a single document are to be stapled together. When multiple documents are to be filed together, they are to be held together with rubber bands or binder clips. Small, standard paper clips are never to go into the file. Does not file copies in more than one file subdivision, and does not file multiple copies unless they are needed to retain written comments from reviewers. If the document being filed has comments attached with "Post-it" stickers, they are to be stapled or taped to the pages to prevent loss.

Performer		Action
Project Participant (cont'd)		Document reviewers sometimes use Review Comment Record (RCR) forms (Attachment C) or the equivalent (or the traveler) rather than placing comments directly on the pages of drafts. When these forms are used, they may be retained in the file without the draft copy itself. Avoids filing unneeded documents. The project manager may decide what is needed.
	2.	Gives the document to Word Processing or places it in the filing cart.
Word Processing	3.	Completes any portion of step 1 not done by the project participant.
	4.	Places a red "File Copy" stamp on the face of the file instruction sheet or the traveler. In the event a document goes to the file without an instruction sheet or traveler, places the "File Copy" stamp on the first page of the document in a location which will permit masking during later copying.
	5.	Files the document in the designated subject location in chronological order with most recent dates in front.
	6.	Prepares new folders as needed due to increasing numbers of documents. Requests the project manager to add or delete subject classifications as appropriate (see guidelines under VI. A above). Modifies the index and file instruction sheet to incorporate such changes.

C. Using Filed Documents

The Out Card system is used whenever a document is to be withdrawn from the project file and carried out of the immediate file area. Documents withdrawn from the project files shall be returned within five working days.

Performer		Action
Employee	1.	Completes an entry on an available Out Card following the instructions in the OUT Card Instructions (Attachment D).

Performer	Action
Employee (cont'd)	2. Removes the desired document from the file and replaces it with the filled-in Out Card.
	3. Within five working days, returns the withdrawn document to its file location, removes the Out Card, crosses out the entry, and returns the card to the card box.

D. Purging and Closing Project Files

Performer	Action
Project Manager	1. As one of the last activities prior to project completion, performs or supervises a review of the entire file, identifies any potential PESI "Product Standards" documents and/or quality records, identifies unneeded documents for discard, and delivers the rest to the stored file administrator. Note: Any identified quality records are separated from the files to be stored and are processed as quality records in accordance with PESI Procedure 1.9, "Management of Quality Records." Ensures that at least the following are included in stored files: Index; Correspondence; Project Implementation Plan; Progress, Status and Monthly Reports; and Deliverables. The following types of documents may be identified for discard: interim drafts, comment copies of drafts, contract documents, other reports, and reference data.
	2. For potential "Product Standards", prepares and provides the manager, Resource Development, a draft "Evaluation Document" along with the recommendation to add the document to the manual as an addition or replacement.
	3. At each annual anniversary of longer term projects (or more often if necessary), performs or supervises a review and disposition the same as that described in D 1 above, except that documents needed by the technical staff are retained in the active project file.

Performer	Action
Project Manager (cont'd)	Note: Reviewer comment forms and copies of drafts annotated with needed reviewer comments are to be kept in the files until approximately three to six months after final acceptance of the document by the highest client organizational level involved. Exceptions to this rule may be made by the project manager in cases where comments are retained longer in accordance with project-wide procedures involving other organizations. Multiple copies of earlier drafts are not to be retained unless they contain needed information. One copy of each earlier draft (which was issued externally) should be retained. Old versions of recurring reports are to be considered for discard whenever possible. This includes production meeting reports after they have been used for monthly reports, commitment reports, resource tracking reports, "POP" and "Actuals" reports, etc.

E. Stored Files

Performer		Action
Project Manager	1.	Stores files in designated area and marks the outside of the file boxes with PESI job number, project title, client name, and date stored.
Project Support Manager	2.	Annually, reviews the number of stored files and provides a written list to the controller with copies to Vice President, of all files older than three years.
Controller	3.	Provides a written memo to the Project Support Manager indicating which files need to be retained for contract close out or cost-incurred audit, and which may be discarded.
Project Support Manager	4.	Discards all stored files older than three years not identified for retention.

F. Project-Type Files at Other PESI Sites

PESI sites working on projects for which they do not have the "Project File" will establish and maintain their own partial duplicate files according to their needs. They will follow the same steps outlined above except that they shall not keep any stored files of duplicate documents. They may discard any documents they no longer need. The operations manager or division manager will designate an individual to take on the project manager's responsibilities outlined above.

VI. ATTACHMENTS

A. Basic File Index
B. Project File Instruction Sheet
C. Review Comment Record Form
D. . Out Card Instructions

ATTACHMENT A

BASIC FILE INDEX

JN0000

Project Manager:

1. INDEX (This Sheet)

2. CONTRACT

3. CORRESPONDENCE (Not filed in another category)

4. PLANS AND SCHEDULES

   - Project Implementation Plan
   - Other Project Management related material

5. REPORTS

   5A. Progress and Status Reports

   5B. Monthly Reports

   5C. Other Reports

6. DELIVERABLES - Other than Schedules and Reports
   (Special breakdown for large projects)

7. REFERENCE DATA (Special breakdown or listing for large projects)

ATTACHMENT B

PROJECT FILE INSTRUCTION SHEET

PROJECT FILES Instruction Sheet			JN _____
2. Contract	3. Correspond	4. Plan & Sch	5. Reports ___ A. P&S ___ B. Monthly ___ C. Other
6. Deliverables			
7. Reference Data			

INSTRUCTIONS

1. Project Manager staples this sheet to the top of the document.

2. IF document is to be filed in Subject Classifications under 2, 3, 4, or 5, place a mark beside the appropriate sub-classification.

3. IF document is to be filed in Subject Classifications under 6 or 7, write the information for the file label.

4. IF a new Subject Classification is being created, add it to the Index Sheet filed under Subject Classification 1. INDEX (see Attachment A).

ATTACHMENT C

REVIEW COMMENT RECORD (RCR)

REVIEW COMMENT RECORD (RCR)			Page 1 of ____
Document Title:		Document No. _____	Document Revision: ___
Reviewed by: _____ Signature _____ Date		Response by: _____ Signature _____ Date	
No.	Reference	Reviewer's Comments	Resolution

ATTACHMENT D

OUT CARD INSTRUCTIONS

OUT

OUT TO	File # or Name Out	DATE	OUT TO	File # or Name Out	DATE	OUT TO	File # or Name Out	DATE

INSTRUCTIONS

1. Draw a line through any used entry that has not been previously lined out.
2. Under "TAKEN BY" print your name or initials.
3. Under "FILE DESCRIPTION OR NAME" print the title; e.g., letter number and date of the document you are removing from the files.
4. Under "DATE" enter today's date.
5. Replace the file or folder in the file drawer with the OUT CARD.
6. When you return the file or folder to the file drawer, replace the OUT CARD with the file, draw a line through your entry, and return the card to the box.

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

MANAGEMENT OF QUALITY RECORDS

I. POLICY

PESI's policy is to process, store, and maintain quality records (or documents which could later become quality records as a result of clients' requests) in accordance with client or internal specifications and national quality assurance program requirements for nuclear facilities. Each PESI Project Manager is assigned the primary responsibility to ensure that quality records are properly identified, managed, and subsequently dispositioned in accordance with the client's direction.

II. DISCUSSION

PESI identifies and lists the types of documents it generates which, upon completion, PESI will enter into the quality records system. See Attachment A for this listing. PESI is responsible for classifying, handling, indexing, preserving, storing, and maintaining quality records in accordance with NQA-1, Quality Assurance Requirements for Nuclear Facilities.

PESI also identifies those documents it generates for clients which could subsequently, after completion, be designated as quality records upon the client's request. Such documents are strictly limited to those listed in the records section of the special procedures for the client's program. These "candidate quality records" are managed in the same manner as quality records pending client direction.

PESI fulfills NQA-1 records storage requirements through dual storage of quality records and candidate quality records. The primary location is the PESI project office, and the PDC office in Oak Ridge, Tennessee. PESI maintains a quality records index and controls access to the quality records at both records storage locations.

Retention periods are assigned to quality records according to their record classifications as lifetime/nonpermanent (see Attachment A). (PESI does not at present generate any lifetime quality records.) PESI maintains the quality records for their designated retention period and, at the completion of this period, evaluates the quality records for destruction, additional retention as needed, or other disposition.

PESI returns candidate quality records to the project file at contract closure for disposition with other project files if there are no quality records arrangements with the client. In the event the client requests that candidate quality records be upgraded to quality records and providing that contractual arrangements have been made, PESI continues to manage these quality records in accordance with this procedure, or otherwise dispositions them in accordance with the client's direction.

For purposes of this procedure, the term "quality records" also includes candidates quality records unless an intended difference is specified.

III. DEFINITIONS

Disposition - Actions taken to remove records from current files such as for transfer to client, to records storage or holding area, to Federal Records Centers, or for destruction.

Document - Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results. A document is not considered to be a quality record until it satisfies the definition of a quality record.

Quality Records - Completed document(s) that furnish evidence of the quality of items and/or activities affecting quality.

Lifetime Quality Records - Lifetime quality records are those quality records that meet one or more of the following criteria:

1. Those which would be of significant value in demonstrating capability for safe operation.

2. Those which would be of significant value in maintaining, reworking, repairing, replacing, or modifying an item.

3. Those which would be of significant value in determining the cause of an accident or malfunction of an item.

4. Those which provide required baseline data for in-service inspections.

Nonpermanent Quality Records - Nonpermanent quality records are those required to show evidence that an activity was performed in accordance with the applicable requirements but need not be retained for the life of the item because they do not meet the criteria for lifetime records.

Candidate Quality Records - Documents generated by PESI (for our clients) which meet the criteria in client procedures for quality records. They are processed and maintained by PESI in the same manner as quality records.

IV. REFERENCES

NQA-1, Quality Assurance Program Requirements for Nuclear Facilities
PESI Procedure 1.9, *Management of Project Documents*
PESI Procedure 1.4, *Managing and Controlling Project Plans*

V. PROCEDURE

A. Identifying and Classifying Quality Records

Performer	Action
Project Manager	1. Identifies and maintains a listing of the project documents to be entered into the quality records system as candidate quality records and/or PESI quality records. Note: The project list of records including quality records is maintained as part of the Project Implementation Plan in accordance with PESI Procedure 1.4, *Managing and Controlling Project Plans*
Quality Assurance & ES&H Protection Manager	2. In coordination with the PESI Vice President, identifies any specific PESI internal documents to be entered into the quality records system.
	3. Classifies each category of quality records as lifetime or non-permanent and maintains a listing of the Quality Records Categories and Classifications (see Attachment A).
	4. Performs or arranges performance of an annual review to ensure quality records are appropriately identified and classified.

B. Preparing Documents as Quality Records

Performer	Action
Preparer	1. Collects and assembles the documents that are to become quality records.
	2. Ensures documents are legible, complete, and identifiable to the associated item or activity. Note: Normally, the original should be used. When the original is not used, the record must be a reproducible copy of the original. Corrections made to documents that are to become quality records shall be in dark ink (i.e., shall be reproducible) and include a line through the part that was corrected, the date, and the initials of the person authorized to make the correction. Once a document has been declared a quality record, no corrections of any kind can be made.
	3. Removes duplicate documents from each set of documents, unless the duplicates contain pertinent comments and/or significant notations or corrections.
	4. Ensures that each document which will comprise a quality record is signed or otherwise authenticated by authorized personnel.
	5. Arranges the documents that will comprise each quality record chronologically or logically according to the subject matter or as determined by the document preparer.
	6. Prepares a Quality Record Verification sheet and includes this sheet as the first page of the documents which will comprise each quality record (See Attachment B).
	7. Secures each document to become a quality record in a binder, folder, or in an envelope.

C. Transferring and Receiving Quality Records

Performer	Action
Preparer or Project File Administrator	1. Prepares a Quality Records Inventory List and Receipt (see Attachment C) for showing the identification of the documents being transferred.
	2. Transfers documents to become candidate quality records and/or PESI quality records to the PESI Quality Records Coordinator.
Quality Records Coordinator	3. Receives documents that have been transferred.
	4. Verifies that each document received is complete and is as represented on the Quality Records Inventory List and Receipt, and accepts these documents as PESI or candidate quality records. Note: Unacceptable documents are returned to the Preparer with an explanation of the deficiencies. The Preparer corrects the deficiencies and resubmits.
	5. Returns a receipt copy of each Quality Records Inventory List and Receipt to the preparer.

D. Indexing Quality Records

Performer	Action
Quality Records Coordinator	1. Enters each quality record on the PESI Quality Records Index in accordance with the minimum indexing data elements described in Attachment D.
	2. Ensures that each quality record is identifiable and retrievable.

E. Storing Quality Records

Performer	Action
Quality Records Coordinator	1. Files the quality record according to the indexing system and maintains it in a locked, limited access filing cabinet located in the PESI project office.

Performer	Action
Quality Records Coordinator (Cont'd)	2. Maintains a second copy of each quality record in a locked, limited access filing cabinet located at the PDC office in Oak Ridge, Tennessee. Note: A Quality Record Coordinator is allocated for each PESI office location who is responsible for properly implementing this procedure. Note: The quality records dual storage arrangements are coordinated with the PESI project support manager and affected project managers. These dual storage arrangements can include storing a second copy of a client's quality records for remote storage from the client's records storage facility. 3. Controls access to the quality record files by: a. Physically securing the files when they are not staffed. b. Designating in writing the persons who have authorized access to the quality records file. c. Using photocopies instead of quality records copies if such documents must be used away from the quality records files area.

F. Dispositioning Quality Records

Performer	Action
Project Manager/ Quality Records Coordinator	1. As authorized by the client at any time during PESI's retention of candidate quality records, dispositions such records in accordance with the client's direction. Note: The Quality Records Coordinator updates the quality records index to reflect the above dispositions (or any other changes in a quality record's status or location). 2. If no quality records arrangements are made with the client, returns candidate quality records to the project file at contract closure.

Performer	Action
Project Manager/ Quality Records Coordinator (Cont'd)	Note: The project file documents are reviewed and dispositioned in accordance with PESI Procedure 1.8, *Management of Project Documents.*
Quality Records Coordinator	3. Periodically reviews the quality records indices to identify those quality records that have exceeded their retention times. Notifies the cognizant project manager concerning these records.
Project Manager	4. Evaluates quality records that have exceeded their retention times to determine if they should be destroyed, retained longer, or otherwise dispositioned. Notifies the Quality Records Coordinator accordingly.
File Administrator & Quality Records Coordinator	5. Coordinate final disposition of quality records at both storage locations and update the quality records index accordingly.

G. Records

Performer	Action
Quality Records Coordinator	1. Prepares the quality records index for entry annually into the quality records system in accordance with this procedure.

VI. ATTACHMENTS

A. Quality Records Categories and Classifications (Example)
B. Quality Records Verification Sheet
C. Quality Records Inventory List and Receipt (Example)
D. Quality Records Indexing Elements

ATTACHMENT A

QUALITY RECORDS CATEGORIES AND CLASSIFICATIONS (EXAMPLES)

TYPE OF QUALITY RECORDS	CLASSIFICATION	
	LIFETIME	NON** PERMANENT
Procedures, Instructions		X
Quality Assurance Program Description		X
Qualification, Training, and Certification Records*		X***
Evaluation Plans		X
Audit Report Packages		X
Formal Surveillance Reports		X
Operational Readiness Review Reports		X
Peer Review Reports		X
Document Review Files		X
Deviation and Corrective Action Report Files		X
Immediate Action Directives		X
External Deviation Report Files		X
Quality Record Indexes		X
Quality Assurance Program Evaluation and Progress Reports		X
Quality Trend Files		X
Quality Problem Files		X

* Active qualification, training, and certification records are maintained by the PESI Administrative Services Department.

** Nonpermanent quality records are retained for at least three years from completion of the project.

*** Retained for three years past employee's work termination or transfer from position. (Exception: documented evidence of the qualifications and training of auditors are retained for the same period of time as required for the audit report with which the auditors are associated.)

ATTACHMENT B

QUALITY RECORD VERIFICATION SHEET

QUALITY RECORD VERIFICATION SHEET

(Type or letter in black or blue ink)

Subject/Title _____

_____

_____

Document Date _____

Total number of pages excluding this page _____

I certify that this document package has been reviewed and meets the requirements for preparing and transferring documents as quality records.

_____ _____

Name Date

Quality Record Number _____
Verification receipt of Complete Document.

_____ _____

Name Date

ATTACHMENT C

QUALITY RECORDS INVENTORY LIST AND RECEIPT (EXAMPLE)

QUALITY RECORDS INVENTORY LIST AND RECEIPT

(Type or print in dark ink)

(Date of Transfer)

TO: Quality Records Coordinator

FROM:

The following candidate or PESI quality record(s) are being transferred:

_____

_____

_____

_____

_____

_____

Number of records listed (by type) _____

_____ _____
Name Date

The quality records listed above have been received by the Quality Records Coordinator.

Received by: _____ **Date:** _____

ATTACHMENT D

QUALITY RECORDS INDEXING ELEMENTS

INDEXING ELEMENTS

The following indexing data elements shall be entered on the quality records index for each quality record:

(1) Record Number: The sequential number assigned to the record upon entry to the quality records system.

(2) Originating Project and Document Number: The name of the originating project and the number assigned to the document by the originator.

(3) Document Date: The most recent date of the documents contained within the quality record or the date considered appropriate by the preparer.

(4) Record Retention Time: Lifetime and nonpermanent retention times are delineated in Attachment A. Enter additoinal retention information, such as changes to classifications or retention times, if necessary, for clarification.

(5) Subject or Title: An accurate subject description or title of the document written as it appears on the document.

(6) Cross-Reference(s): When appropriate, the activity, item or other association to be referenced for indexing and subsequent retrieval of the record.

(7) Record Location: The location of the quality record including dual records storage locations.

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

MANAGEMENT OF PROJECT TRANSMITTALS

I. POLICY

PESI policy is to communicate clearly and completely with the customer, to ensure that desired results are achieved and that the records show closure on all important items of communication with the customer.

II. DISCUSSION

During the course of each project, there will be documents, data, or other information that is to be provided the customer. These may be required by contract, good business practice, or mutual agreement. When such conditions arise, the transmittal of documents, data, or information will be accomplished with a project transmittal form that facilitates clear and complete understanding of the purpose and scope of the transmittal, and desired results from the transmittal. It will also provide for tracking and closure of all transmittal actions.

III. DEFINITIONS

None

IV. REFERENCES

PESI project procedure PMP 1.08, *Management of Project Documents*

V. PROCEDURE

A. Issuing a Project Transmittal

Performer	Action
Manager of Project Support	1. Prepares a project transmittal using the form shown in Attachment A, "Project Transmittal Form," for each transmittal of documentation, data, or information to the client point of contact.

Performer	Action
Manager of Project Support (Cont'd)	2. Enters the project transmittal in the project transmittal log as shown in Attachment B, "Project Transmittal Log."
	3. Secures review and concurrence with the project transmittal from the project manager and corporate management if required. NOTE: If official correspondence is also used, the letter is prepared, coordinated and signed by internal correspondence procedures.
	4. Signs the project transmittal and issues it to the designated client point of contact.
	5. Places a copy of the project transmittal and attachments in the project file in accordance with PESI project procedure PMP 1.08 and completes the project transmittal log.

B. Tracking, Securing Closure Actions, and Closing the Project Transmittal Log

Performer	Action
Manager of Project Support	1. Periodically reviews the project transmittal log to determine any open items or incomplete actions initiated with a project transmittal.
	2. Provides input to weekly project meetings with the client and/or monthly progress reports on open or incomplete actions related to project transmittals.
	3. Secures needed and satisfactory response to any open item or incomplete action.
	4. Achieves closure and records closure in the project transmittal log.

VI. ATTACHMENTS

A. Project Transmittal Form
B. Project Transmittal Log

ATTACHMENT A

PESI PROJECT TRANSMITTAL FORM

PESI PROJECT TRANSMITTAL (PT)

Project: _____ (Title) _____

_____

To: _____ (Client Contact) _____

Subject: _____ (Document Title, etc.) _____

_____

_____

_____

Purpose:

For Information	☐
For Review	☐
For Concurrence	☐
For Approval	☐
For Record	☐

Request: _____ (Date Response Requested) _____

Signed: _____ (Signature) _____ (Title) _____

ATTACHMENT B

PESI PROJECT TRANSMITTAL LOG

PESI PROJECT TRANSMITTAL (PT) LOG

PESI PROJECT _____ (Title)

PT No.	Date Initiated	TITLE	Purpose of Transmittal	Request Response Date	Date of Follow up	Date of Closure	Closure by (Initials)

Perma-Fix Environmental Services, Inc.

Process Operating Procedure

Approval: _____

PESI PROCESS OPERATING PROCEDURES INDEX

NO.	TITLE	REV.	DATE
2.1	PESI Process Operating Procedures Index	Draft OD	8/08/95
2.2	Drum Lifting, Deheading, and Tipping	Draft OB	8/07/95
2.3	Waste Feed Preparation	Draft OB	8/07/95
2.4	Debris Sorting and Shredding	Draft OA	8/07/95
2.5	Chemical Stabilization Treatment	Draft OA	8/07/95
2.6	Solidification Treatment	Draft OA	8/09/95
2.7	Reagent Preparation	Draft OA	(8/4/95)
2.8	Decanting and Curing	Draft OA	6/29/95
2.9	Sampling	Draft OA	(8/4/95)
2.10	Inspections and Tests	Draft OA	7/3/95
2.11	Curing	Draft OA	(8/4/95)
2.12	Cement Handling	Draft OA	(8/4/95)
2.13	Chemicals Handling	Draft OA	(8/4/95)
2.14	Motor Fuel Handling	Draft OA	(8/4/95)
2.15	Operations Log Sheet	Draft OA	7/3/95

Perma-Fix Environmental Services, Inc.
Process Operating Procedure

Approval: _____

DRUM DEHEADING, LIFTING, AND TIPPING

I. POLICY

PESI policy is to minimize the risk of personnel injury while efficiently performing drum handling activities. Whenever possible, movement, lifting and dumping of drums will be performed using mechanical devices. This procedure establishes the guidance that PESI operators and subcontractor personnel must use when performing drum handling operations.

II. DISCUSSION

At numerous locations in the waste treatment process, drum handling operations will be performed. Drum handling includes opening or deheading of drums, movement and lifting of drums, and tipping of drums to empty their contents. Since most of these operations involve the use of fork-lift trucks equipped with hydraulic drum rotating devices, the manufacturer's operating instructions are incorporated into this procedure by reference.

III. DEFINITIONS

Compatible Waste Group (CWG) - A group of waste containers assembled from a single waste category that exhibit similar waste characteristics and are amenable to the same stabilization methods and reagent recipe. The total waste volume of a CWG will be adjusted to fill one White Metal Box (WMB) after all compatible solids, reagents and hydration water have been added.

Drum - A drum is a cylindrical metal container of 30, 55, 85, or 110-gallon holding capacity, with a removable lid. Multiple drums contained within larger drums may be encountered. Large drums which contain other smaller drums may also be referred to as Overpacks.

Drum Deheading and Inspection Station - A partially-enclosed, ventilated area where waste drums are opened or deheaded (cut open). This area is equipped with vertical partition walls on three sides, negative pressure air ventilation system intakes, a jib hoist, and a metal spill collection pan covering the floor.

Drum Rotator - A hydraulic device which mounts on the blades of a fork-lift truck and allows a fork-lift driver to approach, grapple, raise, lower, and rotate a drum, without leaving his seat.

Lift Truck - A propane-fueled, internal combustion engine powered, vehicle with hydraulic lift for the lifting and transporting of loaded pallets. Lift trucks for this project will have a rated lifting capacity of at least 6,500 pounds.

White Metal Box (WMB) - A DOT strong, tight container built to FERMCO/NTS specifications and painted white. Approximate dimensions are 7 ft. × 3 ft. × 2 ft., giving a useful storage capacity of 40 cubic feet.

IV. REFERENCES

A. Operations Manual - 6,500-pound Fork-lift Truck

B. Operations Manual - Hydraulic Drum Rotator

C. Operating Instructions - Scott Alert LEL/O_2/H_2S Monitor

D. Operating Instructions - Non-sparking Drum Punch

E. Operating Instructions - Drum Deheader

V. PROCEDURE

A. Drum Retrieval and Transport

Performer		Action
Lift Truck Operator	1.	Checks his path of movement for obstructions, personnel and hazards, at floor level and overhead. Note: A Lift Truck Operator is a person who has satisfactorily completed lift-truck training, has been Conduct-of-Operations certified, and is completely familiar with his unit.
	2.	Drives the fork-lift to the Incoming Waste Storage Area (See Figure 1).

Performer	Action
Lift Truck Operator (Cont'd)	3. Lowers forks to within 2 inches of the floor, and drives forward to position forks under a loaded pallet.
	4. Raises the loaded pallet off the floor, only as high as necessary to provide adequate ground clearance, and ensuring visibility over the load.
	5. Drives the fork-lift from the Incoming Waste Storage Area to the Drum Deheading and Inspection Station (See Figure 1).
	6. Positions the loaded pallet at the Drum Deheading and Inspection Station inside the metal spill collection pan, and within the zone of influence of the negative pressure ventilation system intakes, lowers the pallet to the floor of the spill collection pan, and backs out of the area to clear the forks and resume operations elsewhere.

B. Drum Opening and Inspection

This procedure is for opening and inspecting waste drums that are in good condition, and can be opened by removing the lid retention ring and the lid. Severely deteriorated drums, bulging drums, or drums with severely corroded lid retention ring bolts may not be amenable to this procedure. In these cases, go to C, below.

Performer	Action
Deheading Operator	1. Observes the Drum ID Number, the MEF Number, and the size of the outer container and records these in Sections A and B of the Operations Log Sheet (See POP-2.15). Records the date and time that deheading and inspection operations begin for each container.
	2. Loosens the lid retention ring bolt of each drum using either a hand-operated speed wrench, or a pneumatic wrench.

Performer	Action
Deheading Operator (Cont'd)	3. Removes the lid retention ring and lifts off the lid. Lightly rinses the lid and ring, as necessary, staging both in a designated area of the Empty Drum Staging Area. Collects Rinse Water in a steel drip pan, until the pan is full. Then uses an air-driven double diaphragm pump to transfer accumulated water from the pan to the Contaminated Water Storage Tank.
	4. Inspects the contents of the drum and records the number and size of inner containers in the spaces provided in Section B of the Operations Log Sheet.
	5. Opens or cuts open any plastic bag liners found in a container.
	6. Manually bails free liquids from the original container(s) with bucket or dipper, into a 55-gallon settling drum. Records the estimated volume of liquid removed from each container in the spaces provided in Section B of the Operations Log Sheet.
	7. Pumps off clear water layers from the settling drum to the Contaminated Water Holding Tank (See Figure 1), using hoses and an air-driven double diaphragm pump with screened suction hose.
	8. To minimize potential airborne contamination, uses a water misting hose to wet down dry dusty waste materials before any further disturbance of these materials takes place.
	9. Groups opened waste containers to make up a Compatible Waste Group (CWG) sized to fill one White Metal Box. Assigns a CWG Identification Number and records it in Section C of the Operations Log Sheet, and marks it on each container in the group.
	10. Records the ending date and time of deheading and inspection operations in Section B of the Operations Log Sheet. Places the Operations Log Sheet in a clear plastic envelope, and transfers the log sheet to the operator at the Screening Station (See Figure 1).

C. Drum Deheading

This procedure is for deheading drums that are not amenable to conventional drum lid removal, as described in Section B above. All procedures for inspecting waste containers and recording inspection information on the Operations Log Sheet will be the same as described above in Section B, Drum Opening and Inspection.

Performer	Action
Deheading Operator	1. Punches the drum lid with a non-sparking punch tool.
	2. Uses the LEL/O_2/H_2S meter to check for explosive mixture in the head space of the drum. Records LEL Meter readings in the spaces provided in Section B of the Operations Log Sheet.
	3. If an potentially explosive mixture (LEL >25 percent) is detected, allows the headspace of the drum to equilibrate with the atmosphere, and repeats the LEL meter check, until LEL measures consistently below 25 percent.
	4. If the headspace in the drum does not contain a potentially explosive mixture (LEL < 25 percent), attaches the electric-powered drum deheader on the rim of the drum and cuts the lid away from the drum.
	5. Removes the drum deheader, and the lid, rinsing the lid if necessary, and staging the lid in a designated area of the Empty Drum Staging Area.
	6. Finishes the deheading operations following the procedures beginning with Step 3 in B, Drum Opening and Inspection, above.

D. Removing Concentric Containers

This procedure is for removing multiple inner containers inside drums or overpacks. All procedures for inspecting waste containers and recording inspection information on the Operations Log Sheet will be the same as described above in Section B, Drum Opening and Inspection.

Performer	Action
Deheading Operator	1. Use the existing jib hoist (See Figure 1) and appropriate lifting straps (per FERMCO Hoisting and Rigging requirements) to lift inner containers one at a time out of the overpack, setting them inside the spill collection pan in the Drum Deheading and Inspection Station, and within the zone of influence of the dust collection intakes.
	2. Opens or deheads the container as described in Sections B and C above.
	3. Using appropriate grapples and slings with the jib hoist, as necessary, empties smaller containers back into the overpack until all waste materials have been reconsolidated into their original outer container.
	4. Lightly rinses empty inner containers into the settling drum, and either pumps the clear water to the Contaminated Water Storage Tank, or recombines it with the waste in the single container. Water to be recombined with the waste can be bailed with buckets from the settling drum back into the waste container.
	5. Moves rinsed empty containers, lids and rings from the Deheading and Inspection Station to the nearby Empty Container Staging Area.
	6. Records the size and number of each inner container in the spaces provided in Section B of the Operations Log Sheet.

E. Drum Lifting and Tipping

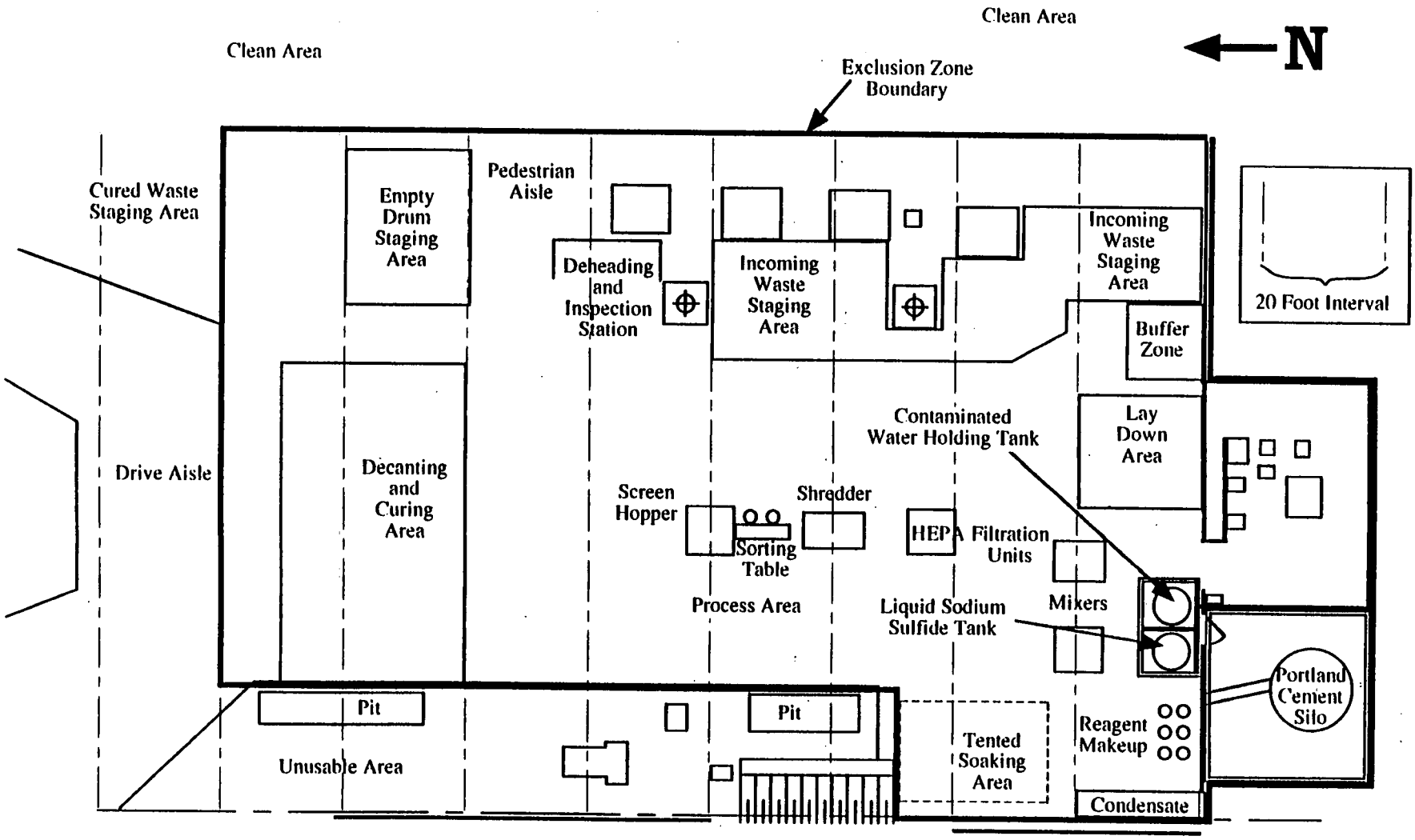
This procedure is for use at any point in the process where an open drum or overpack is to be lifted to the top of another container or piece of process equipment and dumped. These locations (shown in Figure 1) are the Screen Hopper, the Shredder, and the Decanting and Curing Area.

