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DOE-FN/EPA

**125
REPORT**

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR
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Introduction

The Consent Agreement (CA) As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a), the Federal Facility Compliance Agreement (FFCA), and the Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA) signed September 20, 1991, July 18, 1986, and November 19, 1991, respectively, require that monthly reports be submitted to the U.S. EPA regarding progress made to meet the provisions of those agreements. This report fulfills those requirements by describing actions undertaken at the Fernald Environmental Management Project (FEMP) during the period February 1 through February 28, 1993, and planned actions for the period March 1 through March 31, 1993.

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WORK ASSIGNMENTS AND PROGRESS

Descriptions of work progress are presented in the following sections and/or enclosures to this report:

- o CA Section IX - Removal Actions.
- o CA Section X - Remedial Investigation/Feasibility Study.
- o Enclosure A - Wastewater Flows and Radionuclide Concentrations under CA Section XXIII.B.
- o Enclosure B - FFCA: Initial Remedial Measures and Other Open Actions.
- o Enclosure C - FFA: Control and Abatement of Radon-222 Emissions.
- o Enclosure D - Drilling/Boring Logs

CA Section IX. Removal Actions

This section provides an update of activities associated with the implementation of Removal Actions (RAs) at the FEMP during February 1993. Information is presented for each of the Removal Actions identified in the Consent Agreement As Amended.

Phase I Removal Actions

- o RA No. 1, Contaminated Water Under FEMP Buildings.
- o RA No. 2, Waste Pit Area Run-off Control.
- o RA No. 3, South Groundwater Contamination Plume.
- o RA No. 4, Silos 1 and 2.
- o RA No. 5, Decant Sump Tank.
- o RA No. 6, Waste Pit 6 Residues.
- o RA No. 7, Plant 1 Pad Continuing Release.

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Phase II Removal Actions

- o RA No. 8, Inactive Flyash Pile Control.
- o RA No. 9, Removal of Waste Inventories.
- o RA No. 10, Active Flyash Pile Controls.
- o RA No. 11, Pit 5 Experimental Treatment Facility.
- o RA No. 12, Safe Shutdown.
- o RA No. 13, Plant 1 Ore Silos.
- o RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator.
- o RA No. 15, Scrap Metal Piles.
- o RA No. 16, Collect Uncontrolled Production Area Runoff--Northeast.
- o RA No. 17, Improved Storage of Soil and Debris.
- o RA No. 18, Control Exposed Material in Pit 5.

Phase III Removal Actions

- o RA No. 19, Plant 7 Dismantling.
- o RA No. 20, Stabilization of UNH Inventories.
- o RA No. 21, Expedited Silo 3.
- o RA No. 22, Waste Pit Area Containment Improvement.
- o RA No. 23, Inactive Flyash Pile.
- o RA No. 24, Pilot Plant Sump.

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CA Section IX. Removal Actions (continued)

- o RA No. 25, Nitric Acid Tank Car and Area.
- o RA No. 26, Asbestos Removals (Asbestos Program).
- o RA No. 27, Management of Contaminated Structures at the FEMP.

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REMOVAL ACTIONS

RA No. 1, Contaminated Water Under FEMP Buildings

Plant 6 - Through February 1993, approximately 51,843 gallons of Plant 6 perched groundwater have been extracted and transported for treatment to the Plant 8 Volatile Organic Compound (VOC) treatment system. In addition to the original Plant 6 extraction system, the motor bay sumps are being added to the Plant 6 system. Until the permanent system is installed, water collected from the four motor bay sumps is being pumped to drums and then transferred to the Plant 8 VOC Treatment System. The design drawings are being revised to reflect the changes that resulted from the design review comments. Completion of Certified-for-Construction drawings and specifications is anticipated by March 31, 1993.

Plants 2/3 and Plant 8 - Through February 1993, approximately 126,943 gallons of perched water have been collected for treatment from Plant 2/3, and approximately 104,307 gallons of perched water have been collected for treatment from Plant 8.

Plant 9 - Approximately 22,808 gallons of Plant 9 perched water have been extracted and transported to Plant 8 through February 1993.

VOC Treatment System - Through February 1993, approximately 306,773 gallons of groundwater have been treated utilizing the Plant 8 treatment system. A reduced scope of sampling has been implemented so that increased pumping of Plant 2/3 can occur. This increased pumping is being coordinated with, and will occur when, the work to evaluate hydraulic pumping is implemented. This is expected to happen in April 1993.

Pumping of perched water beneath the above-mentioned plants with subsequent treatment in the Interim Plant 8 VOC Treatment System, followed by uranium removal in the Plant 8 Wastewater Treatment System, will continue in accordance with the Work Plan provisions. Treatment will continue in this manner until the Advanced Waste Water Treatment (AWWT) Phases I and II are operational in 1994.

RA No. 2, Waste Pit Area Runoff Control

The Work Plan for the Waste Pit Area Runoff Control Removal Action was approved with modifications by the U.S. EPA on January 10, 1991. Conditional approval was received from the Ohio EPA on April 2, 1991.

All activities for this removal action have been completed.

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REMOVAL ACTIONS

RA No. 3, South Groundwater Contamination Plume

Part 1

The Work Plan for Part 1, Alternate Water Supply for two industrial users (Albright & Wilson Americas [AWA] and Delta Steel) was approved by the U.S. EPA on January 3, 1991. Subsequently, Delta Steel was deleted from the current scope of the project with approval of the U.S. EPA and Ohio EPA. The Delta Steel hookup will be delayed until the planned public water supply can service the facility. A revised Work Plan (Revision 1) was prepared and issued to the EPAs to reflect this and other changes which have occurred. A summary of the most recent and ongoing activities for Part 1 are listed below:

Construction and initial operability testing was completed in December 1992. However, the system will not be placed into operation until approval is received from the Ohio EPA. Results of additional sampling requested by the Ohio EPA were received on January 6, 1993. All data were within the expected limits except for the coliform analysis. As a result of a conversation with Ohio EPA, the wells were rechlorinated. Results of samples taken after rechlorination of the wells were negative for fecal coliform; therefore, approval from the Ohio EPA is expected shortly. Following approval by the Ohio EPA, a sixty-day acceptance period will be implemented prior to system turnover to AWA as outlined in the DOE/AWA Release and Settlement Agreement of February 1990.

Part 2

This project was divided into five construction bid packages. These include: 2A - groundwater discharge pipeline (pressure flow) and outfall pipeline (gravity flow) from south of Willey Road to and including Manhole 183B; 2B1 - Manhole 183B to Great Miami River; 2B2 - Aeration Facility; 2C - recovery well field; and 2D - test well installation and pump test. The following is the status of the Part 2 activities:

Package 2A - Pipeline installation is progressing. Requests for construction bids on the single NPDES monitoring facility were issued on February 5, 1993. The outfall flow monitoring device and chamber are projected to be complete by April 30, 1993.

Package 2B1 - Construction is completed except for bank riprap installation which will be delayed until after additional contamination investigation of the riverbank is completed. However, the outfall will be placed into service prior to installation of the riprap.

Package 2B2 - Construction of the Aeration Facility is progressing. It is anticipated that the facility will be operational by May 1, 1993.

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RA No. 3, South Groundwater Contamination Plume (continued)

Package 2C - Two property condemnation packages were approved by DOE-HQ on January 4, 1993. The two property condemnation cases were filed in U.S. District Court with a request for "Order for Delivery of Possession" by March 15, 1993.

The archaeological/historical (A/H) survey (except for the Delta Steel property) was completed on February 8, 1993. The A/H report will be issued to the Ohio Historical Preservation Office following DOE review and approval.

Package 2D - The Ohio EPA has verbally stated that an NPDES variance for dissolved oxygen during the pump test cannot be approved. Accordingly, an evaluation of alternatives was made. This led to a decision to delay the pump test until the Aeration Facility is operational, approximately in May.

Part 3

The Work Plan for Parts 2 and 3 was prepared as one document. The plan entails the installation and operation of an Interim Advanced Wastewater Treatment (IAWWT) System to reduce uranium contaminant loading discharged to the Great Miami River to a level less than 1,700 pounds per year. Due to the relocation of the Part 2 well field to an area having a higher concentration of uranium, the IAWWT system capacity was expanded to maintain the 1,700 pound per year maximum level. The IAWWT system includes two treatment units. The IAWWT unit located at the Storm Water Retention Basin (IAWWT[SWRB]) consists of two trailer-mounted assemblies, each with a nominal 150 gpm capacity or a total nominal 300 gpm capacity. The unit located at the Bionitrification Effluent Treatment System (IAWWT[BDN-ETS]) has a nominal capacity of 100 gpm. Current activities are described below.

IAWWT(SWRB) Unit

The IAWWT unit at the SWRB continues to operate successfully.

IAWWT(BDN-ETS) Unit

The unit continues to be shut down as a result of blinding of the ion exchange units. Sand filtration testing has been completed and results have been reviewed. A decision, due shortly, will most probably state that FERMCO recommends the installation of a sand filtration pretreatment system for the IAWWT unit at the Bionitrification Effluent Treatment System. The recommendation will include a description of the proposed system features which accommodate returning the IAWWT unit to manageable operating capability.

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RA No. 3, South Groundwater Contamination Plume (continued)

Part 4

Part 4 of the South Groundwater Contamination Plume Removal Action Work Plan involves groundwater monitoring and institutional controls.

Private homeowner and existing RI/FS well sampling in the South Plume area continues. The two homeowner treatment systems installed south of the FEMP property continue to operate successfully.

Part 5

Part 5 was added to the South Plume in order to address the relocation of the Part 2 well field. It includes groundwater modeling and geochemical investigation of the area south of the well field to determine if 20 ppb uranium concentration in groundwater is present downgradient of the Part 2 well field.

The South Plume Groundwater Modeling Report was revised to address the U.S. and Ohio EPA comments. The revised report is expected to be transmitted to the U.S. and Ohio EPA in March.

The geochemical investigation is divided into four phases: Phase I - two traverse lines of hydropunch borings within the alluvium area and concurrent sampling of existing nearby wells; Phase II - two traverse lines of monitoring wells with corresponding hydropunch sampling north and south of the proposed recovery well field; Phase III - seven piezometers clustered near proposed extraction well R-4; and Phase IV - soil vapor sampling.

Phase I was completed on August 25, 1992. Only one hydropunch sample exceeded 20 ppb. A report summarizing Part 5 Phase I is undergoing review and is expected to be issued to U.S. EPA and Ohio EPA in March.

Phase II, installation of the twelve wells, will begin in March. The expected completion date is April 18, 1993.

Part of Phase II and III is delayed pending condemnation proceedings on the Weber property.

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RA No. 4, Silos 1 and 2

Installation of the bentonite in Silos 1 and 2 was completed on November 28, 1991.

The DOE submitted an evaluation detailing a revised method for determining the effectiveness of the bentonite in the silos to the U.S. EPA on December 17, 1992. A meeting between DOE and EPA was held on January 7, 1993. Disapproval with comments was received from the U.S. EPA on February 12, 1993.

As defined in the Removal Action Work Plan and the FFA-CARE, data associated with monitoring the effectiveness of the bentonite installation are included in Enclosure C.

RA No. 5, K-65 Decant Sump Tank

Removal of the liquid from the K-65 Decant Sump Tank was completed on April 16, 1991, when the liquid was transferred to the holding tanks in Plant 2/3. Treatment of the decant liquid based on the Material Evaluation Form and available analytical results was completed on May 12, 1992.

The tank has been accumulating liquid since it was emptied in 1991. Upon reaching approximately 80% of its capacity, repumping was required. On January 22, 1993, a maintenance action was initiated to pump the contents of the tank. On February 2, 1993, the action was completed with the removal of approximately 8,000 gallons of liquid from the tank. The liquid is presently awaiting the results of laboratory analysis, which will allow treatment and disposal of the liquid. On February 8, 1993, a measurement of the K-65 Decant Sump Tank was conducted. The results indicate that approximately three feet of a combination of sludge and liquid remains in the tank; this level amounts to approximately 500 gallons of liquid. Ongoing activities include monitoring the tank liquid level and implementing maintenance actions as required. Per requirements of the K-65 Decant Sump Tank Removal Action Work Plan, Operable Unit 4 will advise DOE-FN when pumping operations are to resume.

A final report was prepared and submitted to the U.S. EPA and the Ohio EPA in August 1992. Comments were received from both agencies, and comment responses were transmitted to the EPAs on November 19, 1992.

U.S. EPA approval of the Response to Comments Document was received. The Final Report has been revised to reflect these responses and submitted to DOE-FN for their review and approval.

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RA No. 6, Waste Pit 6 Residues

This removal action was completed on December 19, 1990.

RA No. 7, Plant 1 Pad Continuing Release

This removal action consists of three phases. Phase I, which implements the run-on/off control measures, is complete. Phase II addresses the installation of 80,000 square feet of a newly covered and controlled concrete storage pad. Phase III involves activities to upgrade the remaining 375,000 square feet of the existing Plant 1 storage pad. Phase III upgrading activities include installation of a polymeric vapor barrier over the existing concrete and the installation of concrete above the barrier with an epoxy sealant. In addition, 22,000 square feet of the Phase III work area will be enclosed beneath a tension structure.

Drum movements began in January and continued throughout February. The drum movements to clear areas for construction are due to be completed by May 14, 1993.

The specifications and drawings necessary for the bid package for Phase III activity are being revised. The Invitation for Bid for Phase III activity is expected in late March/early April.

KEY MILESTONES	STATUS	DUE DATE
Complete Phase III	Open, on schedule	February 19, 1995

RA No. 8, Inactive Flyash Pile Control

The Inactive Flyash Pile Isolation Activity was completed ahead of schedule on December 23, 1991.

RA No. 9, Removal of Waste Inventories

During February 1993, 4,083 drum equivalents (DEs) of low-level waste (LLW) were dispositioned. The FY1993 shipment goal through February was 20,387 DEs. Currently, LLW shipping is 797 DEs behind schedule. The FY1993 goal is to dispose of 67,000 DEs of LLW at the Nevada Test Site (NTS).

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RA No. 9, Removal of Waste Inventories (continued)

Nevada Department of Environmental Protection responded to the analysis of the three drums of thorium sampled in September with an additional request for information. The analysis confirmed the process knowledge characterization of this waste stream. The thorium sampling issues remain open.

Waste shipping activities for March include accelerated shipments of LLW offsite. Disposition of residues to the NTS through SEG and direct from the FEMP and shipments of recoverable metal to SEG will be initiated in March.

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Open, on schedule	June 30, 1993

RA No. 10, Active Flyash Pile Controls

This removal action was completed on June 29, 1992. Any required maintenance will be conducted on an ongoing basis.

RA No. 11, Pit 5 Experimental Treatment Facility

RA No. 11 was completed on March 20, 1992.

RA No. 12, Safe Shutdown

The Safe Shutdown Removal Action documents the ongoing shutdown activities that will remove uranium and other process/raw materials from equipment and pipe lines in areas of formerly used processing equipment and will properly disposition the removed materials off site.

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Open, on schedule	June 30, 1993

The preliminary assessments of the major process areas are continuing. A thorough evaluation is being made of each plant, which will include the addition of air permit and compliance data. This information is being added to the preliminary assessment data base as it is made available. Field evaluation of Plant 8 preliminary assessment is in process.

Inventorying of expense equipment items continued; 2,878 expense items are currently in the data base; 1,411 have been field verified, 578 are on a "shopping list" to ascertain on-site use, 35 have been transferred to Maintenance, and 110 have been placed on AC-563 Forms to be excessed. These numbers are expected to fluctuate from month to month as field verification is conducted.

The following is the status of capital equipment: of an estimated 1,694 total number of items, 1,195 have been put on AC-563 Forms to be excessed, and 499 have been identified as "In Use/Future Use" items. The number of items on AC-563 Forms and the "In Use/Future Use" listing may vary due to change of status of equipment items.

The status of Maintenance work orders issued to-date to isolate and disconnect all utilities/energy sources from equipment not in use is 149, of which 65 have been completed. Completion of these work orders is a preliminary step for removal of hold-up material from the equipment in preparation for equipment removal and Decontamination and Decommissioning.

Status of 4A Metal Removal Project, Phase II (shipment of rolled scrap to NTS): Col. David Jennings and Byron Morris of the Department of the Army will be on-site March 10 to review the status of this project. Since the contract with NTS is being negotiated by the Army, we cannot finalize packaging until the contract is in place and NTS has conducted a site audit. However, preliminary work is in progress. We are in the process of seeking a determination as to whether or not the Safety Assessment needs to be revised. Consolidation of material has begun; however, we cannot package it until we have the determination. Data is being supplied to address mode of transportation and venting requirements questions. The procedure covering this activity has been issued. Four hundred of the NucFil vents have been received, and we have a supply of white metal boxes. The new hydraulic punch has been received and is satisfactorily venting the boxes.

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RA No. 12, Safe Shutdown (continued)

A meeting was held with Nuclear Systems Safety on September 16, 1992, to clarify the safety documentation requirements for the Safe Shutdown Program field activities. A Safety Assessment covering the Safe Shutdown work activities will be written utilizing any existing data accumulated for the site-wide Safety Analysis Report (SAR). Utility isolation of the process equipment is a routine maintenance activity not requiring specific safety analysis. Requests for Safety Assessments have been prepared for the tasks to remove excess materials from the process buildings, to gain entry and remove hold-up materials, and to remove radiological contamination. Exempt from the Safety Assessment are Plant 1 Storage Area of enriched materials greater than 2% U₂₃₅ and Plants 2/3. These areas will be addressed by a separate Safety Assessment.

The Health and Safety Plan for the Safe Shutdown Program was issued on September 28, 1992. The estimated completion date for the SAR has been delayed due to a change in content requirement. A global Risk Assessment and Risk Management Plan is being prepared for the Safe Shutdown Program, and is projected to be completed after the Safe Shutdown Safety Assessment has been approved on March 17, 1993.

Approval of the Safe Shutdown Environmental Assessment (EA) will allow personnel to proceed with removal of hold-up inventories from process equipment. The EA was returned to FERMCO without concurrence. Comments are being addressed. DOE-HQ approval is expected on May 10, 1993.

Progress on the Requests for Proposals (RFP) for the sale of uranium has been delayed. Bids on RFP SD-417, for normal and enriched uranium, were due February 8. Three were received, two of which were two-company teams. Evaluation of those bids was indicated as a planned activity for February on last month's report. However, due to potential conflict of interest with one of the bidding companies, the task of evaluating the bid packages was transferred to DOE-Richland Office, which will, in turn, direct Westinghouse Hanford Company in the evaluation process. This has caused a slippage in the schedule of three weeks, thus far, and it is uncertain at this time who will finalize the selection process. The due date for responses to RFP SD-416, for depleted uranium, is being extended to April 7 to allow time for several interested companies to obtain and test small quantities of the materials. One company representative visited the FEMP on February 24 to view and discuss the materials.

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RA No. 12, Safe Shutdown (continued)

Planned activities for March include continuing the capital equipment disposition effort; following the process on evaluating bids on SD-417 Request for Proposal for the Sale of Normal and Enriched Uranium; initiating packaging of rolled scrap for shipment to Nevada; continuing to issue work orders for utility isolation work; continuing reconciliation of Safe Shutdown data base; pursuing completion of the SAR, Risk Assessment and Risk Management Plan; and commencing issuance of task orders to remove hold-up inventories from process equipment.

RA No. 13, Plant 1 Ore Silos

The Plant 1 Ore Silos Removal Action will include the dismantling of the 14 Plant 1 Ore silos and their support structure. This dismantling will eliminate the potential threat of additional material releases and the safety hazard due to structural deterioration of the silos and their support structure. The activities in this removal action will include characterization, removal, containerization, and disposal of the materials making up the above-ground portion of the facility.

February activities included review and revision of the subcontractor's Removal Action Project Plan, which was approved as noted on February 5, 1993. The subcontractor requested and was granted a 120-day extension for completing the project. A meeting was held to discuss changing the sequence of certain job elements to better facilitate the dismantling of the silos. The proposed sequence changes meet all performance criteria in the approved Work Plan. Equipment for dismantling the silos was delivered to the job site in February.

During March, the following items are to be removed in preparation for removal action activity: conveyors located between Plant 1 and the silos, conveyors and platforms located on top of the concrete silos, steel located between the tile and concrete silos, transite around the electrical control room, and the walkway on the south side of the tile silos.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open, ahead of schedule.	December 19, 1994

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RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator

This removal action will include the isolation or removal and disposition of contaminated soils in the vicinity of the Sewage Treatment Plant. This action will eliminate the potential threat of additional material releases to the environmental media through migration. The activities in this removal action will include characterization, removal, containerization, and storage/disposal of the materials.

A draft Work Plan Addendum (WPA) was submitted to the DOE on December 23. After the incorporation of DOE comments, the draft WPA was transmitted to the EPAs on January 6, 1993. The draft WPA includes a new removal action schedule. February activities included the receipt of Ohio EPA comments on February 9 and U.S. EPA comments on February 17. FERMCO is to submit comment-responses to DOE by March 8 and the revised WPA is due to the EPAs by March 19. Removal of contaminated soil per the revised WPA began March 1 north of the sewage treatment plant.

KEY MILESTONES	STATUS	DUE DATE
Submit Revised Work Plan Addendum detailing need for further action based on analytical results	Open, on schedule	March 19, 1993
Phase III - Completion of off-property excavation	Open, on schedule	May 17, 1993
Phase IV - Submit Final Report	Open, on schedule for August 16, 1993	To Be Determined

RA No. 15, Scrap Metal Piles

The Scrap Metal Piles Removal Action will detail the stabilization and disposition of LLW scrap metal currently stockpiled on site. This removal action will minimize material releases to the environment. Approximately 1,300 tons of scrap copper along with approximately 3,000 tons of recoverable scrap metals are the focus of this removal action.