Performer	Action
Lift Truck Operator	1. Using a 6,500 pound (minimum rated) lift truck with a hydraulic drum rotator firmly attached to the forks, grabs each individual drum, ensuring that the drum is properly positioned, and a good grip has been achieved.

Performer		Action
Lift Truck Operator	2.	Lifts the drum as high as necessary for the entire drum and its rotator to clear obstructions, containers or process equipment.
	3.	Slowly drives forward, observing vertical and lateral clearance, making necessary adjustments to prevent collisions with containers or process equipment. Move forward until the lifted drum or overpack is properly positioned over the container or process equipment to receive the waste.
Observer	4.	Assists the lift truck driver in horizontal and vertical positioning of the lifted container prior to emptying. Uses verbal as well as hand signal communication.
Lift Truck Operator	5.	After ensuring that no personnel are in the potential splash zone, rotates the drum until release of the waste from the lifted container is achieved.
Observer	6.	Visually checks the tipped container to determine whether or not waste materials released properly.
	7.	Uses poles, and extended-handle box cutters, as necessary to help disengage waste from the tipped container.
Lift Truck Operator	8.	Returns the empty container to the upright position, backs away, and lowers the empty container to floor level. Returns the empty container to the Deheading and Inspection Station for rinsing.
Observer	9.	Provides assistance to the fork-lift operator in backing away, lowering the empty container, and moving it back to the Deheading and Inspection Station for rinsing and reuse or staging for disposal.

VI. ATTACHMENTS

A. Figure 1 - Plant 6 Equipment Layout
B. Figure 2 - Waste Preparation Process



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Figure 1
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

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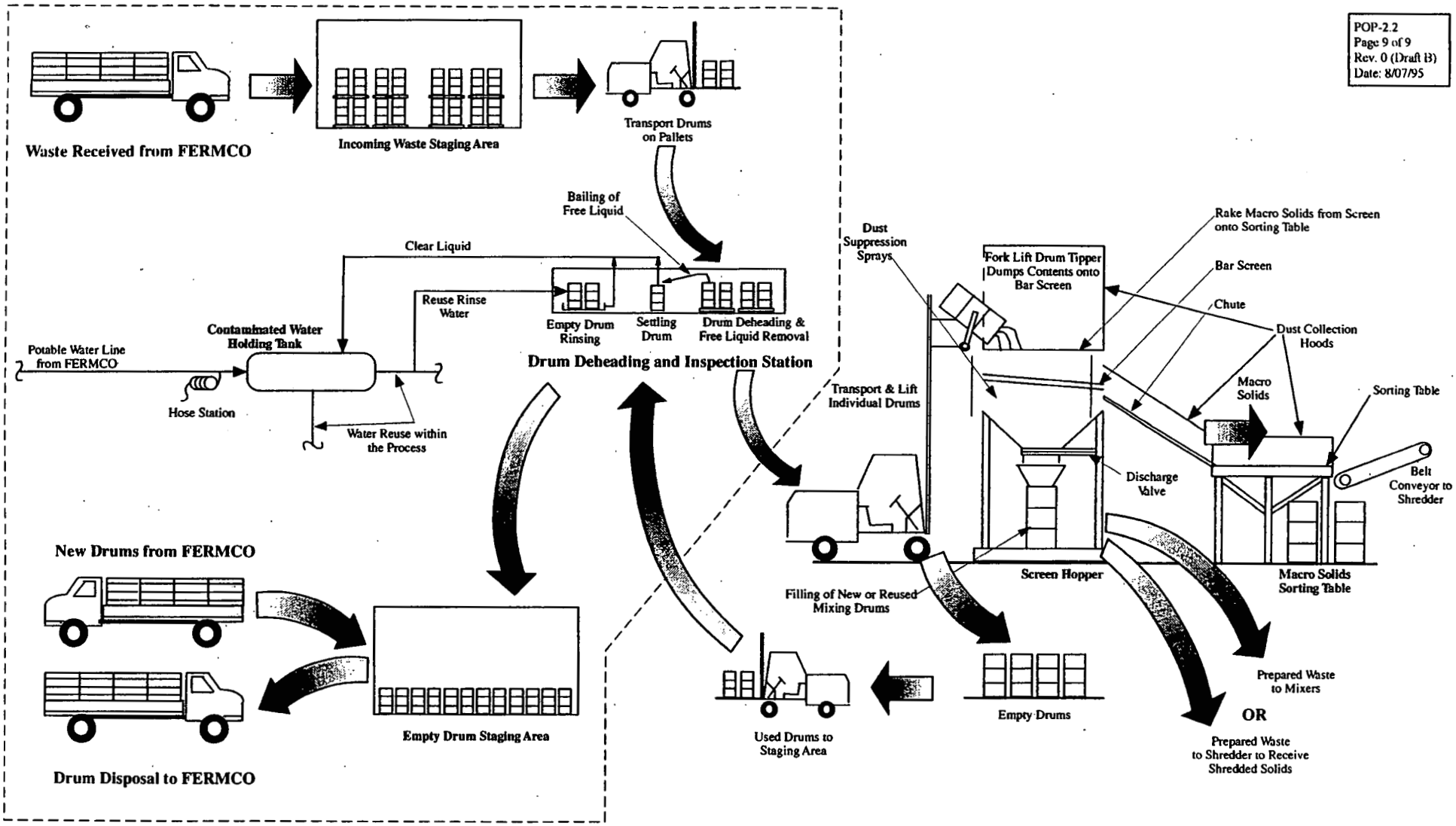


Figure 2
Waste Preparation Process

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Process Operating Procedure

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WASTE FEED PREPARATION

I. POLICY

PESI policy is to minimize the risk of personnel injury while efficiently preparing wastes and their containers for further treatment processing in downstream processes. The process goal of waste feed preparation is to maximize uniformity of the wastes entering the treatment process. This procedure establishes the guidance that PESI operators and subcontractor personnel must use when performing waste feed preparation.

II. DISCUSSION

Before mixed wastes can be reliably treated by the Perma-Fix Process, the waste must first be prepared for treatment. Waste preparation includes adjusting moisture content, cutting open plastic bags, screening to remove macro solids, recontainerizing the waste in 55-gallon mixing drums, and providing adequate freeboard for later reagent additions.

III. DEFINITIONS

Compatible Waste Group (CWG) - A group of waste containers assembled from a single waste category that exhibit similar waste characteristics and are amenable to the same stabilization methods and reagent recipe. The total waste volume of a CWG will be adjusted to fill one White Metal Box (WMB) after all compatible solids, reagents and hydration water have been added.

Mixing Drum - A mixing drum is a heavy-gauge, steel, 55-gallon, open-top drum. It must have good structural integrity and be free of leaks. It must also be marked with a unique identification number.

Freeboard - An amount of open space intentionally provided at the top of a mixing drum to ensure that there is sufficient room in the drum for treatment reagents and water.

Macro Solids - Heterogeneous waste materials mixed with the waste in the waste drums, that must be separated, size reduced, and recombined with the waste at an appropriate point in the waste stabilization process. Macro solids are defined as any solid materials that will not pass through a 2-inch bar screen.

Waste Drum - An original waste container or drum which will be emptied and rinsed during the waste preparation activity.

IV. REFERENCES

A. Operations Manual - Wilson Knife Shredder

V. PROCEDURE

A. Adjusting Liquid Content

Liquid content of the incoming waste is expected to vary over a wide range, with some drums containing as much as 50 percent free liquid, and others having only dry dusty materials. Free liquid layers will be removed, and dry dusty material will be wet down to help minimize dust generation, and improve consistency of waste entering downstream processes.

Performer	Action
Deheading Operator	1. Ensures that all containers in a Compatible Waste Group (CWG) proceed to the screening process, with no commingling of waste from other CWGs.
	2. As described in POP-2.2, removes free liquid layers out of the waste container and pumps it to the Contaminated Water Holding Tank (See Figure 1).
	3. As described in POP-2.2, wets down any dry dusty waste materials before the waste undergoes further waste preparation activities.
Screen Operator	4. Records in the spaces provided in Section C of the Operations Log Sheet the date and time each waste container enters the Screening Area (See Figure 1), the original container ID number, and the CWG Number.
	5. Visually inspects containers to ensure that liquid content has been properly adjusted. Takes appropriate corrective action, in conjunction with the Deheading Operator, to either add water, or remove excess water to ensure proper solid/liquid ratios in each container.

Performer	Action
Screen Operator (Cont'd)	6. Records in the spaces provided in Section C of the Operations Log Sheet the estimated waste volume for each original container, before screening (based upon level observed in the original container).

B. Opening or Cutting Plastic Liners

The presence of plastic drum liners or bagged waste materials can have a negative impact on productivity in the screening operation. Plastic liners or bags must be opened before screening.

Performer	Action
Screen Operator	1. Checks to ensure that any plastic drum liners or other plastic bags contained in the waste drum have been opened, so as to release the waste when the drum is emptied into the screen hopper. Opens or cuts open any intact plastic bags or liners inside the container.

C. Screening for Macro Solids Removal

Macro solids larger than 2 inches in any dimension can interfere with waste mixing in the downstream chemical stabilization and solidification treatment steps of the process. Also, some containers of oil, grease, solvents or aerosols may be found mixed with the waste in the waste containers. These types of waste materials are chemically incompatible with the stabilization process, and therefore must be removed from the waste. To minimize potential productivity impacts, macro solids must be separated, sorted, and size reduced as necessary to accomplish stabilization and solidification treatment. The first step in macro solids management is removal from the waste by screening. During the screening process, care will be exercised to keep all containers within each CWG in an intact group.

Performer	Action
Screen Operator	1. Turns on the water mist system at the top of the screen hopper, immediately prior to emptying of a waste drum, and turns it off immediately after the drum emptying operation is complete.

Performer	Action
Screen Operator (Cont'd)	2. As described in POP-2.2, serves as an observer, using verbal and hand communication to guide the lift truck operator in positioning the waste drum over the screen hopper, prior to emptying. Provides similar guidance to the lift truck operator as he backs away from the screen hopper.
Lift Truck Operator	3. Follows the guidance of the Screen Operator in positioning and dumping original waste containers into the Screen Hopper, and in backing away from the hopper.
	4. As described in POP-2.2, assists the Screen Operator in dislodging any waste materials remaining in the waste drum after it has been dumped into the top of the Screen Hopper.
Screen Operator	5. Uses poles, pry bars, water spray, and extended-handle box cutters, as necessary to separate waste from macro solids and drum liners on top of the bar screen.
	6. Rakes macro solids off the bar screen and down a chute to the sorting table.

D. Filling Mixing Drums

Screened waste materials will discharge from the bottom of the Screen Hopper by way of a guillotine gate valve. These materials will be dispensed by the operator into heavy duty 55-gallon mixing drums to a pre-determined fill level, to ensure adequate freeboard. During the filling of mixing drums, care will be exercised to keep all the containers in a each CWG in an intact group.

Performer	Action
Screen Operator	1. Positions an empty 55-gallon mixing drum under the discharge valve of the screen hopper, and places a plastic drape into the mouth of the drum.
	2. Turns on the water mist spray immediately prior to dispensing waste into the mixing drum, and turns it off immediately after dispensing.

Performer	Action
Screen Operator (Cont'd)	3. Opens the discharge valve and dispenses enough waste into the mixing drum to establish the desired freeboard above the waste level. Then closes the valve to prevent overfilling.
	4. Checks the freeboard and bails waste to add or remove screened waste as necessary to adjust freeboard.
	5. Removes the drape from the mixing drum and directs the lift truck operator in grabbing the filled mixing drum and removing it from under the screen hopper.
Screen Operator	6. Records in the spaces provided in Section C of the Operations Log Sheet the Mixing Drum ID Number, the estimated waste volume after screening, and the freeboard level. Marks the CWG Number on the outside of each mixing drum with chalk, crayon, or paint pen.
	7. Directs container movement by the lift truck operator to keep all containers in a CWG together as a group.
Fork-lift Operator	8. Under the direction of the Screen Operator, grabs and transports each filled mixing drum in a particular CWG to its proper staging location.
	9. Places the completed Operations Log Sheet back in the clear plastic envelope and attaches it to one of the mixing drums in the CWG that has been prepared for treatment.

VI. ATTACHMENTS

A. Figure 1 - Plant 6 Equipment Layout
B. Figure 2 - Waste Preparation Process

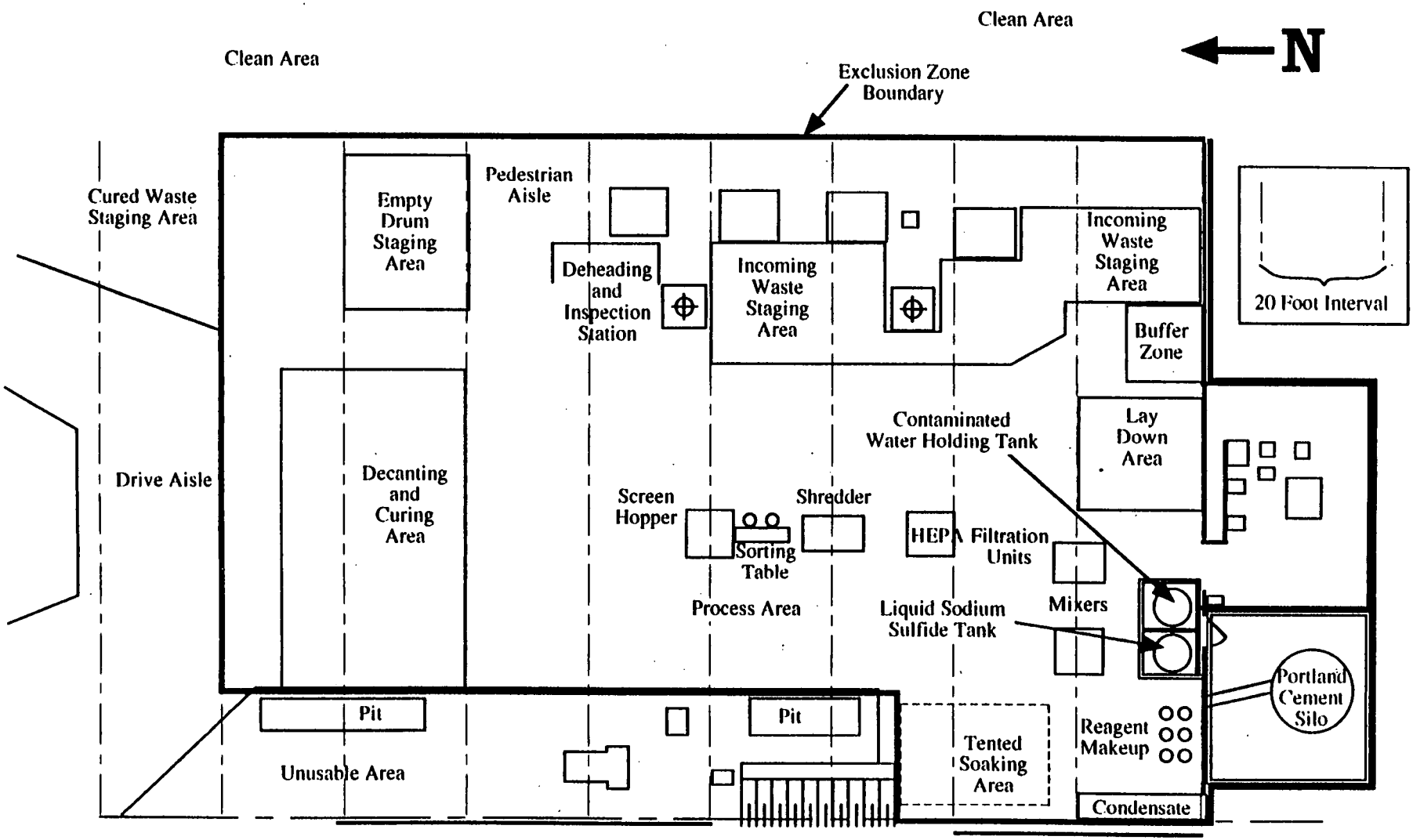


Figure 1
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

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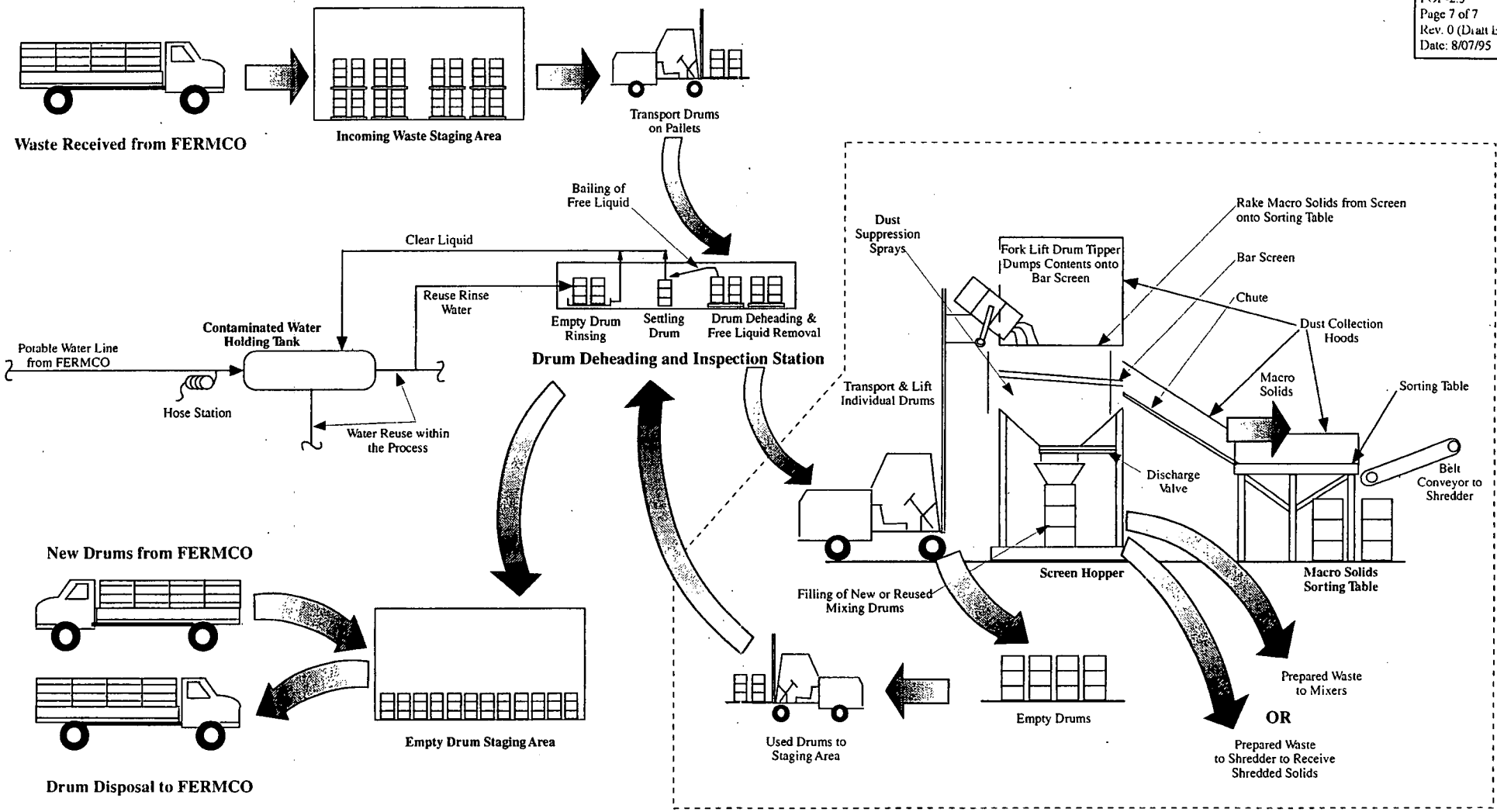


Figure 2
Waste Preparation Process

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Process Operating Procedure

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MACRO SOLIDS SORTING AND SHREDDING

I. POLICY

PESI policy is to minimize the risk of personnel injury while efficiently sorting separated macro solids for process compatibility and size reduction as appropriate for downstream co-treatment of macro solids and waste. The process goal of macro solids sorting and shredding is to maximize uniformity and reduce the size of process compatible solids before they are recombined with the waste stream for treatment. This procedure establishes the guidance that PESI operators and subcontractor personnel must use when performing waste feed preparation.

II. DISCUSSION

Macro solids removed from the waste in the screening operation must be sorted for process compatibility, and for their ability to be safely and effectively size reduced in the shredder. The five categories of sorted waste to be established are:

Process Incompatible Macro Solids/Wastes

Examples: Soft Tar
Solvent Containers (still containing material)
Oil or Grease Containers

Process Compatible/Shreddable Macro Solids

Examples: Wood
Paper
Masonry
Refractory Brick
Sheet Plastic
PVC Pipe

Process Compatible/Unshreddable Macro Solids

Examples: Steel Pipe
Structural Steel

Elemental Lead

Examples: Lead Shielding
Lead Flashing
Lead Piping
Lead-Acid Battery Cores

Potentially Hazardous Containers

Examples: Aerosol Cans
Gas Cylinders
Fuel Cans
Acid Bottles
Chemical Reagent Bottles
Oxidizer Containers

III. DEFINITIONS

Compatible Waste Group (CWG) - A group of waste containers assembled from a single waste category that exhibit similar waste characteristics and are amenable to the same stabilization methods and reagent recipe. The total waste volume of a CWG will be adjusted to fill one White Metal Box (WMB) after all compatible solids, reagents and hydration water have been added.

Macro Solids - Heterogeneous waste materials mixed with the waste in the waste drums, that must be separated, size reduced, and recombined with the waste at an appropriate point in the waste stabilization process. Macro solids are defined as any solid materials that will not pass through a 2-inch bar screen.

Process Compatible Solids/Waste - Any waste or solids which are inorganic and which are small enough to pass through a 2-inch bar screen. These materials are small enough to be mixed without physical interference or damage to the mixer or mixing drum.

Process Incompatible Solids/Waste - Any waste or solids which are of an organic chemical nature, are compressible, or are contaminated with waste constituents that cannot be adequately stabilized with the cement stabilization process. Elemental lead, such as lead shielding or flashing has the potential to cause treated waste to fail the NTS waste acceptance criteria, and is therefore incompatible with the process. Organic chemicals, such as solvents or petroleum fractions, are chemically incompatible with the cement stabilization process.

Shredded Solids - Size-reduced solids discharged from the bottom of the knife shredder. These solids will pass a 2-inch bar screen.

Unshreddable Macro Solids - Any macro solids that are either too large or too hard to be shredded without risking damage to the shredder or its blades.

IV. REFERENCES

A. Operations Manual - Wilson Brothers Knife Shredder

V. PROCEDURE

A. Transfer of Macro Solids to the Sorting Table

As described in POP-2.3, macro solids are retained on the bar screen of the Screen Hopper. The Screen Operator separates the macro solids from any entrained waste solids on top of the screen, and then rakes the macro solids, off the bar screen and down an inclined chute between the Screen Hopper and the Sorting Table (See Figures 1 and 2, attached). When debris arrives at the bottom of the chute, it will be the responsibility of the Sorting Table Operator.

Performer		Action
Screen Operator	1.	Wets down macro solids on the bar screen with a light water spray. Rakes wet macro solids from bar screen to discharge chute and down onto the sorting table.
	2.	Informs the Sorting Table Operator, which Compatible Waste Group (CWG) Number the macro solids came from. Calls Sorting Table Operator's attention to each change from one CWG to the next.
	3.	Provides the updated Operations Log Sheet to the Sorting Table Operator.
Sorting Table Operator	4.	Receives macro solids from the bar screen by way of an inclined chute. Receives Operations Log Sheet from the Screen Operator.

Performer	Action
Sorting Table Operator (Cont'd)	5. Records in the spaces provided in Section D of the Operations Log Sheet the date and time that macro solids from each waste CWG is transferred to the Sorting Table. Also records the original container ID number and the CWG Number.
	6. When debris from two separate CWGs is on the sorting table at the same time, uses a plastic fence to keep them separate. Ensures that all macro solids from a CWG proceeds through the sorting and shredding process as a group, with no waste from other CWGs becoming mixed in with the CWG being processed.

B. Sorting of Macro Solids

The Sorting Table Operator is responsible for sorting macro solids into the five categories described in Section II above, and for record keeping on the Operations Log Sheet for all activities associated with the sorting of macro solids. Of the five categories of macro solids, the only one that may proceed directly to the shredder for size reduction is the Process Compatible/Shreddable Macro Solids. These will be carried on a continuous belt conveyor and discharged into the feed hopper of the shredder. All other categories of macro solids will be separated by the Sorting Table Operator and placed into marked and designated storage drums.

Performer	Action
Sorting Table Operator	1. Rinses macro solids on the sorting table with potable water, and allows them to drain on the table. Rinse water gravity drains from the sorting table into a contaminated water settling drum.
	2. Using the 5 categories of macro solids described in Section II above, hand sorts macro solids and rakes each type of unshreddable or incompatible solid into the appropriate designated storage drum.
	3. Places process compatible/shreddable macro solids on a belt conveyor discharging into the feed hopper of the shredder.
	4. Minimizes contact handling of macro solids by raking solids into the appropriate storage drums with a hand paddle.

Performer	Action
Sorting Table Operator (Cont'd)	5. Ensures that macro solids of one category are not put into a storage drum containing solids of a different category.
	6. Records the volume and description of process-compatible macro solids of the following types in the spaces provided in Section D of the Operations Log Sheet: Shreddable Macro Solids Unshreddable Macro Solids
	7. When a drum containing sorted process-incompatible solids have become full, guides the Lift Truck Operator in identifying and taking custody of the drum for removal to a designated location in the Lay Down Area (See Figure 1). These categories of incompatible solids include: Elemental Lead Potentially Hazardous Containers
	8. When the drum containing sorted process compatible/unshreddable debris is full, guides the Lift Truck Operator in identifying and taking custody of the drum for removal to a designated location in the Decanting and Curing Area (See Figure 1).
Lift Truck Operator	9. Follows the guidance of the Sorting Table Operator and downstream process operators in moving macro solids storage drums to designated staging locations.

D. Discharging Shredded Solids Into Mixing Drums

Shredded solids will discharge from the bottom of the shredder by way of a discharge hopper into a single 55-gallon drum. The receiving drum can be either empty or previously filled to a specified freeboard level with screened and prepared waste. Procedures in this section are for the direct discharge of shredded solids into mixing drums that have been previously filled with screened and prepared wastes.

Performer	Action
Shredder Operator	1. Guides the Lift Truck Operator in positioning a drum of screened and prepared waste underneath the shredder, so that shredded solids will discharge directly into the drum. Places the plastic drape inside the drum.

Performer		Action
Lift Truck Operator	2.	Under the direction of the Shredder Operator, grabs and transports each filled mixing drum and places it under the shredder discharge hopper.
Shredder Operator	3.	Ensures that the debris to be shredded and the waste drum which receives the shredded debris are from the same waste CWG.
	4.	Turns on the shredder and the water mist spray (if necessary) immediately prior to feeding macro solids into the feed hopper of the shredder. Turns on the conveyor belt to feed solids into the shredder.
Shredder Operator	5.	Turns off the shredder and the water mist spray immediately after shredding of the batch has been completed.
	6.	Removes the plastic drape, and guides the Lift Truck Operator in grabbing, lifting and removing the mixing drum from underneath the shredder.
	7.	Checks the freeboard and hand removes shredded debris if insufficient freeboard remains for proper treatment in downstream processes. Distributes shredded debris amongst all of the mixing drums in a CWG in order to ensure that all mixing drums in the CWG have the appropriate freeboard level.
	8.	Directs the Lift Truck Operator where to take the filled mixing drums.
	9.	Records in Section D of the Operations Log Sheet the volume of shredded debris added to the Mixing Drum. Notes on the Operations Log Sheet whether or not the material shredded was for reprocessing of WAC failed monoliths.
	10.	Records the ending date and time of the shredding operation for each CWG processed. Indicates the destination of any unshreddable debris.

Performer	Action
Shredder Operator	11. Places the completed Operations Log Sheet back in the clear plastic envelope and attaches it to one of the mixing drums in the CWG that is being transported to the Perma-Fix Mixer location.
Lift Truck Operator	12. Under the direction of the Shredder Operator, grabs and transports each filled mixing drum that has received shredded debris to the Perma-Fix Mixer location for treatment (See Figure 1).

E. Discharging Shredded Debris Into Empty Drums

The procedures and operator responsibilities for discharging shredded debris into empty drums will be the same as listed in Section D above, except that an empty drum will be used instead of a drum that has been previously filled with screened and prepared waste.

VI. ATTACHMENTS

A. Figure 1 - Plant 6 Equipment Layout

B. Figure 2 - Debris Sorting and Size Reduction

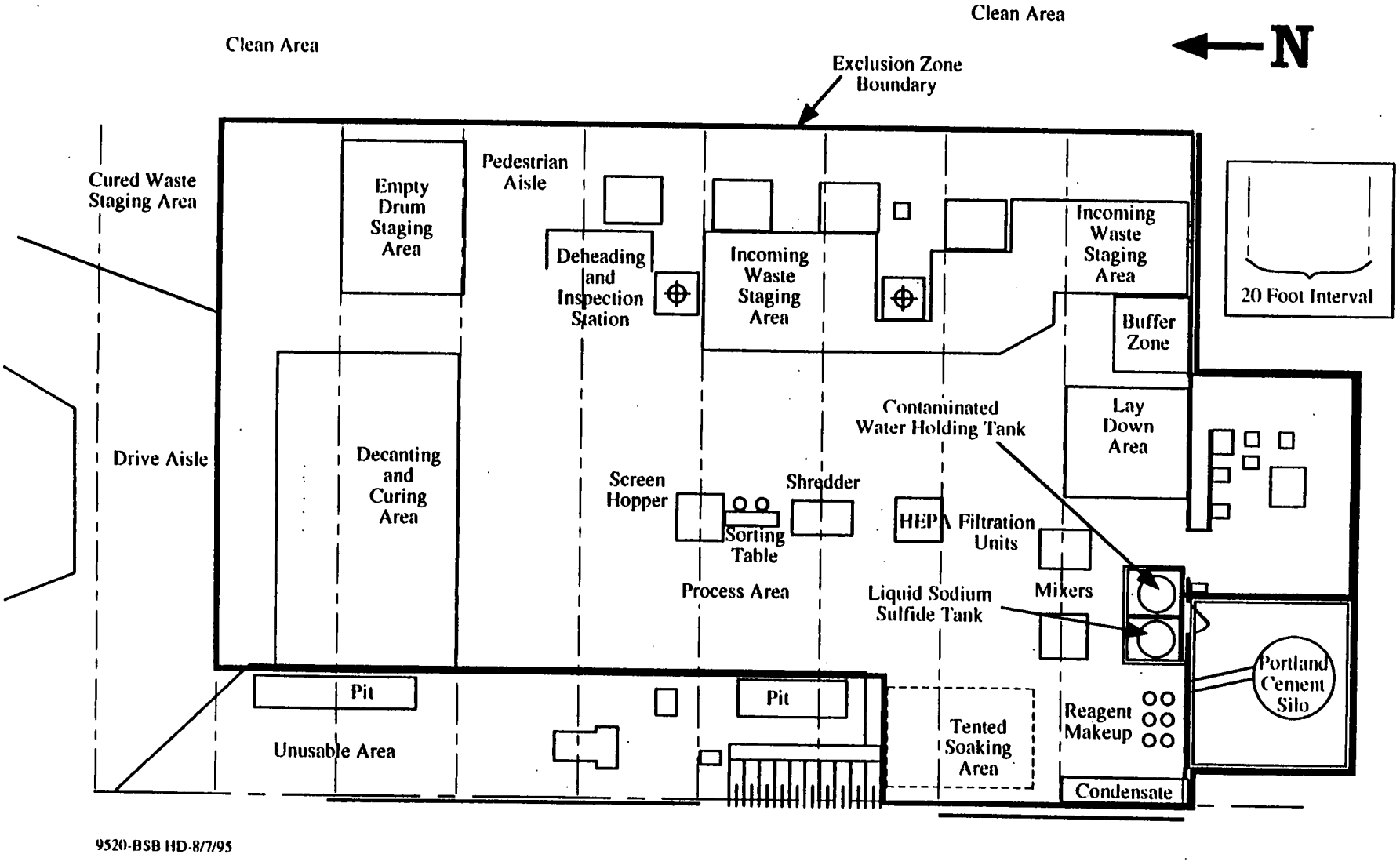
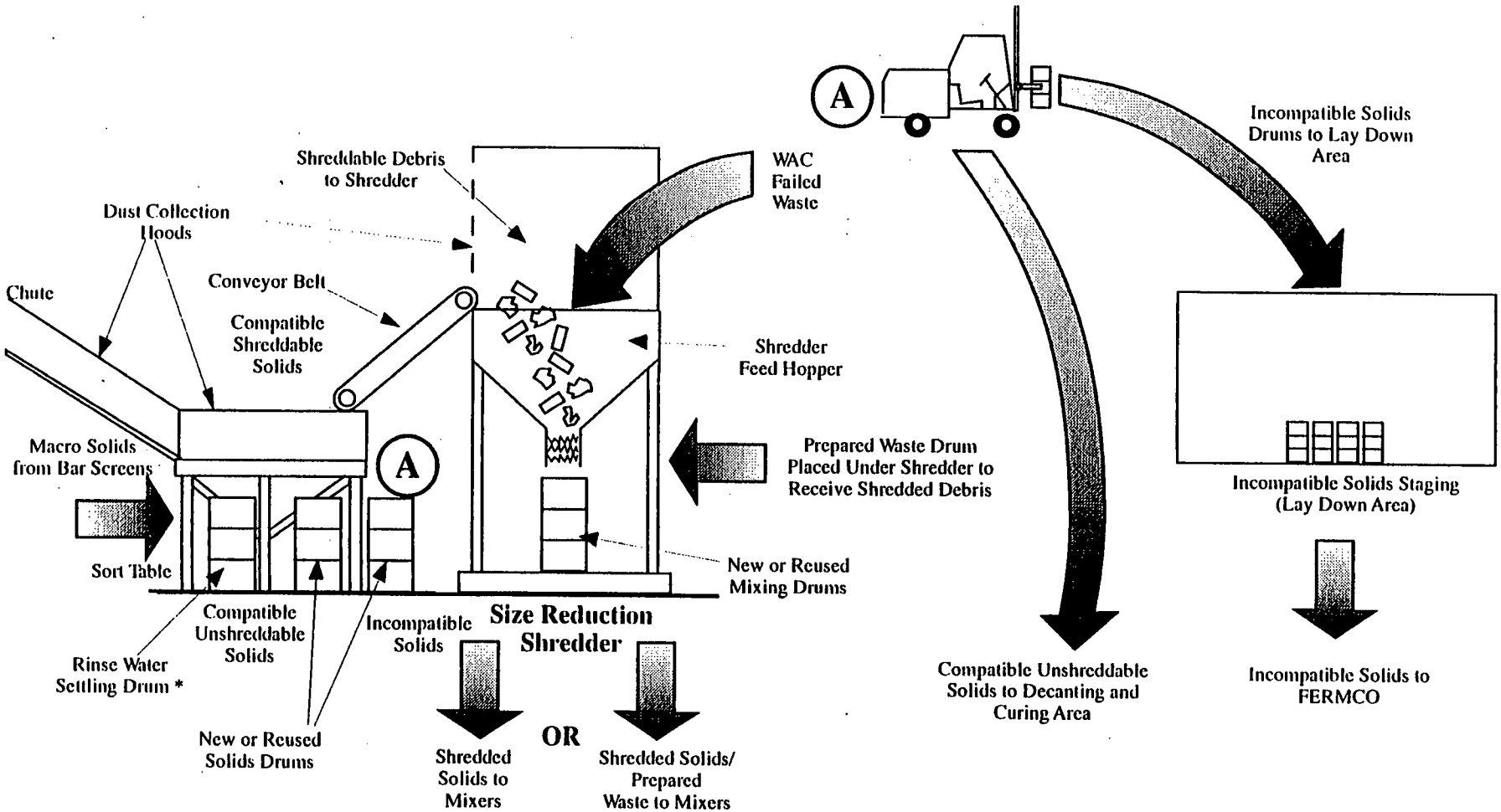


Figure 1
Mixed Waste Stabilization Project
Plant 6 Equipment Layout



* Clear rinse water is pumped to the Contaminated Water Holding Tank

Figure 2
Debris Sorting and Size Reduction

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Date: 8/07/95

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Perma-Fix Environmental Services, Inc.
Process Operating Procedure

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PRETREATMENT STABILIZATION

I. POLICY

PESI policy is to minimize the risk of personnel injury while efficiently performing chemical pretreatment of prepared waste or waste mixtures, prior to cement stabilization. The process goal of the pretreatment stabilization activity is to chemically precipitate all toxic heavy metals and radionuclides so as to minimize their leachability from the final treated waste form. This procedure establishes the guidance that PESI operators and subcontractor personnel must use when performing chemical stabilization treatment using the Perma-Fix Mixer.

II. DISCUSSION

Chemical pretreatment stabilization by the Perma-Fix Process involves the precipitation of toxic heavy metals and radionuclides in a chemical form that has low solubility compared to that of the untreated waste. The steps of the chemical pretreatment and the reagents used will vary somewhat with waste types. For standard treatment, sodium sulfide stabilization will effectively precipitate all heavy metals, except for barium and hexavalent chromium. For wastes expected to contain high concentrations of these metals, pretreatment with ferrous sulfate may be needed to reduce the leachability of these metals, before sodium sulfide is used for the final precipitation step. Each of these procedures are described below.

III. DEFINITIONS

Compatible Waste Group (CWG) - A group of waste containers assembled from a single waste category that exhibit similar waste characteristics and are amenable to the same stabilization methods and reagent recipe. The total waste volume of a CWG will be adjusted to fill one White Metal Box (WMB) after all compatible solids, reagents and hydration water have been added.

Pretreatment Stabilization - A chemical reaction in which soluble metal ions are made essentially insoluble by a chemical precipitation reaction.

Stabilization Reagent - A chemical compound which reacts with metal ions to form an insoluble precipitate. Commonly used stabilization reagents include: ferrous sulfate and sodium sulfide.

pH - A measure of the relative acidic or basic nature of a water, sludge or waste. The pH scale extends from 0 to 14, with 7 being the neutral point (neither acid or base). A pH value between 0 and 7 is acidic with lower values indicating greater acidity. A pH value between 7 and 14 is basic with higher values indicating greater basicity.

pH Control Reagents - Chemical compounds which are added to water, sludge or waste to adjust its pH either up or down. To decrease pH, an acidic reagent is used. To increase pH a basic reagent is used. Commonly used acidic reagents include: sulfuric acid, hydrochloric acid, and sodium bisulfite. Commonly used basic reagents include: sodium hydroxide, lime, and sodium carbonate.

Sulfide Reaction End Point - The point of equivalency where enough sodium sulfide reagent has been added to exactly balance the sulfide demand exhibited by all of the precipitable metals in the waste.

Lead Acetate Paper Test - A colorimetric test using lead acetate saturated paper test strips to detect when the sulfide reaction end point has been attained. The lead acetate reacts with free sulfide to produce a stain varying in color from beige to black depending on the concentration of free sulfide present. A black color indicates a great excess of free sulfide, a beige to light brown color indicates only a slight excess of free sulfide. The test is performed after sodium sulfide has been added to the waste and completely dispersed and reacted with the waste mass.

White Metal Box (WMB) - A DOT strong, tight container built to FERMCO/NTS specifications and painted white. Approximate dimensions are 7 ft. × 3 ft. × 2 ft., giving a useful storage capacity of 40 cubic feet.

IV. REFERENCES

None

V. PROCEDURE

A. Loading and Log-in of Waste for Pretreatment Stabilization

Mixing drums containing prepared waste or waste/solids mixtures are brought to the mix units by lift truck and placed under the propeller mixer. Figure 1 shows the locations of the mix units in Plant 6, and Figure 2 provides a process schematic of the pretreatment stabilization process. The mixing drums are grouped into Compatible Waste Groups (CWGs) that contain from 4 to 5 mixing drums per CWG. The actual

number of mixing drums in a CWG and the degree to which they are filled with waste/solids is dictated by the Design Recipe. Each CWG is treated as a group, and no mixing drums from other CWGs are processed by a mix unit until the previous CWG has been completed.

The following procedures describe how each mixing drum is chemically pretreated prior to the addition of cement solidification reagents.

Performer	Action
Lift Truck Operator	1. Transports mixing drums from a specific CWG from the Screening or Shredding Areas to the Mix Unit Location and stages them as directed by the Mix Unit Operator.
	2. Transports shredded solids storage drums from the Shredder Area and places them with the prepared waste drums from the same CWG, or as directed by the Mix Unit Operator.
Mix Unit Operator	3. Receives and stages 55-gallon drums from the Screening or Shredding Areas in CWGs which are properly sized to fit into a White Metal Box (WMB) after treatment.
	4. Logs in each waste container by recording the following information in the spaces provided in Section E of the Operations Log Sheet: Mixing Drum ID Number CWG Number Beginning Date and Time Initial Color and Texture of the Waste
	5. Guides the Lift Truck Operator in positioning each prepared waste drum one at a time underneath the mixer for treatment.
Lift Truck Operator	6. Follows the guidance of the Mix Unit Operator in lifting each individual mixing drum and placing it under the mixer, and then in backing away from the mixer.
	7. Follows the guidance of the Mix Unit Operator in lifting each drum of shredded solids to a position near the mixer, and within arms reach of Mix Unit Operator, and then in backing away from the mixer.

Performer	Action
Mix Unit Operator	8. Ensures that all mixing drums in a specific CWG have been treated before initiating log-in and loading of the next CWG underneath the mixer.

B. Chemical Stabilization of Barium and Hexavalent Chromium

This procedure considers chemical reduction of chromium and sulfate precipitation of barium to be a pretreatment step which immediately precedes standard sodium sulfide stabilization. In some cases the chromium reduction/barium precipitation step takes place and then the waste is allowed to react and soak overnight before the sulfide stabilization takes place.

Performer	Action
Mix Unit Operator	1. Using hydraulic controls, raises the mixer assembly high enough for the bottom of the impeller to clear the top of the mixing drum.
	2. Manually swings the Mix Unit arm over the drum, and hydraulically lowers the impeller into the waste, taking care not to puncture the sides of the drum.
	3. Using hydraulic controls drives the mixer in forward or reverse rotation at speeds up to 300 rpm to agitate the waste inside the mixing drum.
	4. Pivots the mixer support arm by hand, and uses the horizontal ram to move the mixer inside the mixing drum so as to ensure that all wastes and shredded solids in the drum are thoroughly mixed.
	5. Continues mixing until all lumps or irregularities inside the drum have been broken up and homogenized.
	6. Using the methods described in POP-2.10, tests every mixing drum for pH and records the initial pH reading in the space provided in Section E of the Operations Log Sheet.
	7. If pH is above 7, adds sodium bisulfite until pH tests show less than 7. Records the corrected pH and the name, concentration and amount of pH adjustment reagent added in the spaces provided in Section E - 1 of the Operations Log Sheet.

Performer	Action
Mix Unit Operator (Cont'd)	8. Records the start time of Pretreatment Stabilization mixing (*Barium/Chromium Stabilization Step*) in the space provided in Section E - 1 of the Operations Log Sheet.
	9. After waste color, consistency and texture are uniform throughout the mixing drum, adds the prescribed amount (See the Design Recipe Notice posted at each work station) of ferrous sulfate and mixes thoroughly. Note: At this point, the design treatment recipe may require that the waste be reacted overnight, before proceeding with sulfide stabilization. If so removes the mixer from the drum and moves the drum to the Soaking Area (See Figure 1). If overnight soaking is not required, proceeds directly to step 12 below.
Mix Unit Operator (Continued)	10. When ferrous sulfate mixing is complete, records the ending date and time in Section E-1 of the Operations Log Sheet. Also records the ending pH, and the amount and strength of the ferrous sulfate reagent added.
	11. Proceeds to Step C below.

C. pH Adjustment

Bench-scale tests have shown the production of hydrogen sulfide gas from sodium sulfide treatment of wastes to be insignificant as long as the pH of the waste is over 7.0. For purposes of ensuring a factor of safety, pH will be adjusted to at least 9.0 before sodium sulfide treatment begins. For wastes that have been demonstrated during the bench scale tests to release ammonia during the solidification treatment step, pH will be adjusted to 12.0 or higher, and these wastes will be allowed to soak overnight before further processing. The following are procedures for adjusting pH.

Performer	Action
Mix Unit Operator	1. Using hydraulic controls, drives the mixer in forward or reverse rotation at speeds up to 300 rpm to agitate the waste inside the mixing drum.

Performer	Action
Mix Unit Operator (Cont'd)	2. Using the methods described in POP-2.10, tests every mixing drum for pH and records the initial pH reading on the Operations Log Sheet.
	3. If pH is below the value prescribed in the design recipe (9.0 or 12.0), adds sodium hydroxide or lime until pH tests show a pH equal to or greater than the value prescribed. Records the starting and ending pH in the spaces provided in Section E - 2 of the Operations Log Sheet.
	4. If the design recipe calls for soaking the waste in the drum overnight, removes the mixer from the drum and moves the drum to a designated staging area. If overnight soaking is not required, proceeds directly to step 5 below.
	5. When pH adjustment is complete, records the ending date and time in Section E - 2 of the Operations Log Sheet. Also records the name and amount of alkaline reagent used for the pH adjustment.
	6. Proceeds to Step D below.

D. Standard Treatment with Sodium Sulfide

Standard treatment of mixed wastes with sodium sulfide while mixing with the Perma-Fix Mixer is described as follows. The Mix Unit Operator is responsible for compliance with this procedure.

Performer	Action
Mix Unit Operator	1. Logs in each waste container by recording the following information in Section E - 3 of the Operations Log Sheet: Mixing Drum ID Number Group Number Beginning Date and Time Initial Color and Texture of the Waste
	2. Using the methods described in POP-2.10, tests every mixing drum for pH and records the initial pH reading in the space provided in Section E - 3 of the Operations Log Sheet. If pH is below the value required by the design recipe, goes back to Section C above, to adjust pH.

Performer	Action
Mix Unit Operator (Cont'd)	3. Using hydraulic controls, raises the mixer assembly high enough for the bottom of the impeller to clear the top of the mixing drum.
	4. Manually swings the Mix Unit arm over the drum, and hydraulically lowers the impeller into the waste, taking care not to puncture the sides of the drum, and then proceeds with mixing of the drum.
	5. Using hydraulic controls drives the mixer in forward or reverse rotation at speeds up to 300 rpm to agitate the waste inside the mixing drum.
	6. Pivots the mixer support arm by hand, and uses the horizontal ram to move the mixer inside the mixing drum so as to ensure that all wastes and shredded solids in the drum are thoroughly mixed.
	7. Continues mixing until all lumps or irregularities inside the drum have been broken up and homogenized.
	8. Adds the initial dose of sodium sulfide to the drum (See Design Recipe Notice posted at the work station) and mixes thoroughly, observing color and texture of the waste to make sure that all sulfide has been thoroughly dispersed and reacted with the waste. Mixing time will be for at least one minute after color and texture appear homogeneous. Note: For dry wastes, the sulfide may be added before step 1 above. The moisture of the sodium sulfide solution may be needed to slurry the waste. For wet wastes, the sodium sulfide may be added in the dry flake form.
	9. After waste color and texture are uniform throughout the mixing drum, performs lead-acetate paper test as described in POP-2.10 to evaluate for the sulfide reaction end point. The end point is reached when the Color Intensity Value (CIV) of the paper strip matches the comparison chart between 6 and 10 on the CIV scale.

Performer	Action
Mix Unit Operator (Cont'd)	10. If the CIV is less than 6, repeats steps 7 and 8 with small incremental doses of additional sodium sulfide until the CIV is 6 or above.
	11. When mixing is complete and the CIV is within the control range, stops mixing operations, and records the ending date and time in the spaces provided in Section E - 3 of the Operations Log Sheet. Also records the waste color after mixing on the Operations Log Sheet.

E. Removal of Mixing Drum

Although in most operating scenarios solidification treatment by POP-2.6 will proceed immediately after the completion of pretreatment stabilization by this procedure, it may be necessary to remove the mixing drum from underneath the mixer and move it to a staging area. This procedure describes the steps in removing the mixing drum from the Mix Unit.

Performer	Action
Mix Unit Operator	1. Hydraulically raises the mixer until the bottom of the mixer shaft clears the top of the mixing drum.
	2. Uses a spatula to scrape adhering waste from the shaft and blades of the mixer, allowing the waste to fall back into the drum.
	3. Manually pivots the mixer away from the mixing drum and guides the Lift Truck Operator in grabbing, lifting, removing the mixing drum and staging it in a designated area.
Lift Truck Operator	4. Follows the guidance of the Mix Unit Operator in grabbing and removing the mixing drum from underneath the mixer.
	5. Transports the mixing drum to a designated staging area and places the drum together with the other mixing drums of that same waste CWG.

VI. ATTACHMENTS

A. Figure 1 - Plant 6 Equipment Layout

B. Figure 2 - Pretreatment Stabilization

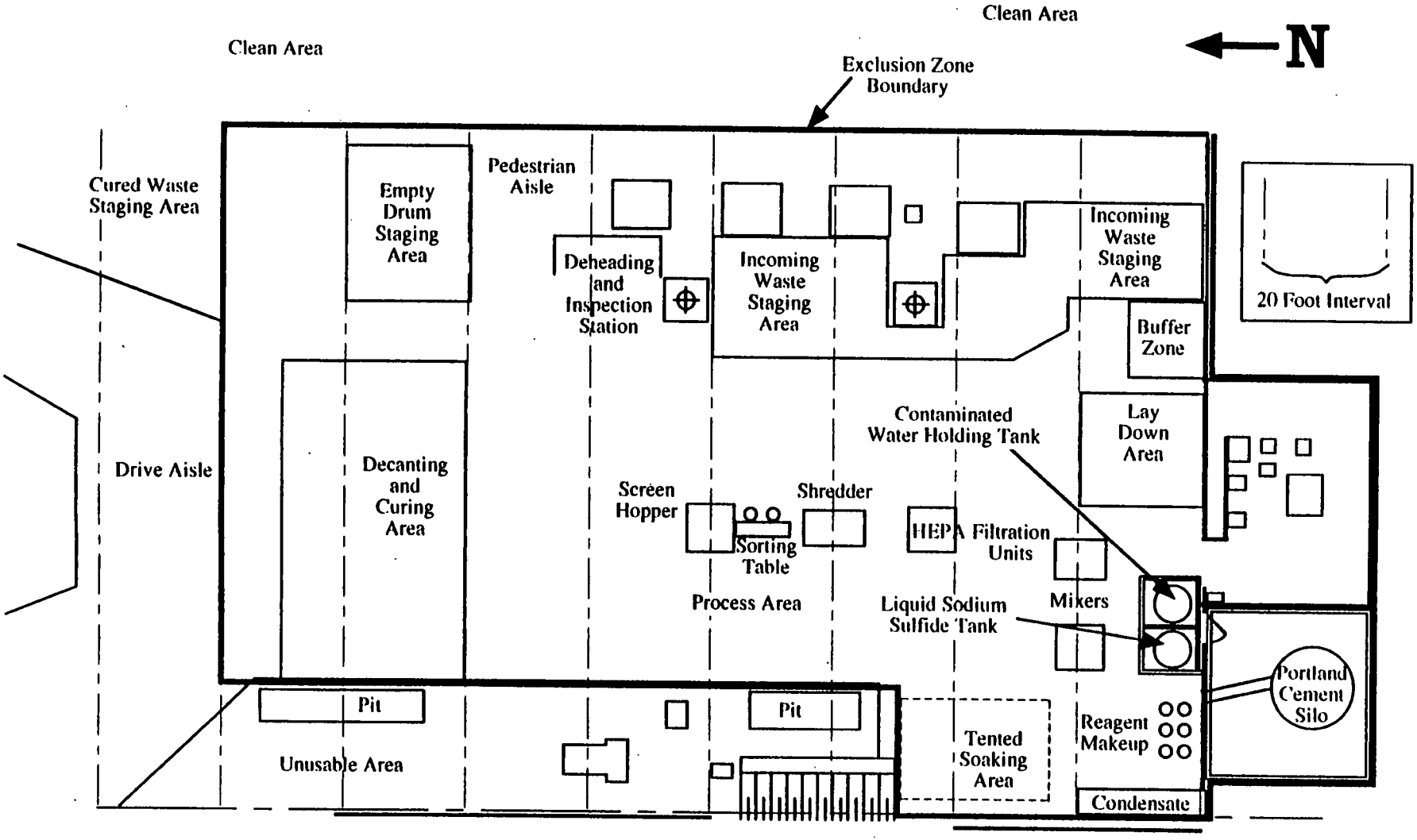


Figure 1
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

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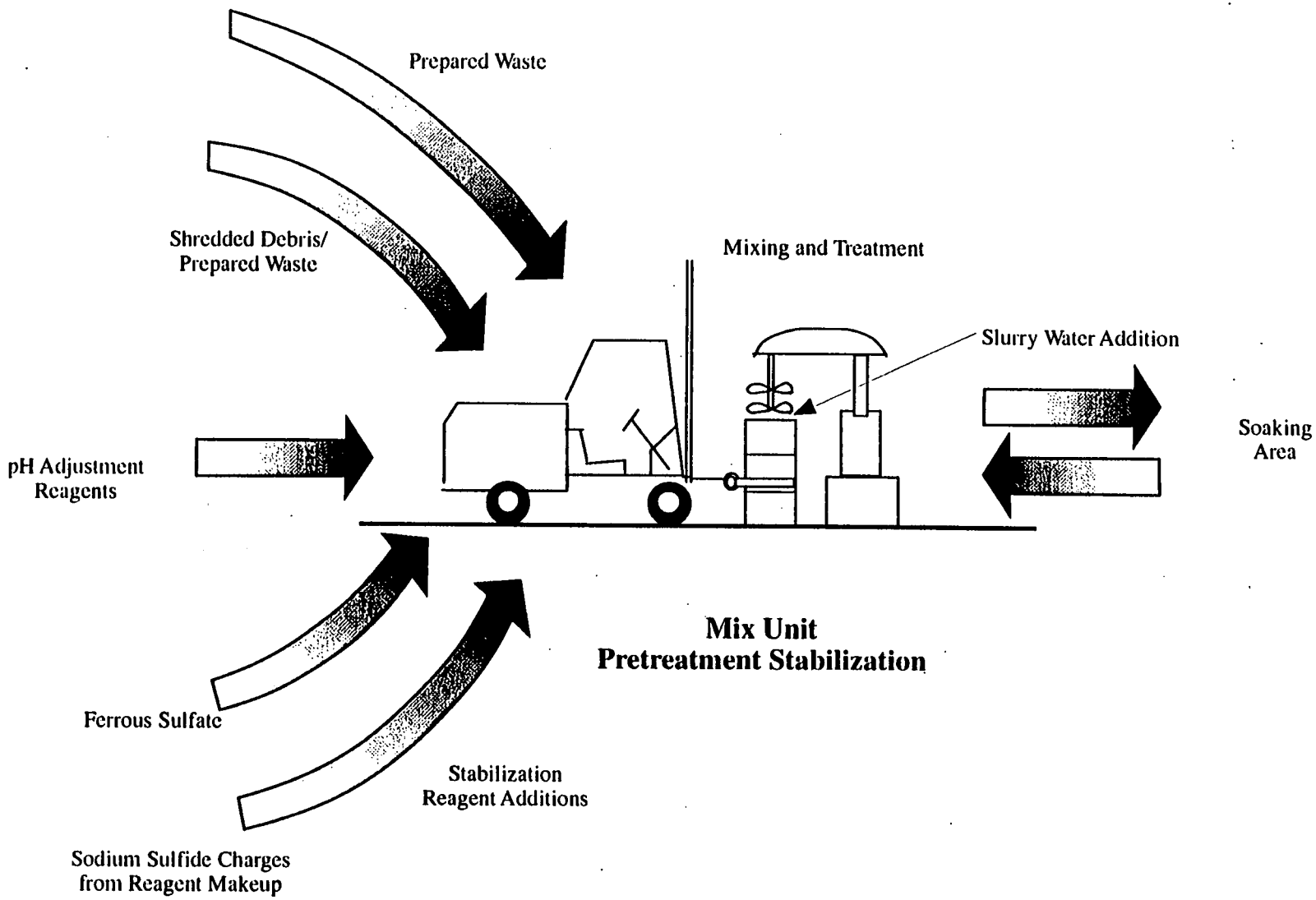


Figure 2
Pretreatment Stabilization

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Perma-Fix Environmental Services, Inc.
Process Operating Procedure

Approval: _____

SOLIDIFICATION TREATMENT

I. POLICY

PESI policy is to minimize the risk of personnel injury while efficiently performing pozzolan treatment of waste or waste/solids mixtures, to solidify them for off-site disposal. The process goal of the solidification treatment activity is to produce a treated waste that will absorb and chemically bind all free water, and provide a solid monolith inside a disposal container. This procedure establishes the guidance that PESI operators and subcontractor personnel must use when performing solidification treatment with pozzolanic reagents using the Perma-Fix Mixer.

II. DISCUSSION

Solidification treatment by the Perma-Fix Process involves the addition of pozzolans in accordance with a design recipe established through bench-scale recipe development tests. The design recipe is specific to the waste being treated, and cannot be used for other types of waste unless it has been proven to be effective for those wastes by bench-scale evaluations. The design recipe establishes the minimum dosage for each pozzolan and the performance specifications that the treated waste should meet. A Design Recipe Notice is posted at each Mix Unit Location to guide the operators in consistent application of the design recipe to wastes fitting the known waste profile. At the operator's discretion, additional pozzolans can be added to ensure that the performance specifications are met or exceeded.

III. DEFINITIONS

Compatible Waste Group (CWG) - A group of waste containers assembled from a single waste category that exhibit similar waste characteristics and are amenable to the same stabilization methods and reagent recipe. The total waste volume of a CWG will be adjusted to fill one White Metal Box (WMB) after all compatible solids, reagents and hydration water have been added.

Design Recipe - Prescribed dosages of one or more Pozzolans that have been shown by bench-scale testing to be effective in solidifying wastes having a specific waste profile.

Design Recipe Notice - An easy to read notice which is posted at each operator location, to communicate the currently applicable design recipe, raw waste profile and performance specifications to the operators.

Performance Specifications - A set of chemical and physical criteria which comprise minimum performance expectations for successful treatment of wastes fitting the raw waste profile using the design recipe.

Pozzolan - A solidification reagent that reacts with water and the waste matrix to cause crystallization of the Pozzolan/waste mixture into a dry solid. Typical pozzolans include Portland Cement (Type I or II), Class C Fly Ash, Cement Kiln Dust, or a combination.

Raw Waste Profile - A physical description of a waste category that is used to evaluate incoming waste batches for applicability of the design recipe.

White Metal Box (WMB) - A DOT strong, tight container built to FERMCO/NTS specifications and painted white. Approximate dimensions are 7 ft. × 3 ft. × 2 ft., giving a useful storage capacity of 40 cubic feet.

IV. REFERENCES

None

V. PROCEDURE

A. Loading and Log-in of Waste for Treatment

In most cases, solidification treatment with the design recipe will proceed immediately after the completion of the Pretreatment Stabilization Step; before the mixing drum is moved. In cases where chemically stabilized wastes must be allowed to soak overnight, it will be necessary for each mixing drum to be brought back from the soaking area, and placed under the mixer again. The following procedure governs the return of wastes from soaking or staging areas for additional treatment. Figure 1 shows the equipment layout of the processing area in the Plant 6 Building. Figure 2 is a schematic diagram of the solidification treatment process.

Performer		Action
Lift Truck Operator	1.	Transports mixing drums from a specific Compatible Waste Group (CWG) from the Soaking Area or Staging Area to the Mix Unit Location and stages them as directed by the Mix Unit Operator.
	2.	Transports shredded solids drums from the Shredder Area and stages them with prepared waste drums from the same CWG, or as directed by the Mix Unit Operator.

Performer		Action
Mix Unit Operator	3.	Receives individual mixing drums from the Soaking Area, in CWGs, ensuring that the appropriate Operations Log Sheet accompanies the waste.
	4.	Receives shredded debris drums from the Lift Truck Operator and stages them with the mixing drums from the same CWG.
	5.	Logs in each waste container by recording the following information in the spaces provide in Section F of the Operations Log Sheet: Mixing Drum ID Number CWG Number Beginning Date and Time Initial Color and Texture of the Waste
	6.	Guides the Fork-Lift Driver in positioning each prepared waste drum one at a time underneath the mixer for treatment.
Lift Truck Operator	7.	Follows the guidance of the Mix Unit Operator in lifting each individual mixing drum and placing it under the mixer, and then in backing away from the mixer.
	8.	Follows the guidance of the Mix Unit Operator in lifting each drum of shredded solids to a position near the mixer, and within arms reach of Mix Unit Operator, and then in backing away from the mixer.
Mix Unit Operator	9.	Ensures that all mixing drums in a specific CWG have been treated before initiating log-in and loading of the next CWG underneath the mixer.

B. Solidification Treatment According to the Design Recipe

Solidification Treatment will be performed according to a design recipe established by bench-scale testing of samples of the specific waste to be treated. The design recipe includes the minimum dosage established for each pozzolanic reagent, and the performance criteria that the treated waste should exhibit after treatment. This information and the raw waste profile are communicated to the operators by posting a

Design Recipe Notice at each work station. The procedures associated with solidification treatment and design recipe compliance are as follows.

Performer		Action
Process Supervisor	1.	Produces an easily readable Design Recipe Notice (See Figure 3 for format) and posts this notice at each Mix Unit location. The design recipe portion of this notice must include the following information:
		a. The minimum dosages for each pozzolan included in the design recipe.
		b. The headspace requirement for reagent displacement.
		c. The amount of shredded solids that may be added by hand.
		d. The minimum mixing time required for blending of pozzolans with the waste matrix.
		e. Applicable performance specifications for properly treated waste at the time mixing ends. These specifications include:
		Acceptable Range for Slump Test Acceptable Range for Specific Gravity
	2.	Performs spot checks of mixer operations to ensure that the design recipe is followed as a minimum, and applicable performance specifications are met or exceeded.
Mix Unit Operator	3.	Using hydraulic controls, raises the mixer assembly high enough for the bottom of the impeller to clear the top of the mixing drum.
	4.	Manually swings the Mix Unit arm over the drum, and hydraulically lowers the impeller into the waste, taking care not to puncture the sides of the drum, and then proceeds with mixing of the drum.
	5.	Using hydraulic controls drives the mixer in forward or reverse rotation at speeds up to 300 rpm to agitate the waste inside the mixing drum.

Performer	Action
Mix Unit Opertor (Cont'd)	6. Pivots the mixer support arm by hand, and uses the horizontal ram to move the mixer inside the mixing drum so as to ensure that all wastes and solids in the drum are thoroughly mixed.
	7. Continues mixing until all lumps or irregularities inside the drum have been broken up and homogenized.
	8. Adds the initial doses of each pozzolanic reagent specified in the design recipe to the drum and mixes thoroughly, observing color and texture of the waste to make sure that all pozzolans have been thoroughly dispersed and reacted with the waste. Mixing time will be as specified in the design recipe.
	9. For at least the first mixing drum out of each CWG, performs spot checks of pH, and slump of a sample of the waste taken from the mixing drum. Records pH and slump test results, and observations of color and texture in the spaces provided in Section F of the Operations Log Sheet.
	10. If the pH or slump test results or the observations of color or texture do not conform to the acceptable range for these performance specifications, adds more pozzolans as necessary to bring the results into the acceptable range. Treats and retests as necessary to achieve the acceptable range, recording each set of test results and observations in the spaces provided in Section F of the Operations Log Sheet.
	11. If waste consistently requires more pozzolans in order to meet the performance specifications, notifies the Process Supervisor that an adjustment of the design recipe may be needed.
	12. When mixing is complete and the performance specifications have been met or exceeded, stops mixing operations, and records the ending date and time in the spaces provided in Section F of the Operations Log Sheet. Also records the waste color and texture after mixing.