Containerization of the Phase I scrap metal pile at B69 pad began in February. Two loads were shipped to Quadrex on March 2, 1993. FERMCO is to audit the Quadrex facility on March 8, 1993. Off-site processing is scheduled to start on March 17.

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RA No. 15, Scrap Metal Piles (continued)

Containerization of the Phase IIA bulk scrap copper began on January 14. Containerization of the small pile is complete. The large copper pile is 40% complete and is due for completion on April 1, 1993.

KEY MILESTONES	STATUS	DUE DATE
Phase IIB: Submittal of Subcontractor's Removal Action Plan	Open, on schedule	September 30, 1993
Phase IIB: Submittal of Final Report	Open, on schedule	March 30, 1995

RA No. 16, Collect Uncontrolled Production Area Runoff – Northeast

The scope of this removal action is to collect the remaining stormwater runoff from the perimeter of the 136 acre former production area that currently discharges to Paddy's Run and divert it through the existing storm sewer system to the Storm Water Retention Basin. Construction is ongoing along the north perimeter fence; 675 lineal feet of trench drain has been completed, and three tie-ins to the existing system have been made.

Future work on this removal action includes continuation of construction work.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open, on schedule	August 30, 1993

RA No. 17, Improved Storage of Soil and Debris

This removal action will include the management and appropriate storage of contaminated soil and debris on site. This will eliminate the potential threat of additional material releases to the environment due to wind, rain, or vehicular traffic. The activities in this Removal Action will include characterization, interim storage, and management of the contaminated soil and debris materials until the final remediation under Operable Unit 3.

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RA No. 17, Improved Storage of Soil and Debris (continued)

U.S. and Ohio EPA conditional approval, with comments, of the revised Work Plan were received on October 5. Responses to EPA comments were transmitted on November 18. The Ohio and U.S. EPA approved the flow diagram and comment-responses on December 28 and 31, 1992, respectively. January activity included revision of the Work Plan. The final Work Plan was submitted to DOE on February 18 for transmittal to the EPAs.

A draft Environmental Assessment was issued to DOE-FN in November; the final was submitted to DOE for approval in February. February activities also included FERMCO review and comment of the Safety Assessment and the Geotechnical Borings Work Plan. A subcontractor is to begin sampling for the Geotechnical survey in March. This subcontractor is to submit the 90% Design Review to FERMCO in March. The Functional Requirements Document was provided to FERMCO for signature and approval.

RA No. 18, Control Exposed Material in Pit 5

Dredging activities were completed in December 1992. Minor berm modifications will be made in the spring of 1993 as the weather permits.

There was no field construction activity during February. The training manual for the operation of the dredge is complete and undergoing final review. The Preliminary Removal Action Final Report has been prepared.

Planned activities for March includes raising the elevation of the Pit 5 berm to meet the requirements for free board distance for safety.

KEY MILESTONES	STATUS	DUE DATE
Complete Field Work	Completed December 16, 1992	February 3, 1993

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RA No. 19, Plant 7 Dismantling

The Plant 7 Dismantling Removal Action will include decontamination and dismantling of the Plant 7 structure. This dismantling will eliminate the potential threat of additional material releases and the safety hazard due to histoplasmosis. The activities in this removal action will include characterization, decontamination, removal, containerization, and disposal and beneficial re-use of the materials making up the above ground portion of the facility.

The Removal Action Work Plan was submitted to DOE on February 19, 1993.

KEY MILESTONES	STATUS	DUE DATE
Submit Work Plan to the U.S. EPA	Open, on schedule	April 20, 1993

RA No. 20, Stabilization of UNH Inventories

The Stabilization of UNH Inventories Removal Action will remove and prepare for safe storage approximately 230,000 gallons of acidic UNH that is currently stored in 21 tanks in and around Plant 2/3. Existing processing equipment will be used to neutralize the solutions, filter the precipitate, and package the resulting filter cake in double containment for safe storage. This activity was previously part of RA No. 12, Safe Shutdown, but is being accelerated as a separate expedited response.

February activities included review of the procedure for processing and the resolution of comments. The project is still on hold awaiting DOE permission to resume.

March activities will include final approval of the procedure for further processing, training for new personnel who will be involved and installation of new sightglass on Tank FI-608.

RA No. 21, Expedited Silo 3

On December 13, 1991, an Action Memorandum was issued to initiate an expedited removal action. The Silo 3 Removal Action mitigated the potential release of material to the environment and included the following actions:

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REMOVAL ACTIONS

RA No. 21, Expedited Silo 3 (continued)

- All obvious openings in the dust collector hopper were covered and sealed.
- The dust collector was removed.
- All obvious pathways for release were capped or covered.

Implementation of the Removal Action was initiated on December 20, 1991. The material within the dust collector hopper exposed to the environment was stabilized on December 21, 1991. Loose equipment on the silo dome was removed. Shipment of the sealand container, in which the dust collector was placed, to an approved disposal facility occurred on October 9, 1992.

On February 2, 1993, the Expedited Silo 3 Removal Action Final Report was submitted to DOE-FN for review and approval.

RA No. 22, Waste Pit Area Containment Improvement

This project involves the stabilization of the south berm of Pit 4, the regrading of the drainage ditches along Pits 3, 4, 5, and 6, and the resurfacing of the road between Pits 3, 4, 5, and 6.

The final Certified for Construction package for the Waste Pit Area Containment Improvement action was completed by a subcontractor and released to FERMCO. The proposed completion date is June 30, 1993.

Planned activities for March include preparing a detailed estimate and schedule for the proposed construction activities, and procuring materials, labor, and equipment.

RA No. 23, Inactive Flyash Pile

A field investigation was conducted to determine if select locations within the Inactive Flyash Pile and South Field Disposal area boundary (RA No. 8) would require material to be removed. On June 24, contaminated debris from three of the regulated areas identified in the survey report were collected and placed in interim controlled storage. The contaminated items collected were a plastic bag (approximately 1 gallon) containing soil, a 1 foot x 2 feet section of transite and two small pieces of yellow material. Results of the survey were submitted on June 29, 1992. As a result of removal of the debris, DOE-FN determined that no additional action is required until remediation.

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RA No. 24, Pilot Plant Sump

This sump is located on the southwest side of the Pilot Plant. The sump consists of a stainless steel cylinder approximately two feet in diameter and ten feet deep. This sump was built to remove liquids from the floor drains of the Pilot Plant and was actively used only during the renovation of the Pilot Plant in 1969.

The sump is filled with a thick liquid and sludge. Analytical results of the sump contents show high concentrations of metals: lead, copper, chromium, nickel, as well as thorium and volatile organic compounds.

The draft final Work Plan was submitted to the EPAs on October 14. Ohio EPA approval was received on November 10; U.S. EPA Conditional Approval with comments was received on November 24, 1992. December activities included transmittal of comment-responses to the U.S. EPA on December 18, 1992. The U.S. EPA approved comment-responses on February 22, 1993.

The fifth pump-out of the sump occurred on January 20, 1993, resulting in 135 gallons. To date, approximately 770 gallons have been removed over a seven month period. FERMCO is considering the use of a subcontractor for an investigation to determine the piping integrity.

February activity also included the receipt of comments on the Health and Safety Plan. The Risk Assessment is in final FERMCO review.

RA No. 25, Nitric Acid Tank Car and Area

The Nitric Acid Rail Car is located on the northern perimeter of the production area and east of Building 63. The FEMP RCRA Part A and Part B application identify this tank car and area surrounding it as a Hazardous Waste Management Unit.

This high-grade, stainless steel tank car has a capacity of approximately 100,000 gallons and measures approximately 10 feet wide x 40 feet long x 15 feet high. This unit operated from 1952 until about 1989. The tank car stored nitric acid used at the FEMP. Based on recent analysis, the tank car now contains 50-100 gallons of nitric acid. This removal action includes removal of residual contents from the tank car followed by decontamination and dispositioning of the tank car.

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RA No. 25, Nitric Acid Tank Car and Area (continued)

The draft Work Plan/Closure Plan Information and Data Package was issued to the EPAs on October 30, 1992. Ohio EPA comments were received December 2 and U.S. EPA disapproval was received December 9. A 20-day extension was requested and approved to adequately address RCRA/CERCLA integration of the Work Plan with closure issues and specific technical concerns and to obtain results from recent sampling of the tank car contents. The final Work Plan was submitted to the EPAs on January 28, 1993. Ohio EPA conditional approval was received. March activity will include comment resolution and revision of the Work Plan pending receipt of U.S. EPA comments.

RA No. 26, Asbestos Removals (Asbestos Program)

This removal action documents ongoing asbestos abatement activity at the FEMP to mitigate the potential for contaminant release and migration. Abatements within the Asbestos Program to date include small-scale in-situ repairs, encasement, encapsulation, and removals.

The April 1993 submittal to DOE will include a model specification to apply to all asbestos abatement on-site (both small- and large-scale). This submittal will also provide generalizations of all abatement activities to date as well as planned abatement activities for the next year, including several large-scale abatement projects.

Field activities in asbestos material identification and abatement continue. March activities will include reviewing and updating procedures and the model specification in preparation for submittal of Work Procedures to DOE in April.

KEY MILESTONES	STATUS	DUE DATE
Submit Work Procedures for 1993 to the U.S. EPA	Open, on schedule	May 19, 1993
Submit final draft of Work Plan to U.S. EPA	Open, on schedule	August 10, 1993

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RA No. 27, Management of Contaminated Structures at the FEMP

This removal action requires the submittal of the Engineering Evaluation/Cost Analysis (EE/CA) study to identify alternatives for managing contaminated structures; the documentation of the selection of a response(s) that will mitigate the potential threat to workers, the general public, and the environment associated with these structures; and addressing health and environmental impacts associated with the proposed action.

Ohio EPA conditional approval and draft U.S. EPA conditional approval of the draft EE/CA were received on January 19. Responses to EPA comments were transmitted on February 24, 1993 and revision to the EE/CA has begun since comments from the EPAs were minor and conditional approval of the document was granted. The public comment period closed on February 8; no public comments were received.

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1.0 Operable Unit 1

Operable Unit 1, as defined in the Amended Consent Agreement, includes Waste Pits 1 - 6, Clearwell, Burn Pit, berms, liners, and soil within the operable unit boundary.

1.1 Field Investigation

1.1.1 Radon Sampling Program

Scope:

The Radon Sampling Program was initiated to develop a representative measurement of radon releases from the waste pit area. The November 19, 1991, "Federal Facility Agreement for Control and Abatement of Radon-222 Emissions" currently requires radon flux measurements of Waste Pits 1, 2, 3, 4, and 5, and the Clearwell. The data will be used to support National Emission Standards for Hazardous Air Pollutants (NESHAP) compliance and Remedial Investigation/Feasibility Study (RI/FS) characterization requirements. The program consists of a one-time measurement of radon release using large area activated charcoal collectors (LAACC).

Status:

Radon Flux measurements were completed for Pits 1-4. All results indicated radon flux densities were below the NESHAP regulatory limit of 20 pCi/m² sec. Per an agreement with the EPA, radon measurements were not required for Pit 5 or the Clearwell due to the water cover on these pits. The final technical reports have been issued and forwarded to the EPA. This project is now complete.

Issues/Corrective Actions:

None to report.

1.1.2 Pits 5 and 6 and the Clearwell Sampling Program

Scope:

The objectives of the Pits 5 and 6 and Clearwell Sampling Program are to obtain sufficient quantities of samples for treatability studies, and to provide additional Resource Conservation and Recovery Act (RCRA) characterization information on the waste pits. The pits were sampled using a crane with a clamshell.

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1.1 Field Investigation (continued)

Status:

The sampling of Pits 5 and 6 and the Clearwell is complete. These samples were shipped to the analytical and treatability laboratories where characterization and stabilization testing are ongoing. Analytical data for characterization were received, and validation of this characterization data is not yet completed.

Issues/Corrective Actions:

None to report.

1.2 Treatability Studies

Scope:

The Operable Unit 1 treatability studies will evaluate the two treatment process options identified in the Operable Unit 1 Initial Screening of Alternatives document: cement stabilization and vitrification. The technical feasibility of these technologies will be evaluated by conducting a series of experiments on both composite waste samples and individual strata samples. Performance criteria, including formulation ranges, compressive strength, leachability, bulking factor, and permeability, will be investigated. Cement stabilization binding agents, including portland cement, flyash, Blast Furnace Slag, and sodium silicate, are being evaluated. Clay (attapulgite and clinoptilolite) will be added to reduce the leachability of metals in the waste. Glass formers and modifiers considered for vitrification are flyash, soil, and sodium hydroxide.

The stabilization testing consists of two phases. The preliminary phase, now complete, consisted of reagent range-finding experiments on a pit-by-pit basis using composite samples from individual waste pits. The advanced phase consists of testing on strata samples where available. Each phase contains two stages permitting additional reagent testing as necessary. An optional phase to evaluate waste form durability is also being considered.

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1.2 Treatability Studies (continued)

Status:

The TCLP leachate analysis for both cementation and vitrification samples is currently being completed by IT Analytical. Validated data will be available in April. Compositional analysis of vitrified waste to determine normalized leach rates for PCT is proceeding. Small platinum crucibles for analysis have been procured and shipped to IT for the completion of this work.

Issues/Corrective Actions:

None to report.

1.3 Remedial Investigation

Scope:

A RI Report will be prepared in accordance with the U.S. EPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA Directive 93553-01) and the approved Risk Assessment Work Plan Addendum.

Status:

A preliminary draft RI has been submitted to DOE-FN and DOE-HQ for review.

An evaluation of the impact of data changes on the characterization of the nature and extent of contamination on fate and transport modeling is being conducted and will be complete by the end of March 1993. The draft RI report is being revised. Validation of WEMCO-collected analytical data from Pits 5, 6 and Clearwell is nearly complete with Clearwell data left to validate.

The final draft of the RI Report will be submitted to DOE in June 1993.

Issues/Corrective Actions:

None to report.

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1.3 Remedial Investigation (continued)

OU 1 REMEDIAL INVESTIGATION REPORT

PRIMARY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants within the Operable Unit 1 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	10/12/93 C	12/11/93 C	01/10/94 C

C = Consent Agreement Date

1.4 Planned Activities for March 1993

- Compositional analysis of composite samples to be used for durability testing samples will be performed by the treatability lab. Samples for durability testing will be prepared based on agreed schedule for testing between IT and the University of Cincinnati.
- Continue to review and revise the draft Remedial Investigation Report, including the baseline risk assessment.
- Complete data inventory, including sample location and validation status.

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2.0 Operable Unit 2

Operable Unit 2, as defined in the Amended Consent Agreement, includes the flyash piles, other South Field disposal areas, lime sludge ponds, solid waste landfill, berms, liners, and soil within the operable unit boundary.

2.1 Field Investigation

2.1.1 Work Plan Addendum - Installation of Monitoring Well 1433

Scope:

The Work Plan Addendum provides for installation of Monitoring Well 1433 in the northwest area of the South Field, near Boring 1401. This well is desirable to further characterize the fill/soil material by sampling any perched groundwater/leachate that may be present at that location that was not previously encountered.

Status:

Groundwater was discovered in Monitoring Well 1433 on November 13, 1992. Sampling of the groundwater began on November 18, 1992. Groundwater samples were collected for full Hazardous Substance Listing, full radiological, and general groundwater quality parameters. Groundwater samples were also sent to the on-site FEMP laboratory for Total Uranium analysis. Results from the on-site analysis indicate Total Uranium measured is 4,200 ppb. The contract laboratory completed the analysis of the soil samples retrieved during the installation of the well.

The contract laboratory completed the analysis of the groundwater samples taken November 18, 1992. Data validation and database entry functions are continuing.

Issues/Corrective Actions:

Sampling of Monitoring Well 1433 is now complete per the Operable Unit 2 Work Plan and follow-on groundwater sampling of the well will be performed by FERMCO.

Due to the erratic occurrence of the perched water in the South Field and the nature of the unconsolidated fill material where Monitoring Well 1433 was installed, it has been proposed that shallow trenching be performed instead of the installation of additional monitoring wells. The trenching activities would take place in close proximity to Monitoring Well 1433. Trenching is preferred over the possibility to install additional wells for further investigation purposes.

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2.1.1 Work Plan Addendum - Installation of Monitoring Well 1433 (continued)

Trenching would provide several advantages, including; 1) exposure of buried material for visual inspection, classification, and radiological instrument surveys, 2) ease of soil sampling, and 3) groundwater infiltration, thus providing more groundwater available for which may be more representative of subsurface water quality of a larger area.

2.2 Treatability Studies

Scope:

This study is complete except for final revision to the Treatability Study Report. These results support the FS and subsequent remedy selection for Operable Unit 2. The study demonstrated that waste stabilization can achieve the desired level of material strength and provides quantitative leaching data for geochemical and computer modeling of groundwater contaminant transport.

Status:

On November 25, 1992, Ohio EPA approval was received on the Treatability Report Comment Response document which was submitted on October 21, 1992. In a letter received on October 21, 1992, the U.S. EPA conditionally approved the Treatability Study Report pending resolution of three outstanding comments followed by report revision. Responses to these comments were submitted to U.S. EPA on November 21, 1992. On December 29, 1992, the U.S. EPA approved the Treatability Study Report.

Issues/Corrective Actions:

None to report.

2.3 Remedial Investigation

The RI provides a summary of the field investigations and supports the FS by defining the nature and extent of the contaminants in the Operable Unit 2 study area, estimating the volume of contaminated media and materials, and providing a Baseline Risk Assessment which establishes remedial action objectives.

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2.3 Remedial Investigation (continued)

Status:

The draft RI report was submitted to the EPA on October 16, 1992. A meeting was held on November 6, 1992, in Chicago to discuss the draft RI and preliminary comments. During the Program Manager's meeting, held December 10, 1992, the U.S. EPA expressed general concern with the RI. These concerns were: the amount of data that had not been validated; the heavy reliance upon CIS data; not being able to make a determination as to the aquifer; too heavy of a focus on radiological contaminant and not enough on HSLs; and the adequacy of data. The EPA stated that if an FS was submitted proposing the current leading remedial alternative of capping, they could not approve it. The EPA stated that the only alternative they could approve based upon the existing RI would be total exhuming of the material and treatment. Comments were received from the U.S. EPA and the Ohio EPA on December 18, 1992. The specific comments confirmed their concern expressed at the December 10 meeting.

A meeting was held January 6, 1993, to discuss the issues with the EPAs. As a result of the meeting, it was agreed that DOE would be prepared to present potential plans for additional data acquisition to the EPAs on January 28, 1993.

At the January 28 meeting, DOE-FN met with the EPAs to discuss the path forward for the Operable Unit 2 RI and FS. The EPAs were presented with two alternatives. One alternative would allow DOE to meet the Record of Decision (ROD) for the Lime Sludge Ponds and the Active Flyash Pile, and defer the ROD for the Solid Waste Landfill, Inactive Flyash Pile and South Field for approximately nine months beyond the Amended Consent Agreement date. The other alternative proposed a slip of all the subunits of Operable Unit 2 for approximately nine months.

Issues/Corrective Actions:

During the November 5 meeting, the U.S. EPA announced it would be inclined to reject the draft RI Report due to inadequate data on the nature and extent of contamination.

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2.3 Remedial Investigation (continued)

OU 2 REMEDIAL INVESTIGATION REPORT

PRIMARY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants within the Operable Unit 2 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	10/16/92 A	12/18/92 C	02/08/93 C

C = Consent Agreement Date

A = Actual Completion Date

2.4 Feasibility Study

The FS evaluates alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses, and to identify the key tradeoffs that must be balanced for the operable unit.

Status:

The FS Report and the Proposed Plan were submitted for internal review on November 16, 1992. Copies were provided to DOE-HQ for parallel review on November 20, 1992.

Schedules are being reviewed and updated. Information will be reported as received.

Issues:

The FS schedule continues to be very tight with no float available. In addition, the two cycle DOE review (DOE-FN followed by DOE-HQ) has been compressed to one cycle

(DOE-FN and DOE-HQ in parallel). The final draft for DOE-HQ approval is scheduled for submission on January 20, 1992, and the scheduled submittal to U. S. EPA and Ohio EPA is maintained for March 15, 1993. The entire FS schedule may be affected by EPA comments on the draft RI Report.

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2.4 Feasibility Study (continued)

Corrective Actions:

Additional personnel are being used on the FS in conjunction with many parallel activities to complete the first draft FS Report and incorporate comments.

OU 2 FEASIBILITY STUDY REPORT

PRIMARY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	03/15/93 C	05/13/93 C	06/13/93 C

C = Consent Agreement Date

2.5 Planned Activities for February 1993

- Continue observations and measurements of groundwater levels for Monitoring Well 1433.
- Continue with the data validation and final database entry of the results of the contract laboratory analysis of the samples.

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3.0 Operable Unit 3

Operable Unit 3, as defined in the Amended Consent Agreement, includes the Production Area and production-associated facilities and equipment (includes all above and below-grade improvements) including, but not limited to, all structures, equipment, utilities, drums, tanks, solid waste, waste, product, thorium, effluent lines, K-65 transfer lines, wastewater treatment facilities, fire training facilities, scrap metal piles, feed stocks, and coal pile.