C. Removal of Mixing Drum

At the conclusion of solidification treatment, the mixing drum will be removed from underneath the mixer and taken to the Decanting and Curing Area. This procedure describes the steps in removing the mixing drum from the Mix Unit.

Performer		Action
Mix Unit Operator	1.	Hydraulically raises the mixer until the bottom of the mixer shaft clears the top of the mixing drum.
	2.	Uses a spatula to scrape adhering waste from the shaft and blades of the mixer, allowing the waste to fall back into the drum.
	3.	Manually pivots the mixer away from the mixing drum and guides the Lift Truck Operator in grabbing, lifting, removing the mixing drum and staging it in a designated area.
Lift Truck Operator	4.	Follows the guidance of the Mix Unit Operator in grabbing and removing the mixing drum from underneath the mixer.
	5.	Transports the mixing drum to the Decanting and Curing Area and follows the guidance of the Decant Operator in dumping the contents of the mixing drum into a White Metal Box for curing and eventual disposal.

VI. ATTACHMENTS

A. Figure 1 - Plant 6 Equipment Layout

B. Figure 2 - Solidification Treatment

C. Figure 3 - Design Recipe Notice

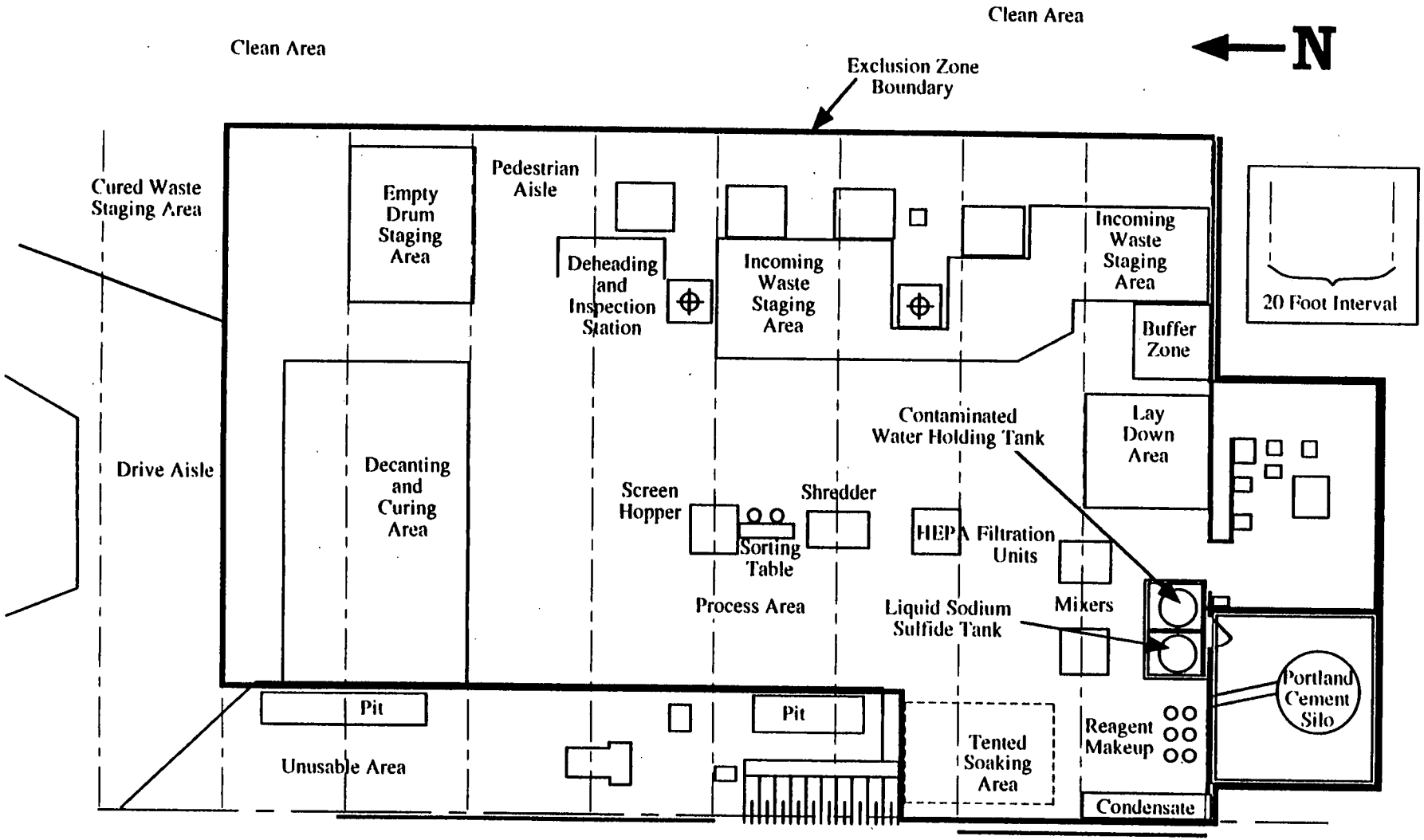


Figure 1
Mixed Waste Stabilization Project
Plant 6 Equipment Layout

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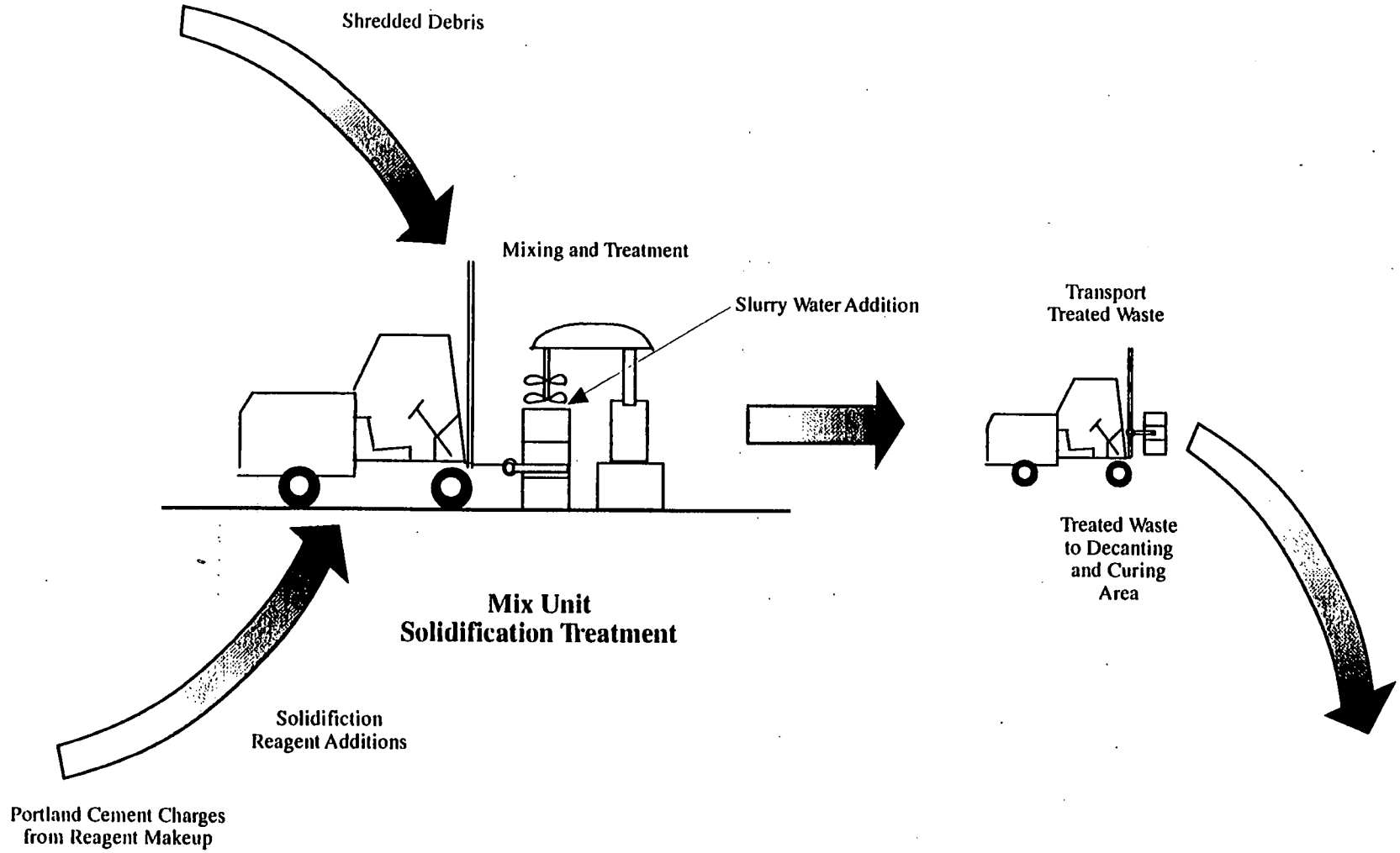


Figure 2
Solidification Treatment

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Figure 3

Design Recipe Notice

Waste Category Designation _____

Posting Date_____ Posting Time_____

Raw Waste Profile

Color_____
Texture_____

Free Water
Content _____

Macro Solids_____
_____
_____

pH_____

Freeboard _____ inches.

Prescribed Dosages

1. Adjust pH to _____,
with _____.

2. Stabilize Barium & Chromium
with _____ Gallons of _____%
Ferrous Sulfate, Mix _____ min.

3. Adjust pH to _____,
with_____.

4. Allow to Soak _____ hrs.

5. Stabilize all metals with
_____ Gallons of_____%
Sodium Sulfide, Mix _____ min.

6. Add solidification reagent
_____ lbs/gallons of Type ____
Portland Cement, Mix ____ min.

PERFORMANCE SPECIFICATIONS

Final Color of Treated Waste _____.

Final Texture of Treated Waste _____.

Lead Acetate Test Color Intensity Value, _____ minimum (CIV).

Slump Test Value, _____ maximum (inches).
_____ minimum (inches).

Perma-Fix Environmental Services, Inc.
Process Operating Procedure

Approval: _____

DECANTING, SAMPLING, CURING AND RECLAIM

I. POLICY

PESI policy is to minimize the risk of personnel injury while efficiently sampling and decanting treated waste into final shipping containers (White Metal Boxes), for setting, curing and eventual disposal in the container. This procedure establishes the guidance that PESI operators and subcontractor personnel must use when performing decanting, sampling and curing of treated wastes.

II. DISCUSSION

After solidification treatment has been completed according the the Design Recipe and the Performance Criteria, it is completely stabilized and only needs to be placed in its final container to set and cure. This will be done by transporting each mixing drum by fork-lift from the Mix Unit location to the Decanting and Curing Area, where a grab sample will be collected. Then the drum rotator attachment will be used to rotate the drum, dumping the contents into a specific White Metal Box.

III. DEFINITIONS

White Metal Box - A DOT strong, tight container built to FERMCO/NTS specifications and painted white.

Grab Sample - A sample collected from a Mixing Drum, which is representative of the treated waste contained within that drum.

Composite Sample - A single sample made up of combined grab samples, that is representative of the combined wastes in a single White Metal Box.

IV. REFERENCES

None

V. PROCEDURE

A. Waste Sampling Prior to Decanting

The following procedure governs the sampling of treated waste immediately prior to the decanting of each mixing drum into the White Metal Box.

Performer	Action
Decant Operator	1. Receives individual mixing drums from the Mix Unit Locations.
	2. Along with the first mixing drum of each waste Group delivered to the Decanting and Curing Area, receives from the Fork-Lift Driver the last page of the Operations Log Sheet.
Fork-Lift Operator	3. Receives from the Mix Unit Operator the last page of the Operations Log Sheet and records on it the Mixing Drum ID Number and the Group Number, in the same order in which they appear on the previous page of the Operations Log Sheet. Delivers the last page of the Operations Log Sheet along with the first Mixing Drum of the waste Group to the Decant Operator.
	4. Transports completely treated mixing drums from a specific waste Group from the Mix Unit Location to the Decanting and Curing Area.
Decant Operator	5. Observes the Mixing Drum ID Number, and the Group Number on the mixing drum and on the Operations Log Sheet. Records the date and time that the waste enters his custody.
	6. Using a trowel and three labeled, standard plastic sample containers, collects three 8-cubic inch grab samples from the top of each mixing drum, immediately before the waste is decanted into a White Metal Box.
Fork-Lift Operator	7. Assists the Decant Operator in sampling each mixing drum before it is decanted into the White Metal Box.

Performer	Action
Decant Operator	8. Record on each sample container label and the Operations Log Sheet the Mixing Drum ID Number, the waste Group Number, the White Metal Box ID Number, and a unique Sample Identification Number.
	9. Combines one 8-cubic inch grab sample, from each mixing drum decanted into a certain White Metal Box, into one composite sample of approximately 40 cubic inches volume that is representative of the waste contained in the White Metal Box.
	10. Completes a Chain-of-Custody Form for each White Metal Box filled, that identifies all of the Grab and composite samples associated with that White Metal Box.
	11. Places these samples and the completed Chain of Custody Form in a locking storage cabinet in the Decanting Area, until the samples and the waste in the White Metal Box have set (up to 48 hours).
	12. After the samples have completely set, each 40 cubic inch composite sample (per white metal box) and one 8-cubic inch grab sample (per mixing drum) and their Chain of Custody Forms will be transferred to the custody of a designated FERMCO sampling representative, who will transport these samples to a project sample archive maintained by FERMCO.
	13. After the samples have completely set, one 8-cubic inch grab sample from each mixing drum will be retained in a locked sample archive cabinet in the project area.
	14. For every 50th mixing drum to be delivered to the Decanting and Curing area, the project archive grab sample will be provided to FERMCO for quick turnaround feedback testing. These samples will be analyzed immediately after setting to provide timely process feedback.

B. Decanting of Treated Waste into White Metal Boxes and Sinking of Debris

Performer		Action
Decant Operator	1.	Lines the White Metal Box with a plastic bag so that the monolith will easily release from the White Metal Box if it must be removed for reprocessing at a later date.
	2.	Directs the Fork-lift operator to the proper White Metal Box and guides him in positioning the mixing drum over the White Metal Box.
Fork-Lift Operator	3.	Follows the guidance of the Decant Operator in lifting and dumping each mixing drum from a specific waste Group into the same White Metal Box.
Decant Operator	4.	Observes and assists during the decanting of waste, and if necessary, scrapes the inside of the mixing drum with a paddle to remove adhering waste from the interior of the drum.
	5.	Guides the fork-lift operator as he backs out of the Decanting and Curing Area, so as to avoid collisions between the fork-lift and other White Metal Boxes.
	6.	With the help of the Fork-Lift Driver lifts and places any oversize unshreddable debris associated with a waste Group into the waste in the White Metal Box before the waste sets.
Fork-Lift Operator	7.	Provides assistance to the Decant Operator in lifting and placing oversize unshreddable debris into the waste in the White Metal Box before the waste sets.
Decant Operator	8.	Records on the Operations Log Sheet the date and time of decanting for each mixing drum decanted. Also records a description of any oversize unshreddable debris sunk into the waste in the White Metal Box.

C. Observation of Set and Cure

At the beginning and end of each operating day, waste in the Decanting and Curing Area will be inspected by the Decant Operator, to evaluate the success of the solidification treatment. This procedure provides guidance to the Decant Operator in performing and documenting these inspections.

Performer	Action
Decant Operator	1. At the beginning and end of each operating shift, inspects all waste that has been decanted, to assess whether set and cure are proceeding satisfactorily.
	2. At the beginning and end of each operating shift, inspects all waste samples still in his custody, to assess whether set and cure are proceeding satisfactorily.
	3. After 24 and 48 hours (if necessary) evaluates the physical condition of the wastes in the White Metal Boxes to determine whether reclaim and reprocessing of treated waste is needed.
	4. Records all observations on the Operations Log Sheet. Indicates on the Operations Log Sheet (Yes/No) whether the waste has failed to set, or is affected by the failure of a TCLP feedback analysis.

D. Additional Treatment of Waste That Fails to Set

In the event that the waste in a White Metal Box fails to set and cure within a reasonable amount of time (48 hours), more pozzolans will be added and mixed directly in the white metal box, using electric powered ½-inch drive right angle drills and 24 inch long mud paddle attachments.

Performer	Action
Decant Operator & Helpers	1. Bails waste from the white metal box into a 55-gallon drum to create space for more reagent.
	2. Uses one or more ½-inch drive right angle drills and 24 inch long mud paddle attachments to agitate waste.

Performer		Action
Decant Operator & Helpers	3.	Adds additional doses of the prescribed pozzolans while mixing, until slump test result indicates enough pozzolans have been added.
Decant Operator	4.	Records the date and time of treatment and amount of additional pozzolan added.

E. Reclaim of Solidified Waste that Fails TCLP Testing

n the event that the waste in a White Metal Box is affected by the failure of a TCLP feedback analysis, the waste will have to be removed from the White Metal Box, and sent back to the shredder for size reduction. Then the shredded monolith materials will be repackaged in mixing drums as described in POP-2.4 and sent back through the treatment process again. This procedure describes how monolith materials will be removed from the White Metal Box.

Performer		Action
Decant Operator & Helpers	1.	Use jack hammer as necessary to breakup monolith inside the White Metal Box.
	2.	Guides the Fork-lift Operator in turning the White metal Box over on its top to release the monolith
Fork-Lift Operator	3.	Follows the guidance of the Decant Operator in overturning the white metal box.
Decant Operator & Helpers	4.	Using shovels, hand load the waste into 55-gallon drums for return to the Shredder.
Decant Operator	5.	Records the reclaim drum ID numbers on the old Operations Log Sheet, and prepares a new Operations Log Sheet giving the reclaimed waste a new waste Group Number.
	6.	Interfaces with the Shredder Operator and the Process Supervisor to arrange retreatment of the waste. Provides the reclaim drums and the new Operations Log Sheet to the Fork-lift Operator.

Performer		Action
Fork-Lift Operator	7.	Receives from the Decant Operator the filled reclaim drums and the Operations Log Sheet and transports these to the Shredder Operator.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.
Process Operating Procedure

Approval: _____

INSPECTIONS AND TESTS

I. POLICY

PESI policy is to perform necessary inspections and tests of the wastes undergoing treatment in order to ensure that Performance Specifications associated with the Design Recipe are met or exceeded. In keeping with this policy, all Perma-Fix Team members assigned to any task of this project are to perform inspections, observations and tests as prescribed in the Design Recipe, by methods set forth in the applicable POPs, and record the results on the Operations Log Sheet, as described in POP-2.15. These procedures provide guidance as to methods to be used in performing specified inspections and tests, and are to be used by all Perma-Fix Team personnel throughout the conduct of this project.

II. DISCUSSION

In order to properly control the treatment process, some real-time testing is required to measure conformance to the Design Recipe and the Performance Specifications. Then process control actions are taken, as necessary, to bring the measured parameter into conformance. This procedure contains instructions for performance of the following inspections, observations and tests:

- Observations of Color and Texture of Waste
- Measurement of pH (Indicator Paper Method)
- Measurement of pH (Instrumental Method)
- Measurement of Lower Explosive Limit (LEL)
- Testing for Sulfide End Point (Lead-Acetate Paper Test)
- Measurement of Slump (ASTM-C-143-78)
- Measurement of Grout Hardness (Pocket Penetrometer Method)

Manufacturers instructions are provided for the tests which involve use of vendor-supplied equipment, testers, or reagents.

III. DEFINITIONS

Color - A description of the color of the waste in comparison to established color descriptions over the range from white to black.

Texture - A description of the waste in comparison to established texture descriptions over the range from fine grain to coarse.

pH Indicator Paper - A vendor-supplied chemically treated paper test strip which changes color over the pH range from 0.0 to 14.0 and is evaluated based on a color comparison chart with color patches at intervals of 1 pH unit.

Calibration - A procedure by which the output value of a measuring instrument is adjusted to match the value of a known standard.

Lower Explosive Limit - An instrumental measurement method to detect potentially explosive air/fuel mixtures. Read out is in percent.

Sulfide End Point - The point in time, when all chemical demand of the waste for the sodium sulfide reagent has been satisfied. The end point is identified using the lead acetate colorimetric test, which detects the presence of an unreacted residual of free sulfide in the waste.

Lead Acetate Indicator Paper - A vendor-supplied, or Perma-Fix prepared paper test strip impregnated with lead acetate, which changes color in the range from white to black, with color intensity being proportional to the concentration of fee sulfide residual.

Slump - A measure of the cohesiveness of a portland cement or waste/grout mixture. A standard test kit (ASTM-C-143-78) is used to perform this test. Slump is a method by which the likelihood of successful setting and curing of a grout can be measured and predicted.

Pocket Penetrometer - A vendor-supplied device which was designed to measure the hardness of soil, but which also can be used to measure the compressive strength of a waste/grout monolith. This device provides a reading of compressive strength in pounds per square inch (psi).

IV. REFERENCES

Vendor-supplied, manufacturers operating instructions are attached to this procedure and referenced specifically in the following procedures.

V. PROCEDURE

A. Observations of Color and Texture of Waste

Any operator who is required to perform color and texture evaluations by either a POP or by the information requirements of the Operations Log Sheet, shall use the following ranges to report color or texture.

Performer	Actions
Any Operator	1. Performs a color evaluation based upon the following color ranges established for this project. Records the code for the color of the waste on the Operations Log Sheet.

W	White
LT	Light Tan
MT	Medium Tan
DT	Dark Tan
LB	Light Brown
MB	Medium Brown
DB	Dark Brown
LG	Light Gray
MG	Medium Gray
DG	Dark Gray
B	Black

2. Performs a texture evaluation based upon the following texture ranges established for this project. Records the code for the texture of the waste on the Operations Log Sheet.

T	Like **Talcum** Powder
Ch	Like **Chalk**
C	Like **Clay**
StC	Like **Silty Clay**
SaC	Like **Sandy Clay**
FS	Like **Fine Sand**
MS	Like **Medium Sand**
CS	Like **Coarse Sand**
FG	Like **Fine Gravel**
MG	Like **Medium Gravel**
CG	Like **Coarse Gravel**

B. Measurement of pH (Indicator Paper Method)

Any operator who is required to perform pH measurement on the waste by either a POP or by the information requirements of the Operations Log Sheet, shall use the following method for measurement of pH using color indicator paper. This method shall be the primary method of pH measurement, due to its simplicity, and direct response.

Performer	Actions
Any Operator	1. Performs a pH measurement using vendor-supplied color indicator paper to directly measure the pH according the color produced when the paper is exposed to the waste.
	2. Compares the exposed pH paper strip to the color comparison patches on the outside of the dispenser, and records the pH to the nearest half unit on the Operations Log Sheet.

C. Measurement of pH (Instrumental Method)

If it should become necessary to perform pH measurements by instrumental measurements, Perma-Fix personnel will use the instrument manufacturer's instructions to calibrate the meter across the full pH range, accounting for temperature, and using standard pH buffer solutions of 3.0, 7.0 and 12.0.

Performer	Actions
Any Operator	1. Using a calibrated pH meter, measures the pH of the waste by a digital or analog readout on the output indicator of the meter, as follow:
	a. Collects a sample of the waste and inserts the pH probe and temperature probe into the waste and first reads temperature, waiting until the reading stabilizes.
	Note: If the waste is too thick to produce a steady meter reading, the waste can be diluted with deionized or distilled water until it is fluid enough to be produce a steady reading. Use only as much water as is needed to promote agitation.

Performer	Action
Any Operator (Continued)	b. Sets the meter to the Temperature Mode. Using the temperature setting knob on the instrument, resets the temperature of the meter to the measured temperature.
	c. Switches the meter to pH Mode, and measures pH, waiting until the meter reading stabilizes. Records the pH result in the appropriate location on the Operations Log Sheet.
	2. Returns the waste sample to the batch from which it came, and rinses the probes clean with deionized water. Stores probes in a cup of deionized water until another measurement is to be made.

D. Measurement of Lower Explosive Limit (LEL)

Whenever it is necessary to check for explosive air/fuel mixtures in a punched container at the Deheading and Inspection Station, or anywhere else in the project work area, it will be done with a manufacturer-calibrated Scott Alert Model S108, or equivalent meter. This type of meter provides a digital reading in percent of the Lower Explosive Limit. This meter produces an audible alarm when the LEL reading is over a preset limit. The operator will follow the instructions in the manufacturer-supplied manual when performing this measurement. Attachment A to this procedure is the manual for the Scott Alert Model S108 meter.

E. Measurement of Oxygen Concentration (% O_2)

We do not anticipate that measurements to detect oxygen deficiency will be required during this project, because we anticipate no situations requiring confined space entry. However if an oxygen deficiency check, it will be performed with the Scott Alert Model S108, or an equivalent unit, by following the manufacturer's instructions in the manual (Attachment A).

F. Measurement of Hydrogen Sulfide Gas (ppm H_2S)

Because sodium sulfide will be used as a treatment reagent during the project, it will be necessary to periodically check for hydrogen sulfide gas in the work area. Bench-scale tests may have shown that hydrogen sulfide gas in the air space immediately above the treated waste does not have more than 1 ppm H_2S. In performing spot checks for hydrogen sulfide the Scott Alert Model S108 meter, or an equivalent unit, will be used, by following the manufacturer's instructions in the manual (Attachment A).

G. Testing for Sulfide End Point (Lead-Acetate Paper Test)

Testing for the end of the sulfide reaction will be performed by the Mix Unit operators, and a satisfactory result must be achieved, before the operator may proceed to the next step of the treatment. The following steps apply to the use of lead acetate paper strips to test for the sulfide reaction end point.

Performer		Actions
Mix Unit Operator	1.	Performs a lead acetate paper test by exposing a strip of lead acetate paper to the waste and observing the intensity of the brown-black color produced by the free sulfide residual.
	2.	Compares the exposed lead acetate paper strip to the color comparison chart included with this procedure as Attachment B. This chart will be posted at each Mix Unit Location, within easy view of the operator. Records the Color Intensity Value (CIV) on the Operations Log Sheet.

H. Measurement of Slump (ASTM-C-143-78)

Measurements of slump by the ASTM-C-143-78 method will be performed on at least one sample of treated waste from each Waste Group, and it should be done on the first Mixing Drum treated from each Waste Group. The measurement will be performed using a standard cone slump test kit.

Performer		Actions
Mix Unit Operator	1.	Performs a slump test by following the instructions included with this procedure as Attachment C. Records the measurement in inches in the place indicated in Section F of the Operations Log Sheet.
	2.	When the test is complete, returns the grout used during the test, and any grout was not used to the Mixing Drum being treated.
	3.	By wiping with paper towels and rinsing with potable water, cleans the cone, pan and rod for use in the next slump test. At the end of each operating day, wipes all components of the test kit dry to ensure that they do not corrode overnight.

Performer		Actions
Mix Unit Operator (Cont'd)	4.	Places used wipes in the drum from which the waste came, for co-disposal with the treated waste.

I. Measurement of Grout Hardness (Pocket Penetrometer Method)

When measurements of grout hardness are required, they will be performed using a Pocket Penetrometer (Soiltest, Inc. Model CT-421A or equivalent). This method will be an effective means of evaluating setting and curing of treated waste in the Decanting and Curing Area.

Performer		Actions
Decant Operator	1.	Performs a penetrometer test by following the instructions included with this procedure as Attachment D. Records the compressive strength measurement in pounds per square inch (psi) in the box of Section G, labeled Observations of Set and Cure on the Operations Log Sheet.
	2.	By wiping with paper towels and rinsing with potable water, cleans and drys the pocket penetrometer and returns it to its case, to ensure that it does not corrode.

VI. ATTACHMENTS

A. Scott Alert Model S108
B. Color Comparison Chart of Lead Acetate Strips
C. Concrete Slump Test - Recommended Procedure
D. Soiltest, Inc. Model CT-421A Operating Manual

CALIBRATION MANUAL

FOR

SCOTT-ALERT

MODELS
S102, S106 and S108

COMBUSTIBLE GAS
OXYGEN
HYDROGEN SULFIDE

INTERPRETING DISPLAYS MANUAL

FOR

SCOTT-ALERT

MODEL S108

% LFL | % O_2 | PPM H_2S

COMBINATION COMBUSTIBLE GAS, OXYGEN AND HYDROGEN SULFIDE DETECTION INSTRUMENT

OPERATION MANUAL

FOR

SCOTT-ALERT

MODEL S108

% LFL | % O_2 | PPM H_2S

COMBINATION COMBUSTIBLE GAS, OXYGEN AND HYDROGEN SULFIDE DETECTION INSTRUMENT

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1.0 INTRODUCTION

The SCOTT-ALERT, Model S108, see Figure 1-1, is a microprocessor controlled, self-contained, portable instrument designed to detect:

a) the presence of combustible gases or vapors in air and provide a digital indication of the concentration and;

b) the presence or lack of oxygen in air and provide a digital indication of the concentration and;

c) the presence of hydrogen sulfide in air and provide a digital indication of the concentration.

All three variables are monitored at the same time. However, the desired combustible gas or vapor, oxygen or hydrogen sulfide digital indication must be selected by the appropriate switch.

The combustible gas or vapor concentration is displayed in percent (0-100%) of the Lower Flammable Limit (LFL), the oxygen concentration is displayed in percent (0.0 to 25.0%) of the atmosphere and the hydrogen sulfide concentration is displayed in parts per million (0-199ppm) in air.

An audible alarm is provided which is activated when:

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a) a gas or vapor concentration exceeds a preset level or;
b) a low or high oxygen pre-set level is exceeded or;
c) a hydrogen sulfide concentration exceeds a pre-set level or;
d) the battery voltage is low or;
e) a sensor or electronic failure or a below 3% oxygen concentration occurs.

A fast pulse rate tone (1/2 second pulse every second) indicates a high gas or vapor concentration, a low or high oxygen concentration or a high hydrogen sulfide concentration. A pulse rate tone of 4 consecutive pulses every minute indicates that approximately 10% of battery life remains while a continuous tone indicates that the instrument is no longer functional. Each time the instrument is turned on, the audible alarm is activated for a 1/10 second duration.

Whichever variable (% LFL, % O_2 or PPM H_2S) is displayed, when an alarm condition is encountered the audible alarm will sound.

The instrument is available with one of the following factory calibrations for combustible gas or vapor in air:

-HEXANE	P/N 40010783
-METHANE	P/N 40010780
-GENERAL PURPOSE	P/N 40011558

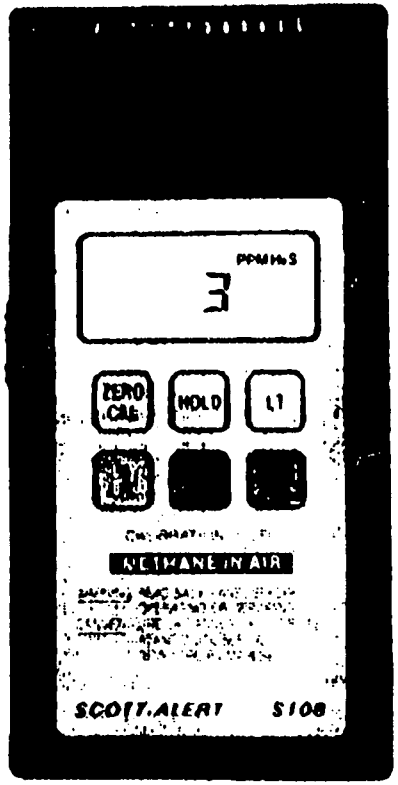


Figure 1-1
Scott-Alert Model S108
Combination Combustible Gas, Oxygen and Hydrogen Sulfide Detection Instrument

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This manual describes the various features, functions and basic displays of the Scott-Alert, Model S108. **THIS MANUAL SHOULD BE READ AND UNDERSTOOD BEFORE OPERATION OF THE INSTRUMENT.**

2.0 OPERATIONAL ENVIRONMENT

The Scott-Alert is designed to be "Intrinsically Safe" suitable for operation in Class I, Division 1, Groups A, B, C, and D hazardous environments.

3.0 INSTRUMENT DESCRIPTION

The Scott-Alert instrument is designed for use as a personal monitor. The following accessories are available providing flexibility for remote monitoring of inaccessible areas: aspirator bulbs, battery operated pumps, hoses, probes and extension poles (see Section 8.0).

The specially contoured case is high impact resistant, flame retardant ABS plastic.

The instrument can be hand held or used with the optional leather carrying case with belt loop and shoulder strap.

An earphone accessory is available when utilizing the instrument in a noisy environment.

Each instrument has color coded function switches for ease of instrument-type identification. Switches have "tactile feel" and "tactile

location" giving the user a sense of switch actuation as well as position when operated with gloved hands and/or in poorly illuminated areas.

Power is provided with rechargeable nickel cadmium batteries providing 8 to 10 hours of continuous operation without recharging.

The electronics for each instrument are solid state and are microprocessor controlled providing "state-of-the-art" design.