3.1 RI/FS Work Plan

Scope:

The purpose of the RI/FS Work Plan is to detail the approaches and assumptions to be applied to the gathering of information and the presentation of results. Specifically, the Operable Unit 3 RI/FS Work Plan identifies the approach to be employed for baseline risk assessment and the specific sampling and sampling strategy to be performed during the field investigation program.

Status:

Operable Unit 3 RI/FS Work Plan activities in February 1993 included the receipt of comments from the U.S. EPA and Ohio EPA on the December 18, 1992 Draft Final version of the Operable Unit 3 RI/FS Work Plan Addendum (WPA). Specifically, comments and conditional approval of the WPA were received from the Ohio EPA by letter of February 16, 1993. In a letter of February 17, 1993, the U.S. EPA also provided comments but disapproved the WPA pending incorporation of the comments. A meeting was held on February 18, 1993 with the EPAs to discuss the comments on the WPA. Responses to the comments will be provided to both Agencies by March 19, 1993. The WPA will be revised at a later date, after agreement on the acceptability of the proposed changes reflected in the responses to EPA comments.

Issues/Corrective Actions:

None to report.

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3.1 RI/FS Work Plan (continued)

OU 3 WORK PLAN ADDENDUM

SCOPE	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
The Work Plan Addendum includes an initial evaluation of Operable Unit 3 (e.g., conceptual models and waste/contaminant quantities), a work plan rationale (e.g., data requirements and SAP approach) and specific OU3 RI/FS tasks.	08/04/92 A	12/18/92 C 12/17/92 A

C = Consent Agreement Date

A = Actual

3.2 Field Investigation

Scope:

The purpose of the Operable Unit 3 field investigation program is to gather information necessary to perform a baseline risk assessment, further identify the nature of contaminants in the operable unit, refine estimates of volume of contaminated materials, and support initial screening of applicable alternatives.

Status:

Mobilization activities for the implementation of RI/FS field characterization continued in February, including development of field sampling procedures and on-site logistics planning. Receipt of equipment procured for sampling activities also continued. Field Work Package comment-responses were submitted January 8. The Risk Assessment and Safety Assessment for the field activities have been completed. A training plan for the field program was completed.

Issues/Corrective Actions:

None to report.

3.3 Treatability Studies

Scope:

The purpose of treatability studies is to gather information necessary to support remedy selection and implementation. Specific studies will be structured to gather the necessary information.

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3.3 Treatability Studies (continued)

Status:

Formal identification of treatability studies for Operable Unit 3 has not been undertaken; however, remedy screening treatability studies will be conducted in parallel with the Field Investigation and Initial Screening of Alternatives (ISA) development. Development of an outline for a Treatability Study Work Plan (TSWP) was initiated in January. Scheduling of the delivery of the TSWP will be made to correspond with the completion of pertinent portions of the ISA.

Issues/Corrective Actions:

None to report.

3.4 Remedial Investigation Report

Scope:

The purpose of the RI is to provide a summary of the field investigations and to support the FS by defining the nature and extent of the contaminants in Operable Unit 3, estimating the volume of contaminated media and materials, and providing a baseline risk assessment which establishes remedial action objectives.

Status:

With the exception of planning the report content and layout, formal development of the RI has not begun.

3.5 Feasibility Study

Scope:

The purpose of the FS is to evaluate alternatives in detail with respect to the nine U.S. EPA evaluation criteria. The alternatives are analyzed individually and then compared to one another to determine respective strengths and weaknesses and to identify key tradeoffs.

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3.5 Feasibility Study (continued)

Status:

Formal activities associated with the FS have not been initiated for Operable Unit 3, although ISA research and document layout planning are underway.

Issues/Corrective Actions:

None to report.

3.6 Planned Activities for March 1993

- Focus on ISA research and initiate identification of remedy screening tier treatability studies.
- Complete development of field sampling procedures and personnel training plans to support the RI/FS field characterization program.
- Continue Proposed Plan document preparation to achieve an interim Record of Decision for Operable Unit 3.
- Prepare responses to U.S. EPA and Ohio EPA comments from the 12/18/92 draft final version of the RI/FS Work Plan Addendum and submit to DOE and the EPAs.
- Field sampling procedures will be finalized and submitted along with the WPA comment-responses.
- FERMO is actively pursuing a location in the controlled area to be used as a sampling equipment storage area.

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4.0 Operable Unit 4

Operable Unit 4, as defined in the Amended Consent Agreement, consists of Silos 1, 2, 3, and 4, the silo berms, the Decant Sump Tank System, and soil within the operable unit boundary.

4.1 Field Investigation

4.1.1 Sampling West of K-65 Silos 1 and 2

Scope:

The information obtained through this additional investigation will augment the current understanding and conclusions drawn from previous sampling and analytical results which have been used to characterize the extent of contamination in the vadose zone and groundwater in the glacial overburden immediately west of the K-65 Silos 1 and 2. Two 1000 series piezometers will be installed in the uppermost perched water interval in the K-65 Silos area. One well or lysimeter will target the perched water zone down gradient of the Decant Sump Tank. Three lysimeters will be installed in the east bank of Paddy's Run to verify that contamination from the vadose zone or perched water is not entering the stream.

Status:

The completed workplan addendum was processed as part of the Operable Unit 4 RI/FS baseline and was approved by the Level III, II, and I Change Control Boards on January 15, 1993, January 22, 1993, and January 27, 1993, respectively. Due to the schedule constraints associated with the completion of the investigative effort in time to include the additional data into the Operable Unit 4 Feasibility Study Report, the DOE-FN has authorized FERMCO to proceed with the implementation of the workplan without the U. S. EPA formal approval of the addendum. This notice was given by DOE-FN with the confidence that previous U. S. EPA concerns about this project have been adequately addressed in the workplan and proposed field work.

Notice to Proceed was given to the subcontractor, Penn Drilling, on February 1, 1993. Field work was scheduled to begin on February 8, 1993. To date, contractual problems have prohibited mobilization of drilling rigs for well installation. Contractual problems should be resolved and mobilization should occur by March 15, 1993.

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4.1.1 Sampling West of K-65 Silos 1 and 2 (continued)

Issues/Corrective Actions:

The information obtained from this investigation program will be considered in the Operable Unit 4 Feasibility Study. Highest priority must be given to these field investigations to avoid schedule delays to the Operable Unit 4 Feasibility Study Report submittal. The results from this sampling effort will be integrated into the Operable Unit 5 Remedial Investigation Report. If the field investigation, perched groundwater analyses, and data validation is completed in a timely fashion, the information will be presented in the Final RI Report for Operable Unit 4.

4.2 Treatability Studies

Scope:

A Treatability Study Work Plan addresses the additional information that is required to support the FS and subsequent remedy selection for Operable Unit 4. There are two separate treatability studies to support the Operable Unit 4 FS. One study considers cement stabilization of Silos 1, 2, and 3 material and chemical extraction, leachate stabilization, and leachate purification of Silos 1 and 2 material. The second treatability study considers the vitrification of Silos 1, 2, and 3 material.

The Treatability Study Work Plan for cementation and chemical extraction will demonstrate whether stabilization achieves the desired level of material strength, provide information to help determine the effectiveness of chemical extraction, and provide data for use in fate and transport modeling. The study is composed of three preliminary phases, an advanced phase, and an optional phase. The preliminary phases determined the potential reagents and conditions for stabilization and/or extraction of composites of the silo material. The advanced phase evaluated the material variability by testing formulations and/or extraction on the top, middle, and bottom layers from each silo. The optional phase consists of testing stabilized waste for durability using American Society of Testing and Materials wet/dry and freeze/thaw test methods. In addition, radon emanation and radon leaching of cement stabilized waste and precipitate will be performed.

The Treatability Study Work Plan for the vitrification of residues from Silos 1, 2, and 3 considers vitrification of silo material, radon emanation rate from the vitrified waste, and the leachability of the vitrified waste.

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4.2 Treatability Studies (continued)

Status:

Stabilization Experiments - Complete.

International Technology Corporation's Chemical Stabilization Draft Report submittal to FERMCO is on schedule for March 1, 1993.

Chemical Extraction tests - Complete.

Vitrification Treatability Tests - Complete

Draft Final Vitrification Treatability Test Report was received on February 22, 1993. The document's internal review is in process.

Optional Treatability Test - radon leaching on stabilized material and material from Chemical Separation is on-going. Radon emanation tests were completed in January 1993.

Issues/Corrective Actions:

Durability testing is in process. No problems have been encountered and work is proceeding as scheduled.

4.3 Remedial Investigation Report

Scope:

The RI provides a summary of the field investigations and supports the FS by defining the nature and extent of the contaminants in the Operable Unit 4 study area, estimating the volume of contaminated media and materials, and providing a baseline risk assessment which establishes remedial action objectives.

Status:

The draft Operable Unit 4 Remedial Investigation Report underwent extensive revision through cooperative efforts from International Technology Corporation, FERMCO, and DOE-FN, with the intent of providing additional information and improved readability. Air modelling was rerun and additional information concerning the perched groundwater zone in the glacial overburden immediately west of the K-65 Silos has been incorporated into the report. The revised Remedial Investigation Report is currently undergoing an internal review and is on schedule for the April 19, 1993, issuance to the U.S. EPA.

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4.3 Remedial Investigation Report (continued)

OU4 REMEDIAL INVESTIGATION REPORT

PRIMARY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants in the Operable Unit 4 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	04/19/93 C	06/18/93 C	07/18/93 C

C = Consent Agreement Date

4.4 Feasibility Study

Scope:

The FS evaluates alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses, and to identify the key tradeoffs that must be balanced for the site.

Status:

The revision of alternatives, described in the U.S. EPA-approved ISA, is designed to provide separate alternatives for the different waste media. For example, alternatives for the disposition of Silos 1, 2, and 3 contents are being created; silo structures, berms, and subsoils are being grouped into a separate set of alternatives; and Silo 4 is being dispositioned in separate alternatives. On-property disposal options were discussed during October 1992 and are being included as appropriate to the alternatives. Alternative description revisions are ongoing. Cost estimates and alternative risk assessments are also ongoing.

Issues/Corrective Actions:

None to report.

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4.4 Feasibility Study (continued)

OU4 FEASIBILITY STUDY

PRIMARY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

4.5 Planned Activities for March 1993

- Continue Risk Assessment activities.
- Complete validation of the Toxicity Characteristic Leaching Procedure analytical data for the vitrified material leachate.
- Complete validation of the PCT analytical data for the vitrified material leachate.
- Continue durability testing as part of the Optional Treatability Program.
- Continue revisions to RI, based on DOE and FERMCO comments.
- Rerun air model for Operable Unit 4.
- Continue Feasibility Study development.

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5.0 Operable Unit 5

Operable Unit 5, as defined in the Amended Consent Agreement, includes groundwater, surface water, soil not included in the definitions of Operable Units 1 - 4, sediments, flora, and fauna.

5.1 Field Investigation

5.1.1 Operable Unit 5 Work Plan Addenda

Scope:

Soil and perched groundwater sampling will be conducted in the following areas under this program: the Plant 1 Pad, the Southeast Quadrant of the Production Area, the Fire Training Area, the KC-2 Warehouse Area, Scrap Metal Area and Electrical Substation, and the K-65 Slurry Line and the Clearwell Line.

Status:

On November 30, 1992, conditional approval was received from the Ohio EPA to proceed with the field investigations. On December 2, 1992, the U.S. EPA also provided conditional approval of the Work Plan. Conditional approval from both agencies was based upon the necessity to respond to specific comments which appear minor. It was determined in January 1993 to initiate field investigations for the KC-2 Warehouse Area even though comments from the regulators indicated concerns and issues that require further resolution.

The responses to the additional comments from the Ohio EPA and U.S. EPA are pending completion of a FERMCO and DOE-FN internal review. After completion of the internal review, responses will be transmitted to the respective regulatory agency. The Work Plan Addenda will be revised once final comment resolutions have been obtained from the regulatory agencies, DOE-FN, and FERMCO.

Field characterization of the K-65 Slurry and Clearwell Line continued according to the Work Plan. The first and second round of groundwater samples from the ten existing monitoring wells and eight of the nine new monitoring wells are now complete. The RI/FS contract laboratory completed analysis of the first round of groundwater samples for Hazardous Substance List (HSL) volatiles, general water quality, and full radiological parameters. The contract laboratory has completed their analysis of the second round of groundwater samples for the ten existing monitoring wells and eight of the nine new monitoring wells for full HSL, general groundwater quality, and full radiological parameters.

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5.1.1 Operable Unit 5 Work Plan Addenda (continued)

Data validation continues on the completed analysis. Database entry operations are proceeding concurrent with completion of data validation efforts.

Well development activities were attempted at Monitoring Well 1842 in February 1993. However, due to extremely slow recharge rates, the first round of groundwater sampling has not occurred.

A monitoring well was not installed at location 0841 because groundwater was not encountered.

The nine new wells which were installed according to the Work Plan for this task and the status of each are as follows:

- 1836 Installation completed. Well development and first and second round of groundwater sampling completed.
- 1837 Installation completed. Well development and first and second round of groundwater sampling completed.
- 1838 Installation completed. Well development and first and second round of groundwater sampling completed.
- 1839 Installation completed. Well development and first and second round of groundwater sampling completed.
- 1840 Installation completed. Well development and first and second round of groundwater sampling completed. Second round of groundwater sampling was completed February 10, 1993.
- 1841 Boring complete. Well not installed because groundwater was not encountered at this location.
- 1842 Re-installation completed. Well development was attempted in January and February 1993; however, due to an extremely slow recharge rate, the first round of groundwater sampling has not occurred.
- 1843 Installation completed. Well development and first and second round of groundwater sampling completed.

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5.1.1 Operable Unit 5 Work Plan Addenda (continued)

- 1844 Installation completed. Well development and first and second round of groundwater sampling completed.

The Work Plan calls for only one round of groundwater sampling at existing Monitoring Wells 1173 and 1174 in the Southeast Quadrant. Groundwater sampling of Monitoring Wells 1173 was completed on February 24, 1993. Field crews were mobilized in February 1993 to perform sampling at Monitoring Well 1174; however, the monitoring well could not be properly located as indicated on monitoring well location maps. Monitoring Well 1174 was identified as a flush mounted type well. The field crew reported that the concrete pad and flush mounted cap exists, but when opened, no evidence of a well casing was found. FERMCO is attempting to re-establish the exact location of this well by reviewing historical documents. Survey coordinates will be reviewed and attempts to locate the well will be made. The contract laboratory is performing analysis on the first round of groundwater samples from Monitoring Well 1173.

The Work Plan Addenda also requires the installation of Monitoring Wells 1866, 1867, 1868, and 1869. Monitoring Wells 1866, 1868, and 1869 are installed. A boring was drilled and sampled at Location 0867 per the Work Plan Addenda; however, no groundwater was encountered and the boring was plugged and abandoned. First round of groundwater sampling was completed for Monitoring Wells 1866 and 1868. Attempts were made to develop and sample Monitoring Well 1869; however, due to extremely slow recharge rates, the first round of groundwater sampling could not be completed. The contract laboratory is proceeding with analysis of the first round of groundwater samples for Monitoring Wells 1866 and 1868. Laboratory completed the chemical analysis for 1866. Laboratory analysis is continuing for radiological parameters for Monitoring Wells 1866 and 1868 and chemical parameters for Monitoring Well 1868.

The Work Plan Addenda requires the installation of Monitoring Wells 1886, 1887, and 1890 in the Fire Training Area. Monitoring wells 1887 and 1890 were installed in December 1992. A monitoring well at location 0886 was not installed because no groundwater was encountered at this location. The boring was plugged and abandoned. The first round of groundwater sampling was completed on Monitoring Well 1887 February 3, 1993. Attempts to develop and sample Monitoring Well 1890 began February 2, 1993; however, due to extremely slow recharge rates, the sampling could not be performed. The contract laboratory continued radiological and chemical analysis for the monitoring wells.

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5.1.1 Operable Unit 5 Work Plan Addenda (continued)

The single hand auger sample located at the sump in the Fire Training Area was completed February 5, 1993. The four hand auger samples in the stormwater ditches were completed December 1992. The contract laboratory completed chemical analysis of the four hand auger samples taken in the stormwater ditches; however, the radiological parameters were not completed. Laboratory analysis continued for the radiological and chemical parameters on the single hand auger sample taken in the sump area.

The Work Plan Addenda requires 14 auger borings in the Plant 1 Pad Area. All of the auger borings were completed in January 1993. The contract laboratory continues to perform analysis on the radiological and chemical parameters. First round of groundwater sampling was completed on existing Monitoring Wells 1338, 1339, 1343, and 1348 in December 1992. The contract laboratory completed analysis of the chemical parameters for Monitoring Wells 1338, 1339, and 1348. However, the chemical analysis continued for Monitoring Well 1343. The radiological parameters from the groundwater samples are currently being analyzed.

Field investigations for the KC-2 Warehouse Area, Scrap Metal Pile, and Electrical Substation were completed in February. The contract laboratory is performing radiological and chemical analysis of samples collected for the subject areas.

Issues/Corrective Action:

Final resolution of the Ohio EPA and U.S. EPA comments that were received in December 1992 should be made with resolutions transmitted back to the respective regulatory agency for final review and approval.

Lack of comment resolution has caused an apparent negative variance in the Operable Unit 5 Consent Agreement Baseline Schedule. Conditional approval received from the regulatory agencies has provided some schedule recovery through acceleration of both field characterization effort and subsequent sample analysis at the contract laboratories.

5.1.2 Outfall Line Investigation

Scope:

This Work Plan Addendum defines the sampling and analysis required to investigate potential leakage from the Outfall Line as part of the Operable Unit 5 RI. The installation of Monitoring Well 2119 and subsequent sampling program were based upon possible failure of the pipeline between Manhole 179 and 180.

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5.1.2 Outfall Line Investigation (continued)

If groundwater contamination has occurred due to a failure in the pipeline between Manhole 179 and 180, then a previously unidentified occurrence of contamination in groundwater may exist beyond the FEMP eastern boundary. Installation of Monitoring Well 2119 will determine if there is groundwater contamination associated with a pipeline failure between Manholes 179 and 180. If an off-FEMP plume is identified, then an additional investigation may be required to determine vertical and lateral extent of the plume.

Status:

Hydropunch II operations and subsequent installation of Monitoring Well 2119 was completed in January 1993. First round of groundwater sampling was completed January 27, 1993. Second round of groundwater sampling is tentatively scheduled for March 29, 1993.

Preliminary, on-site laboratory analyses were completed on groundwater samples obtained during Hydropunch operations. The results are as follows:

<u>Depth (feet)</u>	<u>Results (ppb) Uranium</u>
28.0	1.0
41.0	0.7
51.0	0.6
61.0	0.5
71.0	0.3
81.0	0.8
91.0	0.5
101.0	1.3
111.0	0.1
121.0	0.3
131.0	1.0
141.0	0.2
151.0	0.2

5.1.2 Outfall Line Investigation (continued)

Awaiting completion of the chemical and radiological analysis at the contract laboratory for Monitoring Wells 2119 and 2067.

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5.1.2 Outfall Line Investigation (continued)

Responses to the December 1992 additional comments from the Ohio EPA and U.S. EPA are pending completion of an internal review. However, the evident lack of contamination in the monitoring well sample reduced the applicability of the comments. After completion of the internal review, responses will be transmitted to the respective regulatory agency. The Work Plan Addenda will be revised once final comment resolutions have been obtained from the regulatory agencies, DOE-FN, and FERMC0.

Issues/Corrective Actions:

Final comment resolution of the Ohio EPA and U.S. EPA comments received in December 1992 should be made with resolutions transmitted back to the respective regulatory agency for final review and approval.

5.1.3 Installation of Monitoring Well 2166

Scope:

This Work Plan Addendum will provide a vertical profile of uranium concentration data for the water column upgradient of Homeowner Well 13, and a monitoring location at the vertical depth with the maximum uranium concentration. Homeowner well groundwater sampling has detected an increase in total uranium in water pumped from Homeowner Well 13.

Homeowner Well 13 is completed approximately 20 feet beneath the water table contact. Monitoring Well 2398 indicates total uranium concentrations of 1.4 $\mu\text{g/L}$ and 3.7 $\mu\text{g/L}$ at the water table contact. A vertical profile of uranium concentration, upgradient of Homeowner Well 13, is needed to determine at what level beneath the water table contact uranium concentrations are the greatest.

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5.1.3 Installation of Monitoring Well 2166 (continued)

Status:

The second and final round of groundwater sampling was completed on Monitoring Well 2166 January 25, 1993. Analyses results are still pending from the contract laboratory for the second round of groundwater sampling.

Data validation and database entry functions are continuing on the contract laboratory data.

Issues/Corrective Actions:

None to report.

5.2 Treatability Study

Scope:

The purpose of this study is to provide information to support the FS and subsequent remedy selection for Operable Unit 5. Specifically, the study will demonstrate the feasibility of soil washing as a remedial technology for cleaning soils in Operable Unit 5. The study incorporates a physical separation/chemical extraction process that initially involves the separation of a soil into different particle-size fractions. Reagent formulas in the washing solutions are used in the extraction of radionuclides and organic and inorganic compounds from these different-size fractions. The contaminants may be separated from the wash stream into a concentrated residue for further treatment. The study consists of two phases: 1) remedy screening Stages 1 and 2, involving laboratory and bench-scale tests; and 2) remedy selection using pilot-scale equipment. Soils from three different areas will be used in these investigations. These soils are from the following areas: incinerator area (ID-A), Plant 1 Pad Area (ID-B), and maintenance building area (OU 5-A).

Status:

DOE-FN received a letter from U.S. EPA dated June 22, 1992, agreeing with the revised comment responses to the Work Plan. These responses have been incorporated into the final Treatability Study Work Plan which was distributed on August 4, 1992. As of December 31, 1992, U.S. EPA and Ohio EPA have approved this Work Plan.

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5.2 Treatability Study (continued)

Remedy screening Stage 2 testing of ID-A and ID-B soils was completed in January 1993. Remedy screening Stages 1 and 2 testing of the Operable Unit 5 soil is in progress with a scheduled completion in April 1993. Pilot plant design for skid assembly and utilities and fabrication of the skids was completed with a scheduled construction completion date of late March 1993. System startup is anticipated for April 1993.

Issues/Corrective Actions:

None to report.

5.3 Initial Screening of Alternatives (ISA)

Scope:

The ISA Report documents the initial activities of the Feasibility Studies (FS). These activities include developing remedial action objectives, developing general response actions, identifying volumes or areas of media to which response actions might be applied, identifying and screening technologies, identifying and evaluating technology process options, assembling selected representative process options into alternatives, and performing an initial screening of alternatives.

Status:

A draft copy of the ISA Report was submitted to the Ohio EPA and U.S. EPA for review on November 13, 1992. Comments from both agencies were received in January 1993. A response to comments document was prepared and transmitted to both agencies on February 12, 1993. Approval of the responses (with one exception) has been received. Final document preparation is proceeding ahead of the Consent Agreement schedule.

Issues/Corrective Actions:

None to report.

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5.4 Remedial Investigation (RI)

Scope:

The RI serves as the mechanism for collecting data to characterize site conditions; determining the nature of the site's wastes; determining the nature and extent of contamination; and assessing baseline risk to human health and the environment.

Status:

RI data compilation and evaluation continues. All data sources to be included in the RI are being identified and summarized. Chemical and radiological data collected as part of both the RI/FS and other site sampling programs are being posted on maps and evaluated. The geologic and hydrogeologic information contained in RI/FS and site files and documents is being compiled, evaluated, and updated. Existing maps and cross sections are being updated where additional information has become available. New maps and cross sections of the glacial overburden have been generated. The new maps and cross sections will provide the basis for a more detailed interpretation of the glacial overburden geology than has previously been presented in RI/FS documents.

Draft versions of RI Report, Sections 1 and 2, have been prepared. Preparation of RI Report, Section 3 continues. Work on improving the current regional aquifer model also continues, along with the development of additional fate and transport models needed for Operable Unit 5 activities. Work on evaluating groundwater and surface water background values continues. Work on preparing an ecological risk screening study based on U.S. EPA Region V guidelines has begun. A meeting was held with a Region V representative on February 13, 1993, to discuss and agree upon approaches to ecological risk assessment.

A significant data validation effort was initiated in January and became fully operational in February. A backlog of nearly 8,000 RI/FS samples requiring validation have been identified. Validation of all these samples is scheduled for completion in May 1993.

Issues/Corrective Actions:

None to report.

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5.5 Planned Activities for March 1993

- Continue compiling, evaluating and summarizing all data sources to be included in the Operable Unit 5 RI.
- Meet with EPA representatives to present and discuss results of the data evaluation.
- Continue RI activities initiated in January 1993 with respect to RI Report Sections 1, 2 and 3, fate and transport modeling, background values.
- Continue validation of backlogged Operable Unit 5 RI data.
- Prepare final ISA report document incorporating Ohio EPA and U.S. EPA comments.
- Revise the Operable Unit 5 Work Plan Addenda upon receiving final comment resolution of the Ohio EPA and U.S. EPA December 1992 comments.
- Complete the development and initial round of groundwater sampling of Monitoring Well 1842 for the K-65 Slurry and Clearwell Line subtask of the Operable Unit 5 Work Plan Addenda.
- Complete the first round of groundwater sampling for new Monitoring Well 1869. Initiate the second round of groundwater sampling for Monitoring Well 1868. Complete the second round of groundwater sampling for Monitoring Well 1866. These wells are located in the S.E. Quadrant subtask of the Operable Unit 5 Work Plan Addenda.
- Resolve the issue concerning the location of existing Monitoring Well 1174, which is part of the S.E. Quadrant subtask of the Operable Unit 5 Work Plan Addenda. Perform first round of groundwater sampling if the well is located.
- Attempt development and first round of groundwater sampling of Monitoring Well 1890 in the Fire Training Area subtask of the Operable Unit 5 Work Plan Addenda.
- Begin second round of groundwater sampling for Monitoring Wells 1338, 1339, 1343, and 1348, located in the Plant 1 Pad Area, for the Operable Unit 5 Work Plan Addenda.

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5.5 Planned Activities for March 1993 (continued)

- Revise the Operable Unit 5 Work Plan Addenda for the Outfall Line Investigation upon receiving final comment resolution of Ohio EPA and U.S. EPA December 1992 comments.
- Initiate second round of groundwater sampling at Monitoring Well 2119 for the Outfall Line Investigation Work Plan Addenda.
- Complete the Work Plan Addenda for the Investigation of the Skeet Shooting Range and for the Study of the Great Miami Riverbank in the vicinity of the outfall line.
- Complete preparation of work scopes for additional site characterization programs that may be needed based on the Operable Unit 5 data evaluation.

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6.0 On-Site Disposal Cell

The Engineered Waste Management Facility (EWMF) scope has been modified to evaluate the On-Site Disposal Cell (OSDC) alternatives along with the complete evaluation of off-site alternatives. All further reference to the EWMF will be entitled OSDC.

The technical approach for the evaluation will be based on a information previously developed for the EWMF. This information is being expanded to include the development of engineering assessment to evaluate the On-Site Disposal/Storage, Off-Site Disposal, and Transportation Risk Assessment for Off-Site Disposal. The information generated by these technical reports and the reports that will be generated from the information gathered for the EWMF Siting Report will serve as a basis for evaluating the disposal options and alternatives.

6.1 EWMF General Siting Report

Scope:

The EWMF Siting Report was scoped to evaluate the feasibility of locating an EWMF facility at the FEMP. The intent was to deliver all of the information necessary to meet the requirements in a singular document. In order to expedite the delivery of the technical information, the report has been subdivided into six (6) stand-alone technical reports. The technical reports will be identified as follows with the appropriate scope:

- Geotechnical Engineering Analysis for an On-Site Disposal Cell - This report will contain the engineering analysis prepared for the EWMF structure. This will include an analysis of the barrier and cap design, drainage system, erosion analysis, slope stability analysis and an estimated cost of construction for an on-site tumulus. The report will be entitled, "Technical Report 5.1A, Engineering Evaluation Report for On-Site Disposal".
- Site Characterization Report - This report will include the investigation and evaluation of the site geology, radiation measurements, well installation diagrams, boring logs, and analytical data. This report will be entitled "Technical Report 5.1B, Site Characterization/Geological Report for On-Site Disposal".

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6.1 EWMF General Siting Report (continued)

- Material Source Survey - This report will discuss the availability and cost of materials in the local area required to construct the OSDC. This report will be entitled "Technical Report 5.1C, Material Source Survey for On-Site Disposal".
- ARARs Report - This report will identify and discuss the ARARs that will be applicable to the construction of an OSDC. This report will be entitled "Technical Report 5.4, ARARs for On-Site Disposal Cell Concept".
- Survey of Local Geology in the Alternate Siting Areas - This report will cover the investigation of two alternative sites for the OSDC adjacent or near the FEMP situated on bedrock highs. The two sites to be evaluated are the Girl Scout Camp and another located west of the FEMP. The report will be entitled, "Technical Report 5.3A, Geological Report for Off-Site Disposal".
- Ecological Characterization - This report will discuss the ecological characterization of the two off-site locations. The two sites to be evaluated are the Girl Scout Camp and another located west of the FEMP. The report will be entitled, "Technical Report 5.3B, Ecological Characterization of the Off-Property Disposal Cell Study Area".

Status:

A contract has been placed for IT Corporation to complete the six above mentioned technical reports. All six technical reports have been received. The risk-based evaluation of an on-site disposal cell containing treated wastes has been delayed pending further review.

Issues/Corrective Actions:

None to report.

6.2 Planned Activities for February 1993

None.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

7.0 Site-Wide Characterization Report

7.1 Risk Assessment Work Plan Addendum

Scope:

The Risk Assessment Work Plan Addendum provides a detailed scheme for development and completion of a baseline risk assessment for each operable unit, a preliminary site-wide baseline risk assessment, and a remedial action risk evaluation with each operable unit FS.

The Risk Assessment Work Plan Addendum presents the specific risk assessment methods to be followed in the RI/FS risk assessment tasks. It also establishes the scope of risk assessment work and documents the specific approach to determine whether estimated risks associated with selected remedial alternatives for the entire site are protective of human health and the environment. The addendum provides the methods, models, and parameters to develop the baseline risk assessment for each operable unit, the preliminary baseline risk assessment of the Site-Wide Characterization Report (SWCR), the remedial action risk evaluation, and the comprehensive response action risk evaluation for each operable unit FS.

Status:

The (Final) Risk Assessment Work Plan Addendum was transmitted to the U.S. EPA and Ohio EPA on June 19, 1992. Responses to comments received from the U.S. EPA on August 6, 1992, were submitted on September 24, 1992.

Issues/Corrective Actions:

None to report.

7.2 SWCR Report Preparation

Scope:

The SWCR is a one-time summary of all FEMP site data available as of December 1, 1991. It contains the preliminary baseline risk assessment which estimates human health and ecological risk of the FEMP from a site-wide perspective. The SWCR also provides the initial list of the leading remedial alternatives for each operable unit for input into the FS cumulative response action risk evaluation.

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7.2 SWCR Report Preparation (continued)

Status:

In February, U.S. EPA comments were addressed. Comments will be incorporated and a revised SWCR will be transmitted to DOE-FN on March 19, 1993.

SITE-WIDE CHARACTERIZATION REPORT

SECONDARY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Provides a one-time summary of site characterization data available as of 12/1/91, the Preliminary Baseline Risk Assessment, and a list of the leading remedial alternatives.	08/05/92 A	10/08/92 A	12/1/92 A

C = Consent Agreement Date

A = Actual

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8.0 Community Relations

Status

On February 23, 1993, DOE held a community meeting concerning the ongoing cleanup of the FEMP. Approximately 50 community residents attended. FEMP technical staff were on hand to explain exhibits on various cleanup activities. The general meeting began with presentations by DOE personnel on the status of cleanup at the site. U.S. EPA, OEPA and FRESH made statements and the remainder of the time was spent answering questions from the public. The meeting was recorded by a court stenographer and the transcript will be placed in the Administrative Record.

The *Fernald Project Cleanup Report* was mailed to area residents the second week of February. The report is intended to update the community on activities associated with environmental studies and cleanup efforts at the Fernald site. It is also designed as a supplement to information provided at regular community meetings and through other communication activities.

The 45-day public comment period for the EE/CA for Removal Action No. 27, Management of Contaminated Structures at the FEMP, concluded on February 8, 1993.

DOE has requested U.S. EPA approval of two modifications to the 1991 Amended Consent Agreement:

1. On February 2, 1993 DOE requested the Record Of Decision (ROD) for Operable Unit 2 be extended to March 1, 1995. On February 9, EPA disapproved the schedule extension request. DOE and U.S. EPA met February 17 and discussed the proposed Operable Unit 2 work scope and schedule.
2. The Amended Consent Agreement schedule for Operable Unit 3 calls for a ROD date of May 2, 1997 for the decontamination and decommissioning (D&D) of the former production facilities and the disposition of waste from that area. DOE has proposed to EPA that D&D activities be accelerated by approximately two years with the original 1997 ROD date being retained for the waste disposition.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

8.0 Community Relations (continued)

DOE-FN gave an FEMP update at the monthly FRESH (Fernald Residents for Environment, Safety and Health) meeting. Topics included:

- Status of the Operable Unit 2 schedule extension
- Status on the development of the new advisory committee
- Updates on the decant sump and the rotary kiln
- Explained alternate near-site waste storage
- Update on the Plant 1 Ore Silos Removal Action
- Public water supply (possibility of DOE added as a customer)

Approximately 20 members of the community attended the FRESH meeting. Plans were discussed for the upcoming April 3, 1993 FRESH tour of the Fernald site.

On February 18, 1993, staff from the Radiological Assessments Corporation presented their findings on the draft Task 4 Report -- Environmental Pathway Analysis - Models and Validation at a public workshop in Cincinnati, Ohio. This workshop is part of an ongoing series to discuss progress on the Centers for Disease Control's Fernald Radiation Dose Reconstruction Project. Approximately 28 members of the public attended.

The trial focusing on the \$100 million class-action lawsuit brought against National Lead of Ohio by former Fernald employees and subcontractors slated for February 16 has been postponed. Defense attorneys persuaded a federal appeals court to block Judge S. Arthur Spiegel's plan for a summary jury trial. The U.S. Court of Appeals for the Sixth Circuit now must schedule oral arguments for challenges to Judge Spiegel's handling of the case.

Issues/Corrective Action

None.

Planned Activities for March 1993

The Responsiveness Summary for the EE/CA for Removal Action No. 27 is due to U.S. EPA by mid-March.

The public comment period on two DOE documents: Environmental Restoration and Waste Management Five-Year Plan and the Site-Specific Plan concludes March 15, 1993.

A Community Roundtable on Risk Communication is scheduled for March 23, 1993.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
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ENCLOSURE A

**WASTEWATER FLOWS AND RADIONUCLIDE
CONCENTRATIONS UNDER CA SECTION XXIII.B**

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
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Introduction

The accompanying Effluent Radiation Reports provide, in accordance with the requirements of Section XXIII.B of the Consent Agreement As Amended under CERCLA Sections 120 and 106 (a), data on the daily wastewater flows, radionuclide concentrations, and loadings released to the Great Miami River and an estimate of runoff and radionuclide concentrations to Paddy's Run during February 1993.

Summary - February 1993

The total quantity of uranium discharged from the FEMP to the Great Miami River via Manhole 175 (Outfall 11000004001) was 81.48 kilograms. The average uranium concentration for the previous 12 months was 0.54 mg/L. This is 62.9% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

There was no discharge from the Stormwater Retention Basin (Outfall 11000004002) to Paddy's Run via the Storm Sewer Outfall Ditch in February 1993. Based on 2.95 inches of rainfall in February 1993, the total quantity of uranium discharged to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 8.38 kilograms.

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398705
Cincinnati, Ohio 45239-8705

Location: 11000004001 Month: February 1993
001 Total Discharge
Manhole 175 (Effluent to the Great Miami River)

<u>Day</u>	<u>Flow (MGD)</u>	<u>Total Alpha (pCi/L)</u>	<u>Total Beta (pCi/L)</u>	<u>Total U (mg/L)</u>	<u>Total U (kgs)</u>	<u>Calculated Total U-238 (pCi/L) (1)</u>
1	0.648	486	167	1.05	2.57	355
2	0.526	617	167	1.04	2.07	351
3	0.668	631	275	1.26	3.18	426
4	1.063	482	198	0.92	3.70	311
5	1.090	423	203	0.70	2.89	236
6	0.518	518	261	0.95	1.86	321
7	0.479	613	243	1.11	2.01	375
8	0.588	473	266	0.83	1.85	280
9	0.664	360	288	0.54	1.36	182
10	0.769	248	266	0.45	1.31	152
11	0.835	279	144	0.43	1.36	145
12	0.460	703	360	1.32	2.30	446
13	0.417	495	131	1.02	1.61	345
14	0.297	459	95	0.97	1.09	328
15	0.320	414	63	0.82	0.99	277
16	0.691	239	81	0.45	1.18	152
17	0.632	437	99	0.47	1.12	159
18	0.786	369	104	0.66	1.96	223
19	1.130	514	194	0.78	3.33	264
20	0.501	622	432	1.14	2.16	385
21	1.106	581	315	0.96	4.02	324
22	1.172	784	838	1.37	6.07	463
23	1.307	626	788	1.24	6.13	419
24	1.392	599	896	1.17	6.16	395
25	1.393	550	667	0.98	5.16	331
26	1.062	802	932	1.10	4.42	372
27	1.254	495	775	0.95	4.51	321
28	<u>1.350</u>	712	892	1.00	<u>5.11</u>	338
TOTAL	23.118				81.48	

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**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project

Location: 001 Total Discharge

Month: February 1993

	Flow (MGD)	Total Alpha (pCi/L)(2)	Total Beta (pCi/L)(2)	Total U (mg/L)(2)	Total U (kgs)	Calculated Total U-238 (pCi/L)(1)(2)
Avg.	0.826	535	447	0.93	2.91	315
Max.	1.393	802	932	1.37	6.16	463
Min.	0.297	239	63	0.43	0.99	145

The average uranium concentration for the previous twelve months was 0.56 mg/L. This is 62.9% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

- Comments: (1) The activity of this discharge has been and will continue to be reported as Uranium-238 (pCi/L) in accordance with the Ohio EPA format for reporting uranium. Since this does not account for the activity of the other uranium isotopes in the effluent, the total uranium data is also presented. The calculated total U-238 is based on a conversion factor of 337.84 pCi U-238/mg Total U applied to measure value of total uranium.
- (2) Average values presented are flow-weighted.

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398705
Cincinnati, Ohio 45239-8705

Location: 11000004002
002 Discharge (Overflow) to Storm Sewer Outfall Ditch
Stormwater Retention Basin Spillway (Effluent to Paddy's Run)

Month: February 1993

There was no discharge to Paddy's Run from the Stormwater Retention Basin.

Based on 2.95 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 8.38 kgs.

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ENCLOSURE B

**FFCA: INITIAL REMEDIAL MEASURES
AND OTHER OPEN ACTIONS**

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR
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INTRODUCTION

Enclosure B describes actions undertaken at the FEMP during the period February 1 through February 28, 1993, that are not covered by the reporting requirements of the Consent Agreement As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a).

WORK ASSIGNMENTS AND PROGRESS

Descriptions of ongoing work progress are presented in the following sections of this report. The status of ongoing work in support of the Federal Facility Compliance Agreement (FFCA) is summarized in Table 1 of Enclosure B. Completed work previously reported upon has been eliminated for the sake of brevity. In this portion of the report and in Table 1, descriptions of actions are presented in a format consistent with that of the FFCA.

**COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND
LIABILITY ACT (CERCLA).**

1. Initial Remedial Measures

Section C

K-65 Silo Project - Status information on the K-65 Silo project normally reported in this section is being provided under Operable Unit 4: Silos 1-4.

2. Remedial Investigation/Feasibility Study (RI/FS)

Status information on the Remedial Investigation/Feasibility Study (RI/FS) normally reported in this section is being provided separately in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).

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**COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND
LIABILITY ACT (CERCLA)**

3. Reports and Record Keeping

Section B

The RI/FS Monthly Technical Progress Report for January 1993 was transmitted to the U.S. EPA on February 21, 1993, as an integral part of the Consolidated Consent Agreement/Federal Facility Compliance Agreement/Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (CA/FFCA/FFA-CARE) Monthly Progress Report in accordance with the requirements of Section X of the Consent Agreement As Amended.

CLEAN AIR ACT (CAA)

Section E

The Quarterly Particulate Emissions Report will now be incorporated into the Annual NESHAP Compliance Report.

RADIATION DISCHARGE INFORMATION

Section A

The twenty-first Quarterly Liquid Discharge Report for the period October through December 1991 was submitted to the U.S. EPA on February 20, 1992. This information will now be submitted on an annual basis as part of the FEMP Annual Site Environmental Report.

REPORTING REQUIREMENTS

Section B

The Federal Facility Compliance Agreement Monthly Progress Report for January 1993, was transmitted to the U.S. EPA on February 21, 1993, as Enclosure B of the Consolidated Consent Agreement/Federal Facility Compliance Agreement/Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (CA/FFCA/FFA-CARE) Monthly Progress Report.

**STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON
FEDERAL FACILITY COMPLIANCE AGREEMENT ACTIONS**

FEBRUARY 31, 1993

<u>ACTION</u>	<u>DESCRIPTION</u>	<u>COMPLETION TIME AFTER FFCA SIGNED</u>	<u>FY1992 STATUS</u>
CERCLA			
1.	INITIAL REMEDIAL MEASURES		
1.C	Implement radon control plan approved by the U.S. EPA.	-----	No longer applicable. Progress on actions to address radon emissions from the K-65 Silos are being reported separately under Section IX-Removal Actions of the Consent Agreement/FFCA Monthly Progress Report.
2.	REMEDIAL INVESTIGATION/FEASIBILITY STUDY		No action required.
2.A	RI/FS work is to be conducted in accordance with the U.S. EPA guidelines.	N/A	
2.B	--No Action Required--	-----	Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).
2.E	Amend and submit revised RI/FS Work Plan to U.S. EPA if deficiencies are found.		Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).
2.F	Implement tasks described in the approved RI/FS Work Plan		Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA sections 120 and 106(a).
3.	REPORTS AND RECORD KEEPING		
3.B	Submit monthly RI/FS progress reports.	monthly	The RI/FS Monthly Progress Report for January 1993 was transmitted to the U.S. EPA on February 21, 1993. (DOE-1179-93)
CLEAN AIR ACT			
B.4	Prepare annual progress report installation and replacement of emission control devices.	yearly	The Fourth Annual Progress Report on the installation and replacement of emission control devices was transmitted to the U.S. EPA on January 28, 1992 (DOE-982-92).

STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON FEDERAL FACILITY COMPLIANCE AGREEMENT ACTIONS

FEBRUARY 31, 1993

C.	Provide annual reports to the U.S. EPA per 40 CFR 61.94(c).	yearly	The Annual NESHAP Compliance Report for CY1990 was transmitted to the U.S. EPA on June 25, 1992 (DOE-1912-92).
D.1	Provide U.S. EPA with yearly stack-testing schedule.	yearly	The 1989 stack testing schedule was transmitted to the U.S. EPA on June 16, 1989. A letter (DOE-1615-89) was transmitted to the U.S. EPA on September 15, 1989, indicating that, due to the uncertainty concerning resumption of production at the FEMP, the 1989 FFCA Stack Testing Program was being deferred. In August 1991, the DOE confirmed that no further production would take place at the facility, and renamed the facility the FEMP. Stacks in areas such as the Laboratory are currently being identified for potential testing during FY1993.
D.2	Provide U.S. EPA with stack-test results for stacks tested that year.	45 days	Because the FEMP has been out of production since mid-1989, there was no opportunity to perform stack testing. The DOE, in August 1991, confirmed that no future production will take place at the FEMP. Stacks in areas such as the Laboratory are currently being identified for potential testing during FY1993.
E.1	Maintain records of monthly particulate matter emissions.	-----	Ongoing.
E.2	Provide quarterly reports to U.S. EPA on these emissions.	-----	The Quarterly Particulate Emissions Report will now be incorporated into the Annual NESHAP Compliance Report.
RCRA			
A.1	Conduct a hazardous waste determination on all waste streams.	30 days	Complete. Pursuant to the Proposed Amended Consent Decree, a RCRA waste evaluation was be conducted on all identified waste streams pertaining to the PACD.
A.2	Commence a hazardous waste analysis program for materials in the landfill and going to the incinerator.	30 days	Complete. Operation of these units was discontinued and data on the waste which had gone to them was provided in a 30-day FFCA deliverable on August 17, 1986.

**STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON
FEDERAL FACILITY COMPLIANCE AGREEMENT ACTIONS**

FEBRUARY 31, 1993

A.5	Update the facility closure plan to reflect the year the facility expects to begin closure.	30 days	The Facility closure date is dependent upon closure schedules for individual TSD units as presented most recently in Section I of the RCRA Part B Permit Application transmitted to the Ohio EPA and the U.S. EPA on October 30, 1991 (DOE-211-92). Facility closure will be completed on a date the last TSD unit is closed.
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RADIATION DISCHARGE INFORMATION

A.3	Report to U.S. EPA, Ohio EPA and Ohio Department of Health the results of the continuous liquid discharge samples.	yearly	The twenty-first Quarterly Discharge Report for the period October through December 1991 was transmitted to the U.S. EPA on February 20, 1992 (DOE-941-92). This information will now be reported on an annual basis.
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REPORTING REQUIREMENTS

B.	Issue monthly progress report of actions taken to ensure compliance with FFCA requirements.	monthly	January's FFCA Monthly Progress Report was transmitted to the U.S. EPA on February 21, 1993. (DOE-1179-93)
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ENCLOSURE C

**FEDERAL FACILITY AGREEMENT:
CONTROL AND ABATEMENT OF RADON-222 EMISSIONS**

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR
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Introduction

The Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA), signed November 19, 1991, requires that a monthly report be submitted to the U.S. EPA regarding all steps undertaken in the preceding month to implement Part V of the agreement and that all data generated as a result of those actions be submitted.

Enclosure C fulfills those requirements by describing steps taken at the FEMP during the period February 1 through February 28, 1993, to implement Part V, Radon-222 Control and Abatement Plan, paragraphs 19-33 of the FFA-CARE.

After four months of data collection for the applicable parameters, preparation is now underway to evaluate the data for use in the Transport Release Models.

Work Assignments and Progress

In this section of Enclosure C, action descriptions and work progress are presented in a format consistent with that of the FFA-CARE. Immediately following this section are the K-65 Silos Report and the Selected Radon Data Report. Reporting this data is also a requirement included in the U.S. EPA approved Silos 1 and 2 Removal Action Work Plan (Removal Action No. 4).

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<u>FFA Part, Paragraph(s)</u>	<u>Description of Commitment</u>	<u>FFA Due Date</u>	<u>Status of Commitment</u>
Part V, 19 & 21	Implement the K-65 Silos 1 and 2 Removal Action in accordance with the approved Silos 1 and 2 Removal Action Work Plan.	12/1/91	Completed. Installation of the bentonite completed 11/28/91.
Part V, 20	Reduce radon-222 to a level As-Low-As Reasonably Achievable (ALARA) with the goal as specified in the Silos 1 and 2 Removal Action Work Plan.	5/22/92	Completed. The Bentonite Effectiveness Environmental Monitoring Report was transmitted to the U.S. EPA on 5/22/92.
Part V, 22	Submit proposed methodology for estimating radon-222 concentration reductions resulting from completion of the Silos 1 and 2 Removal Action.	Within 60 days of completing removal action; 1/27/92.	The Bentonite Effectiveness Environmental Monitoring Plan was resubmitted to the U.S. EPA for comment and approval on 3/13/92. EPA approval was received on 4/24/92. DOE is preparing a revision to the methodology.
Part V, 23	Evaluate performance of the removal action and determine whether or not additional actions are needed prior to final remediation.	None specified.	Methodology for estimating radon-222 concentration reduction submitted to U.S. EPA per paragraph 20 of Part V. The first Bentonite Effectiveness Environmental Monitoring Report was issued to the U.S. EPA on 5/22/92. DOE submitted a revision to the methodology to the U.S. EPA on 12/17/92.
Part V, 24, 25, and 33	Demonstrate compliance with NESHAP Subpart Q at the completion of final remediation using a methodology approved by the U.S. EPA. Applicable to: Silos 1, 2, and 3; Waste Pits 1, 2, 3, 4, and 5 and the Clearwell; and any newly discovered radon-222 emission sources.	None specified.	No information to report for February 1993.

<u>FFA Part, Paragraph(s)</u>	<u>Description of Commitment</u>	<u>FFA Due Date</u>	<u>Status of Commitment</u>
Part V, 26	Directly measure radon-222 flux from Waste Pits 1, 2, 3, 4, and 5 and the Clearwell in the RI/FS under the CERCLA Consent Agreement.	None specified.	Radon sampling is complete for Pits 1, 2, and 3. All measurements were below the criteria set by the U.S. EPA. A final report was issued to the U.S. EPA on 6/25/92. A letter was received from the U.S. EPA on 10/16/92 giving approval of the proposed method for measuring the radon flux from Pit 4. The letter also stated that since the Clearwell is water covered, and Pit 5 is nearly 100% water covered, the flux from Pit 5 and the Clearwell may be assumed to be zero.
Part V, 26	Include direct measurement data from Waste Pits 1, 2, 3, 4, and 5 and the Clearwell in the RI/FS under the CERCLA Consent Agreement.	None specified.	See above.
Part V, 27	Estimate radon-222 emissions from Silo 3 based upon characterization data; include the estimated radon-222 emission data from Silo 3 in the RI/FS that includes Silo 3 under the CERCLA Consent Agreement.	None specified.	Completed. An estimate of radon flux from the K-65 Silo 3 was submitted to the U.S. EPA on 12/17/91. Radon flux for the silo was estimated to be above 20 pCi/m ² -s.
Part V, 28	Submit documentation or estimates of current radon-222 emissions from existing but newly discovered sources that contain radium-226 in sufficient concentrations to emit radon-222 in excess of NESHAP Subpart Q prior to final remediation.	Within 30 days of discovery.	No new sources identified.
Part V, 30	Submit methodology for direct measurement or other appropriate means of characterization of the relevant emissions pursuant to paragraph 29 of the FFA.	Within 45 days of the U.S. EPA response pursuant to paragraph 29.	None required.

<u>FFA Part, Paragraph(s)</u>	<u>Description of Commitment</u>	<u>FFA Due Date</u>	<u>Status of Commitment</u>
Part V, 31	Submit results of measurements pursuant to paragraph 30.	Within 30 days of U.S. EPA approval of characterization method.	None required.
Part VI, 31	Submit monthly report on steps undertaken to implement Part V of the FFA-CARE and the data obtained in the preceding month.	20th day of succeeding month.	The progress report being submitted herewith as an integral part of the CERCLA Consent Agreement Monthly Progress Report.

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Data Reporting Requirements: RA No. 4: Silos 1 and 2

As defined in the Silos 1 and 2 Removal Action Work Plan and the Federal Facility Agreement, data associated with monitoring the effectiveness of the bentonite installation are included in the following tables: the K-65 Silos Report and the Selected Radon Data Report.

The K-65 Silos Report includes data on the following parameters:

- Ambient temperature and pressure near the silos.
- Silos 1 and 2 headspace temperature.
- Silos 1 and 2 differential pressure.
- Silos 1 and 2 radon headspace concentration.
- Silos 1 and 2 headspace humidity

The silo radon headspace data submitted was collected manually since the completion of the bentonite installation until mid-July 1992. Currently, the data for Silos 1 and 2 and the perimeter pylons is automatically recorded.

The Selected Radon Data Report includes radon data from the following locations:

- Air monitoring station number 5 (AMS-5)
- Air monitoring station number 6 (AMS-6)
- Pilot Plant
- Background data
- K-65 Monitoring Data (K-65 NW, K-65 SW, K-65 NE, K-65 SE).

The radon data submitted in Enclosure C: Radon Data for the K-65 Removal Action and in all previous consent agreement status updates is considered to be draft. The radon data, although collected by qualified technicians using detailed procedures, was not obtained in a manner which would withstand a rigorous validation process. The various field and laboratory procedures are currently being reviewed and modified to be in accordance with the conditionally approved Site-Wide CERCLA Quality Assurance Project Plan (SCQ). Once the sampling and analysis procedures have been modified and approved, along with specific validation protocols, suspect radon data will either be qualified or rejected.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT (DAILY AVERAGES)

LOCATION: Silo # 1

DATE: February 1993

Day	Ambient		Temperature	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
	Temp Deg. F	Pres In. Hg.	Head Space Deg. F			
1	28.4	29.5	39.4	96.5	-0.011	5528
2	23.0	29.8	38.9	96.7	-0.010	46874
3	29.6	29.7	38.5	96.6	-0.009	55161
4	30.5	29.8	38.5	96.4	-0.009	19777
5	33.2	29.6	38.5	96.6	-0.009	64731
6	27.0	29.6	38.6	96.7	-0.010	17047
7	28.9	29.5	38.4	96.5	-0.009	58306
8	32.8	29.5	38.5	95.5	-0.009	8338
9	38.1	29.6	38.8	96.4	-0.008	33232
10	41.4	29.5	39.2	96.4	-0.007	63399
11	35.7	29.4	39.6	96.3	-0.013	7762
12	35.8	29.1	39.8	96.3	-0.087	27678
13	27.9	29.2	39.6	*	0.114	3137
14	27.7	29.5	39.2	*	0.036	5387
15	27.7	29.6	38.8	*	-0.013	35191
16	27.9	29.3	38.8	*	-0.046	30468
17	17.8	29.7	38.6	*	0.028	4918
18	1.6	29.8	37.8	*	-0.013	3332
19	10.1	29.6	36.9	*	-0.012	16239
20	29.0	29.4	36.9	*	-0.010	64377
21	34.2	28.9	37.2	*	-0.103	112735
22	26.3	29.2	37.3	*	-0.011	2727
23	18.8	29.5	37.1	*	-0.012	3112
24	10.5	29.8	36.4	*	-0.012	15335
25	8.0	29.8	35.9	*	-0.012	25343
26	21.2	29.6	35.8	*	-0.012	1957
27	14.1	29.8	35.7	*	-0.011	18362
28	15.1	29.8	35.5	*	-0.011	34576
ARITHMETIC MEAN	25.1	29.5	38.0	96.4	-0.010	28037
MAXIMUM	41.4	29.8	39.8	96.7	0.114	112735
MINIMUM	1.6	28.9	35.5	95.5	-0.103	1957
MEDIAN	27.8	29.6	38.5	96.5	-0.011	19069

Notes: * - Data censored, questioned, or not available.
Report generated from previously edited data files.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
 FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

4243

FACILITY: Fernald Environmental Management Project
 U.S. Department of Energy
 7400 Willey Road, P.O. Box 398704
 Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT (DAILY AVERAGES)

LOCATION: Silo # 2

DATE: February 1993

Day	Ambient Temp Deg. F	Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
1	28.4	29.5	39.8	*	-0.006	35108
2	23.0	29.8	39.3	*	-0.005	80199
3	29.6	29.7	39.0	*	-0.005	165710
4	30.5	29.8	39.0	*	-0.006	79366
5	33.2	29.6	39.0	96.8	-0.005	203711
6	27.0	29.6	39.1	97.0	-0.006	109295
7	28.9	29.5	38.8	97.0	-0.005	213608
8	32.8	29.5	39.0	96.8	-0.006	96516
9	38.1	29.6	39.3	*	-0.006	171558
10	41.4	29.5	39.7	*	-0.006	259077
11	35.7	29.4	40.1	*	-0.007	63508
12	35.8	29.1	40.1	*	-0.006	114440
13	27.9	29.2	39.9	*	-0.006	62888
14	27.7	29.5	39.5	*	-0.006	56278
15	27.7	29.6	39.2	*	-0.006	65809
16	27.9	29.3	39.0	*	-0.006	15008
17	17.8	29.7	38.9	*	-0.006	2702
18	1.6	29.8	38.1	*	-0.004	2550
19	10.1	29.6	37.2	*	-0.004	36818
20	29.0	29.4	37.2	*	-0.004	159386
21	34.2	28.9	37.4	*	-0.005	145529
22	26.3	29.2	37.5	*	-0.006	33441
23	18.8	29.5	37.4	*	-0.004	23688
24	10.5	29.8	36.8	*	-0.004	2557
25	8.0	29.8	36.4	*	-0.004	2550
26	21.2	29.6	36.2	*	-0.006	2390
27	14.1	29.8	36.1	*	-0.004	24415
28	15.1	29.8	36.1	*	-0.004	46731
ARITHMETIC MEAN	25.1	29.5	38.4	96.9	-0.005	81244
MAXIMUM	41.4	29.8	40.1	97.0	-0.004	259077
MINIMUM	1.6	28.9	36.1	96.8	-0.007	2390
MEDIAN	27.8	29.6	39.0	96.9	-0.006	63198

Notes: * - Data censored, questioned, or not available.
 Report generated from previously edited data files.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Report
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

SELECTED RADON DATA REPORT

MONTH: FEBRUARY, 1993

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	AMS 5	AMS 6	PILOT PLANT	BKGRD
	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)
02/01/93	0.5	2.1	0.7	0.3
02/02/93	0.6	0.5	0.7	0.5
02/03/93	1.1	0.8	1.1	0.9
02/04/93	1.1	0.9	1.2	0.8
02/05/93	1.2	0.9	1.2	1.0
02/06/93	0.9	0.6	0.9	0.4
02/07/93	0.8	0.6	1.0	0.6
02/08/93	0.9	0.8	1.0	0.6
02/09/93	0.9	0.6	0.8	0.6
02/10/93	1.5	1.2	1.4	1.3
02/11/93	0.7	0.6	0.8	0.5
02/12/93	0.5	0.4	0.7	0.4
02/13/93	0.4	0.2	0.6	0.3
02/14/93	0.4	0.3	0.6	0.3
02/15/93	0.4	0.3	0.6	0.3
02/16/93	0.5	0.4	0.6	0.3
02/17/93	0.5	0.3 I	0.6	0.5
02/18/93	0.8 C	1.4 C	0.8	1.0 C
02/19/93	M	0.9 C	0.9	0.6
02/20/93	M	0.4	0.7	0.3
02/21/93	M	0.5	0.8	0.5
02/22/93	0.4 I	0.4	0.8	0.4
02/23/93	0.5	0.4	0.6	0.3
02/24/93	0.5 C	0.5	0.6	0.5
02/25/93	M	0.5	0.5	0.4
02/26/93	M	0.4	0.4	0.3
02/27/93	M	0.6 C	1.3	0.9
02/28/93	M	0.7 C	0.9	0.9

Summary of Daily Averages

	AMS 5	AMS 6	PILOT PLANT	BKGRD
	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)
AVERAGE	0.7	0.6	0.8	0.6
MAXIMUM	1.5	2.1	1.4	1.3
MINIMUM	0.4	0.2	0.4	0.3
MEDIAN	0.5	0.5	0.8	0.5
Std. Dev	0.3	0.4	0.2	0.3

- NOTES:
- "C" indicates that data was censored due to ambient temperatures below manufacturer's specifications causing erroneous recordings.
 - "I" indicates incomplete data.
 - "M" indicates radon monitor malfunction.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES COMPLIANCE AGREEMENT/
 FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

4243

FACILITY: Fernald Environmental Management Report
 U.S. Department of Energy
 7400 Willey Road, P.O. Box 398704
 Cincinnati, Ohio 45239 Hamilton

SELECTED RADON DATA REPORT

MONTH: FEBRUARY, 1993

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	K-65, NW (pCi/L)	K-65, SW (pCi/L)	K-65, NE (pCi/L)	K-65, SE (pCi/L)
02/01/93	0.8	0.9	0.4	0.9
02/02/93	2.2	2.5	3.8	2.4
02/03/93	3.8	2.5	8.8	4.3
02/04/93	4.1	3.3	4.7	3.3
02/05/93	3.3	2.6	8.3	5.5
02/06/93	1.5	2.7	3.9	2.6
02/07/93	1.7	2.7	5.3	4.0
02/08/93	1.6	2.3	3.4	1.9
02/09/93	1.2	1.9	1.7	1.5
02/10/93	2.2	2.6	5.8	3.9
02/11/93	1.3	4.5	1.0	1.1
02/12/93	1.0	2.0	1.2	1.4
02/13/93	0.7	0.7	2.1	1.1
02/14/93	0.7	0.6	1.6	0.7
02/15/93	1.1	1.0	0.7	0.6
02/16/93	0.8	2.3	0.4	1.4
02/17/93	0.9	0.8	1.9	1.3
02/18/93	2.0 C	1.8	1.8 C	1.4 C
02/19/93	1.7 C	2.4	2.9 C	1.9 C
02/20/93	2.9	2.2	3.2	3.0
02/21/93	6.8	4.2	2.7	2.5
02/22/93	0.9	0.7	2.2	0.9
02/23/93	1.3	0.7	2.2	2.1
02/24/93	3.3 C	1.0	1.6	1.6
02/25/93	3.5	1.9	0.4	0.9
02/26/93	1.2	1.1	0.4	2.0 I
02/27/93	1.4 C	2.2	2.1 C	4.9 C
02/28/93	2.1 C	2.5	5.9	6.1 C

Summary of Daily Averages

	K-65, NW (pCi/L)	K-65, SW (pCi/L)	K-65, NE (pCi/L)	K-65, SE (pCi/L)
AVERAGE	2.0	2.0	2.9	2.3
MAXIMUM	6.8	4.5	8.8	6.1
MINIMUM	0.7	0.6	0.4	0.6
MEDIAN	1.5	2.2	2.1	1.6
Std. Dev	1.3	1.0	2.2	1.5

- NOTES:
- "C" indicates that data was censored due to ambient temperatures below manufacturer's specifications causing erroneous recordings.
 - "I" indicates incomplete data.
 - "M" indicates radon monitor malfunction.