The Liquid Crystal Display (LCD) provides:

a) the digital display of percent Lower Flammable Limit of the specified combustible gas or vapor in air or;

b) the digital display of percent oxygen in air or;

c) the digital display in parts per million (ppm) of hydrogen sulfide in air.

The selected variable legend (% LFL, % O_2 or PPM H_2S) is also shown.

The display can be momentarily illuminated for poorly lighted areas.

3.1 Alarm Legends

The following alarm or operation legends will be displayed as appropriate.

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"ALARM" - Flashing legend indicates:

a) high gas or vapor concentration which exceeds a pre-set level (factory set at 25% -adjustable).

b) low or high oxygen concentration which exceeds a pre-set level (factory set at 19.5% -adjustable and 25.0% - fixed).

c) high hydrogen sulfide concentration which exceeds a pre-set level (factory set at 10 ppm - adjustable).

"LOBAT" - Flashing legend indicates the batteries are low.

NOTE: Legend will start to flash when 10 percent (approximately 1 hour) of battery life remains.

"FAIL" - Flashing legend indicates a sensor or electronic failure or a below 3% oxygen concentration.

"HOLD" - Legend indicates the "HOLD" switch has been depressed and the highest indication for % LFL, the lowest indication of % O_2 or the highest indication for PPM H_2S will be retained until:

a) the "HOLD" switch is again depressed or;

b) the selected display (% LFL, % O_2 or PPM H_2S) is changed to another display.

3.2 Audible Alarms

As previously stated, an audible alarm is provided for the following alarm conditions.

"ALARM" -

a) high gas or vapor concentration.

b) low or high oxygen concentration.

c) high hydrogen sulfide concentration.

The audible alarm provides a latching fast pulse rate tone (1/2 second pulse every second). The alarm can be silenced for a 30 second duration by depressing the display switch (% LFL, % O_2 or PPM H_2S) of the selected variable that is in alarm. If the alarm condition still exists after the 30 second duration, the audible alarm will again be activated.

The silenced alarm only effects the variable in the alarm mode. The audible alarm will be immediately activated when any other monitored variables encounter an alarm condition.

"LOBAT" - Audible alarm indicates the batteries are low. A pulse rate tone of 4 consecutive pulses every minute indicates that approximately 10% of battery life remains while a continuous tone indicates that the instrument is no longer functional. Each time the instrument is turned on, the audible alarm is activated for a 1/10 second duration denoting the audible alarm is functional.

"FAIL" - Audible alarm indicates sensor or electronic failure or a below 3% oxygen concentration. Alarm provides a fast pulse rate tone.

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NOTE: If the audible alarm is annoying and the instrument must be used for monitoring any of the other variables not in the "FAIL" mode, an internal switch is provided to deactivate the alarm. Once deactivated, the alarm cannot be activated by additional failures. However, all failure legends (% LFL, % O_2 or PPM H_2S) will be displayed on the Liquid Crystal Display (LCD). See Figure 3-1 for switch location

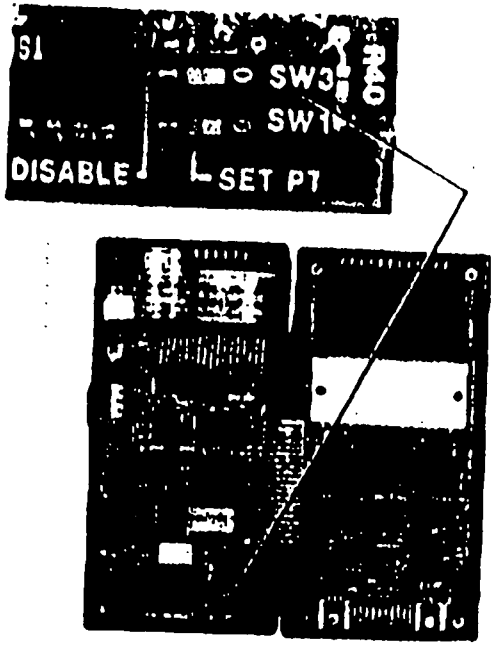


Figure 3-1
Fail Disable Switch

INSTRUCTIONS

1. Place the instrument switch plate face down on a clean surface with the slotted openings facing away from you.
2. Fully loosen the four (4) screws located at each corner from the back of the case.
3. Open the case with the back section folding to the left.
4. Reference Figure 3-1. Locate the Fail Disable Switch labeled SW3.
5. The switch position for normal operation is "0". Slide the switch to the fail disable position "1". This completes the fail disable adjustment.
6. Close the case with the back section folding to the right.
7. Install the four (4) screws holding the front and back case sections together.

NOTE: Upon replacement of failed sensor, the fail disable switch must be reactivated.

4.0 GENERAL INSTRUCTIONS

4.1 Unpacking

Remove the instrument from the shipping carton and examine for external damage.

If damage is found, notify your Scott Distributor, Sales Representative or the Scott Factory for corrective action to be taken.

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4.2 Identification

The portable combination combustible gas or vapor, oxygen and hydrogen sulfide detection instrument, Model S108, is identified by the following color coded function switches:

- % LFL - YELLOW
- % O_2 - GREEN
- PPM H_2S - RED

4.3 Batteries

The instrument is provided with internal nickel cadmium rechargeable batteries.

BATTERIES MUST BE CHARGED FOR 14 HOURS BEFORE INSTRUMENT OPERATION.

When the batteries are fully charged, the instrument can be continuously operated for 8 to 10 hours without recharging.

The instrument can also be stored in an energized charger providing immediate use with fully charged batteries.

NOTE: When the instrument has been in storage, it may be necessary to complete a number of charge/discharge cycles (audible alarm) before the maximum of 10 hours continuous operation can be realized.

4.4 Battery Charger

Scott manufactures single instrument and multi-instrument chargers suitable for wall mounting or bench top use. Chargers are available for 120 or 240V a-c, 50/60 Hz or 12V d-c power sources, each with a 6 foot coiled line cord and suitable plug. The 12V d-c charger provides a standard cigarette lighter adaptor for operation

A red Light Emitting Diode (LED) on each charger indicates when the instrument is charging.

4.4.1 Charger Operation

1. Plug the charger line cord into the correct power source - see label on the back of the charger.
2. Insert the instrument (from the top of the charger) between the retaining clips until the instrument is seated against the bottom.
3. The red LED will now be illuminated when the instrument and charger are correctly connected.

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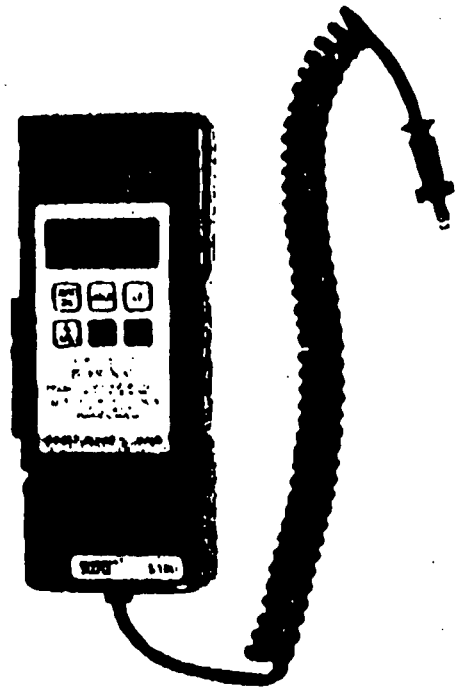


Figure 4-1
Scott-Alert Battery Charger

5.0 SWITCH FUNCTIONS AND DISPLAYS

5.1 Switch Functions

Seven external switches are provided to operate the instrument. See Figure 5-1.

ON/OFF Switch

- Slide the ON/OFF switch located on the left side of the instrument upward to the "ON" position to turn the instrument "ON".
- Slide the ON/OFF switch located on the left side of the instrument downward to turn the instrument "OFF".

NOTE: Each time the instrument is turned "ON", the Liquid Crystal Display (LCD) always indicates the "% LFL" legend and the associated digital display.

% LFL Display Switch

- Depress to select the combustible gas or vapor digital display. When this function is selected, the "% LFL" legend appears on the LCD.

% O_2 Display Switch

- Depress to select the oxygen digital display. When this function is selected, the " % O_2" legend appears on the LCD.

PPM H_2S Display Switch

- Depress to select the hydrogen sulfide digital display. When this function is selected, the "PPM H_2S" legend appears on the LCD.

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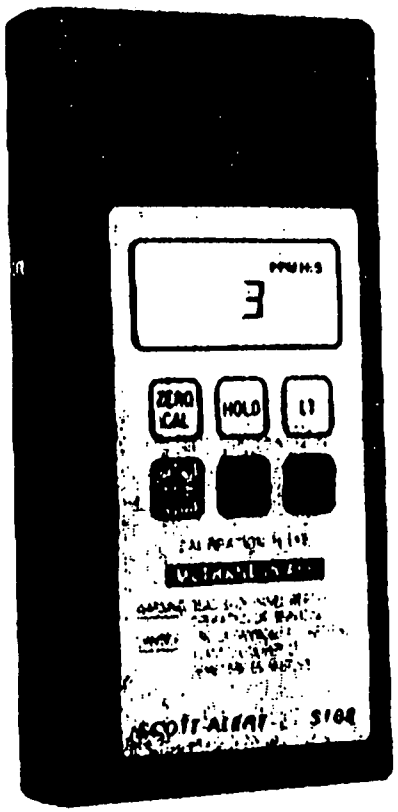


Figure B-1
Scott-Alert, Model S10E
Switch Locations

NOTE: When the % LFL, % O_2 or PPM H_2S display has been selected, it is not necessary to turn the instrument "OFF" before selecting another display.

ZERO CAL Switch

- Depressing and holding the ZERO CAL switch provides an automatic means of zero calibrating each selected variable without the use of screwdrivers or additional tools.

CAUTION

THE ZERO CAL ADJUSTMENT MUST ONLY BE PERFORMED IF A NORMAL OXYGEN AS WELL AS A COMBUSTIBLE AND TOXIC GAS FREE ATMOSPHERE EXISTS.

HOLD Switch

- Depressing the HOLD switch allows the instrument to hold the digital display for the selected display (% LFL, % O_2 or PPM H_2S) at the:

a) maximum percent LFL concentration encountered or;
b) lowest oxygen concentration encountered to a minimum of 3% or;
c) maximum ppm concentration encountered.

- Depress to release the HOLD function and digital display.

The HOLD mode may also be released by depressing another (% LFL, % O_2 or PPM H_2S) display switch.

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NOTE: This mode of operation is normally used with an extension pole to monitor a confined space before entering, or in some cases, difficult to reach or inaccessible areas.

LT (Light) Switch
- Depress and hold switch to provide illumination for the Liquid Crystal Display.

5.2 Displays

The following Figures 5-2 through 5-9 illustrate the legends which may be displayed on the Liquid Crystal Display.

NOTE: Actual operating displays are described in the "INTERPRETING DISPLAYS MANUAL FOR SCOTT-ALERT MODEL S108 -COMBINATION COMBUSTIBLE GAS, OXYGEN AND HYDROGEN SULFIDE DETECTION INSTRUMENT", which accompanies the Model S108 instrument.

5.2.1 Legends

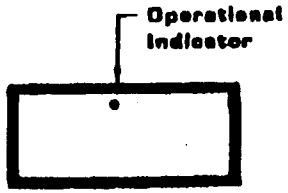


Figure 5-2
Flashing "O" Indicates
Microprocessor Is Operational

NOTE: For clarity, the flashing operational indicator is not shown on the following display examples.

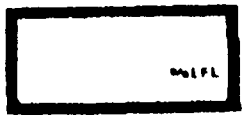


Figure 5-3
Monitored Variable
(Selected)

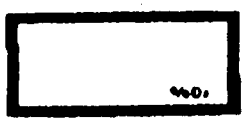


Figure 5-4
Monitored Variable
(Selected)



Figure 5-5
Monitored Variable
(Selected)

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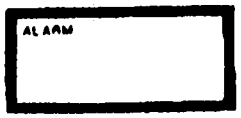


Figure 5-6
FLashing "Alarm" Indicates High Gas Concentration, High or Low Oxygen Concentration or High Hydrogen Sulfide Concentration



Figure 5-7
Flashing "Lobat" Indicates Low Battery Condition



Figure 5-8
Flashing "Fail" Indicates Sensor or Electrical Failure or Below 3% Oxygen Concentration

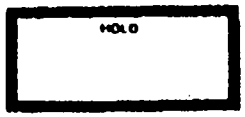


Figure 5-9
"Hold" Indicates the Hold Mode has been Selected

6.0 OPERATING INSTRUCTIONS

CAUTION

BEFORE EACH DAY'S USAGE THE SENSITIVITY MUST BE TESTED ON A KNOWN CONCENTRATION OF METHANE, PROPANE OR HYDROGEN SULFIDE IN AIR EQUIVALENT TO 25% TO 50% OF FULL SCALE CONCENTRATION. THE INDICATION MUST BE EQUAL TO OR HIGHER THAN THE ACTUAL CONCENTRATION.

ACTUAL RECALIBRATION SHOULD ONLY BE PERFORMED BY QUALIFIED INSTRUMENT MAINTENANCE PERSONNEL (SEE CALIBRATION MANUAL P/N 40011555).

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CAUTION

OPERATION OF CATALYTIC-TYPE COMBUSTIBLE GAS SENSOR MAY BE SERIOUSLY AFFECTED BY SILICONES, FREE HALOGENS, HALOGENATED HYDROCARBONS AND METALLIC OXIDES PRESENT IN THE AMBIENT AIR BEING MONITORED. IF THE PRESENCE OF ANY OF THESE SUBSTANCES IS SUSPECTED, INCREASED FREQUENCY OF CALIBRATION VERIFICATION IS REQUIRED.

CAUTION

DO NOT USE THE INSTRUMENT FOR MIXTURES OTHER THAN COMBUSTIBLE GAS, VAPOR OR TOXIC GAS TO BE DETECTED.

CAUTION

ANY INDICATION OR READING DENOTING THE PRESENCE OF A COMBUSTIBLE GAS OR VAPOR, A LACK OF OXYGEN OR THE PRESENCE OF A TOXIC GAS SIGNIFIES THE NECESSITY TO FOLLOW ESTABLISHED COMPANY PROCEDURES FOR THE PRESENCE OF FLAMMABLE GASES OR VAPORS, THE LACK OF OXYGEN OR THE PRESENCE OF TOXIC GASES.

USE IN OXYGEN ENRICHED ATMOSPHERES MAY BE HAZARDOUS.

CONFIRM THAT THE INSTRUMENT'S BASIC COMBUSTIBLE GAS, VAPOR AND TOXIC GAS CALIBRATIONS ARE APPROPRIATE FOR THE INTENDED USE.

SEE CALIBRATION LABEL ON THE FACE OF THE INSTRUMENT.

CAUTION

IF THE DIGITAL DISPLAY RAPIDLY INCREASES TO 99 AND THEN IMMEDIATELY DECREASES AND STABILIZES AT OR NEAR 0, A VERY HIGH GAS OR VAPOR CONCENTRATION ABOVE THE LOWER FLAMMABLE LIMIT MAY BE PRESENT AND ALL COMPANY ESTABLISHED SAFETY PROCEDURES SHOULD BE FOLLOWED.

BELOW "0" DIGITAL DISPLAY MAY INDICATE A FLAMMABLE CONCENTRATION.

RE-CALIBRATION SHOULD BE PERFORMED AFTER EXTENDED EXPOSURE TO A HIGH COMBUSTIBLE GAS, VAPOR OR TOXIC CONCENTRATION. SEE CALIBRATION MANUAL P/N 40011555.

6.1 Preparation For Use

Before using the instrument the following operational check should be performed in a combustible and toxic gas free atmosphere with 20.9% oxygen.

6.1.1 Turn the instrument "ON" by sliding the ON/OFF switch located on the left side of the instrument to the "ON" position.

6.1.2 Observe the LCD - See Figure 6-1

a) The small "0" will be flashing which indicates the microprocessor is operational.
If the small "0" does not flash or appear, the instrument should not be used.

b) The legend "% LFL" will always be displayed when the instrument is turned "ON".

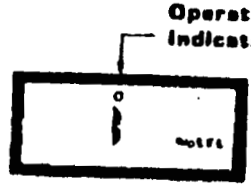


Figure 6-1
Correctly operating display for an instrument functioning with properly operating batteries, sensors and electronics before calibration.

6.2 Operation

If all conditions described in 6.1 (6.1.1 through 6.1.2) are met, proceed as follows.

6.2.1 Zero Calibration

CAUTION
THE ZERO CAL ADJUSTMENT MUST ONLY BE PERFORMED IF A NORMAL OXYGEN AS WELL AS A COMBUSTIBLE AND TOXIC GAS FREE ATMOSPHERE EXISTS.

Calibrate the monitored variables (% LFL, % O_2 and PPM H_2S) utilizing the ZERO CAL switch each time the instrument is turned "ON".

DEPRESS AND HOLD the ZERO CAL switch and then:

a) depress momentarily and release the % LFL display switch - the display should indicate "0". See Figure 6-2.

b) depress momentarily and release the % O_2 display switch - the display should indicate "20.9". See Figure 6-3.

c) depress momentarily and release the PPM H_2S display switch - the display should indicate "0". See Figure 6-4.

d) release the ZERO CAL switch. All three monitored variables have been calibrated and the instrument is now ready for operation.

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NOTE: Any variable exceeding ±9% of zero calibration must be calibrated using the zero calibration potentiometers located on the back of the instrument (see Calibration Manual P/N 40011555).

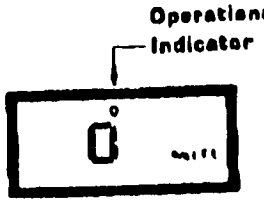


Figure 6-2

Correctly operating display after calibration for an instrument functioning with properly operating batteries, sensors and electronics with no combustible gas percent.

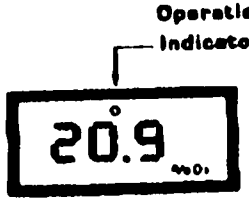


Figure 6-3

Correctly operating display after calibration for an instrument functioning with properly operating batteries, sensors and electronics with a normal oxygen atmosphere.

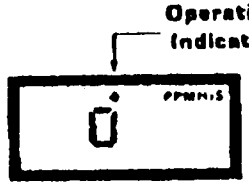


Figure 6-4

Correctly operating display after calibration for an instrument functioning with properly operating batteries, sensors and electronics with no hydrogen sulfide percent.

6.2.2 Depress the desired display switch (% LFL, % O_2 or PPM H_2S).

NOTE: Regardless of the selected display, all three (3) variables (% LFL, % O_2 and PPM H_2S) are monitored continuously and will provide a visual and audible alarm when the % LFL, % O_2 or PPM H_2S alarm levels are exceeded.

7.0 SPECIFICATIONS

Case
Dark brown molded high impact resistant, flame retardant ABS plastic.

Case Size
3-1/8" wide x 6-1/4" long x 1-5/8" deep
(79mm wide x 159mm long x 41mm deep)

Weight
18 ounces

Display
Liquid Crystal - 3/4" high x 1-3/4" long
(19mm high x 44mm long)
Seven segment high visibility digital display, illuminates for low ambient light conditions. Display contains legends for gas concentrations being indicated; "ALARM", "HOLD", "LOBAT" and "FAIL".

Battery Life (Continuous Operation)
8 to 10 hours

External Switch Functions
ON/OFF, ZERO CAL, HOLD, LT (light), % LFL, % O_2 and PPM H_2S

Internal Switch Functions
Set Point, Fail Alarm Deactivation

External Adjustments
% LFL - Zero and Span
% O_2 - Span
PPM H_2S - Zero and Span

Internal Adjustments
Set Points for % LFL, % O_2 and PPM H_2S

Visual and Audible Alarms
ALARM (high gas or vapor concentration, low or high oxygen concentration and high hydrogen sulfide concentration)
LOBAT (low battery warning and end of use)
FAIL (sensor or electrical integrity)

7.1 Combustible Gas or Vapor

Range
0-100% Lower Flammable Limit (LFL) in air

Accuracy
±3% of full scale

Speed of Response
10 seconds to 63% of step change of applied gas concentration

Temperature Limits
Storage: -40°C to +60°C
Operation: -10°C to +60°C

Humidity Variation
Less than 3% full scale, 10 to 90% relative humidity

7.2 Oxygen

Range
0.0 - 25.0% oxygen in air

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Accuracy
±0.8% oxygen at ambient temperatures

Speed of Response
20 seconds to 63% of oxygen change

Temperature Limits
Storage: -3°C to +60°C
Operation: 0°C to +40°C

Humidity Variation
Less than ±0.8% oxygen, 10 to 90% relative humidity

7.3 Hydrogen Sulfide

Range
0-199 parts per million (ppm)

Accuracy
±5 ppm from 0 to 50 ppm
±5% of full scale from 50-199 ppm

Speed of Response
45 seconds to 63% of step change of applied gas concentration

Temperature Limits
Storage: -3°C to +60°C
Operation: 0°C to +40°C

Humidity Variation
Less than 3% of full scale, 10 to 90% relative humidity

8.0 INSTRUMENT ACCESSORIES

8.1 Battery Chargers

P/N 40010700: Charger for single instrument with 6 ft. coiled line cord, for 120V a-c, 50/60 Hz. Suitable for wall mounting or bench top mounting. Case size 8-3/4" long x 3-1/2" wide x 2" deep (222mm long x 89mm wide x 51mm deep). Red LED indicates when instrument is charging, 14 hour charging time required. F.M. Approved.

P/N 40010815: Charger for single instrument with 6 ft. coiled line cord, same as P/N 40010700, only operates on 240V a-c, 50/60 Hz.

P/N 40010816: Charger for single instrument with 6 ft. coiled line cord, same as P/N 40010700, only provides a standard cigarette lighter adaptor for 12V d-c operation.

P/N 40010817: Charger for four instruments with 6 ft. coiled line cord for 120V a-c, 50/60 Hz operation. Suitable for wall mounting or bench top mounting. Case size 8-3/4" long x 14" wide x 2" deep (222mm long x 356mm wide x 51mm deep). Red LED's indicate when individual instruments are charging, 14 hour charging time required.

P/N 40010818: Charger for four instruments with 6 ft. coiled line cord, same as P/N 40010817, only operates on 240V a-c, 50/60 Hz.

8.2 Carrying Case

P/N 40011604: Leather carrying case with belt loop and shoulder strap, suitable for hydrogen sulfide instrument models only. Instrument totally functional within case.

8.3 Earphone

P/N 40010796: Earphone, heavy duty service design with 5 ft. heavy PVC coated cord. Complete with ear loop and silicone rubber ear insert for high noise environment. For use with all Scott-Alert models.

8.4 Extension Pole

P/N 40010819: Extension Pole for reaching inaccessible areas, 6 ft. long collapsible to 3 ft., 1" diameter non-conductive plastic. Complete with clamping mechanism to securely hold Scott-Alert instruments.

8.5 Calibration Kits, Cylinders and Adaptors for Combustible Gas

P/N 40009061: Calibration Kit, 2.5% methane in air. To be used for calibrating the following Scott-Alert instruments:

P/N 40010710	P/N 40010750
P/N 40010760	P/N 40010780

P/N 40009173: Calibration Kit, 1.0% propane in air. To be used for calibrating the following Scott-Alert instruments:

P/N 40010733	P/N 40010753
P/N 40010763	P/N 40010783

***P/N 40011101:** Calibration Kit, 1.5% methane in air. To be used for calibrating the following Scott-Alert instruments:

P/N 40010710	P/N 40010750
P/N 40010760	P/N 40010780

***P/N 40011155:** Calibration Kit, 0.45% propane in air. To be used for calibrating the following Scott-Alert instruments:

P/N 40010733	P/N 40010753
P/N 40010763	P/N 40010783

EACH OF THE ABOVE KITS INCLUDE A 7.5 SCF CYLINDER OF THE APPROPRIATE GAS AT 245 psig, FLOW RATE INDICATOR, 6 FT. TYGON TUBING AND SCOTT-ALERT CALIBRATION ADAPTOR.

***P/N 40011300:** Calibration Kit, 1.5% methane in air. To be used for calibrating the following Scott-Alert instruments:

P/N 40010710	P/N 40010750
P/N 40010760	P/N 40010780

***P/N 40011301:** Calibration Kit, 0.45% propane in air. To be used for calibrating the following Scott-Alert instruments:

P/N 40010733	P/N 40010753
P/N 40010763	P/N 40010783

* TO CONFORM TO F.M. SPECIFICATION (±10% OF ALARM SETTING) FOR FACTORY SET ALARM AT 25% LFL

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EACH OF THE ABOVE KITS INCLUDE A 17 LITER CYLINDER OF THE APPROPRIATE GAS AT 240 psig, FLOW RATE INDICATOR, 6 FT. TYGON TUBING, VALVE ADAPTOR AND SCOTT-ALERT CALIBRATION ADAPTOR.

P/N 40009062: Calibration cylinder of 2.5% methane in air, 7.5 SCF at 245 psig.

P/N 40009174: Calibration cylinder of 1.0% propane in air, 7.5 SCF at 245 psig.

***P/N 40011087:** Calibration cylinder of 1.5% methane in air, 7.5 SCF at 245 psig.

***P/N 40011154:** Calibration cylinder of 0.45% propane in air, 7.5 SCF at 245 psig.

***P/N 40011302:** Calibration cylinder of 1.5% methane in air, 17 liter at 240 psig.

***P/N 40011303:** Calibration cylinder of 0.45% propane in air, 17 liter at 240 psig.

P/N 40010723: Spare Scott-Alert calibration adaptor for use with the following Calibration Kits:

P/N 40009061	P/N 40009173
P/N 40011101	P/N 40011155
P/N 40011300	P/N 40011301

* TO CONFORM TO F.M. SPECIFICATION (±10% OF ALARM SETTING) FOR FACTORY SET ALARM AT 25% LFL.

8.6 Calibration Kits, Cylinders and Adaptors for Hydrogen Sulfide

P/N 40011490: Calibration Kit for calibrating at 15 ppm. To be used for calibrating the following Scott-Alert instruments:

P/N 40010720	P/N 40010760
P/N 40010763	P/N 40010780
P/N 40010783	

P/N 40011625: Calibration Kit for calibrating at 50 ppm. To be used for calibrating the following Scott-Alert instruments:

P/N 40010720	P/N 40010760
P/N 40010763	P/N 40010780
P/N 40010783	

EACH OF THE ABOVE KITS ARE COMPLETE WITH 22-1/2" HIGH x 8" WIDE x 4" DEEP HIGH IMPACT RESISTANT PLASTIC CARRYING CASE CONTAINING ONE (1) HYDROGEN SULFIDE IN NITROGEN DISPOSABLE CYLINDER, ONE (1) OXYGEN IN NITROGEN DISPOSABLE CYLINDER, PRE-SET REGULATOR, TUBING AND CALIBRATION ADAPTOR. KIT PROVIDES APPROXIMATELY (25) CALIBRATIONS.

P/N 40010954: Ovenless Calibration Kit for calibrating at 15 ppm. To be used for calibrating the following Scott-Alert instruments:

P/N 40010720	P/N 40010760
P/N 40010763	P/N 40010780
P/N 40010783	

P/N 40011620: Ovenless Calibration Kit for calibrating at 50 ppm. To be used for calibrating the following Scott-Alert instruments:

P/N 40010720	P/N 40010760
P/N 40010763	P/N 40010780
P/N 40010783	

EACH OF THE ABOVE KITS UTILIZE A BATTERY OPERATED PUMP AND PERMEATION TYPE TUBES FOR **UNLIMITED NUMBER OF CALIBRATIONS UP TO ONE (1) YEAR.** CALIBRATOR MEASURES APPROXIMATELY 10" HIGH x 7" WIDE x 13" DEEP. KIT INCLUDES PERMEATION TUBE, FITTINGS, TUBING, FLOW METER AND CALIBRATION ADAPTOR.

P/N 40011492: Calibration Cylinders (hydrogen sulfide in nitrogen and oxygen in nitrogen) for calibrating at 15 ppm. Used with kits P/N 40011490 and P/N 40011625.

P/N 40011602: Calibration Cylinders (hydrogen sulfide in nitrogen and oxygen in nitrogen) for calibrating at 50 ppm Used with kits P/N 40011490 and P/N 40011625.

P/N 40011497: Permeation tube for calibrating at 15 ppm. Used with kit P/N 40010954.

P/N 40011595: Permeation tube for calibrating at 50 ppm. Used with kit P/N 40011620.

P/N 40011511: Spare Scott-Alert calibration adaptor for use with the following Calibration Kits:

P/N 40011490	P/N 40011625
P/N 40010954	P/N 40011620

8.7 Aspirator, Pump, Hoses, Probes, Water Trap and Calibration Screwdrivers

P/N 40011290: Hand Aspirator Assembly provides sample draw from remote inaccessible locations. For use with all Scott-Alert models.

P/N 40011298: Battery Operated Sample Pump eliminates hand aspiration when remote inaccessible locations require monitoring. For use with all Scott-Alert models.

P/N 40000008: 5 ft. non-kink neoprene hose with 5/16-24 female coupling on one end. For use with P/N 40011290.

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P/N 40000040: 15 ft. non-kink neoprene hose with 5/16-24 female coupling on one end. For use with P/N 40011290.

P/N 40000600: Non-kink neoprene hose, 3/16 ID. For use with P/N 40011298.

P/N 40000004: 12 in. copper probe, 3/16 including O.D. For use with P/N 40000002 and P/N 40000040.

P/N 40000012: 30 in. transparent non-conducting probe, barbed fitting on one end. For use with P/N 40000002 and P/N 40000040.

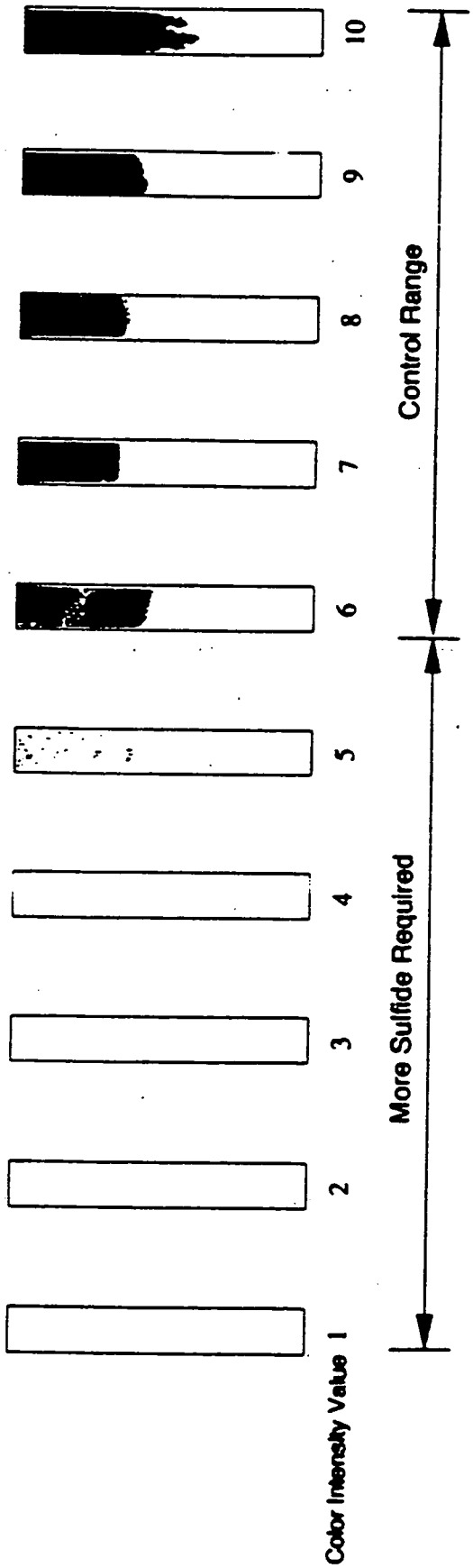
P/N 40000690: Same as P/N 40000012 only with anti-syphon holes located in first 4 in. of probe. For use with P/N 40000002 and P/N 40000040.

P/N 40000730: Water Trap Assembly. For use with P/N 40011290 only.

P/N 40011818: (5) miniature screwdrivers used for calibration. For use with all Scott-Alert models.

NOTES

ATTACHMENT B
Color Comparison Chart of Lead Acetate Strips



Color Comparison Chart of Lead Acetate Strips

CONCRETE SLUMP TEST

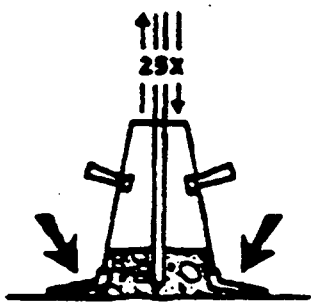
Recommended Procedure

Purpose of test: To determine the consistency of fresh concrete and to check its uniformity from batch to batch. The test is based on ASTM C 143-78 "Standard Test Method for Slump of Portland Cement Concrete." Also refer to ASTM C 172-82 "Standard Method of Sampling Freshly Mixed Concrete."

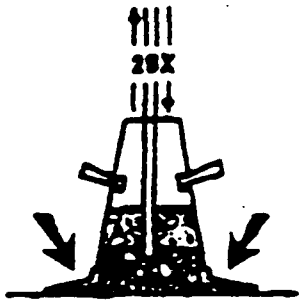
Take two or more representative samples – at regularly spaced intervals – from the middle of the mixer discharge; do not take samples from beginning or end of discharge. Obtain samples within 15 minutes or less. *Important:* Slump test must be made within 5 minutes after taking samples.

Combine samples in a wheelbarrow or appropriate container and remix before making test.

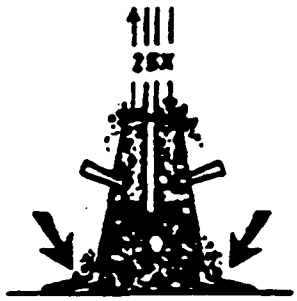
Dampen slump cone with water and place it on a flat, level, smooth, moist, nonabsorbent, firm surface.



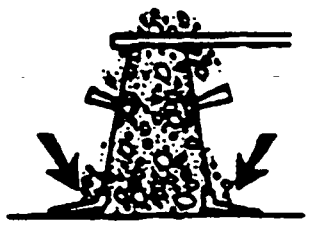
1. Stand on the two foot pieces of cone to hold it firmly in place during Steps 1 through 4. Fill cone mold ⅓ full by volume (2⅝" (67 mm) high) with the concrete sample and rod it with 25 strokes using a round, straight steel rod of ⅝" (16 mm) diameter x 24" (600 mm) long with a hemispherical tip end. Uniformly distribute strokes over the cross section of each layer. For the bottom layer, this will necessitate inclining the rod slightly and making approximately half the strokes near the perimeter (outer edge), then progressing with vertical strokes spirally toward the center.



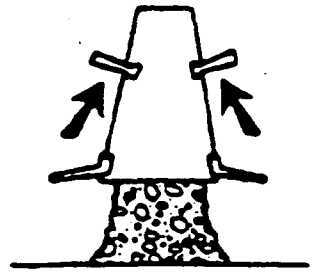
2. Fill cone ⅔ full by volume (half the height) and again rod 25 times with rod just penetrating into, but not through, the first layer. Distribute strokes evenly as described in Step 1.



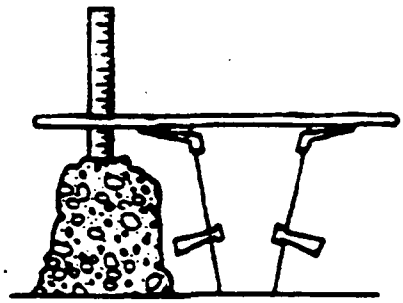
3. Fill cone to overflowing and again rod 25 times with rod just penetrating into, but not through, the second layer. Again distribute strokes evenly.



4. Strike off excess concrete from top of cone with the steel rod so the cone is exactly level full. Clean the overflow away from the base of the cone mold.



5. Immediately after completion of Step 4, the operation of raising the mold shall be performed in 5 ± 2 sec. by a steady upward lift with no lateral or torsional motion being imparted to the concrete. The entire operation from the start of the filling through removal of the mold shall be carried out without interruption and shall be completed within an elapsed time of 2½ minutes.



6. Place the steel rod horizontally across the inverted mold so the rod extends over the slumped concrete. Immediately measure the distance from bottom of the steel rod to the displaced original center of the top of the specimen. This distance, to the nearest ¼ inch (6 mm), is the slump of the concrete. If a decided falling away or shearing off of concrete from one side or portion of the mass occurs, disregard the test and make a new test on another portion of the sample.

PREPARED BY MASTER BUILDERS, DIVISION OF MARTIN MARIETTA CORPORATION.
IN THE INTEREST OF BETTER CONCRETING PRACTICES.

Form RM 2581
Printed in U.S.A. 184

ATTACHMENT D

Insert a Copy of the Soiltest, Inc. Model CT-421A Operating Manual when it is available.

Perma-Fix Environmental Services, Inc.
Process Operating Procedure

Approval: _____

OPERATIONS LOG SHEET

I. POLICY

PESI policy is to fully document the treatment, repackaging, sampling and analysis of wastes treated by the Perma-Fix Team. In keeping with this policy, all Perma-Fix Team members assigned to any task of this project are to record all required data, measurement results, and observations in real-time. This procedure and the attached Operations Log Sheet provide the minimum requirements and the format for operational record keeping to be used by all Perma-Fix Team personnel throughout the conduct of this project.

II. DISCUSSION

In order for the treated waste to be accepted at Nevada Test Site (NTS), three quality objectives must be met, namely:

- A finished waste form that meets the Waste Acceptance Criteria (WAC) of NTS.
- Traceability of waste from the beginning to the end of the process.
- Evidence of Project and Process Quality Control

By this procedure, the traceability and process control will be fully documented for every original container of waste.

III. DEFINITIONS

Operations Log Sheet - A one-page form for use by process operators in documenting required data, measurement results and observations. The form serves as a checklist of data required, and provides a format for recording the information.

MEF Number - An inventory number assigned to a particular lot of waste by FERMCO for waste characterization and tracking purposes. MEF stands for Material Evaluation Form.

Waste Group Number - A unique identification number assigned to groupings of waste containers as they are received, deheaded and inspected. The Waste Group Number is

assigned to a volume of waste which after treatment by the Design Recipe will fill one White Metal Box (WMB).

White Metal Box (WMB) - A DOT strong, tight container built to FERMCO/NTS specifications and painted white.

Original Container ID Number - A unique identification number marked on the outside of each original, outer waste container received from FERMCO.

Concentric Inner Containers - Some original containers will contain one or more smaller containers, multiple overpacks, with one container in the center, surrounded concentrically by the other containers. This packaging arrangement must be disassembled one container at a time.

Shreddable/Unshreddable Debris - Shreddable debris is inorganic in nature, and is of a size and strength that can be size reduced in the shredder. The only type of material that we know now that can't be shredded is structural steel. Unshreddable debris can be surface decontaminated and sunk into the treated waste in the WMB during the waste decanting process.

Mixing Drum ID Number - A unique identification number marked on the outside of each 55-gallon Mixing Drum. Since Mixing Drums will be repetitively reused, this number will be repeated on numerous Operations Log Sheets throughout the project. This ID number provides a traceable link between the original outer container and the WMB that eventually receives the treated waste.

Freeboard - The empty space between the top lip of a drum or container and the top of the waste inside the drum or container. Freeboard is measured as a depth measurement using a ruler or yard stick, and is recorded on the Operations Log Sheet in inches.

Setting - The process by which Portland Cement or grout mixtures change from a slurry to a solid monolith.

Curing - The process, following setting, by which Portland Cement or grout monoliths grow harder over time.

IV. REFERENCES

POP-2.2 ***Drum Deheading, Lifting and Tipping*** - The procedure which governs log-in of the original waste containers, opening or deheading of the containers, unstacking of concentric containers, inspection of waste, removal of excess water, grouping of waste, and lifting, transporting, and emptying of waste containers.

POP-2.3 ***Waste Feed Preparation*** - The procedure which governs the screening of waste for debris removal, the filling of Mixing Drums with screened waste, and the adjustment of water content of the waste.

POP-2.4 ***Debris Sorting and Shredding*** - The procedure which governs the separation of waste into three categories; process incompatible, compatible shreddable, and compatible unshreddable. The procedure also governs operation of the shredder, and recombination of shredded debris with screened waste.

POP-2.5 ***Chemical Stabilization Treatment*** - The procedure which governs pretreatment of waste for chromium reduction, for ammonia off-gassing, and for stabilization of toxic heavy metals and radionuclides.

POP-2.6 ***Solidification Treatment*** - The procedure which governs the addition and mixing of pozzolans (Portland Cement) for the purpose of absorbing free water and solidifying the chemically stabilized waste into a solid monolith.

POP-2.8 ***Decanting, Sampling, Curing and Reclaim*** - The procedure which governs waste sampling and sample custody control, decanting of treated waste into WMBs, setting and curing of waste, and reclaim of waste that fails to meet the WAC of NTS.

V. PROCEDURE

A. Recording Information on the Operations Log Sheet

The following roles and responsibilities are established for record keeping during waste processing operations. All record keeping will be performed in real-time. There shall be no time lag between the completion of a processing step and the completion of record keeping.

Performer		Action
Deheading Operator	1.	Follows the procedural steps described in POP-2.2 in performing his waste processing duties.
	2.	For each original waste container received from FERMCO, fills out as completely as possible Sections A and B of the Operations Log Sheet.
	3.	When waste processing duties are complete, transfers waste containers in Waste Groups to the Screen Operator, along with all of the Operations Log Sheets for those waste containers.
Screen Operator	4.	Follows the procedural steps described in POP-2.3 in performing his waste processing duties.
	5.	For each original waste container received from the Deheading Operator, fills out as completely as possible Section C of the Operations Log Sheet.
	6.	When waste processing duties are complete, transfers waste containers in Waste Groups to the either the Shredder Operator or the Mixer Operator, as directed by the posted Design Recipe, along with all of the Operations Log Sheets for those waste containers.
	7.	Transfers debris to the Debris Sort Operator by way of a chute. Notifies the Debris Sort Operator of which waste containers and Waste Groups the debris came from.
Debris Sort Operator	8.	Follows the procedural steps described in POP-2.4 in performing his waste processing duties.
	9.	For each batch of oversize debris received from the Screen Operator, sorts waste into categories for downstream handling, and documents estimated quantities, descriptions and fates of debris in Section D of the Operations Log Sheet.
	10.	When waste processing duties are complete, transfers sorted shreddable debris to the Shredder Operator, along with all of the Operations Log Sheets for those waste containers.

Performer	Action
Debris Sort Operator (Continued)	11. When waste processing duties are complete, transfers sorted unshreddable debris to the Decant Operator.
Shredder Operator	12. Follows the procedural steps described in POP-2.4 in shredding debris and adding it back to the waste, as directed in the posted Design Recipe.
	13. When waste processing duties are complete, transfers sorted, shredded debris or waste/debris mixtures to the Mix Unit Operator, along with all of the Operations Log Sheets for those waste containers.
Mix Unit Operator	14. Follows the procedural steps described in POP-2.5 in pretreating and chemically stabilizing waste in Mixing Drums.
	15. For each Mixing Drum of waste received and treated, completes as much as possible Section E of the Operations Log Sheet.
	16. For wastes that must be removed and taken to a Soaking Area, transfers custody of the pretreated Mixing Drums and the Operations Log Sheet to the Fork-Lift Operator.
Fork-Lift Operator	17. Takes the pretreated Mixing Drums and their attached Operations Log Sheets to the Soaking Area and returns them to the Mix Unit Operator at the end of the posted Soaking Interval.
Mix Unit Operator	18. When Chemical Stabilization Treatment is complete, proceeds with Solidification Treatment as described below.
	19. Follows the procedural steps described in POP-2.6 in performing Solidification Treatment in Mixing Drums.
	20. For each Mixing Drum of waste received and treated, completes as much as possible Section F of the Operations Log Sheet.

Performer	Action
Mix Unit Operator (Continued)	21. Transfers custody of the treated Mixing Drums and their attached Operations Log Sheets, by way of the Fork-lift Operator, to the Decant Operator.
Decant Operator	22. Follows the procedural steps described in POP-2.8 in sampling and decanting treated waste into WMBs by Waste Groups.
	23. For each Mixing Drum of waste received, sampled and decanted, completes as much as possible Section G of the Operations Log Sheet.
	24. After setting and curing have been completed, and no further observations are to be recorded on the Operations Log Sheet, it will be transferred to the custody of the Process Supervisor, who will ensure that it is properly filed in the Project Files.

VI. ATTACHMENTS

Operations Log Sheet

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

PESI FACILITY AND EQUIPMENT SPECIFICATIONS INDEX

NO.	TITLE	REV.	DATE
3.1	PESI Facility and Equipment Specifications Index	Draft OB	7/5/95
3.2	Material Shredder Specification	Draft OA	6/23/95
3.3	Drum Mixing Equipment Specification	Draft OA	6/29/95
3.4	Water Tank Specification	Draft OA	6/29/95
3.5	Drum Deheader Specification	Draft OA	6/29/95
3.6	Negative Air Ventilating Equipment Specification	Draft OA	6/29/95
3.7	Cement and Chemicals Handling Equipment Specification	Draft OA	6/29/95
3.8	Fabricated Bar-Screen Unit Specification	Draft OA	6/29/95
3.9	Miscellaneous Equipment and Material Specifications	Draft OA	6/29/95

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

MATERIAL SHREDDER SPECIFICATION

Manufactured by Wilson Brothers Incorporated, located in Memphis, Tennessee, complete with contact parts constructed of carbon steel with an industrial finish. Lip seals on shafts with double wall construction and 4140 steel cutters (knives).

Shredder knife bed 68" x 39" x 6" O.D. with 52" x 29" throat, and includes oil bath between knife bed and torque motor. There are two 12" diameter knife blades per set and a total of three sets of knives are provided. Knife blades are 2" high and 5/8" thick. There is a shaft mounted reducer/torque converter - Dodge Torque Arm 24:62:1 with belt drive and an OSHA approved guard.

Includes an inlet hopper with flange for bolting to shredder knife bed. The hopper is adaptable to either hydraulic or air operated ram (if required).

Drive 50 HP, 1770 RPM (full load) - TEFC - Frame 61 - Type - P - INS Class B
ID NO. P32G512D-G11MZ
Reliance Electric Motor
230/460 Volt - 3 phase AC - 60 HZ
Amps - 124/63; S.F. - 1.0; Design - B; NEPA Code - F; AMB-040C; Duty - Cont; Oper. Temp Code - T3B; MN5327

Drive controls installed in a NEMA-12 panel, including necessasry start-stop stations and monitoring devices.

Motor starters to be full voltage - reversing

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

DRUM MIXER SPECIFICATION

The unit includes all features of the van-mounted mobile unit for application of the Perma-Fix Process. This in-drum mix unit is a hydraulically driven, variable speed, reversible propeller mixer, with three staged carbon steel or stainless impellers. Includes extra impellers.

The movements of the hydraulic torque-mixer head are: up and down; in and out; and the head can manually be positioned radially. The impeller operates in both directions.

The power assembly unit consists of a hydraulic magna pump mounted on a 48" x 25" x 13" resevoir. Filter on return line included.

The Magna Pump is powered by a 30 H.P., 1750 R.P.M. (full load) TEFC Frame 286-T; INS Class F; Elektrim Motor; 230/460 volt; 3 phase A.C.; 60 Hz; amps - 33.9 FL and 217 LR; S.F. - 1.2; Design - B; NEMA Code - G; AMB-040C; duty-cont; torque - 90 ft/lbs FL; 198 ft/lbs LR : 207 ft/lbs BD; efficiency - 91.0% FL @ 91% PF - Weight - 385 lbs.; Bearings - 6311zz

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

WATER TANK AND BUCKET SPECIFICATIONS

Water Tank: One 1200 gallon-polyethylene, single wall, tank.

Buckets: 100 (each) - 5 gallon - polyethylene buckets for reagent charges.

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

DRUM DEHEADER SPECIFICATIONS

Wizard Drum Tool Company

Drum Deheader - Self propelled (Model -G)

Manual - Electric

Weight - 53 lbs. (Net)

Cuts drums up to 16 gage steel.

Powered by 1/3 HP, 110 volt, 60 Hz, single phase, amps 5.7 F.L., and 220 in-lbs torque.

Dimensions: 17" L x 11" W x 19" H

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

NEGATIVE AIR UNIT AND HEPA FILTER SPECIFICATIONS

Negative air units - with hose and HEPA filters	Two 5 hp, 2000 cfm (negative air) ventilation units Bartlett Services Inc. - model AP-2000, complete with hoses, and prefilters (PM-40) Weight - 530 lbs.
Replacement HEPA Filters:	Flanders Nuclear Grade HEPA Filter super flow model 007-8-02 = 05-NU-GGF
Replacement Pre-Filters:	PM-40 (24" x 24" x 2") Case contains 12 filters

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

CEMENT AND CHEMICALS HANDLING EQUIPMENT SPECIFICATIONS

- One 200 barrell (minimum) capacity storage silo
- Two 6000 lb capacity lift trucks with tipper attachment (fuel will be propane)
- One 500 gallon liquefied propane gas storage tank
- One 1200 lb minimum capacity jib crane hoist and strap
- One 1"-Roper (RBM) air-driven double diaphragm pump and 300 ft. of 1 ½" reinforced industrial water transfer hose
- 200 (each) - 55 gallon steel drums (No. 1A2 x 485)
- One right-angle drill and paint paddles

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

MISCELLANEOUS EQUIPMENT AND MATERIALS SPECIFICATIONS

- Two HEPA wet vacs - Nilfisk America, Model RVP-60, 15 gal tank - 12 v battery (3 micron) including hose
- 150 tons of ASTM-type 1 or 2 Portland Cement
- Personal protection equipment
  - Disposal Coveralls
  - Sleeves
  - Booties
  - Negative pressure respirators
  - Negative pressure cartridges
- Decontamination equipment and supplies
  - Two rolls of 10-mil plastic sheeting (20 ft x 100 ft sheets)
  - 10 pks of wipes (200 sheet per package)
  - ? Citric acid
- Electric power distribution and circuit protection panel
  - Cable, conduit, connectors, fuses, fuse boxes, etc.
- Computer - Copier - Fax
  -
- Area isolation material
  -
- Miscellaneous wood, bolts, etc.
  - Wood
    Bolts
- Bench scale testing equipment
  - Cole Parker Instrument Co.
    Temperature - Ph - ORP Meter and Probes
    (Model 05996-50)
  - Hydrometers
  - Tripple beam balance
- Sampling equipment
  - Trouels
  - Dippers
  - Containers

Perma-Fix Environmental Services, Inc.

Facility and Equipment Specifications

Approval: _____

FABRICATED BAR-SCREEN SPECIFICATIONS

[TO BE SUBMITTED LATER]

Perma-Fix Environmental Services, Inc.

Materials Management Procedure

Approval: _____

PESI MATERIALS MANAGEMENT PROCEDURES INDEX

NO.	TITLE	REV.	DATE
4.1	PESI Materials Management Procedures Index	Draft OD	7/27/95
4.2	Waste Drum Receiving and Storage	Draft OA	7/11/95
4.3	Cement Receiving and Storage	Draft OA	7/11/95
4.4	Chemicals Receiving and Storage	Draft OA	7/11/95
4.5	Motor Fuel Receiving and Storage	Draft OA	7/11/95
4.6	Reject Product Management	Draft OA	7/27/95
4.7	Acceptable Product Management	Draft OA	7/27/95
4.8	Process Waste Management	Draft OA	7/27/95
4.9	Waste Container Storage and Handling	Draft OA	7/27/95

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

WASTE DRUM RECEIVING AND STORAGE

I. POLICY

PESI's policy is to receive, store, and manage waste products presented by FERMCO for stabilization in a retrievable and accountable fashion. PESI will verify the presented waste conforms to process requirements.

II. DISCUSSION

PESI controls all project activities important to quality.

III. DEFINITIONS

None

IV. REFERENCES

PESI Procedure POP-2.15, *Operation Log Sheet*

V. PROCEDURE

Performer	Action
Operation Crew Member	1. Prepares area to receive waste from FERMCO personnel.
	2. Assists FERMCO personnel in delivering waste to PESI area as needed.
	3. Logs waste into waste inventory log book.
	4. Verifies that all delivered containers come from same MEF Number Category and are among the MEF Number Category for the waste campaign being prepared for processing.

Performer	Action
Operation Crew member (cont'd)	5. Returns waste drums which do not meet MEF Number Category criteria.
	6. Receives and handles all waste on pallets to maximum extent possible.
	7. Fills out Sections A and B of the Operations Log Sheet in accordance with PESI Procedure POP-2.15, *Operation Log Sheet.*
	8. Stages waste drums for processing per Processing Supervisor instructions.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

CEMENT RECEIVING AND STORAGE

I. POLICY

PESI's policy is to receive, store, and manage waste products used during stabilization of FERMCO waste in a retrievable and accountable fashion. PESI will verify process conformance on all products used in processing.

II. DISCUSSION

PESI controls all project activities important to quality.

III. DEFINITIONS

None

IV. REFERENCES

PESI Procedure POP-2.15, *Operation Log Sheet*

V. PROCEDURE

Performer	Action
Operation Crew Member	1. Prepares cement silo to receive product in bulk shipments from trucks.
	2. Assists truck delivery of cement products.
	3. Verifies receipt of product assay sheets and compliance with product requirements.
	4. Logs product shipment in materials logbook with date and time ID.

Performer	Action
Operation Crew member (cont'd)	5. Forwards shipment paperwork to project procurement file.
	6. Handles cement per PESI procedure, POP-2.12, *Cement Handling.*

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

CHEMICALS RECEIVING AND STORAGE

I. POLICY

PESI's policy is to receive, store, and manage waste products used during stabilization of FERMCO waste in a retrievable and accountable fashion. PESI will verify process conformance on all products used in processing.

II. DISCUSSION

PESI controls all project activities important to quality.

III. DEFINITIONS

None

IV. REFERENCES

PESI Procedure POP-2.13, *Chemical Handling*

V. PROCEDURE

Performer	Action
Operation Crew Member	1. Prepares loading dock to receive product in bulk shipments from trucks.
	2. Assists truck delivery of chemical products.
	3. Verifies receipt of product assay sheets and compliance with product requirements.
	4. Logs product shipment in materials logbook with date and time ID.

Performer	Action
Operation Crew member (cont'd)	5. Forwards shipment paperwork to project procurement file.
	6. If not delivered on pallet, transfers product to project pallets for handling.
	7. Using fork truck, delivers product to area prepared for storage of like product.
	8. Handles chemicals per PESI Procedure POP-2.13, *Chemical Handling.*

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

MOTOR FUEL RECEIVING AND STORAGE

I. POLICY

PESI's policy is to receive, store, and manage product materials such that they are available when needed and conform to project requirements.

II. DISCUSSION

PESI controls all project activities important to quality.

III. DEFINITIONS

None

IV. REFERENCES

PESI Procedure POP-2.14, *Motor Fuel Handling*

V. PROCEDURE

Performer	Action
Operation Crew Member	1. Prepares fork truck propane tanks for pickup or exchange.
	2. Assists truck delivery of propane tanks products.
	3. Verifies compliance with product requirements.
	4. Logs product shipment in materials logbook with date and time ID.
	5. Forwards shipment paperwork to project procurement file.

Performer	Action
Operation Crew member (cont'd)	6. If not delivered on pallet, transfers product to project pallets for handling if weight appears greater than 50 lbs.
	7. Using fork truck, delivers product to area prepared for storage of like product.
	8. Handles motor fuel per PESI Procedure POP-2.14, *Motor Fuel Handling.*

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

REJECT PRODUCT MANAGEMENT

I. POLICY

PESI's policy is to produce final waste forms meeting all the requirements for shipment and disposal at the Nevada Test Site (NTS). Products which do not meet the requirements will be corrected to the extent possible, and put aside for disposition by FERMCO.

II. DISCUSSION

PESI will control all process activities to achieve final waste forms meeting project requirements. Project circumstances that could cause unacceptable waste forms to be produced include:

A. Waste form fails to harden.

B. Chemical analysis verifies treatment failure.

C. Process controls fail to perform or are not implemented.

III. DEFINITIONS

None

IV. REFERENCES

A. Process Operating Procedure 2.8, *Decanting, Sampling, Curing, and Reclaim*
B. Operating Procedure 2.15, *Operations Log Sheet*
C. Quality Assurance Procedure 8.5, *Assessment Planning and Conduct*
D. Quality Assurance Procedure 8.4, *Quality Problems and Corrective Action*
E. Process Operating Procedure 2.5, *Chemical Stabilization Treatment*

V. PROCEDURE

A. If product fails to harden:

Performer		Action
Project Manager or Process Supervisor	1.	Tags waste form as unacceptable.
Process Operator	2.	If waste form has not set after 48 hours from decanting, adds pozzalons and mixes in White Metal Box (WMB) per Process Operating Procedure 2.8, *Decanting, Sampling, Curing, and Reclaim.*
	3.	Adds equal ration of pozzalons to representative sample and mix.
	4.	Sets aside for special monitoring.
	5.	Records results on Operations Log Sheet per Process Operating Procedure 2.15, *Operations Log Sheet.*
ESH&QA Manager	6.	Inspects for conformance with product specifications.
Project Manager or Process Supervisor	7.	Investigates the process failure and prepares assessment report per Quality Assurance Procedure 8.5, *Assessment Planning and Conduct* and recommended corrective actions per Quality Assurance Procedure 8.4, *Quality Problems and Corrective Action.*
Process Operator	8.	If required, modifies process per Process Operating Procedure 2.5, *Chemical Stabilization Treatment.*
ESH&QA Manager	9.	Reports findings, conclusions, and corrective actions to FERMCO.

B. If product fails chemical analysis:

Performer		Action
Project Manager or Process Supervisor	1.	Tags waste form as unacceptable.

Performer		Action
Process Operator	2.	Sets aside and stages for reprocessing.
	3.	Breaks up waste monolith partially and reprocesses the waste beginning at the shredder station per Process Operating Procedure 2.8, *Decanting, Sampling, Curing, and Reclaim*.
	4.	Prepares new Operations Log Sheet referencing and attaching the log of the failed product.
ESH&QA Manager	5.	Inspects for conformance with product specifications.
Process Operator	6.	Upon verifying conformance, returns waste form to curing area for FERMCO acceptance.
ESH&QA Manager	7.	Investigates the process failure and prepares assessment report per Quality Assurance Procedure 8.5, *Assessment Planning and Conduct* and recommended corrective actions per Quality Assurance Procedure 8.4, *Quality Problems and Corrective Action*.
Project Manager or Process Supervisor	8.	If required, modifies process per Process Operating Procedure 2.5, *Chemical Stabilization Treatment*.
ESH&QA Manager	9.	Reports findings, conclusions, and corrective actions to FERMCO.

C. If process controls fail or are not implemented:

Performer		Action
Project Manager or Process Supervisor	1.	Tags waste form as unacceptable.
ESH&QA Manager	2.	Researches project documentation in search of evidence of process control.
	3.	Reinspects to extent possible to establish product attributes.

Performer		Action
Project Manager or Process Supervisor	4.	Performs chemical tests on product sample to establish product attributes.
Process Operator	5.	If inspections and tests confirm acceptable product, prepares documentation per Process Operating Procedure 2.15, *Operations Log Sheet* and delivers waste form to curing area for acceptance by FERMCO.
ESH&QA Manager	6.	Investigates the breach in process control and prepares assessment report per Quality Assurance Procedure 8.5, *Assessment Planning and Conduct*, and recommended corrective actions per Quality Assurance Procedure 8.4, *Quality Problems and Corrective Action.*
	7.	Reports findings, conclusions, and corrective actions to FERMCO.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

ACCEPTABLE PRODUCT MANAGEMENT

I. POLICY

PESI's policy is to produce final waste forms meeting all the requirements for shipment and disposal at the Nevada Test Site (NTS). Products which do not meet the requirements will be corrected to the extent possible, or put aside for disposition by FERMCO.

II. DISCUSSION

PESI will control all process activities to achieve final waste forms meeting project requirements.

III. DEFINITIONS

None

IV. REFERENCES

Project Management Procedure 1.9, *Management of Quality Records*

V. PROCEDURE

Performer	Action
Operations Crew Member	1. If product inspections, log entries, and representative samplings are found to be acceptable, moves waste form to staging area for delivery to FERMCO.
	2. Assists FERMCO in preparing waste forms for transportation from staging area.
	3. Prepares and retains product records on behalf of FERMCO per Project Management Procedure 1.9, *Management of Quality Records*.

Performer	Action
Operations Crew Member (cont'd)	4. Secures custody transfer from FERMCO.
	5. Communicates status of waste custody transfer to PESI accounting for invoicing purposes.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

PROCESS WASTE MANAGEMENT

I. POLICY

PESI's policy is to minimize the volume of process waste produced for shipment and disposal at the Nevada Test Site (NTS).

II. DISCUSSION

PESI will have the potential to generate some secondary mixed waste as a result of process activities. These will include housekeeping, decontamination, collection of trash, PPE, air filters, and liquids. These activities will be designed and controlled in an effort to minimize the final volume of waste produced for shipment and disposal at NTS.

III. DEFINITIONS

None

IV. REFERENCES

None

V. PROCEDURE

Project participants deal with process-generated waste as follows:

Performer	Action
Project Participants	1. Collect liquid waste generated around processing area with the use of wet vacs.
	2. Transfer liquids contained in wet vacs to contaminated water holding tank.
	3. Transfer all contaminated liquids to contaminated water holding tank.

Performer	Action
Project Participants (cont'd)	4. Use water from contaminated water holding tank for waste chemical stabilization and solidification.
	5. Integrate secondary mixed waste like wipes, polymeric, sheeting, and rare FERMCO dispositioned PPE items or air filters into the treatment process for treatment and disposal.
	6. Place PPE doffed upon egress of the Exclusion Zone in collection container for recycle and disposition by FERMCO.
	7. Place Respirators/Cartridges doffed upon egress of the Exclusion Zone in collection container for recycle and disposition by FERMCO.
	8. To extent possible, unpackage and repack any process, facility, or personnel materials being moved into the processing area to minimize the potential of contamination.
	9. Collects radioactively contaminated items that are not mixed waste separately for disposition by FERMCO.
	10. Requests assistance from FERMCO RCT and IH personnel in dispositioning questionable secondary waste generated as a result of project activities.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Material Management Procedures

Approval: _____

WASTE CONTAINER STORAGE AND HANDLING

I. POLICY

PESI's policy is to recycle incoming containers for reuse by FERMCO to the extent possible. Unusable containers will be stored separately for collection and disposal by FERMCO.

II. DISCUSSION

PESI is required to support FERMCO by screening all empty incoming waste containers and separating them into usable and unusable stock in the Empty Drum Staging Area. Usable containers will be rinsed to "RCRA empty" status and returned to FERMCO for reuse. Unusable containers will be staged for collection and disposal by FERMCO.

III. DEFINITIONS

None

IV. REFERENCES

None

V. PROCEDURE

Performer	Action
Operations Crew Member	1. Prepares the Empty Drum Staging Area for collection and storage of usable and unusable waste containers.
	2. Stages incoming containers after the contents have been emptied into a screen hopper.
	3. Stages usable containers and unusable containers into separate groups.

Performer	Action
Operations Crew Member (cont'd)	4. Cleans usable containers to "RCRA Empty" status with potable water spray, and occasional brushing to remove large clumps of material.
	5. Assists in delivery of usable containers to FERMCO for reuse.
	6. Assists in collection of unusable containers by FERMCO for compaction and disposal.

IV. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Environmental Management Procedure

Approval: _____

PESI ENVIRONMENTAL MANAGEMENT PROCEDURES INDEX

NO.	TITLE	REV.	DATE
5.1	PESI Environmental Management Procedures Index	Draft OD	7/31/95
5.2	Management and Control of Production Waste	Draft OA	7/31/95
5.3	Treatment and Disposal of Project Solid Waste	Draft OA	7/31/95
5.4	Treatment and Disposal of Project Liquid Waste	Draft OA	7/31/95
5.5	Treatment and Disposal of Process Off-Gas	Draft OA	7/31/95

Perma-Fix Environmental Services, Inc.

Environmental Management Procedure

Approval: _____

TREATMENT AND DISPOSAL OF PRODUCTION WASTE

I. POLICY

PESI's policy is to protect the environment from process hazards associated with treatment of mixed waste.

II. DISCUSSION

PESI will have the potential to generate some secondary mixed waste as a result of process activities. These will include housekeeping, decontamination, collection of trash, PPE, air filters, and liquids. These activities will be designed and controlled in an effort to protect the environment from exposure to process hazards. PESI will conduct treatment activities within a highly-controlled access site. Our activities take place inside a building having very low traffic, huge volume relative to the processing needs of the project, and designed and fabricated for the purpose of uranium metal making (high-hazard considerations). Our processing area is designed and controlled to collect and treat off-gasses and liquid spills. Solid waste materials will be collected, segregated, contained, and located such that they can be managed and disposed per existing FERMCO waste management practices.