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

4243

K-65 SILO REPORT
RADON CONCENTRATIONS

MONTH: FEBRUARY, 1993

REPORT GENERATED: 03/19/93

Daily Summary of Recorded Headspace Concentrations
(recorded at 5 minute intervals)

Date	SILO 1				SILO 2			
	Average	Maximum	Minimum	Std. Dev.	Average	Maximum	Minimum	Std. Dev.
02/01/93	5528	38390	80	6563	35108	107880	2720	29606
02/02/93	46874	152140	6770	36521	80199	252610	2550	82479
02/03/93	55161	154980	7280	42704	165710	377880	29920	119674
02/04/93	19777	96770	1920	17649	79366	174970	15910	33705
02/05/93	64731	190450	4600	43093	203711	467720	20520	131175
02/06/93	17047	119350	1920	19522	109295	189310	27770	52519
02/07/93	58306	163180	10620	42639	213608	353980	45910	76724
02/08/93	8338	68670	1920	11209	96516	236790	16730	63970
02/09/93	33232	132570	1920	38282	171558	349040	48870	86625
02/10/93	63399	138760	2590	53154	259077	394370	57610	110516
02/11/93	7762	87740	1920	13503	63508	247660	6680	50973
02/12/93	27678	154820	1920	38200	114440	417450	19200	79440
02/13/93	3137	7950	1920	1202	62888	89090	21840	18659
02/14/93	5387	63480	1920	7591	56278	94370	6680	30417
02/15/93	35191	135910	2760	32014	65809	336680	3380	40901
02/16/93	30468	150300	1920	35318	15008	58760	2720	16550
02/17/93	4918	70010	1920	6615	2702	3380	2550	165
02/18/93	3332	11460	1920	1862	2550	2550	2550	0
02/19/93	16239	116340	2760	18783	36818	141350	2550	45456
02/20/93	64377	144440	9280	36973	159386	302880	41620	48580
02/21/93	112735	279600	2590	76531	145529	278980	27770	63186
02/22/93	2727	8610	1920	933	33441	86620	3210	28178
02/23/93	3112	15970	1920	1694	23688	59090	2720	19949
02/24/93	15335	79370	1920	15881	2557	2720	2550	34
02/25/93	25343	66490	5940 (M)	12946	2550	2550	2550 (M)	0
02/26/93	1957	3090	1920	152	2390	2390	2390	0
02/27/93	18362	108310	3930	21315	24415	173160	2390	40588
02/28/93	34576	121360	3760	32524	46731	263320	2550	72654

Grab Samples of Headspace

Date	SILO 1 Concentration	SILO 2 Concentration
02/02/93	221015	142538
02/05/93	266375	653236
02/08/93	17190	353710
02/13/93	358351	647185
02/15/93	219262	508504

- Notes:
1. All values reported in pCi/L.
 2. "M" denotes data incomplete due to equipment failure, i.e. less than 24 hours data available.
 3. Report generated from data files which were a combination of data from the field computer and the peripheral computer.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR
CONTROL AND ABATEMENT OF RADON-222 EMISSIONS
MONTHLY PROGRESS REPORT**

PERIOD ENDING FEBRUARY 28, 1993

ENCLOSURE D

DRILLING/BORING LOGS

PROJECT NUMBER: WBA-40 (04.28)	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4938 4938 By 2/18/93	COORDINATES:	DATE: 1/29/93	
ELEVATION:	GWL: Depth 80 ft	Date/Time: 2/2/93	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yearley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE OF 10		

DEPTH (FT)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1315	4		Soft 10YR(3/3) Dh. brown organic silty clay, low plasticity, med	OL		$\alpha\beta = 60-80 \text{cpn}$ HNU = 0 ppm
	107305 104685	6	8	V. Stiff 10YR(5/4) yellowish brown, low plasticity, moist, silty clay	CL	2.5	
	1/29/93	4		SAA	CL	3.5	
2	1320	31		Hard 10YR(5/4) yellowish brown, silty clay w/ gravel, low plasticity, moist	CL	>4	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107306 104686	27	12				
3	1/29/93	39					
4	1330	37		Hard, SAA 10YR(5/4) yellowish brown, silty gravelly clay, low plasticity, moist	CL	>4	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107307 104687	47	18				
	1/29/93	50					
5	1340	47		V. Stiff SAA	CL	3	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
6	107308 104688	50 1/2	8				
	1/29/93						
7	1415	9		Stiff 10YR(5/4) yel. brown silty gravelly clay w/ coarse gravel, low plasticity, moist	CL	2.5	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107309 104689	7	6				
	1/29/93	11					
8	1425	10		SAA	CL	2.25	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107310 104690	15	5				
	1/29/93	17					
9	1435	29		SAA	CL	3	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107311 104691	21	16				
	1/29/93	50 1/2					
11	1445	10		V. Stiff 2.5Y(4/1) Dh. Grey, silty gravelly clay, low plast. moist	CL	3.5	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107312 104692	17	12				
	1/29/93	19					
12	1455	23		SAA	CL	3.25	$\alpha\beta = 60-80 \text{cpn}$ HNU = 0 ppm
	107313 104693	25	12				
	1/29/93	34					
13	1515	13		SAA	CL	NA	$\alpha\beta = 40-60 \text{cpn}$ HNU = 0 ppm
	107314 104694	17	5				
	1/29/93	21					

on this page only
 Buy 2/10/93
 For sample # corrections

DELETED

NOTES

Drilling Contractor Pennsylvania Drilling SAA - Same as above 082

Drilling Equipment 38 Cyclone NA - Not Applicable

Driller Chris Coulter

David Holmes

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

PROJECT NUMBER: WBA-40 (04.28)	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4438 4938	COORDINATES:	DATE: 1/29/93	
ELEVATION: By 2/18/93	GWL: Depth 80 ft	Date/Time: 3 By 2/2/93	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yearley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE 2 OF 10		

Write by
 For sample # corrections
 on this page only

DEPTH (FT)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	1600	11					$\alpha\beta = NA$
16	1/29/93	9	0	No Recovery	-	-	HNU = NA
17	1615 104705 107315 1/29/93	7 6	6	v. stiff 2.5Y(4/1) Dh Gray, gravelly clay, low plasticity, moist	CL	2.0	$\alpha\beta = 60-80cpm$ HNU = 0 ppm
18	1620 104706 107316 1/29/93	31 27	8	v. stiff, SAA	CL	2.25	$\alpha\beta = 60-80cpm$ HNU = 0 ppm
19	1636 104707 107317 1/29/93	10 26	11	v. Dense, 2.5Y(4/1) Dh Gray, fine sand, poor sorting, moist	SLW	NA	$\alpha\beta = 80-100$ HNU = 0 ppm
20	1640 104708 107318 1/29/93	3 3	4	v. stiff 2.5Y(4/1) Dh. Gray, silty, gravelly clay, low plasticity, moist	CL	2.5	$\alpha\beta = 60-80cpm$ HNU = 0 ppm
21	1645 104709 107319 1/29/93	14 17	10	v. stiff 2.5Y(4/1) Dh. Gray, silty, gravelly clay, low plasticity, moist	CL	2.25	$\alpha\beta = 60-80cpm$ HNU = 0 ppm
22	0905 104710 107320 2/1/93	13 9	2	v. SAA 2.5Y(4/2) Olive, silty gravelly clay, low plasticity, moist	CL	2.0	$\alpha\beta = 60cpm$ HNU = 5 ppm
23	0915 104711 107321 2/1/93	14 17	6	v. stiff 2.5Y(4/1) Dh. Gray, silty, gravelly clay, low plasticity, moist	CL	3.0	$\alpha\beta = 60-80cpm$ HNU = 0 ppm
24	0925 104712 107322 2/1/93	11 10	10	stiff, SAA	CL	1.5	$\alpha\beta = 60cpm$ HNU = 0 ppm
25	0940 104713 107323 2/1/93	10 12	10	stiff, SAA	CL	1.75	$\alpha\beta = 60cpm$ HNU = 0 ppm
26	21193	15					

NOTES
 Drilling Contractor Pennsylvania Drilling
 Drilling Equipment 38 Cyclone
 Driller Chris Coulter
David Holmes
 SAA - Same as above
 NA - Not Applicable
 Samples collected per ASTM standard penetration test
 Colors identified using Munsell Color Chart

PROJECT NUMBER: WBA-40 (04.28)	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4438 4938	COORDINATES:	DATE: 2/1/93	
ELEVATION: By 2/1/93	GWL: Depth 80 ft	Date/Time: 2/1/93	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yearley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool			PAGE 3 OF 10

For sample corrections
 By 2/12/93
 on this page only

PRELIMINARY

DEPTH (FT)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	0945	4					
31	104714 107324 2/1/93	14 9	4	Stiff, 5Y(4/2) olive, silty, gravelly clay, low plasticity, moist	CL	1.75	$\alpha\beta = 60\text{cpm}$ HNU = 0ppm
32	1030	14		SAA			
33	104715 107325 2/1/93	17 23	6		CL	1.75	$\alpha\beta = 40-60\text{cpm}$ HNU = 0ppm
34	1040	15		SAA			
34	104716 107326 2/1/93	17 24	5		CL	1.70	$\alpha\beta = 40-60$ HNU = 0ppm
35	1100	7		SAA			
35	104717 107327 2/1/93	9 11	12		CL	1.75	$\alpha\beta = 60-80$ HNU = 0ppm
36	1110			SAA			
37	104718 107328 2/1/93	29 29 29	4		CL	1.75	$\alpha\beta = 60-80$ HNU = 0ppm
38	1830	50/0	3	Very stiff, SAA	CL	3.0	$\alpha\beta = 40-60\text{cpm}$ HNU = 0ppm
39	1845	18					
40	104720 107330 2/1/93	32 29	16	V. stiff, dk. grey 2.5Y(4/1) silty gravelly clay, low plasticity, moist	CL	3.0	$\alpha\beta = 40-60\text{cpm}$
40				V. stiff - hard, 2.5Y(4/1) dk grey clayey silt, w. plasticity, moist	ML	4.0	HNU = 0ppm
41	1900	28		Med dense 5Y(6/2) dk grey sand (sta)	SP	NA	
41	104721 2/1/93	33	18	SAA	SP	NA	$\alpha\beta = 60-80\text{cpm}$
42		50/3		Hard, 2.5Y(4/1) dk grey, clayey silt, w. plasticity, moist	ML	4.25	HNU = 0ppm
43	1715	23					
43	104722 107331 2/1/93	27	16	V. stiff 2.5Y(4/1) dk grey clayey silt, slight plasticity, moist	ML	2.5	$\alpha\beta = 40-60\text{cpm}$ HNU = 0ppm
44	1430	26					
44	104723 107332 2/1/93	50/2	8	Med. dense - v. dense 5Y(6/2) Fg sand, poorly sorted, moist	SP	NA	$\alpha\beta = 60-80\text{cpm}$ HNU = 0ppm

NOTES
 Drilling Contractor Pennsylvania Drilling
 Drilling Equipment 38 Cyclone
 Driller Chris Coulter
David Holmes
 SAA - Same as above
 NA - Not Applicable
 Samples collected per ASTM standard penetration test
 Colors identified using Munsell Color Chart

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4938	COORDINATES:	DATE: 2/2/93	
ELEVATION:	GWL: Depth 80 ft	Date/Time: 2/2/93	DATE STARTED: 1/29/93
ENGINEER/GEOLOGIST: B. Yearstley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE 4 OF 10		

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45				* Begin 5 feet sampling in aquifer			
50	1500 104724 107333 2/1/93	23 25 31	9	V. Dense 5Y(6/2) lt. olive grey f.g. sand, poorly graded, moist	SP	NA	$\alpha\beta = 40-60$ HNU = 0ppm
55	1600 107334 104725 2/1/93	27 50/3	6	V. Dense 5Y(5/1) grey, med. g. gravelly sand, poorly sorted, moist graded by 2/1/93	SP	NA	$\alpha\beta = 40-60$ HNU = 0ppm
60							

Buy 2/12/93 on this page only
 For sample # corrections

PRIMARY

NOTES

Drilling Contractor Pennsylvania Drilling SAA - Same as above 085

Drilling Equipment 38 Cyclone NA - Not Applicable

Driller Chris Coulter
David Holmes Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4438 4938	COORDINATES:	DATE: 2/3/93	
ELEVATION: By 2/16/93	GWL: Depth 80 ft	Date/Time: 2/2/93 ^{3 By 2/12/93}	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yearley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE 6 OF 10		

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	1245 107338 104725 2/3/93	200/6	6	V. Dense 5Y (6/2) dk. olive gray crs. grained gravelly sand w/ coarse gravel, well sorted, moist green By 2/16/93	SW	NA	B ₈ = 60-80cp H _{NU} = 0ppm
				Hit Water			*Water predicted at 76-77 by water mark on pipe & ease of penetration
80	1300 104734 2/3/93 107339	6 5 5	7	Loose 5Y (6/2) dk. olive gray crs. grained silty, gravelly sand, well sorted, green, wet By 2/16/93	SW	NA	B ₈ = 60-80cp H _{NU} = 0ppm
85	1400 104732 2/3/93 107340	11 15 17	10	SAA	SW	NA	B ₈ = 60-80cp H _{NU} = 0ppm
90							*After taking this sample and set hydro-punch we see water at 90'

For sample # Corrections By 2/12/93 on this page only

PRIMARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 38 Cyclone

Driller Chris Coulter
David Holmes

SAA - Same as above

NA - Not Applicable

086

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

PROJECT NUMBER: WBA-40 (04.28)	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4438 4938 By 2/1/93	COORDINATES:	DATE: 2/3/93, 2/4/93	
ELEVATION:	GWL: Depth 80 ft	Date/Time: 2/7/93	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yeardley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE 7 OF 10		

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	1700 104733 2/3/93	7 9 13	Ø	No Recovery		NA	B ₈ = NA H _{NU} = NA
95	0905 104733 2/4/93 107341	50/4	7	V. Dense 2.5Y(5/2) brownish grey, sand w/ gravel, well graded, wet	SW	NA	B ₈ = 60-80cpm H _{NU} = 0ppm
100	0940 104734 2/4/93 107342	19 23 21	9	Dense 2.5Y(5/2) grayish brown, gravelly sand, well graded, wet	SW	NA	B ₈ = 60-80cpm H _{NU} = 0ppm

For sample # Corrections By 2/12/93 on this page only

PRIMARY
2/2 08/1/93

087

NOTES Drilling Contractor <u>Pennsylvania Drilling</u> Drilling Equipment <u>38 Cyclone</u> Driller <u>Chris Coulter</u> <u>David Holmes</u>	SAA - Same as above NA - Not Applicable Samples collected per ASTM standard penetration test Colors identified using Munsell Color Chart
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PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4438 4938	COORDINATES:	DATE: 2/1/93, 2/2/93	
ELEVATION: ^{By 2/18/93}	GWL: Depth 30 ft	Date/Time: ^{3 By} 2/2/93	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yeardeley	Depth	Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE 5 OF 10		

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6-in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	1115 107335 104727 2/1/93	47 50/3	7	V. Dense 5Y (6/1) Grey, medium grain sand w/ coarse gravel, poorly graded 2/16/93 by sorted, moist	SP	NA	$\alpha\beta = 40-60$ cpm HNU = 0 ppm
65	1310 107336 104727 2/2/93	37 50/3	8	V. Dense 5Y (6/1) Grey, gravelly, crsc. grain sand, well graded, moist	SW	NA	$\alpha\beta = 40-60$ cpm HNU = 0 ppm
76	1330 107337 104728 2/2/93	38 50/4	10	V. Dense 5Y (6/1) Grey, gravelly, fg. sand, well graded, moist	SW	NA	$\alpha\beta = 40-60$ cpm HNU = 0 ppm
75							088

For sample corrections on this page only
 By 2/12/93

PENNSYLVANIA

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 38 Cyclone

Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

PROJECT NUMBER: WBA-40 (04.28)	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 4438 4939	COORDINATES:	DATE: 2/4/93
ELEVATION: By 2/18/93	GWL: Depth 80ft Date/Time: 2/7/93	DATE STARTED: 1/28/93
ENGINEER/GEOLOGIST: B. Yeardley	Depth Date/Time:	DATE COMPLETED: 2/10/93
DRILLING METHODS: Cable Tool	PAGE 8 OF 10	

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105	1400 14735 2/4/93	6 12 18	5	Med. Dense 2.5Y (5R) greyish brown, gravelly sand, well graded, wet	SW	NI	$\beta_8 = 60-80$ HNU = oppn
	107343						Lg. gravel clogged screen
110	1410 14736 2/4/93	17 19 23	18	Med. Dense 2.5Y (5/2) greyish brown, sand w/ some gravel, well graded, wet → last 2in = gravel, poorly graded	SW	NA	$\beta_8 = 60-80$ oppn HNU = oppn
112	107344			↑			
113				*Well abandoned prematurely so to building placement Bottom of sampling at 111.5 Ft			at 110F
114							
115	1498						
120							

For sample & corrections By 2/12/93 at this page only

NOTES

Drilling Contractor Pennsylvania Drilling SAA - Same as above 089

Drilling Equipment 38 Cyclone NA - Not Applicable

Driller Chris Sautter

David Holmes Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II FIELD ENG./GEO. B Yeardley DATE 2/16/93
 PROJECT NO. WBA-40 CHECKED BY _____ DATE _____
 BORING NO. 4938
 PIEZOMETER NO. NA DATE OF INSTALLATION 2/8/93 - 2/10/93
Plugging 2/9/93

BOREHOLE DRILLING

DRILLING METHOD <u>Cable Tool</u>	TYPE OF BIT <u>Hammer Percussion</u>
DRILLING FLUID(S) USED: FLUID <u>water</u> FROM <u>0.0 FT</u> TO <u>90.0 FT</u> FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	CASING SIZE(S) USED: SIZE <u>20 in ID</u> FROM <u>0.0 FT</u> TO <u>120 FT</u> SIZE <u>NA</u> FROM <u>NA</u> TO <u>NA</u>

PIEZOMETER DESCRIPTION

TYPE <u>NA</u>	RISER PIPE MATERIAL <u>NA</u>
DIAMETER OF PERFORATED SECTION <u>NA</u>	RISER PIPE DIAMETERS: O.D. <u>NA</u> I.D. <u>NA</u>
PERFORATION TYPE: SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>NA</u>
AVERAGE SIZE OF PERFORATIONS <u>NA</u>	JOINING METHOD <u>NA</u>
TOTAL PERFORATED AREA <u>NA</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>NA</u>	OTHER PROTECTION <u>NA</u>
PROTECTIVE PIPE O.D. <u>NA</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION ()	
TOP OF RISER PIPE	<u>NA</u>			
GROUND SURFACE	<u>0.0</u>			
BOTTOM OF PROTECTIVE PIPE	<u>NA</u>			
BOREHOLE FILL MATERIALS: CEMENT GROUT/STURRY by 2/16/93 BENTONITE SAND GRAVEL	TOP <u>0.0</u>	Bottom <u>2.0</u>		
	TOP <u>2.0</u>	BOTTOM <u>64.0</u>	TCP	BOTTOM
	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP	BOTTOM
	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP	BOTTOM
	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP	BOTTOM
PERFORATED SECTION	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP	BOTTOM
PIEZOMETER TIP	<u>NA</u>			
BOTTOM OF BOREHOLE	<u>110.0</u>			
GWL AFTER INSTALLATION	<u>NA</u>			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO 090
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

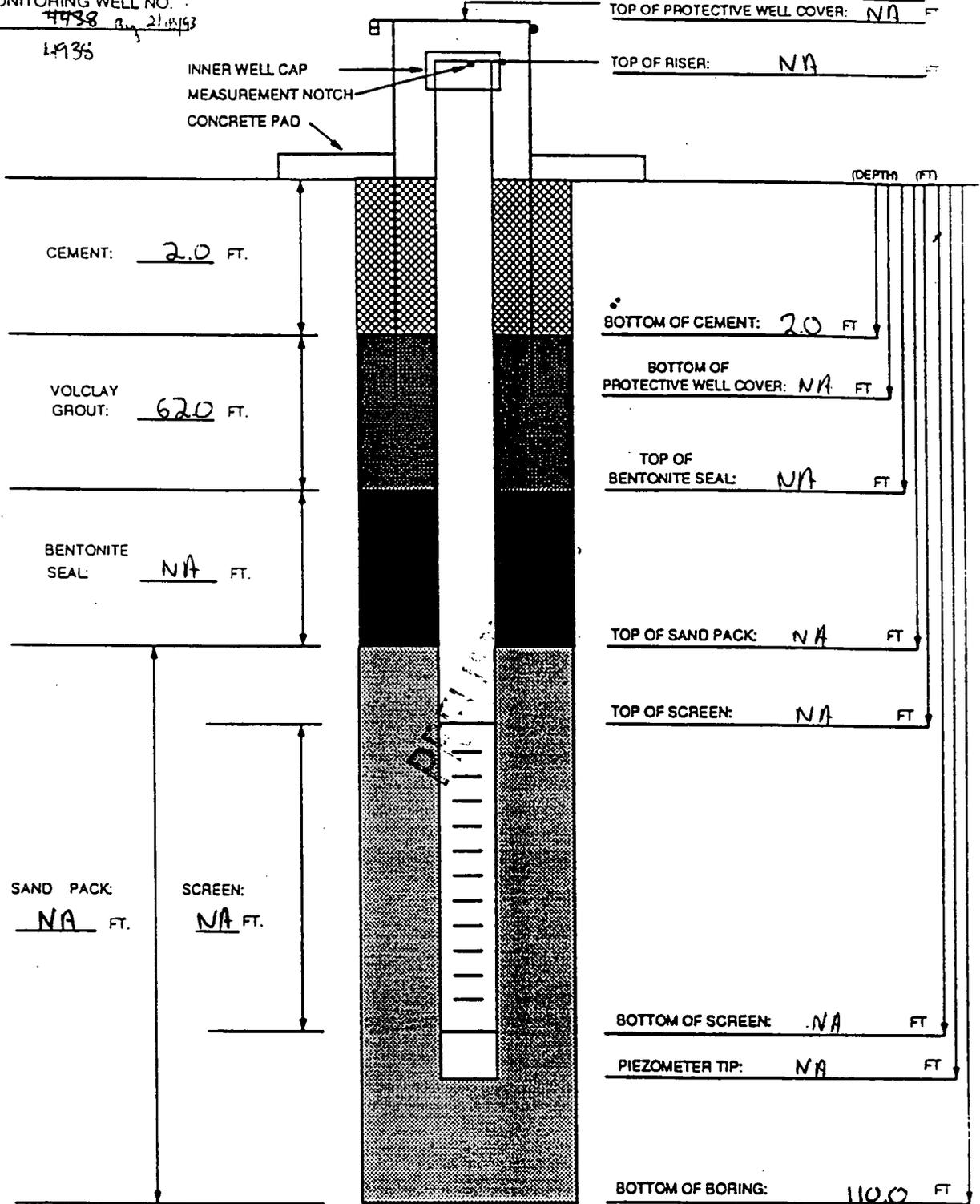
REMARKS Pulled casing and let sand cave in up to 64.0 ft

FERNALD R/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4738

2/21/93
1993

Plugging By 2/10/93
INSTALLATION DATE: 1/29/93 - 2/10/93
2/8/93 HEIGHT

4243



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 20 bags
AMOUNT OF CEMENT: 2 bags
AMOUNT OF WATER USED: 750 gallons
OTHER: 16 drums of soil, 1 drum water
TASK: WBA-40 (64.28)

NOTES:

- 1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
- 2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
- 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
- 4) WATER DEPTH AND DATE 800 FT. 2/21/93
- 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
- 6) PARENTHESIS INDICATE DEPTHS FROM GROUND LEVEL.
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Rrian Yeardley

VISUAL CLASSIFICATION OF SOILS

4243

PROJECT NUMBER: 602.04.27 <small>wages</small>		PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2426	COORDINATES:	DATE: 11/21/93	
ELEVATION:	GWL: Depth 78.8	Date/Time: 2/4/93 1330	DATE STARTED: 11/27/93
ENGINEER/GEOLOGIST: D. O'Brien	Depth: 78.3	Date/Time: 2/10/93 0900	DATE COMPLETED: 2/14/93
DRILLING METHODS: Cable Tool		PAGE: 1	OF 4

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.0 MIN	RECOVERY 100%	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				For descriptions of soils from 0 - 74.0 ft., refer to boring 4426, VC of Soils			

NOTES:

Drilling Contract: <u>Pennsylvania Drilling</u> Drilling Equipment: <u>42 Cyclone</u> Driller: <u>Jim Sacconi</u> <u>Dan Jameson</u>	SAA - Same as Above NA - Not Applicable
---	--

Bkgd: HNU = 0ppm BX = 40-100ppm

VISUAL CLASSIFICATION OF SOILS

4243

PROJECT NUMBER: 602.04.27 w3405	PROJECT NAME: RCRA Phase I
BORING NUMBER: 2426	COORDINATES: _____ DATE: 1/29/93
ELEVATION: _____	GWL: Depth 520.1 Date/Time _____ DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: D. O'Brien	Depth 522.0 Date/Time _____ DATE COMPLETED: 2/4/93
DRILLING METHODS: T. Anderson Cable Tool	PAGE 2 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 100mm	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (%SF)	REMARKS
74	103377	30	18	V. Dense. 10YR(12) Light brownish gray, fine to coarse sand, trace gravel, fine to coarse, no wet	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 60 cpm
75.5	0845	49					
	103377	27	18	SAA	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 40 cpm
77.0	UK	40					
	103377	47	9	V. Dense. 10YR(12) Light brownish gray, fine to coarse sand w/ coarse gravel, wet	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 40 cpm
78.5	UK	10					
	1129193	31	0	No Recovery	NA	NA	H ₂₅ = NA P ₂₅ = NA
80.0	NA	48	0				
	103377	19	16	V. Dense 10YR(12) gray, fine to coarse sand trace gravel, wet	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 40 cpm
81.5	UK	27					
	103377	35					
83.0	1715	47	18	SAA	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 40 cpm
84.5	21193	48					
	103377	21	15	Dense. 10YR(11) Gray, fine to coarse sand w/ gravel, wet	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 60 cpm
86.0	0935	9	17	Dense. 10YR(11) Gray, fine to coarse sand, w/ gravel, wet	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 40 cpm
87.5	21193	16					
	103377	15	15	M. Dense. 10YR(11) Gray, coarse sand, w/ gravel, wet	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 60 cpm
89.0	0935	14					
	103377	6	18	SAA	SW	NA	H ₂₅ = 0 ppm P ₂₅ = 60 cpm
90.0	103377	10					

NOTES: Pennsylvania Drilling * Bottoms Sampling 57.0-59.0ft - Same as Above

Drilling Contract: _____

Drilling Equipment: 42 Cyclone NA - Not Applicable

Driller: Jim Saccani Note: Soils collected from 74.0-59.0ft - used for sieve analysis

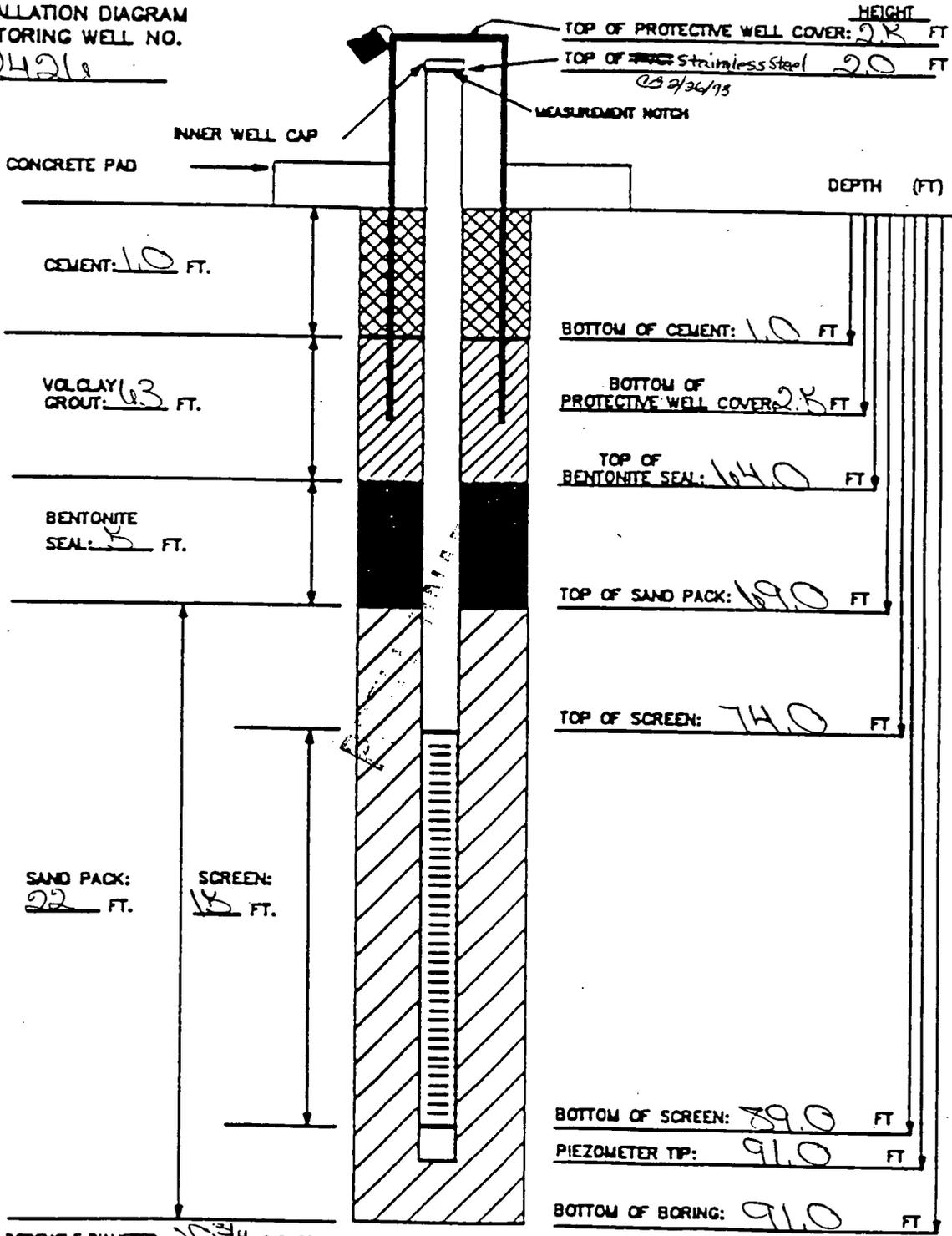
Dan Jameson Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD RI/FS INSTALLATION DIAGRAM MONITORING WELL NO.

2421

INSTALLATION DATE: 2/14/93



MATERIALS USED:
 SAND TYPE AND QUANTITY: 4/30 25 bags
 BENTONITE PELLETS (5-GALLON BUCKETS): 4 buckets
 BAGS OF VOLCLAY GROUT: 17 bags
 AMOUNT OF CEMENT: 1 bag
 AMOUNT OF WATER USED: 100 gal
 OTHER: 14 soil drums

- NOTES:**
- 1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS. 2/14/93
 - 2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. 2/14/93
 - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SLAMP.
 - 4) WATER DEPTH/DATE: 78.84 2/14/93

TASK: W02 ON 27
(WBA 05)

GEOLOGIST/ENGINEER: D.P. Ryan

	Initial	
Field	<u>CB</u>	<u>2/14/93</u>
Lab		
Reg		
Hard Copy		
Verification		

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA 00201 FIELD ENG./GEO. D. O'Brien DATE 2/4/93
 PROJECT NO. 100 CH/27 (WBA 05) CHECKED BY C. Brown DATE 02/26/93
 BORING NO. 242U
 PIEZOMETER NO. 242U DATE OF INSTALLATION 2/4/93

BOREHOLE DRILLING

DRILLING METHOD <u>Cable Tool</u>	TYPE OF BIT <u>CHURN BIT</u>
DRILLING FLUID(S) USED: FLUID <u>HO</u> FROM <u>0.0ft</u> TO <u>91.0ft</u> FLUID <u>NA</u> FROM <u>—</u> TO <u>—</u>	CASING SIZE(S) USED: SIZE <u>10 3/4 in</u> FROM <u>0.0</u> TO <u>91.0ft</u> SIZE <u>NA</u> FROM <u>—</u> TO <u>—</u>

PIEZOMETER DESCRIPTION

TYPE <u>Monitoring Well</u>	RISER PIPE MATERIAL <u>316 stainless steel</u>
DIAMETER OF PERFORATED SECTION <u>4.0 in ID</u>	RISER PIPE DIAMETERS: O.D. <u>4 3/8 in</u> I.D. <u>4.0 in.</u>
PERFORATION TYPE: SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>7-10ft 1-8ft 1-2ft</u>
AVERAGE SIZE OF PERFORATIONS <u>0.02 in</u>	JOINING METHOD <u>Flush joint threads</u>
TOTAL PERFORATED AREA <u>15 ft</u>	

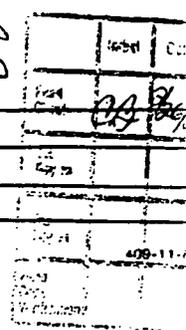
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5ft</u>	OTHER PROTECTION <u>wood boring cover</u>
PROTECTIVE PIPE O.D. <u>10 3/4 in</u>	<u>with rock</u>

ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (ft)		ELEVATION ()	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: <u>Cement</u> GROUT/SLURRY BENTONITE SAND GRAVEL	TOP 0.0	BOTTOM 1.0		
	TOP 1.0	BOTTOM 14.0	TCP	BOTTOM
	TOP 14.0	BOTTOM 19.0	TOP	BOTTOM
	TOP 19.0	BOTTOM 91.0	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 74.0	BOTTOM 89.0	TOP	BOTTOM
PIEZOMETER TIP	91.0			
BOTTOM OF BOREHOLE	91.0			
GWL AFTER INSTALLATION	78.8			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS _____



MW-2426

Customer Number: 103377

MATERIAL: _____

SAMPLE NUMBER: 930201-092

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 133.9

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
<u>10</u>	<u>31.27</u>	<u>23.2</u>	<u>23.2</u>	<u>78.7</u>
<u>20</u>	<u>22.66</u>	<u>21.4</u>	<u>45.2</u>	<u>33.5</u>
<u>40</u>	<u>29.21</u>	<u>21.8</u>	<u>67.0</u>	<u>16.7</u>
<u>60</u>	<u>22.14</u>	<u>16.5</u>	<u>83.5</u>	<u>9.8</u>
<u>100</u>	<u>11.07</u>	<u>8.3</u>	<u>91.8</u>	<u>5.9</u>
<u>200</u>	<u>4.54</u>	<u>3.4</u>	<u>95.2</u>	<u>3.0</u>
<u>Pan</u>	<u>5.44</u>	<u>4.1</u>	<u>99.3</u>	

$$\frac{W_2 \times 100\%}{W_1} = R$$

$$\frac{\text{Original - Duplicate}}{\text{Average}} \times 100\% = \text{RPD}$$

Analyzed by: John Roberts

Checked by: [Signature]

Date analyzed: 2-2-93

GRAIN SIZE Retained	40 %	<u>41</u>
	50 %	<u>29</u>
	90 %	<u>6</u>

Lab No.	Date
CB 1/2	
Lab No.	Date
Lab No.	Date
Lab No.	Date

%

101111 - 2720

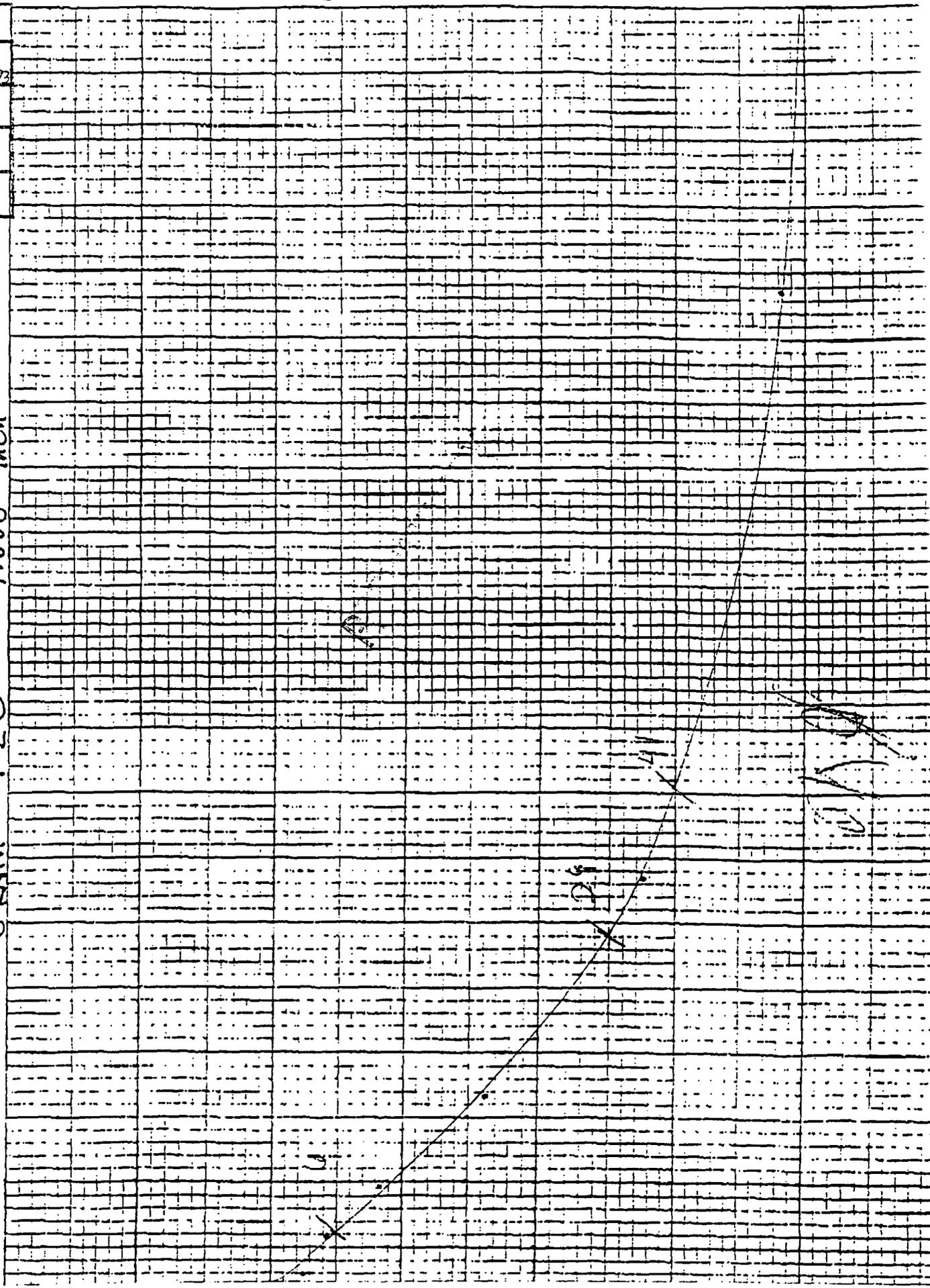
4243

Sheet	Date
1	1/10/20
2	
3	
4	

EUGENE DIETZGEN CO
MADE IN U. S. A.

NO. 3307-410 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

GRAIN SIZE /1000 inch



Soil Analysis - Well 2426

4243

$$40\% = 41 \quad 50\% = 29 \quad 90\% = 6$$

$$\frac{40\%}{90\%} = \frac{41}{6} = \frac{6.83}{\cancel{1.63}} > 3 \text{ use factor of 4}$$

$$50\% \times 4 = .29 \times 4 = 0.116$$

Use coarse sand # .020 slot screen

OB 2/26/93

0.116

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602 04 28 W07-40	PROJECT NAME. RCRH Phase II	
BORING NUMBER. 3452	COORDINATES.	DATE 1/27/93
ELEVATION:	GWL: Depth 63.5' Date/Time 2/5/93/950	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST. Ken Geiger	Depth 61.7' Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS Cable Tool	PAGE 1	OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16" IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	107000	1		Soft, Dark Yellowish Brown (10YR 4/4) silty clay with a trace of silt sand, med plasticity, moist	ML	1.5	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm Some Grass + roots in sample
	1330	2	18				
	1/27/93	3			CL		
1.5	107001	1		Stiff Yellowish Brown (10YR 5/6) silty sandy clay with some gravel low plasticity, moist	CL	1.5	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1340	1	13				
	1/27/93	1					
3.0	107002	2		Stiff, yellowish brown (10YR 5/6) silty clay with some sand and gravel low plasticity, moist	CL	1.5	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1350	3	18				
	1/27/93	5					
4.5	107003	19		Same as Above	CL	1.5	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1400	23	18				
	1/27/93	28		Stiff Gray (2.5Y 5/1) silty sandy clay with some gravel low plasticity, moist	CL	1.5	
6.0	107004	19		Very soft Gray (2.5Y 5/1) silty sandy clay with some gravel low plasticity, moist	CL	1.25	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1410	28	12				
	1/27/93	32					

NOTES:

Drilling Company: Pennsylvania Drilling
 Driller: Dave Newman
 Assistant Driller:

Samples collected PER ASTM standard Penetration Test. Colors identified using Munsell color chart.
Background Levels
 H_{nu} = 0 ppm
 P_y = 20-40 cpm
 L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04 25 WPA-40	PROJECT NAME: RCHA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE: 1/27/93
ELEVATION:	GWL: Depth 63.5 ^{ft} Date/Time 2/15/93/1550	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Gaiger	Depth 61.7 ^{ft} Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: CUBI2 Tool	PAGE 2 OF 13	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	107005 1420 1/27/93	14 23 45	12	Very Soft Gray (2.5Y, 5/1) Silty Sandy clay with some Gravel Low Plasticity, moist	CL	.25	H _{nu} = 0 ppm B _p = 40 cpm L = 0 cpm
9.0	107006 1430 1/27/93	33 45 49	18	Very Soft Gray (2.5Y, 5/1) Silty Sandy clay with some Gravel medium Plasticity, moist	CL	.25	H _{nu} = 0 ppm B _p = 40 cpm L = 0 cpm
10.5	107007 1600 1/27/93	2 4 4	13	Very Soft Gray (2.5Y, 5/1) Silty Sandy clay with a Trace of Gravel, medium Plasticity, moist	CL	.25	H _{nu} = 0 ppm B _p = 40 cpm L = 0 cpm
12.0	107008 830 1/28/93	4 6 9	14	Stiff Dark Gray (2.5Y, 4/1) Silty Sandy clay with some Gravel, medium Plasticity, moist	CL	1.0	H _{nu} = 0 ppm B _p = 60 cpm L = 0 cpm
13.5	107009 840 1/28/92	4 6 8	7	Same as Above	CL	1.0	H _{nu} = 3.0 ppm B _p = 60 cpm L = 0 cpm
15.0							

NOTES:

See Page 1

Background Levels
1/27/93
H_{nu} = 0 ppm
B_p = 20-40 cpm
L = 0 cpm

Background Levels
1/28/93
H_{nu} = 0 ppm
B_p = 40-60
L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6020428 WBA-40	PROJECT NAME: RCRH Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE: 1/28/93
ELEVATION:	GWL: Depth 63.5 ^{ft} Date/Time 2/5/93/750	DATE STARTED: 1/29/93
ENGINEER/GEOLOGIST: Ken Griger	Depth 61.4 ^{ft} Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool	PAGE: 3	OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	107010	7	6	Very Soft Dark Gray (2.5Y, 4/1) silty clay with some sand and gravel, medium plasticity, moist	CL	.25	H _{nu} = 1 ppm P _y = 40 cpm L = 0 cpm
	850	8					
	1/28/93	7					
16.5	107011	5	14	Very Soft, Dark Gray (2.5Y, 4/1) silty clay with some sand and gravel, medium plasticity, moist	CL	.25	H _{nu} = 1 ppm P _y = 40 cpm L = 0 cpm
	905	5					
	1/28/93	7					
18.0	107012	6	18	Same As Above	CL	.25	H _{nu} = 1 ppm P _y = 40 cpm L = 0 cpm
	920	9					
	1/28/93	12					
19.5	107013	7	14	Very soft Dark Gray (2.5Y, 4/1) silty clay with a trace of sand and gravel, medium plasticity, moist	CL	.25	H _{nu} = 1 ppm P _y = 40 cpm L = 0 cpm
	1030	12					
	1/28/93	14					
21.0	107014	7	13	Same As Above	CL	.25	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1050	13					
	1/28/93	14					
22.5							

PRELIMINARY

NOTES:

See Page 1

Background Levels

H_{nu} = 0 ppm
P_y = 40-60 cpm
L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 020428 WBA-40	PROJECT NAME: RCRH Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE: 1/23/93
ELEVATION:	GWL: Depth 63.5' Date/Time 2/15/93/750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7' Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 4 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	107015	1		Hard Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm B _y = 40 cpm L = 0 cpm
	1340	1	6	Gravelly, Sandy, clay Low plasticity, slightly moist	CL	4.5	
		50					
24.0	107016	32	8	Same As Above	CL	4.5	H _{nu} = 0 ppm B _y = 40 cpm L = 0 cpm
	1430	50/4					
25.5	107017	19		Very Stiff Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm B _y = 40 cpm L = 0 cpm
	1510	25	12	Gravelly clay with some sand, medium plasticity, slightly moist	CL	3.5	
		35					
27.0	107018	13		Very Stiff Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm B _y = 40 cpm L = 0 cpm
	1540	17	17	Sandy clay with some gravel, medium plasticity, slightly moist	CL	3.5	
		21					
29.5	107019	10		Stiff, Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm B _y = 40 cpm L = 0 cpm
	1600	12	18	Sandy clay with some gravel and a trace of organic material (wood), medium plasticity, slightly moist	CL	2.0	
		12					
30.0							

NOTES: see Page 1

Background Levels
 H_{nu} = 0 ppm
 B_y = 40-60 cpm
 L = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6020428 WBA-40	PROJECT NAME RCRA Phase II	
BORING NUMBER 3452	COORDINATES	DATE 1/24/93
ELEVATION:	GWL: Depth 63.5 ^{ft} Date/Time 2/5/93/750	DATE STARTED 1/24/93
ENGINEER/GEOLOGIST Ken G. ...	Depth 61.7 ^{ft} Date/Time 2/17/93/1550	DATE COMPLETED 2/16/93
DRILLING METHODS Cable Tool	PAGE 5 OF 13	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	107020	8		Stiff Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	450	11	6	Sandy clay with some gravel, medium plasticity moist	CL	2.0	
		13					
31.5	107021	8		Vary Stiff Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1020	10	18	Sandy clay with some gravel medium plasticity, moist	CL	3.5	
		12					
32.6	107022	10		Stiff, Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1050	14	18	Sandy clay with some gravel medium plasticity, moist	CL	1.5	
		17					
34.5	107023	9		Same as above			H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1330	12	17		CL	1.5	
		17					
36.0	107024	5		Stiff, Dark Gray (2.5Y, 4/1)			H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1350	7	18	Sandy clay with some gravel, medium plasticity, moist	CL	1.0	
		19					
37.5							

NOTES:

See page 1

Background Levels

H_{nu} = 0 ppm
P_y = 40-60 cpm
L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE: 1/29/93
ELEVATION:	GWL: Depth 63.5' Date/Time 2/15/93/750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Gerger	Depth 61.7' Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool	PAGE 6 OF 13	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.6" IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5	107025 1410 1/29/93	29 32 45	13	Very Dense Dark Yellowish Brown (10YR, 4/4) well Graded medium sand with a trace of gravel, Dry	SW	N/A	H _{nu} = 0 ppm B _γ = 40 cpm α = 0 cpm
39.0	107026 1530 1/29/93	41 50/5	8	Same As Above	SW	N/A	H _{nu} = 0 ppm B _γ = 40 cpm α = 0 cpm
40.5				NO Samples Taken. Samples TO BE TAKEN Every 5' STARTING AT 45'			
45.0	107027 1645 1/29/93	50/5	5	Very Dense, Dark Yellowish Brown, (10YR, 4/4) well Graded medium sand with a trace of gravel, Dry	SW	N/A	H _{nu} = 0 ppm B _γ = 40 cpm α = 0 cpm
46.5							
50.0	107028 930 2/1/93	41 49 50/5	14	Very Dense, Dark Yellowish Brown (10YR, 4/4) well Graded medium sand with some gravel, Dry	SW	N/A	H _{nu} = 0 ppm B _γ = 65 cpm α = 0 cpm
57.5							
52.5							104

NOTES:

See Page 1

Background Levels
1/29/93
H_{nu} = 0 ppm
B_γ = 40-60 cpm
α = 0 cpm

Background Levels
2/1/93
H_{nu} = 0 ppm
B_γ = 40-60 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <i>Co20428 WBA-40</i>	PROJECT NAME: <i>RCRA Phase II</i>	
BORING NUMBER: <i>3452</i>	COORDINATES:	DATE: <i>2/3/93</i>
ELEVATION:	GWL: Depth <i>63.5 Ft</i> Date/Time <i>2/5/93/750</i>	DATE STARTED: <i>1/27/93</i>
ENGINEER/GEOLOGIST: <i>Ken Geiger</i>	Depth <i>61.7 Ft</i> Date/Time <i>2/17/93/1550</i>	DATE COMPLETED: <i>2/16/93</i>
DRILLING METHODS: <i>Cable Tool</i>	PAGE <i>7</i> OF <i>13</i>	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55.0	<i>107029 870 2/3/93</i>	<i>32 50 54/5</i>	<i>4</i>	<i>Very dense Dark yellowish brown (10YR 4/4) well graded medium sand with a trace of gravel and clay, Dry</i>	<i>SW</i>	<i>N/A</i>	<i>H₂O = 0 ppm P_h = 46 cpm L = 0 cpm Some moisture appears to be from rainfall.</i>
56.5							
60.0	<i>107030 950 2/3/93</i>	<i>32 50/5</i>	<i>8</i>	<i>Very dense Dark yellowish brown (10YR 4/4) poorly graded medium sand, with some gravel, Dry</i>	<i>SP</i>	<i>N/A</i>	<i>H₂O = 0 ppm P_h = 40 cpm L = 0 cpm Some moisture appears to be from drilling fluid.</i>
61.5				<i>WATER TABLE 61.7'</i>			
65.0	<i>107031 1335 2/3/93</i>	<i>35 50/3</i>	<i>8</i>	<i>Very dense, Dark gray (10YR 4/1) well graded medium sand, with some gravel, wet</i>	<i>SW</i>	<i>N/A</i>	<i>H₂O = 0 ppm P_h = 40 cpm L = 0 cpm</i>
66.5							
67.5							

NOTES:

See Page 1

Background Levels

*H₂O = 0 ppm
P_h = 46-60 cpm
L = 0 cpm*

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 6020428 WBA-40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 3452	COORDINATES:	DATE 2/3/93
ELEVATION:	GWL: Depth 63.5' Date/Time 2/5/93/ 750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 61.7' Date/Time 2/17/93/ 550	DATE COMPLETED: 2/16/93
DRILLING METHODS Cable Tool	PAGE 8	OF 13

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
69.5							
70.0	107032	12		Medium Dense Dark Gray (10YR, 4/1) well Graded Fine Sand with a Trace of Gravel, WET	SW	N/A	H _{nu} = 0 ppm β _r = 40-60 cpm λ = 0 cpm
	1355	10	14				
71.5	2/3/93	12					
75.0	107033	32		Very Dense Dark Gray (10YR, 4/1) well Graded Fine Sand with a Trace of Gravel, WET	SW	N/A	H _{nu} = 0 ppm β _r = 40-60 cpm λ = 0 cpm
	1500	50/3	6				
76.5	2/3/93						
80.0	107035	6		Medium Dense Dark Gray (10YR, 4/1) Poorly Graded Sand with some Gravel, WET	SP	N/A	H _{nu} = 0 ppm β _r = 40-60 cpm λ = 0 cpm
	1410	10	12				
81.5	2/4/93	17					
82.5							

NOTES:

See page 1

Background Levels
2/3/93
H_{nu} = 0 ppm
β_r = 40-60 cpm
λ = 0 cpm

Background Levels
2/4/93
H_{nu} = 0 ppm
β_r = 40-60 cpm
λ = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.29 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE: 2/4/93
ELEVATION:	GWL: Depth 63.5 ^{ft} Date/Time 2/5/93/750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7 ^{ft} Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool	PAGE: 9	OF 13

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.0 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82.5							
85.0	107036 1505 2/4/93	9 17 21	13	Dense Dark Gray (10YR, 4/1) poorly Graded Gravelly Sand, WET	SP	N/A	H _{nu} = 0 ppm β _γ = 40-60 cpm λ = 0 cpm
86.5							
90.0	107037 1625 2/4/93	9 12 15	18	Medium Dense Dark Gray (10YR, 4/1) poorly Graded Gravelly Sand, WET	SP	N/A	H _{nu} = 0 ppm β _γ = 40-60 cpm λ = 0 cpm
91.5							
95.0	107038 940 2/5/93	25 25 25	18	Dense Dark Gray (10YR, 4/1) poorly Graded Gravelly Sand, WET	SP	N/A	H _{nu} = 0 ppm β _γ = 40 cpm λ = 0 cpm
96.5							
97.5							

NOTES:

See Page 1

Background Levels
2/4/93
H_{nu} = 0 ppm
β_γ = 40-60 cpm
λ = 0 cpm

Background Levels
2/5/93
H_{nu} = 0 ppm
β_γ = 40-60 cpm
λ = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE: 2/5/93
ELEVATION:	GWL: Depth 63.5' Date/Time 2/5/93/750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geipel	Depth 61.7' Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool	PAGE 10 OF 13	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
97.5							
100.0	107038 1020 2/5/93	5 7 10	17	medium Dense, Dark Gray (10YR, 4/1) poorly graded sand with some gravel, wet	SP	N/A	H _{nu} = 0ppm B _p = 40-60cpm L = 0cpm
101.5							
105.0	107041 1425 2/5/93	20 25 31	18	v. Dense, Dark Gray (10YR, 4/1) poorly graded gravelly sand with some clay, wet v. Dense, Dark Gray (5Y, 4/1) clayey silt with a trace of gravel, wet	SP ML	N/A N/A	H _{nu} = 0ppm B _p = 40-60cpm L = 0cpm
106.5	107042 1520 2/5/93	17 24 32	10	Very Dense, Dark Gray (5Y, 4/1) well graded fine sand with a trace of gravel, wet	SW	N/A	H _{nu} = 0ppm B _p = 40-60cpm L = 0cpm
108.0	107043 1535 2/5/93	12 16 21	12	Dense, Dark Gray (5Y, 4/1) well graded fine sand with a trace of gravel, wet	SW	N/A	H _{nu} = 0ppm B _p = 60cpm L = 0cpm
109.5	107044 1600 2/5/93	9 12 17	14	medium Dense, Dark Gray (5Y, 4/1) well graded fine sand with a trace of gravel, wet	SW	N/A	H _{nu} = 0ppm B _p = 40-60cpm L = 0cpm
111.0	107045 935 2/8/93	10 32 50	14	Very Dense, Dark Gray (5Y, 4/1) well graded fine sand with a trace of gravel, wet Very Dense, Brown (10YR, 4/3) well graded fine sand with a trace of gravel, wet	SW SW	N/A N/A	H _{nu} = 0ppm B _p = 60cpm L = 0cpm

PRELIMINARY
 2/18/93

NOTES:	Background Levels 2/5/93 H _{nu} = 0ppm B _p = 40-60cpm L = 0cpm	Background Levels 2/8/93 H _{nu} = 0ppm B _p = 40-60cpm L = 0cpm
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See Page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA-40	PROJECT NAME: KORA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE 2/8/93
ELEVATION:	GWL: Depth 63.5 ^{ft} Date/Time 2/5/93/750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST: Ken Grigor	Depth 61.7 ^{ft} Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool	PAGE 11 OF 13	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
112.5	107046	10		Dense Brown (10YR, 4/3) well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	H ₂ O = 0ppm P _r = 60cpm L = 0cpm
	955	24	12				
	2/8/93	24		Soft, Dark Gray (10YR, 4/1) silty clay with a trace of sand, low plasticity, moist	CL	.5	
114.0	107047	12		Very Soft, Dark Gray (10YR, 4/1) silty sandy clay, low plasticity, moist	CL	.25	H ₂ O = 0ppm P _r = 60cpm L = 0cpm
	1020	12	9				
	2/8/93	42					
115.5	107048	10		Very stiff, Dark Gray (5Y, 4/1) silty clay with some black (5Y, 2.5/1) mottling, medium plasticity, moist	CL	2.0	H ₂ O = 0ppm P _r = 60cpm L = 0cpm
	1340	13	18				
	2/8/93	24					
117.0	107050	Shelby		Very stiff, Dark Gray (5Y, 4/1) silty clay with a trace of sand and gravel, medium plasticity, moist	CL	2.0	H ₂ O = 0ppm P _r = 60cpm L = 0cpm
	1515	N/A	18				Shelby Tube
	2/8/93	Tube					
119.0				Bottom of Boring at 117.0 ^{ft} pushed Shelby Tube from 117.0 ^{ft} - 119.0 ^{ft}			Composite Sizer Sample #107049

NOTES:

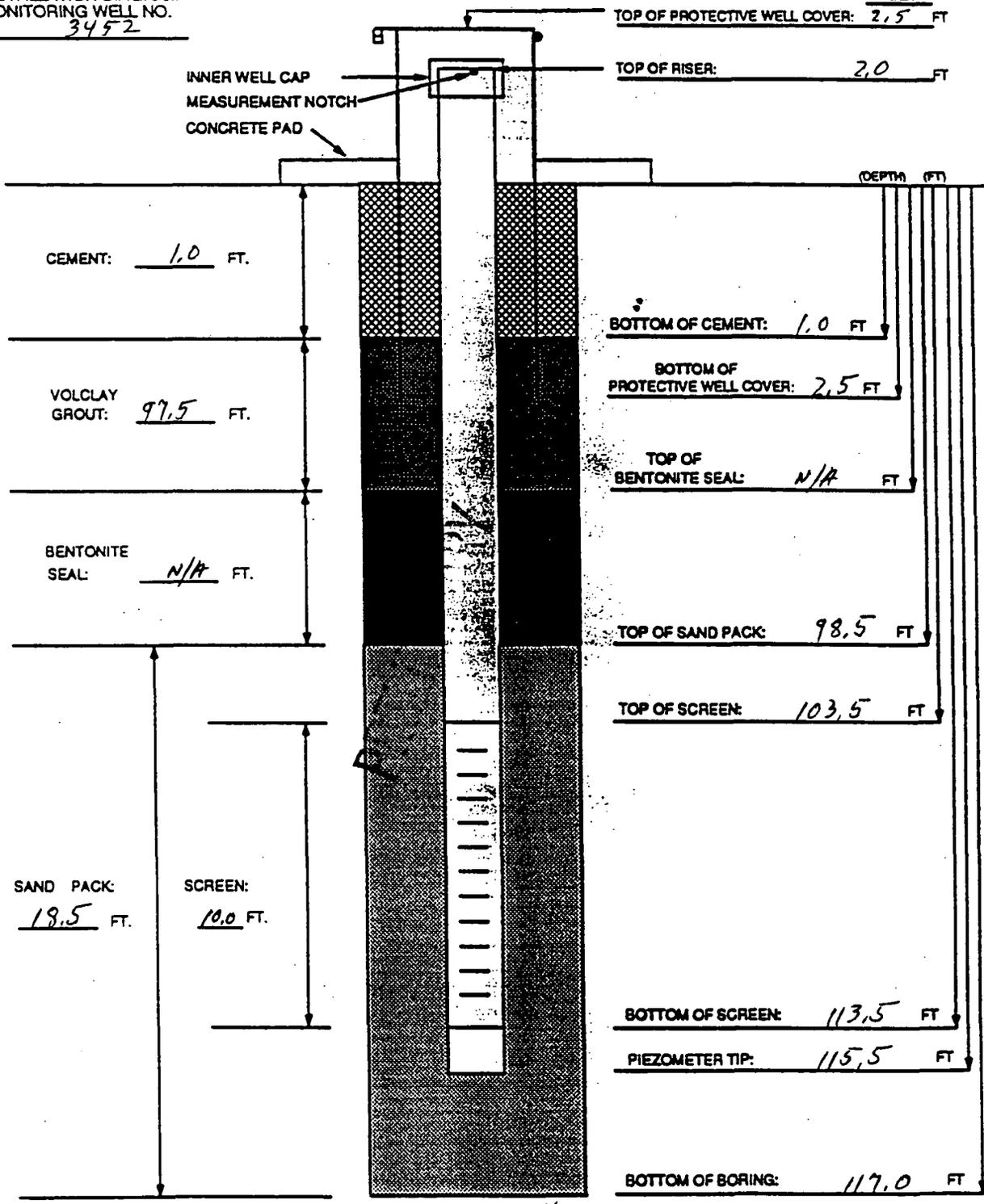
See Page 1

Background Levels

H₂O = 0ppm
P_r = 40-60cpm
L = 0cpm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
3452

INSTALLATION DATE: 2/16/93



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20, 14/80 lb bags
 BENTONITE PELLETS (5-GALLON BUCKETS): N/A
 BAGS OF VOLCLAY GROUT: 20 - 50 lb bags
 AMOUNT OF CEMENT: 1 Bag
 AMOUNT OF WATER USED: 860 Gallons
 OTHER: Riser Pipe Sections 1-10 Screens with 2' gap 10-10" 1-3.5"
 TASK: (602.04.28) WBA-40

NOTES:

- 1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
 - 2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
 - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
 - 4) WATER DEPTH AND DATE 61.7 FT. 2/17/93
 - 5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
 - 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
 - 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK
- GEOLOGIST/ENGINEER: Ken Geiger

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II FIELD ENG./GEO Ken Geiger DATE 2/17/93
 PROJECT NO. (602,04,28) WBA-40 CHECKED BY (C. Miller) DATE 3/01/93
 BORING NO. 3452
 PIEZOMETER NO. 3452 DATE OF INSTALLATION 2/16/93
Monitoring well
 BOREHOLE DRILLING

DRILLING METHOD <u>Cable Tool</u>	TYPE OF BIT <u>Hammer Percussion Bit</u>
DRILLING FLUID (S) USED: FLUID <u>Water</u> FROM <u>0.0 ft</u> TO <u>65.0 ft</u> FLUID <u>N/A</u> FROM <u>N/A</u> TO <u>N/A</u>	CASING SIZE (S) USED: SIZE <u>10.0 in ID</u> FROM <u>0.0 ft</u> TO <u>115.0 ft</u> SIZE <u>N/A</u> FROM <u>N/A</u> TO <u>N/A</u>

PIEZOMETER DESCRIPTION

TYPE <u>Monitoring well</u>	RISER PIPE MATERIAL <u>316 Stainless Steel</u>
DIAMETER OF PERFORATED SECTION <u>4.0 in I.D.</u>	RISER PIPE DIAMETERS: O.D. <u>4 3/8 in</u> I.D. <u>4.0 in</u>
PERFORATION TYPE: SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>1-10' screen with 2" slump</u> <u>10-10 ft, 1-3.5 ft</u>
AVERAGE SIZE OF PERFORATIONS <u>.010</u>	JOINING METHOD <u>Screw Type - Flush Joint</u>
TOTAL PERFORATED AREA <u>10.0 ft</u>	<u>Threaded</u>

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5.0 ft</u>	OTHER PROTECTION <u>Hinged well cover</u>
PROTECTIVE PIPE O.D. <u>10 3/4 in</u>	<u>with lock</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ()	
	TOP	BOTTOM		
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: <i>CONCRETE</i> GROUT/SLURRY BENTONITE SAND GRAVEL	TOP	0.0	BOTTOM	1.0
	TOP	1.0	BOTTOM	98.5
	TOP	N/A	BOTTOM	N/A
	TOP	98.5	BOTTOM	117.0
	TOP	N/A	BOTTOM	N/A
PERFORATED SECTION	TOP	103.5	BOTTOM	113.5
PIEZOMETER TIP			115.5	
BOTTOM OF BOREHOLE			117.0	
GWL AFTER INSTALLATION			61.7	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS _____

Sieve Analysis

4243

Well # 3452

Ken Geigler

2/9/93

sample # 107049

Retained Values

$$90\% = .003$$

$$50\% = .010$$

$$40\% = .013$$

$$\frac{.013}{.003} = 4.3$$

4.3 / 3 use a factor of 4

$$4 \times .010 = .040$$

.040 most closely fits the medium Grain Sand and
The .010 screen size,

Ken Geiger
MW 3452

MW 30

Customer Number: 107049

MATERIAL: _____ SAMPLE NUMBER: 93020P-112

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 142.8

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
<u>10</u>	<u>10.25</u>	<u>7.2</u>	<u>7.2</u>	<u>78.7</u>
<u>20</u>	<u>10.24</u>	<u>7.2</u>	<u>14.4</u>	<u>33.5</u>
<u>40</u>	<u>20.36</u>	<u>14.3</u>	<u>28.7</u>	<u>16.7</u>
<u>60</u>	<u>41.63</u>	<u>29.2</u>	<u>57.9</u>	<u>9.2</u>
<u>100</u>	<u>31.63</u>	<u>22.1</u>	<u>80.0</u>	<u>5.9</u>
<u>200</u>	<u>9.66</u>	<u>6.8</u>	<u>86.8</u>	<u>3.0</u>
<u>Pan</u>	<u>16.26</u>	<u>11.4</u>	<u>98.2</u>	

$$\frac{W_2 \times 100\%}{W_1} = R$$

$$\frac{\text{Original - Duplicate}}{\text{Average}} \times 100\% = \text{RPD}$$

Analyzed by: <u>John Robert</u>	Checked by: <u>[Signature]</u>	Date analyzed: _____
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GRAIN SIZE Retained	40 %	<u>13</u>
	50 %	<u>10</u>
	90 %	<u>3</u>

Kaw Geigel
MW 3452
Sample # 107049

FEB-

9-93 TUE 15:24

WMCO ANALYTICAL

FAX NO. 5137386667

4243

P.02