III. DEFINITIONS

None

IV. REFERENCES

None

V. PROCEDURE

Performer	Action
Project Manager	1. Controls access to processing area to persons having the required training for access or visitors escorted by trained personnel. Visitors must have the written permission of FERMCO including the Manager of Radiological Control and Health and Safety Officer.

Performer	Action
Project Manager (cont'd)	2. Provides secondary containment for significant potential spill areas such as the chemical reagent and contaminated water tanks.
	3. Provides the capability to handle a spill greater than the largest liquid container not having secondary containment.
	4. Protects the floor around likely spill areas with Herculite having a berm around the perimeter.
Operations Crew Members	5. Assist and provide access to FERMCO personnel monitoring radiation, contaminants of concern.
	6. Assist with decontamination in areas selected by FERMCO environmental, safety, and health personnel.
Project Manager	7. Controls access to incoming waste containers and final waste forms to project personnel and appropriate FERMCO personnel.
	8. Keeps a current inventory of all mixed waste delivered by FERMCO to the processing area.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Environmental Management Procedure

Approval: _____

TREATMENT AND DISPOSAL OF PROJECT SOLID WASTE

I. POLICY

PESI's policy is to handle all waste generated as a result of mixed waste treatment in the most appropriate manner to minimize the volume of process waste produced for shipment and disposal at NTS. PESI will also collect, prepare, and locate other project wastes such that they can be picked-up and managed by FERMCO per existing practices.

II. DISCUSSION

PESI will have the potential to generate some secondary mixed waste as a result or process activities. These will include housekeeping, documentation, collection of trash, PPE, air filters, and liquids. These activities will be designed and controlled in an effort to minimize the final volume of waste produced for shipment and disposal at NTS.

III. DEFINITIONS

None

IV. REFERENCES

None

V. PROCEDURE

Performer	Action
Operations Crew Members	1. Remove all non-essential packing and support materials used for mobilization prior to locating equipment and materials within the processing area.
	2. Prepare solid waste materials used to mobilize project equipment in a manner acceptable for collection and disposal by FERMCO.

Performer	Action
Operations Crew Members (cont'd)	3. To the extent possible, unpackage and repack any process, facility, or personnel materials being moved into the processing area to minimize the potential of contamination.
	4. Collect all trash-like material in a manner which prevents it from becoming mixed waste.
	5. Prepare and locate collected trash in a manner that it can be picked up by FERMCO for disposal in a sanitary landfill.
	6. Integrate secondary mixed waste like wipes, polymeric, sheeting, and rare FERMCO selected PPE items or air filters into the treatment process for treatment and disposal.
	7. Place PPE doffed upon egress of the Exclusion Zone in collection container for recycle and disposition by FERMCO.
	8. Place respirators/cartridges doffed upon egress of the Exclusion Zone in collection container for recycle and disposition by FERMCO.
	9. During demobilization, identify, prepare, segregate, and locate solid waste materials in a manner that they can be recycled, reused, or appropriately disposed of by FERMCO.

VI. ATTACHMENTS

None

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Date: 7/31/95

Perma-Fix Environmental Services, Inc.

Environmental Management Procedure

Approval: _____

TREATMENT AND DISPOSAL OF PROJECT LIQUID WASTE

I. POLICY

PESI's policy is to handle all waste generated as a result of mixed waste treatment in the most appropriate manner to minimize the volume of process waste produced for shipment and disposal at NTS. PESI will also collect, prepare, and locate other project wastes such that they can be picked-up and managed by FERMCO per existing practices.

II. DISCUSSION

PESI will have the potential to generate some secondary mixed waste as a result or process activities. These will include housekeeping, documentation, collection of trash, PPE, air filters, and liquids. Treatment activities require the addition of water. However, treatment is flexible enough to use contaminated water generated from housekeeping and decontamination activities. Our plan is to use contaminated water whenever possible and to strive for a zero water balance over the course of the project.

III. DEFINITIONS

None

IV. REFERENCES

None

V. PROCEDURE

Performer	Action
Operations Crew Member	1. Collects liquid waste generated around processing area with the use of wet vacs.
	2. Transfers liquids contained in wet vacs to contaminated water holding tank.

Performer	Action
Operations Crew Member (cont'd)	3. Transfers all contaminated liquids to contaminated water holding tank.
	4. Uses water from contaminated water holding tank during waste chemical stabilization and solidification.
Project Manager	5. Manages the water balance to the extent possible to eliminate the need for waste water treatment during or after the project.
	6. Prepares and locates any excess waste water such that it can be processed by FERMCO and discharged at their waste water treatment facility.

VI. ATTACHMENT

None

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Rev. 0 (Draft A)
Date: 7/31/95

Perma-Fix Environmental Services, Inc.

Environmental Management Procedure

Approval: _____

TREATMENT AND DISPOSAL OF PROCESS OFF-GAS

I. POLICY

PESI's policy is to handle all waste generated as a result of mixed waste treatment in the most appropriate manner to minimize the volume of process waste produced for shipment and disposal at NTS. PESI will also collect and filter fugitive emissions such as dust, cement, and process off-gas generated at key points in the process.

II. DISCUSSION

PESI will have the potential to generate some dust, air-borne cement, ammonia, and rare trace amounts of hydrogen sulfide. To protect project personnel, all work within the processing area will be performed wearing PPE and appropriate respirators. Air and radiation monitoring will be performed daily by FERMCO in support of project activities. Most dust and air-borne cement will be collected by a HEPA filtration unit designed for the project. Gases will be swept away from the processing area with the HEPA filtration unit and dispersed within Plant 6 at concentrations below health and regulatory concern.

III. DEFINITIONS

PPE - Personal Protective Equipment
RCT - Radiation Control Technician

IV. REFERENCES

Project Management Procedure 1.9, *Management of Quality Records*

V. PROCEDURE

Performer	Action
Project Manager	1. Locates collection ducts for HEPA filtration units such that they collect fugitive emissions such as dust, cement particles, and process off-gas.

Performer	Action
Operations Crew Member	2. Operates, tests, and maintains HEPA filtration unit per Facility Equipment Specification 3.6, *Negative Air Ventilating Equipment Specification.*
	3. Assists FERMCO in performing DOP tests, daily monitoring, filter changes, and other activities as requested by RCTs in support of Health and Safety activities.
ESH&QA Manager	4. Maintains records documenting the results of monitoring performed on the HEPA filtration unit per Project Management Procedure 1.9, *Management of Quality Records.*

VI. ATTACHMENT

None

Perma-Fix Environmental Services, Inc.

Emergency Preparedness Procesures

Approval: _____

PESI EMERGENCY PREPAREDNESS PROCEDURES INDEX

NO.	TITLE	REV.	DATE
6.1	PESI Emergency Preparedness Procedures Index	Draft OC	7/20/95
6.2	Process Hazards Control	Draft OA	6/5/95
6.3	Emergency Communications	Draft OA	6/5/95
6.4	Regulatory Notifications and Reporting	Draft OA	6/5/95

Perma-Fix Environmental Services, Inc.

Emergency Preparedness Procedures

Approval: _____

PROCESS HAZARDS CONTROL

I. POLICY

PESI policy is to minimize the impact of any emergency upon the health and safety of all site personnel and the general public. This procedure establishes the guidance regarding FERMCO's role in controlling process hazards as a result of an emergency condition. This procedure applies to PESI employees and contractors who perform tasks and activities internal to PESI.

II. DISCUSSION

PESI has established a Health and Safety Plan to permit waste processing to be conducted without adverse impacts on worker health and safety. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions that might possibly occur while processing the waste materials. The following emergency equipment is available at the site: first aid kits, fire extinguisher and blanket, and pressurized eyewash.

III. DEFINITIONS

None

IV. REFERENCES

A. 40 CFR 355, *Emergency Planning and Notification*

B. *Emergency Planning and Notification Right-to-Know Act* (EPCRA)

C. DOE Order 5500.3A, *Planning and Preparedness for Operational Emergencies*

D. FERMCO ESH-1-1000, *Comprehensive Environmental Safety and Health Program Manual*

V. PROCEDURE

A. General

Performer		Action
First Aid Personnel	1.	Initiates first aid or appropriate action. Note: First Aid Personnel are those personnel who are properly trained to administer first aid or appropriate action and are nearest to the incident.)
	2.	Conducts assistance in a manner to ensure that those rendering assistance are not placed in a situation of unacceptable risk.
	3.	Reports all incidents to the Process Supervisor.
Process Supervisor	4.	Coordinates the emergency response in an efficient, rapid, and safe manner.
	5.	Decides if off-site assistance and medical treatment are required and arranges for assistance.
	6.	Determines if evacuation is necessary. Note: If necessary, all personnel will assemble in the support zone and be accounted for at that time.
PESI Employees and Contractors	7.	Conducts themselves in a mature, calm manner if an incident occurs.
	8.	Avoids spreading the danger to themselves and to surrounding workers.
Process Supervisor	9.	Documents all health and safety risk incidents and reports to Project Manager.
Project Manager	10.	Reports all health and safety incidents to FERMCO along with disposition of the incident, or plan for accomplishing disposition of the incident.

B. Worker Injury

Personnel		Action
First Aid Personnel	1.	Applies Red Cross first aid procedures.
	2.	Seeks emergency medical response depending on the severity of the injury.
	3.	Removes employee from the source of contamination, if the employee can be moved.
	4.	Conducts decontamination procedures, additional first aid, or preparation for transportation at a safe distance from the work site. Note: Personnel decontamination procedures will be conducted as practical. Modification or omission of decontamination procedures may be necessary, depending on the severity of the accident.
	5.	Provides the following first aid procedures if the injury to the worker is chemical in nature (e.g., overexposure): • Eye Exposure - if contaminated solids or liquids get into the eyes, wash eyes immediately at the emergency station using large amounts of potable water and lifting the lower and upper lids occasionally. Wash for at least 15 minutes. Obtain medical attention immediately. Contact lenses will not be worn when working on the site. • Skin Exposure - if contaminated solids or liquids get on the skin, promptly wash the contaminated skin using soap or mild detergent and water for at least 15 minutes. Obtain medical attention immediately when exposed to concentrated solids or liquids. Wash face and hands before leaving the site.

C. Fires

Performer		Action
PESI Employees and Contractors	1.	Refrains from smoking or lighting fires wherever there may be dry grass or other flammable material.
	2.	Refrains from idling or parking vehicles and equipment in or around areas where catalytic connecters may cause grass fire.
	3.	Uses dry chemical fire extinguishers to bring the occurrence under control.
	4.	Places a fire blanket, soil, or other inert material on the burning area to extinguish the flames and to minimize the potential for spreading, if necessary.
	5.	Contacts the fire department for assistance, if necessary.
	6.	Institutes evacuation of immediate vicinity if uncontrollable fire releases potentially toxic gases.
		Note: The fire department is contacted immediately to notify them of the materials involved.

D. Spills

Performer		Action
Process Supervisor	1.	Isolates site spill from all traffic.
	2.	Assures spilled solids are removed and loaded into appropriate containers for subsequent placement or taken to the original destination.
	3.	Assumes spilled liquids are contained with absorbent material and the absorbent is loaded into appropriate containers for disposal.

IV. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Emergency Preparedness Procedures

Approval: _____

EMERGENCY COMMUNICATIONS

I. POLICY

PESI policy is to expeditiously provide information relating to the release of toxic chemicals. This information is intended to inform FERMCO for subsequently informing the general public and communities surrounding the site about releases of toxic chemicals, to assist research, and to aid in the development of regulations, guidelines, and standards, and for other purposes. This procedure applies to PESI employees.

II. DISCUSSION

The *Emergency Planning and Community Right-To-Know Act* (EPCRA) creates a chemical planning and response program including non-emergency reporting requirements. The objective is to inform local communities of the nature and amount of chemicals at a facility.

III. DEFINITIONS

None

IV. REFERENCES

A. 40 CFR 355, *Emergency Planning and Notification*

B. 40 CFR 372, *Toxic Chemical Release Reporting: Community Right-To-Know*

C. *Emergency Planning and Notification Right-To-Know Act* (EPCRA)

D. SSOP-0067, *Spill Incident Reporting and Clean-Up*

V. PROCEDURE

A. General

Performer	Action
Project Manager	1. Produces a report to FERMCO describing the following: • The incident (including date and time) that necessitated the notification and the basis for that decision. • Date, time, and names of all persons and agencies notified and their responses. • Resolution of the incident (including duration) and the corrective action involved.
	2. Submits report to FERMCO within five working days of the resolution of the event.

B. Tier I Report

Performer	Action
Project Manager	1. Prepares input for FERMCO's Tier I Report prior to their March 1 submittal date which includes: • Estimates of the maximum amount and average daily amount of "hazardous chemicals" as defined by the hazard communications standard promulgated by the Occupational Safety and Health Administration (OSHA) for the previous calendar year. • The general location of the "hazardous chemicals" in each hazard category.

C. Tier II Report

Performer	Action
Project Manager	1. Provides chemical-specific for FERMCO's Tier II Report which is generated upon the request of an emergency planning agency which includes: • The chemical or common name of the hazardous chemical.

Performer	Action
Project Manager (Cont'd)	• The maximum yearly and average daily quantity of that material at the site. • An indication of whether the location information should remain confidential.

D. Annual Report

Performer	Action
Project Manager	1. Provides input for FERMCO's annual report to the Ohio Environmental Protection Agency (OEPA) on all releases of specified "toxic chemicals" processed at the site as listed in 40 CFR 372, Subpart D.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Emergency Preparedness Procedures

Approval: _____

REGULATORY NOTIFICATIONS

I. POLICY

PESI policy is to comply with emergency planning and preparedness related requirements for regulatory notification. This information is provided to FERMCO for their subsequent notification to the local emergency planning agency. This procedure applies to PESI employees.

II. DISCUSSION

The *Emergency Planning and Community Right-To-Know Act* (EPCRA) requires notifying the local emergency agency of "reportable quantities" in excess of federally permitted releases. The objective is to provide required notification to local communities of project releases.

III. DEFINITIONS

None

IV. REFERENCES

A. 40 CFR 355, *Emergency Planning and Notification*

B. *Emergency Planning and Community Right-To-Know Act* (EPCRA)

C. SP-P-35-031, *Event Notification and Reporting of Radiological Control Occurrences*

V. PROCEDURE

Performer		Action
Process Supervisor	1.	Contacts appropriate FERMCO personnel immediately if an incident occurs.

Performer		Action
Process Supervisor (Cont'd)	2.	Requests the emergency team for transportation to the hospital if fire department or paramedic emergency services are required. Note: For less serious circumstances, the Process Supervisor, or representative, will provide transportation or the use of services of the occupational medical clinic.
	3.	Establishes communications before conducting active on-site operations by prominently marking the nearest work site telephone and providing alternate forms of communication (e.g., radio).

IV. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Project Management Procedure

Approval: _____

PESI SAMPLE MANAGEMENT PROCEDURES INDEX

NO.	TITLE	REV.	DATE
7.1	PESI Sample Management Procedures Index	Draft OD	7/25/95
7.2	Sampling and Chain-of-Custody	Draft OA	7/25/95
7.3	Analysis and Reporting for Process Feedback Samples	Draft OA	7/25/95
7.4	Analysis and Reporting for Waste Acceptance Samples	Draft OA	7/25/95

Perma-Fix Environmental Services, Inc.
Sample Management Procedure

Approval: _____

SAMPLING AND CHAIN-OF-CUSTODY

I. POLICY

PESI policy is to perform necessary sampling of treated wastes in keeping with the Sampling and Analysis Plan (SAP) in Appendix B of the Volume I Plans document. Furthermore, sampling is to be performed safely, and is to be documented so as to maintain the traceability of all samples to the individual batches treated and containers which received the treated waste. In keeping with this policy, all Perma-Fix Team members assigned to any sampling task are to perform sampling and documentation as set forth in the following procedures.

II. DISCUSSION

In order to provide timely analytical feedback to the process operators and proof of waste acceptability to Nevada Test Site (NTS), it will be necessary to perform sampling of treated waste, and subsequent tests and analyses. POP-2.10 describes the inspections and tests that will be performed on a real-time basis. Sampling and analyses are further discussed in the SAP (Appendix B of Volume I). This procedure covers the methods to be employed in collecting samples, maintaining unbroken Chain-of-Custody and documenting the samples to maintain their traceability to batch and container.

III. DEFINITIONS

Chain-of-Custody - A procedure which ensures that samples, once collected, remain in the custody of specific individuals until analyzed, and that each individual having custody of the sample be identified as to the time interval in which the individual maintained custody of the sample. Chain-of-Custody is "unbroken" if the sample is in the custody of the identified individuals from the sampling time to the time of analysis, and is maintained secure from tampering during that time.

Chain-of-Custody Form - A dual purpose document which is used to request laboratory analyses, and to document a traceable Chain-of-Custody for each sample. A standard Fernald Site form, *Site-wide Analysis Request/Custody Record*, will be used.

Compatible Waste Group (CWG) Number - A unique identification number assigned for tracking purposes to groups of compatible waste containers entering the waste stabilization process. All containers in a CWG have the same CWG Number.

Feedback Sample - A type of grab sample collected for the purpose of performance verification of the process and the Design Recipe.

Grab Sample - A sample collected at a point in time, which is representative of the waste in a single container (Mixing Drum).

Operations Log Sheet - A one-page log sheet which provides a format and checklist of information that individual process operators must record during treatment, sampling, decanting and curing of wastes treated during this project. This sheet when completed provides traceability for grab and composite samples to the original containers, Mixing Drums, and White Metal Boxes (WMBs) to which the samples are related.

Sample Splitting - A procedure in which a larger sample is divided into two or more smaller portions for separate analysis in different laboratories. Sample splitting ensures that each laboratory receives essentially the same sample for analysis.

Waste Acceptance Sample - A type or grab sample collected, archived and subjected to random selection for statistical waste acceptance analyses, aimed at providing proof of acceptability of the treated waste to NTS.

IV. REFERENCES

Sampling and Analysis Plan (SAP), Appendix B of Volume I Plans and Procedures.
FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1.
Process Operating Procedure (POP-2.15) Operations Log Sheet.

V. PROCEDURE

A. Collecting a Grab Sample

Any operator who is required to collect grab samples must follow this procedure for collection of the sample and documentation of the sample on the Operations Log Sheet. For the purposes of this procedure, it is assumed that the Decant Operator or his helper performs this task. Grab samples from Mixing Drums will be collected in sets of two, with one grab to be placed into the Process Feedback Archive, and the other to be

placed in the Waste Acceptance Archive. Each of these grab samples will be representative of the Mixing Drum from which it came.

Performer	Actions
Decant Operator Or Helper	1. Obtains two clean plastic sample containers (500ml capacity).
	2. Attaches a stick-on label on one side of each sample container, and marks the label, using indelible black or blue ink, with the following information concerning the Mixing Drum sampled and the sample collected:

Date/Time of Sampling
CWG Number (from Operations Log Sheet)
Mixing Drum ID Number (from Mixing Drum)
WMB ID Number (from WMB)
Sample ID Number (Composed as Shown Below)
Sampler's Name or Initials

Follows the alphanumeric numbering system shown below in assigning sample numbers to each grab sample

AAA - BB/CC - DDDD - E

AAA - A two or three letter code indicating whether the sample is for waste acceptance purposes (WAC) or for process feedback purposes (PFB).

BB - A two digit code indicating the month when the sample was collected.

CC - A two digit code indicating the year when the sample was collected.

DDDD - A four digit serial number (assigned to each sample sequentially between 0001 and 9999).

E - A one letter code indicating which of two splits, A or B, the sample is (applies only to split samples).

Performer	Actions
Decant Operator or Helper (cont'd)	3. Records the following information from the sample container label on the Operations Log Sheet for each sample collected, ensuring that it is recorded on the right Operations Log Sheet. Date/Time of Sampling WMB ID Number Sample ID Number Sampler's Initials 4. Using a trowel dips waste from the top of the Mixing Drum and packs the waste into each of the sample containers, to eliminate air pockets without overly compressing the waste. Leaves at least ½ inch empty space at the top of the sample container. 5. Completes a Chain-of-Custody Form (*Site-wide Analysis Request/Custody Record*) documenting the collection of the samples, the assignment of sample ID numbers and the person(s) having custody of the samples. 6. Transfers the filled sample containers and the completed Chain-of-Custody Forms for those containers to the appropriate storage cabinet and closes and locks the cabinet to prevent tampering.

B. Sample Splitting

On some special occasions, it may be necessary to split a sample into one or more portions to be analyzed by different laboratories. Sample splitting can be performed before or after the sample sets and cures. The following procedures should be followed for splitting of samples.

Performer	Actions
Decant Operator or Helper	1. If the sample is to be split at the time that it is collected, fills extra sample containers as described in A above. 2. Labels and marks each sample container with sample ID numbers that include a letter designation for the **E** code in the sample number. Each sample container will have the same sample number except for the **E** code designation.

Performer	Actions
Decant Operator or Helper (cont'd)	3. Prepares the Chain-of-Custody Form (*Site-wide Analysis Request/Custody Record*) and completes the Operations Log Sheet as described in A above.
	4. Maintains custody and secure storage of all samples in their respective archives until the samples are picked up for delivery to the laboratory.

C. Transfer of Sample Custody

Transfer of sample custody will be formalized to ensure that an unbroken Chain-of-Custody is maintained from the time of sampling, until the time that a sample is analyzed in the laboratory. The Chain-of-Custody Form (*Site-wide Analysis Request/Custody Record*) previously described will be used to document each transfer of sample custody during the sequence of activities that results in analysis of a sample. The initiator of the sequence of activities is the sampler. When he transfers custody to any other person, he signs and dates the form in the space provided, and the person receiving the sample does likewise. When custody is transferred again, the same procedure is followed. The last person to receive custody is the person at the laboratory who receives the sample. That person also, signs and dates the form to acknowledge receipt of the sample. A copy of the completed Chain-of-Custody Form is returned to the Perma-Fix Project Team with the analytical results. A copy of the Chain-of-Custody Form is attached to this procedure.

VI. ATTACHMENT

Attachment A - Site-wide Analysis Request/Custody Record

ATTACHMENT A

Perma-Fix Environmental Services, Inc.
Sample Management Procedure

Approval: _____

ANALYSIS AND REPORTING FOR PROCESS FEEDBACK SAMPLES

I. POLICY

PESI policy is to perform necessary process feedback sampling and analysis of treated wastes in keeping with the Sampling and Analysis Plan (SAP) in Appendix B of the Volume I Plans document. SMP-7.2 describes the procedures for sampling waste and documenting the sampling activities. This procedure describes the analytical requirements for process feedback purposes, and the reporting of results by the analytical laboratories performing feedback sample analyses. In keeping with this policy, all Perma-Fix Team members receiving or performing data analysis activities on laboratory analytical reports are to use this procedure in reviewing the reports, matching analytical reports with pertinent Operations Log Sheets, and validating data reported.

II. DISCUSSION

Analytical data produced for process feedback purposes, must be validated for completeness and accuracy, matched to the Operations Log Sheets which document the treatment applied to the waste in question, and evaluated to determine the performance level of the Design Recipe. In order for process feedback to be useful for process control purposes, the validated data must be available within a reasonably short period of time after treatment of the waste. For this project we expect that analytical data of two types will be requested and reported back to the Project Office.

Total Metals Analysis - For speed of process feedback, preliminary analyses for RCRA metals concentrations will be performed directly on the samples provided to the laboratory. Reporting from the lab to the Project Office will be within 24 hours of sample receipt by the laboratory.

Toxicity Characteristic Leaching Procedure (TCLP) Metals - If any RCRA metal from the Total Metals Analysis is reported at a concentration exceeding 20 times the BDAT Treatment Standard, the sample will be extracted by the TCLP method and the extract analyzed for RCRA metals concentrations, with the results compared to the BDAT Treatment Standard. Reporting of TCLP results will be within 48 hours after the sample is received by the laboratory.

III. DEFINITIONS

Chain-of-Custody - A procedure which ensures that samples, once collected, remain in the custody of specific individuals until analyzed, and that each individual having custody of the sample be identified as to the time interval in which the individual maintained custody of the sample. Chain-of-Custody is "unbroken" if the sample is in the custody of the identified individuals from the sampling time to the time of analysis, and is maintained secure from tampering during that time.

Chain-of-Custody Form - A dual purpose document which is used to request laboratory analyses, and to document a traceable Chain-of-Custody for each sample. A standard Fernald Site form, *Site-wide Analysis Request/Custody Record*, will be used.

Compatible Waste Group (CWG) Number - A unique identification number assigned for tracking purposes to groups of compatible waste containers entering the waste stabilization process. All containers in a CWG have the same CWG Number.

Feedback Sample - A type of grab sample collected for the purpose of performance verification of the process and the Design Recipe.

Grab Sample - A sample collected at a point in time, which is representative of the waste in a single container (Mixing Drum).

Laboratory Analytical Report - A written report of laboratory analytical results generated by the analytical laboratory and transmitted to the Perma-Fix Team site office.

Operations Log Sheet - A one-page log sheet which provides a format and checklist of information that individual process operators must record during treatment, sampling, decanting and curing of wastes treated during this project. This sheet when completed provides traceability for grab and composite samples to the original containers, Mixing Drums, and White Metal Boxes (WMBs) to which the samples are related.

Sample Splitting - A procedure in which a larger sample is divided into two or more smaller portions for separate analysis in different laboratories. Sample splitting ensures that each laboratory receives essentially the same sample for analysis.

IV. REFERENCES

Sampling and Analysis Plan (SAP), Appendix B of Volume I, Plans and Procedures
FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1
Process Operating Procedure (POP-2.15) *Operations Log Sheet*
Sample Management Procedure (SMP-7.2) *Sampling and Chain-of-Custody*

V. PROCEDURE

A. Provision of Samples and Specifications for Feedback Sample Analysis

Any operator who is required to collect treated waste samples, package them, and provide them to a laboratory for process feedback purposes must follow the sampling and Chain-of-Custody procedures provided in SMP-7.2 in the collection, packaging, labeling, and documentation of the sample. He must complete the Chain-of-Custody Form, specifying the analyses to be performed by the laboratory in the spaces provided, and documenting the transfer of sample custody to the laboratory. For the purposes of this procedure, it is assumed that the Decant Operator or his helper performs this task. The following is the minimum specification for analytical services to be requested on the Chain-of-Custody Form.

1. **RCRA Metals (Total Metals Basis):** For rapid analytical feedback, samples of the stabilized waste will be analyzed immediately after initial set has been achieved for the 8 RCRA metals listed below. This analysis will be performed directly on the sample to determine the total metals concentrations present in the waste. Column C provides the BDAT Treatment Standards for each of the RCRA metals. Column D provides the trigger values for each RCRA metal that would require a full TCLP extraction and analysis to be performed.

A	B	C	D
Parameter	EPA Waste Code	BDAT Treatment Standard (mg/L)	Concentration Trigger for TCLP Analysis (mg/L)
Arsenic	D004	5.0	100
Barium	D005	100.0	2,000
Cadmium	D006	1.0	20
Chromium	D007	5.0	100
Lead	D008	5.0	100
Mercury	D009	0.20	4
Selenium	D010	5.7	100

2. **TCLP:** For each Process Feedback Sample in which any RCRA metal result exceeds the trigger value in Column D, the Toxicity Characteristic Leaching Procedure (TCLP) will be performed to produce an extract of the treated waste. Then the extract will be analyzed for RCRA metals and compared to the BDAT Treatment Standards listed in Column C.

The following procedures should be followed in specifying laboratory analyses.

Performer	Action
Decant Operator Or Helper	1. Verifies that the samples have set to a solid state.
	2. Selects the process feedback sample(s) to be analyzed from the project archive and packages the sample(s) for delivery to the laboratory.
	3. Finds the Chain-of-Custody Form(s) for the sample(s) to be analyzed, writes in the Total RCRA Metals parameters to be analyzed on the form, and places the completed form with the sample(s) for pickup by FERMCO personnel.
	4. When the FERMCO representative arrives to pickup the sample(s), signs and marks the date and time of sample custody transfer on the Chain-of-Custody Form, to document the transfer of sample custody, retains one copy of the Chain-of-Custody Form, and gives the remaining copies and the sample(s) to the FERMCO representative.
FERMCO Representative	5. Signs and marks the date and time of sample custody transfer on the Chain-of-Custody Form, to document the transfer of sample custody. Collects the sample(s) and Chain-of-Custody Forms and delivers them to the laboratory.
	6. Signs and marks the date and time of sample custody transfer on the Chain-of-Custody Form, to document the transfer of sample custody to the laboratory.
Laboratory Representative	7. Signs and marks the date and time of receipt on the Chain-of-Custody Form, to document the transfer of sample custody to the laboratory.

B. Data Reporting, Validation, and Evaluation

For each Total RCRA Metals sample analyzed, the laboratory will report the analytical data requested on the Chain-of-Custody Form, in writing to the Project Team Office. The results for each sample can be reported individually, or in combination, but the data for each sample must be reported within 24 hours of receipt of the sample at the laboratory. Upon receipt of an analytical report, the following actions should be taken.

Performer	Actions
Project Manager or Process Supervisor	1. Receives the laboratory analytical report and matches it with the Chain-of-Custody Form and the pertinent Operations Log Sheets.
	2. Verifies that results have been reported for all samples submitted and that data has been reported for all analytes requested. If any data is missing, immediately notifies the laboratory by telephone.
	3. Verifies that appropriate analytical methods were used, and that reported detection lifts are low enough to provide accurate data at least one order of magnitude lower than shown in Column C in A.1. of this procedure. If detection limits are too high, investigate with the laboratory to determine the cause.
	4. Evaluate the data reported for the 8 RCRA metals in comparison to Column D in A.1. of this procedure.
	5. If any of the RCRA metal concentrations are reported to be in excess of the Column D value, authorize the laboratory to perform the TCLP extraction and metals analysis on the sample.
	6. If the TCLP results for any RCRA metal are reported at a value exceeding Column C in A.1. above, investigate with the laboratory to determine if the results reported are accurate.
	7. If the results are valid, and exceed Column C, halt the production process, investigate appropriate Operations Log Sheets, and perform bench-scale testing to modify the Design Recipe.

VI. ATTACHMENT

None

ATTACHMENT A

Perma-Fix Environmental Services, Inc.
Sample Management Procedure

Approval: _____

ANALYSIS AND REPORTING FOR WASTE ACCEPTANCE SAMPLES

I. POLICY

PESI policy is to provide necessary sampling support to FERMCO in sampling treated wastes for waste acceptance analyses, in accordance with the Sampling and Analysis Plan (SAP) in Appendix B of the Volume I Plans document. SMP-7.2 describes the procedures for sampling waste and documenting the sampling activities. This procedure describes the analytical requirements for waste acceptance purposes, and the reporting of results by the analytical laboratories performing the analyses. In keeping with this policy, all Perma-Fix Team members receiving waste acceptance analytical data or performing data analysis activities are to use this procedure in reviewing the reports, matching analytical reports with pertinent Operations Log Sheets, and validating data reported.

II. DISCUSSION

Analytical data produced for waste acceptance purposes must be validated for completeness and accuracy, matched to the Operations Log Sheets which document the treatment applied to the waste in question, and evaluated to determine the acceptability of the treated waste to NTS.

III. DEFINITIONS

Chain-of-Custody - A procedure which ensures that samples, once collected, remain in the custody of specific individuals until analyzed, and that each individual having custody of the sample be identified as to the time interval in which the individual maintained custody of the sample. Chain-of-Custody is "unbroken" if the sample is in the custody of the identified individuals from the sampling time to the time of analysis, and is maintained secure from tampering during that time.

Chain-of-Custody Form - A dual purpose document which is used to request laboratory analyses, and to document a traceable Chain-of-Custody for each sample. A standard Fernald Site form, *Site-wide Analysis Request/Custody Record*, will be used.

Compatible Waste Group (CWG) Number - A unique identification number assigned for tracking purposes to groups of compatible waste containers entering the waste stabilization process. All containers in a CWG have the same CWG Number.

Grab Sample - A sample collected at a point in time, which is representative of the waste in a single container (Mixing Drum).

Log Analytical Report - A written report of laboratory analytical results generated by the analytical laboratory and transmitted to the Perma-Fix Team site office.

Operations Log Sheet - A one-page log sheet which provides a format and checklist of information that individual process operators must record during treatment, sampling, decanting and curing of wastes treated during this project. This sheet when completed provides traceability for grab and composite samples to the original containers, Mixing Drums, and White Metal Boxes (WMBs) to which the samples are related.

Sample Splitting - A procedure in which a larger sample is divided into two or more smaller portions for separate analysis in different laboratories. Sample splitting ensures that each laboratory receives essentially the same sample for analysis.

Waste Acceptance Sample - A type or grab sample collected, archived and subjected to random selection for statistical waste acceptance analyses, aimed at providing proof of acceptability of the treated waste to NTS.

IV. REFERENCES

Sampling and Analysis Plan (SAP), Appendix B of Volume I Plans and Procedures
FEMP Containerized Waste Sampling and Analysis Plan, Rev. 1
Process Operating Procedure (POP-2.15) *Operations Log Sheet*
Sample Management Procedure (SMP-7.2) *Sampling and Chain-of-Custody*

V. PROCEDURE

A. Provision of Samples and Specifications for Waste Acceptance Sample Analysis

Any operator who is required to collect treated waste samples, package them, and provide them to a FERMCO representative for waste acceptance purposes must follow the sampling and Chain-of-Custody procedures provided in SMP-7.2 in the collection, packaging, labeling and documentation of the sample. He must complete the Chain-of-Custody Form, identifying the person who performed the sampling and the date and

time of the sampling in the spaces provided, and document the transfer of sample custody to the FERMCO representative. The FERMCO representative will specify the analyses to be performed and mark these requested analyses on the Chain-of-Custody Form. For the purposes of this procedure, it is assumed that the Decant Operator or his helper performs this task.

Performer	Action
FERMCO Representative	1. Randomly selects one or more samples from the Waste Acceptance Archive.
Decant Operator Or Helper	2. Finds selected sample(s) and their Chain-of-Custody Form(s). Signs and marks the date and time of sample custody transfer on the Chain-of-Custody Form, to document his relinquishing custody of the sample(s). Retains one copy of the Chain-of-Custody Form, and gives the remaining copies and the sample(s) to the FERMCO representative.
FERMCO Representative	3. Signs and marks the date and time of sample custody transfer on the Chain-of-Custody Form(s), to document his receipt of the sample(s). Collects the sample(s) and Chain-of-Custody Form(s) and delivers them to the laboratory.
	4. Marks the Chain-of-Custody Form(s) with the requested analyses, to communicate to the laboratory which analytical parameters should be tested on each sample.
	5. Signs and marks the date and time of sample custody transfer on the Chain-of-Custody Form, to document the transfer of sample custody to the laboratory.
Laboratory Representative	6. Signs and marks the date and time of receipt on the Chain-of-Custody Form, to document the transfer of sample custody to the laboratory.

B. Data Reporting, Validation, and Evaluation

For each sample analyzed by the laboratory, the laboratory will report the analytical data requested on the Chain-of-Custody Form, in writing to the FERMCO Project Office, and send a copy to the Perma-Fix Project Office. The results for each sample can be reported individually, or in combination. Upon receipt of an analytical report in the Perma-Fix Project Office, the following actions should be taken.

Performer	Action
Project Manager or Process Supervisor	1. Receives the laboratory analytical report and matches it with the pertinent Chain-of-Custody Form(s) and Operations Log Sheets.
	2. Verifies that results have been reported for all samples submitted and that data has been reported for all analytes requested. If any data is missing, immediately notifies the laboratory by telephone.
	3. Verifies that appropriate analytical methods were used, and that reported detection limits are low enough to meet the requirements established for the project. If detection limits are too high, investigate with the laboratory to determine the cause.
	4. Evaluate the data reported for the 8 RCRA metals in comparison to the BDAT Treatment Standards listed in Column C, Section A.1. of SMP-7.3, *Analysis and Reporting for Process Feedback Samples*
	5. If any of the RCRA metal concentrations are reported to be in excess of the BDAT Treatment Standards, investigate with the laboratory to determine whether the data is valid.
	6. If the data is found to be accurate, halt the production process and perform bench-scale testing to modify the Design Recipe.

VI. ATTACHMENTS

None

Perma-Fix Environmental Services, Inc.

Quality Assurance Procedure

Approval: _____

PESI QUALITY ASSURANCE PROCEDURES INDEX

NO.	TITLE	REV.	DATE
8.1	PESI Quality Assurance Procedures Index	Draft OA	6/7/95
8.2	Personnel Training	Draft OA	6/7/95
8.3	Quality Improvement	Draft OA	6/7/95
8.4	Quality Problems and Corrective Action	Draft OA	6/7/95
8.5	Assessment Planning and Conduct	Draft OA	6/7/95

Perma-Fix Environmental Services, Inc.

Quality Assurance Procedure

Approval: _____

PERSONNEL TRAINING

I. POLICY

It is the policy of PESI that all personnel performing project activities will have the necessary training before they perform those activities. This includes training required by the client.

II. DISCUSSION

PESI project personnel are thoroughly trained and experienced in the application of the Perma-Fix process, and need no additional formal training in that regard. Project training needs, therefore, fall into four categories. They are:

A. Site-specific training required by the client.

B. Project-specific SOP training.

C. PESI Quality Assurance Program training.

D. Training in new needs that arise during the course of the project.

This procedure contains provisions for dealing with all four areas of need. The PESI Quality Assurance Coordinator will serve as training coordinator for all project-related training.

III. DEFINITIONS

Training - A planned and systematically implemented activity designed to provide participants with knowledge, skill, or ability in an area of performance necessary for project success. This includes, but is not limited to, formal classroom training. All training, regardless of format, will be documented.

IV. REFERENCES

None

V. PROCEDURE

A. Site-Specific Training

Performer	Action
Quality Assurance Coordinator	1. Works with the client's representative to determine site-specific training needed. Determines which PESI project positions need each type of training. Constructs and maintains a matrix (similar to Attachment A) which shows these needs.
	2. Determines which courses will be provided by the client and which ones will be obtained from other sources. Obtains a schedule for client-provided training.
	3. Schedules individuals for training. If source is other than FERMCO, collects evidence of training and enters it into the project records system.

B. SOP Training

Performer	Action
Quality Assurance Coordinator	1. Works with the PESI Project Manager to identify which procedures must be read and understood by which project participants.
	2. Distributes a listing of the appropriate procedures, along with documentation instructions and a schedule for completion, to all project participants.
	3. Follows up to ensure that the activity is completed as scheduled. On a sampling basis, evaluates the effectiveness of the "read and understand" process, and takes further action as needed.
	4. Ensure that all documentation is complete, and enters it into the project records system.

C. PESI Quality Assurance Program Training

Performer	Action
Quality Assurance Coordinator	1. Schedules an orientation and indoctrination session with project participants to ensure that they understand the overall goals and methods of the project's Quality Assurance Program. This is an adjunct to the specific provision of the SOPs which each individual has read and understood. Emphasis will be placed on the following points: • Individual responsibility for quality and quality assurance. • Importance of teamwork among all project participants. • Importance of identifying and resolving problems. • Importance of being alert for trends that indicate systemic problems. • Prime importance of the customer's need for confidence in our work. 2. Enters documentation of training into the project records system.

D. Responding to New Training Needs

Performer	Action
Quality Assurance Coordinator	1. In coordination with the Project Manager, remains alert to the need for additional or revised training. This includes considering the training implications of day-to-day performance, overall project performance trends, and the results of management assessment and independent assessment activities. 2. When training needs arise, identifies the optimum source for the training. Arranges for employees to attend training. Enters documentation of the training into the project records system. 3. Evaluates the results of the training through discussions with employees and the project manager, and through observation of on-the-job performance. Takes follow-up action as needed.

VI. ATTACHMENTS

A. Attachment A, "Site Training Matrix (Sample)"

ATTACHMENT A

Site Training Matrix (Sample)

Job Title	QA Program	HAZWOPER[2]	GET[1]	Rad Worker[1]	Security[1]	Process SOPs	Site Worker[1]	Respirator[1]	Energy Control[1]	Lead Worker[1]	Medical Cert.
Project Manager	X	X	X	X	X		X	X	X	X	X
Process Supervisor	X	X	X	X	X	X	X	X	X	X	X
Pjt. Mgt. Spt. Lead	X	X			X		X				
QA & ES&H Lead	X	X	X	X	X	X	X	X	X	X	X
QA Coord.	X	X	X	X	X	X	X	X	X	X	X
ES&H Coord.	X	X	X	X	X	X	X	X	X	X	X
Field Crew	X	X	X	X	X	X	X	X	X	X	X

Notes:
1. Provided by customer
2. 40 hour SARP/OSHA, and 8 hour refresher as needed, per 29 CFR 1910.120

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Perma-Fix Environmental Services, Inc.

Quality Assurance Procedure

Approval: _____

QUALITY IMPROVEMENT

I. POLICY

It is the policy of PESI that continuous improvement will be an integral part of the work of all project employees. Each employee will continually look for ways to increase the quality of our processes and results, and to provide additional confidence to the customer that value is being delivered through project activities. Each employee will take personal responsibility for quality improvement, and will work with management to ensure that barriers to quality are identified and removed.

II. DISCUSSION

This process, along with that described int he referenced PESI procedure, provides a complete system for identifying, analyzing, and resolving quality problems of all levels of significance.

III. DEFINITIONS

Quality Problems - A condition in which either a Nonconformance or a Deficiency exists.

Nonconformance - A hardware deviation that places the item or component outside accepted standards or specifications.

Deficiency - A deviation in a system or process that places it outside accepted standards or specifications.

Significant Quality Problem - A nonconformance or deficiency that has, or could have, a serious impact on safety, quality, environmental protection, or project goals and schedules.

Improvement Opportunity - A condition in which hardware, processes, or activities meet standards or specifications but could be improved to provide added value in terms of safety, quality, environmental protection, or project goals and schedules.

IV. REFERENCES

PESI 8.4, "Quality Problems and Corrective Action"

V. PROCEDURE

A. Handling Quality Problems

Performer	Action
PESI Employee	1. Upon discovering a quality problem, immediately makes a judgment regarding its severity. If it is a significant quality problem, temporarily halts the associated work process and consults with the Project Manager.
Project Manager	2. Gathers the facts from the employee, decides whether or not to resume the work operation, and implements that decision.
	3. In cooperation with the Quality Assurance Coordinator, determines if the problem should be handled as a normal day-to-day variation in work or as a Quality Problem using the process in PESI 8.4, "Quality Problems and Corrective Action."
	4. If the problem should be handled as a Quality Problem, uses the process in PESI 8.4, "Quality Problems and Corrective Action" to address it.
	5. If the problem should not be handled as a Quality Problem using the process in PESI 8.4, corrects the problem and makes the appropriate notations in the daily operating log.

B. Handling Improvement Opportunities

Performer	Action
PESI Employee	1. Identifies the improvement opportunity, brings it to the attention of the Project Manager.

Performer	Action
Project Manager	2. Discusses the opportunity with the employee, the Quality Assurance Coordinator, and other affected project participants.
	3. Makes assignments to plan, implement, and evaluate the actions taken to respond to the improvement opportunity. Follows up to ensure completion of these actions.

C. Identifying Trends

Performer	Action
Project Manager	1. Periodically meets with the Quality Assurance Coordinator to review performance data to identify trends. Such data include: • Daily operating logs • Employee Suggestions • Inspection results • Sampling data analysis results • Quality Problems (nonconformances and deficiencies) • Results from audit, surveillance, and other assessments
	2. Identifies action to be taken to address adverse trends and initiates such action. Addresses quality problems as provided for in PESI 8.4.

VI. ATTACHMENT

None

Perma-Fix Environmental Services, Inc.

Quality Assurance Procedure

Approval: _____

QUALITY PROBLEMS AND CORRECTIVE ACTION

I. POLICY

PESI policy is that quality problems will be identified, documented, and corrected as quickly as possible. This effort involves both the Quality Assurance Coordinator, the Project Manager, and other line performers. They will work as a team to correct problems in PESI processes or results. All quality problems will be reported to FERMCO, and copies of associated documents will be provided to them.

II. DISCUSSION

Quality Problems can be identified through planned assessment activities, through quality improvement activities, or through other means such as external reviews or evaluations. Regardless of the source of the problem, it will be handled in accordance with this procedure.

III. DEFINITIONS

Quality Problems - A condition in which either a Nonconformance or a Deficiency exists.

Nonconformance - A hardware deviation that places the item or component outside accepted standards or specifications.

Deficiency - A deviation in a system or process that places it outside accepted standards or specifications.

Significant Quality Problem - A nonconformance or deficiency that has, or could have, a serious impact on safety, quality environmental protection, or project goals and schedules.

Corrective Action - Includes all the following actions that apply to a particular problem:

- Disposition action (use-as-is, repair, rework, scrap)
- Root cause analysis
- Action to prevent recurrence

Disposition action that is use-as-is, repair, or rework shall be approved by FERMCO before it is implemented.

IV. REFERENCES

A. PESI 8.3, "Quality Improvement"

B. PESI 8.5, "Assessment Planning and Conduct"

V. PROCEDURE

A. Documentation of Quality Problems

Performer	Action
Quality Assurance Coordinator	1. Identifies the quality problem (nonconformance or deficiency) through personal actions or from reports from other project participants. Confirms the problem's existence with the Project Manager.
	2. In the case of nonconformances, ensures that the item or component has been tagged, segregated, or otherwise prevented from being inadvertently used.
	3. Determines the need to notify FERMCO, and takes appropriate action.
	4. Documents the problem on a Nonconformance Report or a Deficiency Report. Coordinates closely with the Project Manager. Signs the report, and issues it to the Project Manager for action.
	5. Monitors the action taken by the Project Manager to ensure that the problem is addressed.

B. Correcting the Quality Problem

Performer	Action
Project Manager	1. Determines disposition and corrective action needed. Coordinates with the Quality Assurance Coordinator.
	2. Initiates disposition and corrective action, and monitors activities to ensure that they are completed as scheduled and that the desired results are achieved.
Quality Assurance Coordinator	3. Monitors disposition and corrective actions as they are carried out.
	4. Verifies that the actions committed to have been completed, and that the desired results are achieved. Works with the Project Manager to resolve problems with the implementation of corrective action.
	5. Approves closure of the Nonconformance or Deficiency Report.
	6. Processes all related documentation as a project record.
	7. Provides copies fo all related documents to FERMCO.

VI. ATTACHMENTS

A. Attachment A, "Nonconformance Report"

B. Attachment B, "Deficiency Report"

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ATTACHMENT A

Nonconformance Report

Perma-Fix	NONCONFORMANCE REPORT	1 NR NO.
		2 DATE
3 ITEM IDENTIFICATION AND DESCRIPTION		4 PROJECT
		5 TAG NO.
6 RECIPIENT		7 CONTRACT NO./WP NO./PURCHASE ORDER
8 SPECIFICATION NO. AND REVISION		9 DRAWING NO. AND REVISION
10 **DESCRIPTION OF NONCONFORMANCE**		
A. ACTUAL CONDITION		B. REQUIREMENT
11 ISSUED BY (QA SPECIALIST) DATE		12 APPROVED BY DATE
13 DISPOSITION ☐ ACCEPT ☐ REWORK ☐ REPAIR ☐ CONDITIONAL (EXPLAIN) JUSTIFICATION AND SPECIAL REQUIREMENTS		
14 **DISPOSITION APPROVAL**		
RESPONSIBLE MANAGER DATE		TECHNICAL APPROVAL DATE
15 VERIFICATION ☐ REQUIRED ☐ NOT REQUIRED IF REQUIRED, LIST ACTIONAND RESULTS ITEM VERIFICATION ☐ ACCEPTABLE ☐ UNACCEPTABLE ☐ ADDITIONAL ACTION REQUIRED		
16 RELEASED BY (QA SPECIALIST) DATE		17 APPROVED BY DATE

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ATTACHMENT B
(Page 1 of 2)

Deficiency Report

PERMA-FIX

DEFICIENCY REPORT

Page ___ of ___

DR No. _____ Discovered by: _____ Date: _____

I. Description of Condition (Include requirement violated)

Response Required Within ___ Days of Issue Date ___ See Continuation Sheet ☐

Prepared by: _____

Approved by (QA Coordinator): _____ Date: _____

II. Response

Action Completion Date _____ Additional Documents Attached ☐ See Continuation Sheet ☐

Prepared by: _____

Approved by: _____ Date: _____ (Response Date)

III. Evaluation of Response Response Accepted: Yes ___ No ___

See Continuation Sheet ☐

Evaluated by: _____

Approved by: _____ Date: _____

IV. Completion Verification & Basis for Closure

Action Completion Reported by: _____ Date: _____

Additional Documents Attached ☐ See Continuation Sheet ☐

Verified by: _____ Date: _____ (Verification Date)

Approved by: _____ Date: _____ (Closure Date)

ATTACHMENT B
(Page 2 of 2)

Deficiency Report Form (Example)

PERMA-FIX
DEFICIENCY REPORT Page ___ of ___

DR No. _____

Perma-Fix Environmental Services, Inc.

Quality Assurance Procedure

Approval: _____

ASSESSMENT PLANNING AND CONDUCT

I. POLICY

It is the policy of PESI to supplement the control actions taken by line managers with a set of management and independent assessments. These assessments will be planned, conducted, reported, and followed up in a systematic manner, and the results will be used in quality improvement activities.

II. DISCUSSION

None

III. DEFINITIONS

Assessment - A generic term that includes Management Assessment and Independent Assessment. Assessments can be conducted in several ways. Audit, Surveillance, and Review are three of the more common ones.

IV. REFERENCE

PESI 8.4, "Quality Problems and Corrective Action"

V. PROCEDURE

A. Evaluation Planning

Performer	Action
Quality Assurance Coordinator	1. Develops an overall assessment plan and schedule which identifies the major activities or items to be evaluated, and which identifies the most appropriate evaluation method. This can include management assessments. Attachments A-D provide various forms and formats to be used.
	2. Prepares an assessment plan and the needed checklists. (Attachment A)

B. Evaluation Conduct

Performer	Action
Quality Assurance Coordinator	1. Conducts the assessment activity in accordance with the evaluation plan and evaluation checklists.
	2. Notifies appropriate supervision of item or activity noncompliance. Initiates nonconformance reports per procedure 8.4.
	3. Discusses preliminary evaluation results with appropriate supervision to ensure adequacy of evidence and conclusions.
	4. Prepares a report of the results from the conduct of the assessment activity.

V. RECORDS

Documents created or collected are to be retained as project records.

IV. ATTACHMENTS

A. Attachment A - Assessment Plan

B. Attachment B - Assessment Checklist

C. Attachment C - Assessment Report Format

ATTACHMENT A

Evaluation Plan

ASSESSMENT PLAN	Evaluation No.: Dates of Evaluation
1. Organization to be Evaluated: 2. Location of Evaluation:	
3. Scope:	
4. Previous Evaluation Activities for Follow-up:	
5. Team Members:	
6. List of Controlling Documents and Revisions:	
7. Proposed Schedule:	
Prepared by: _____ (QA Coordinator)	Date: _____

ATTACHMENT B

(Page 1 of 2)

Quality Assurance Evaluation Checklist

Assessment Checklist

ID. No.: | Assessment Subject: | Page 1 of

Organization Evaluated: | Date(s) Of Assessment: | Prepared By: | Date:

Team Leader: | Type Of Assessment: | Approved By: | Date:

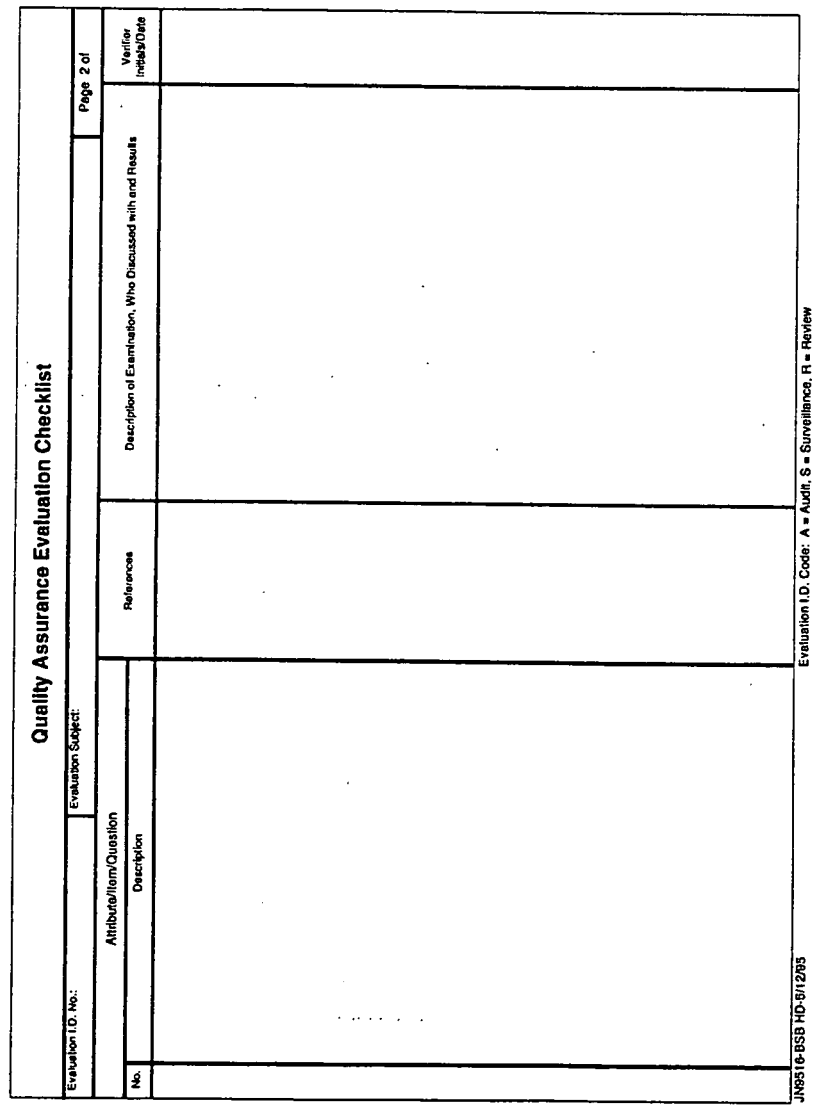
No.	Attribute/Item/Question Description	References	Results

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ATTACHMENT B

(Page 2 of 2)

Quality Assurance Evaluation Checklist



Assessment Report Format

The coversheet or transmittal letter should contain the following:

a) Assessment number
b) Assessment subject
c) Date response is due
d) Date(s) of conduct

The body of the report should include the following sections:

a. PURPOSE

This is a statement of the purpose of the assessment and areas examined.

b. CONCLUSIONS

The conclusions summarize the results and state the adequacy and effectiveness of the areas audited.

c. RESULTS

Results include the specific areas of conformance and non-conformance. The original Deficiency or Nonconformance Report forms are attached to the report.

The audit report is signed by the team leader.

Perma-Fix Environmental Services, Inc.

Health and Safety Procedure

Approval: _____

PESI HEALTH AND SAFETY PROCEDURES INDEX

NO.	TITLE	REV.	DATE
9.1	PESI Health and Safety Procedures Index	Draft OC	7/20/95
9.2	Handling and Storage of Chemicals	Draft OA	(8/4/95)
9.3	Mixing of Chemicals	Draft OA	(8/4/95)
9.4	Monitoring of Workplace Air	Draft OA	(8/4/95)
9.5	Monitoring of Discharge Air	Draft OA	(8/4/95)
9.6	HEPA Management	Draft OA	7/11/95
9.7	Radiological Protection	Draft OA	(8/4/95)
9.8	Hoisting and Rigging	Draft OA	(8/4/95)

Perma-Fix Environmental Services, Inc.

Health and Safety Procedures

Approval: _____

HEPA MANAGEMENT
O&M OF THE BSI MODEL AP-2000 HEPA UNIT

I. POLICY

It is the policy of PESI, in executing the Mixed Waste Stabilization Project at Fernald, to increase the margin of worker safety to the extent practicable through proper operation and maintenance of localized ventilation for control of dust and airborne contamination.

II. DISCUSSION

This procedure describes operation and maintenance (O&M) of the Bartlett Services Inc., model AP-2000 ventilator, which is designed for high volume airflow and extended HEPA filter life. All filters are changed from a side access door located on the right side of the housing. A filter locking mechanism is intended to assure proper installation of replacement filter elements, preventing air from bypassing the HEPA filter. Power requirements are 230/460 V AC 3 phase at 12/6 amps. This procedure applies to work integral to the Mixed Waste Stabilization Project at Fernald; it applies exclusively to subcontractor personnel authorized by the H&S Coordinator to operate or maintain this equipment. All PESI employees operating or maintaining the AP-2000 will do so only after receiving training on this procedure.

III. REFERENCE

Bartlett Nuclear Services, Inc. 1 - 800 - 225-0385
Air * Pak Portable HEPA Ventilation Manual

IV. PROCEDURE

A. Start-Up

NOTE: The AP-2000 may be placed at any location throughout the mixed waste stabilization process area. The 6" rollers travel over irregular floor surfaces.

Performer	Action
Process Supervisor & ES&H Coordinator	1. Approve the placement of the AP-2000.
Process Technician	2. Relocate the AP-2000 to the approved location.

NOTE: The standard 5 hp motor may be connected to common 480, 3 phase welding outlets. To operate AP-2000 from 230, 3 phase outlets the following must be performed by authorized electrical personnel:

Electrician	3. Wires motor as indicated on motor plate for 460 or 230 operation.
	4. Replaces heaters in the magnetic motor starter with those rated at 230 (460 heaters are installed at the factory).
	5. Changes plug or cord.
	6. Upon initial start-up, checks the direction of the motor rotation. When viewing the motor from the rear, rotation should be clockwise.

B. Safety Precautions

NOTE: Accidental Start Hazard - When performing maintenance, including filter changes or inspections, the large back inclined fan impeller presents a safety hazard if the unit is powered.

Performer	Action
Process Technician	1. Verifies that the unit is unplugged to prevent accidental starting while fingers/hands, or clothing are present within the interior of the machine.
	2. Tags out the plug with a tag labeled "Out of Service" to ensure co-workers do not replug the unit to power during maintenance.

NOTE: Fire Hazard - Ventilating for welding, burning, grinding, or work requiring ventilation of sparks or burning materials is not expected as part of the Mixed Waste Stabilization Project. If such ventilation becomes a requirement, take the following steps prior to continued operation of the AP-2000.

Performer	Action
ES&H Coordinator	2. Calls for and directly supervises the following steps 3 and 4.
Process Technician	3. Installs a Spark Arrester — Inserts a spark arrester, which is a stainless steel mesh prefilter (24" x 24" x 2"), in the prefilter track to replace prefilters made of fiberglass or paper.
	4. Verifies HEPA Filter has Stainless Steel Encasement — Checks the HEPA filter frame by opening the side access door. If filters have wooden frames, replaces them with HEPA filters with Stainless Steel frames.

NOTE: **Efficiency Hazard** - To ensure filtration efficiency, the new unit has been DOP tested. All filters supplied by Bartlett Nuclear Services are factory DOP tested in accordance with Mil-Std-282 while encapsulated at two flow rates. All filters are labeled and certified to have the efficiency of no less than 99.97% on a challenge aerosol having a homogeneous particle size of 0.3 microns at capacity.

Performer	Action
ES&H Coordinator	5. Schedules DOP testing as required on a six-month basis to be performed by the manufacturer or equivalent.
	6. Ensures DOP testing is accomplished and documented or otherwise tags the unit out of service until testing is up to date.

C. Configuration

NOTE: Configuration and operation of the unit must have approval of both the Process Supervisor and H&S Coordinator (or designees).

Performer	Action
Process Technician	1. Configures and operates a single 2000 CFM suction line or two 1000 CFM lines as job requirements indicate.
	2. Regulates air flow with the blast gates located in the suction transition.

Performer	Action
Process Technician (cont'd)	3. Leaves both blast gates open for best adsorption of gas contaminates when a single carbon adsorber cart is attached to the unit.

NOTE: Layout of ducts must be approved by both the Process Supervisor and H&S Coordinator (or designees).

Performer	Action
Process Technician	4. Avoids kinks or 90° turns in the flexible ducting. When sharp turns are required, uses 22 gauge sheet metal transitions. Use "Flexaust" brand CW-C, or equivalent, designed for high volume air handling at high negative pressures.
	5. Locates the ventilation unit as close to the work area as possible to reduce "static" loading from long duct runs.
ES&H Coordinator	6. Direct and approve steps 1-5 above.

D. Pressure

The magnehelic gauge located at the rear of the AP-2000 indicates the HEPA filter resistance to airflow. Over a period of 2 to 3 years, the gauge reading will increase. Requires change out of the filter elements when the magnehelic gauge indicates 10" w.g. Filter change out should not be needed during the Mixed Waste Stabilization Project.

Performer	Action
ES&H Coordinator	1. Records magnehelic gauge readings monthly.

NOTE: The increased magnehelic readings may be used to estimate airflow reductions due to filter loading as follows:

Pressure vs. Air Flow		
Magnehelic Gauge Reading (w.g.)	Condition	Air Flow (CFM)
1"	(New Filter) OK	2,100
3"	OK	1,970
5"	OK	1,890
8"	OK	1,720
10"	**Change Required**	1,470
11"	**Change Required**	687

Change the filter when the magnehelic gauge reading approaches 10" w.g.

E. Filter Life

Filter life depends on the *dust loading*. Because the unit will be operated in an area where solidification is being performed, the prefilters will be changed routinely. With proper pre-filtering, the HEPA will give 3-4 years of service.

Performer		Action
H&S Coordinator	1.	Determines the frequency at which the prefilters should be changed to minimize dust loading on the HEPA and supervises filter change outs.
Process Technician	2.	Changes out the prefilters at the determined frequency.

NOTE: Refer to the attached sketch while using this procedure. Bartlett filter are equipped with a protective wire mesh screen over the filter faces to protect the filter media from damage. Always handle HEPA filters from the sides. Do not touch the filter face when removing HEPA filters from their shipping box or during installation.

Process Supervisor	3.	Provides materials and tools required for filter change out as follows: • Pliers, to tighten wing nuts • Large plastic bag, 55 gallon or greater • Label for bags IAW site requirements • Replacement filters

Performer	Action
ES&H Coordinator	4. Directly supervises process technician(s) during filter change out.
Process Technician	5. Disconnects the unit from the power source and tags out power cord plug.
	6. Removes 4 wing nuts from access door corners.
	7. Opens door - Swing the horizontal filter locking mechanism bar outward, unlocking the filter element.
	8. Removes the spent filters by sliding them out through the access door and into the large plastic bag.
	9. Seals and labels the waste plastic bag.
	10. Removes the replacement filter from package by holding filter at frame edges only.
	11. Locates the "fluid seal" of the filter and faces it toward the upstream side of the housing. Slides the fluid seal into place.
	12. Gently closes the locking mechanism bar and observe the movement of the filter to the knife edges, engaging the fluid seal.
	NOTE: If you have difficulty locking the filter, it may not be properly seated or positioned in the housing. The housing door will not close unless the filter is seated correctly.
	13. After filter is seated, closes housing door and replaces stainless steel wing nuts.
	14. Transfers labeled bagged spent filter to Fernald site representative.
	15. Returns tools to process supervisor.

V. ATTACHMENTS

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A. Diagram of housing permanently installed into the air system

ATTACHMENT A

THIS ATTACHMENT WILL BE PROVIDED

Perma-Fix Environmental Services, Inc.

Acronyms, Abbreviations, and Initialisms

Approval: _____

PESI ACRONYMS, ABBREVIATIONS, AND INITIALISMS

ALARA	As Low As Reasonably Achievable
BDAT	Best Demonstrated Available Technology
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CIV	Color Intensity Value
COTR	Contracting Officer's Technical Representative
CWG	Compatible Waste Group
DOE	U. S. Department of Energy
DOT	Department of Transportation
DQOs	Data Quality Objectives
EPA	Environmental Protection Agency
EPCRA	*Emergency Planning and Notification Right-to-Know Act*
ES&H	Environmental Safety & Health
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FFA	*Federal Facility Agreement*
HEPA	High Energy Particulate Air
LDR	Land Disposal Restrictions
LEL	Lower Explosive Limit
LLW	Low Level Waste
MSDS	Material Safety Data Sheet
MEF	Material Evaluation Form
NEMA	National Electrical Manufacturer's Association
NEPA	*National Environmental Policy Act*
NTS	Nevada Test Site
NRC	Nuclear Regulatory Commission
OEPA	Ohio Environmental Protection Agency
O&M	Operation and Maintenance
OSHA	*Occupational Safety & Health Act*
PAT	Process Acceptance Test
PDC	Performance Development Corporation

PESI	Perma-Fix Environmental Services, Inc.
PFB	Process Feedback
RAM	Radioactive Materials
RCRA	*Resource Conservation and Recovery Act*
RCR	Review Comment Record
RFP	Request for Proposal
SAP	Sampling and Analysis Plan
SOW	Statement of Work
TCLP	Toxicity Characteristic Leaching Process
TLD	Thermo Luminescent Dosimeter
TSD	Treatment, Storage, and Disposal
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Schedule
WMB	White Metal Box