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**CONSOLIDATED CONSENT AGREEMENT/
FEDERAL FACILITY COMPLIANCE
AGREEMENT/FEDERAL FACILITY AGREEMENT
FOR CONTROL AND ABATEMENT OF RADON-
222 EMISSION MONTHLY PROGRESS REPORT
PERIOD ENDING JANUARY 31, 1993**

02/19/93

**DOE-FN/EPA
200
REPORT**

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
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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 January 1 through January 31, 1993, and planned actions for the period February 1 through February 28, 1993.

Highlights of activities in January include the following:

- The draft Work Plan Addendum for Removal Action No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator, was transmitted to the U.S. and Ohio EPAs on January 6, 1993.
- The final Work Plan for Removal Action No. 25, Nitric Acid Tank Car and Area, was submitted to the U.S. EPA and the Ohio EPA on January 28, 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 January 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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RA No. 1, Contaminated Water Under FEMP Buildings

Plant 6 - Through January 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 1993.

Plants 2/3 and Plant 8 - Through January 1993, approximately 125,443 gallons of perched water have been collected for treatment from Plant 2/3, and approximately 101,307 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 January 1993.

Plant 8 - Through January 1993, approximately 302,273 gallons of groundwater have been treated utilizing the Plant 8 treatment system.

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.

Future actions include the continuation of the Plant 6 Motor Bay Sump design. A revised Sampling and Analysis Plan for the Plant 8 VOC Treatment System was explained to the U.S. EPA and Ohio EPA at the January 27, 1993, Technical Information Exchange (TIE) Meeting, and received verbal concurrence from both agencies. The plan was required because excessive costs were encountered and projected for the future. The plan is deemed sound based on proven system effectiveness and the provision of duplicity in the VOC Treatment System design. The plan and the associated justification will be submitted for documentation purposes to both agencies.

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REMOVAL ACTIONS

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.

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. The results of the sampling were discussed with the Ohio EPA on January 27. An agreement was made to retest the wells. The results, received on January 29, also indicated "positive" for coliform. The wells will be disinfected and sampling will be performed again.

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.

An agreement was reached with the Hamilton County Department of Public Water regarding DOE's "fair share" cost for the public water supply which will service the Fernald area, (including Delta Steel). It is anticipated that the system will be operational in early 1994.

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

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 on schedule for completion prior to the Package 2D pump test. Procurement activities for adding a single NPDES monitoring facility on the new outfall pipeline are being expedited in order to minimize impact to DOE and U.S. EPA mandated commitments. Design drawings for the added monitoring facility were completed January 28, 1993.

Package 2B1 - The outfall and associated pipeline are complete.

Package 2B2 - Construction of the Aeration Facility is progressing. The Part 2B2 schedule may be impacted by late delivery of blowers and some electrical equipment; this should not impact the overall Part 2 schedule. DOE-FN had hoped for aeration capability during the test well (Package 2D) pump test to avoid impacts to the FEMP Storm Water Retention Basin operations. However, aeration of the South Plume discharge stream during the pump test is not expected to be available. Therefore, DOE reiterated its Dissolved Oxygen NPDES variance request to the Ohio EPA during the January 27 TIE meeting.

Two property condemnation packages were approved by DOE-HQ on January 4. The U.S. Corps of Engineers submitted the condemnation packages to the Department of Justice (week of January 25), and to the assigned U.S. Attorney (week of February 1). The U.S. Attorney will prepare the package for U.S. District Court review.

A temporary access agreement allowing the archaeological/historical survey to proceed was signed by Weber. This permits access to the CSX property for initial recovery well field (Package 2C) construction. The entire well field area (except Delta Steel property) survey is expected to be complete in early February 1993.

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

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(BDN-ETS) Unit

The unit continues to be shut down as a result of colloidal blinding of the ion exchange units. The 90% design effort for the addition of a flocculation/clarification step upstream of the IAWWT(BDN-ETS) was submitted for 90% review on January 7, 1993.

Further testing of sand filtration has shown unexpected successful results based on visual observations. Upon completion of this testing, a decision will be made to proceed with the pretreatment system (flocculation/clarification or sand filtration) which best suits the continued operation of the IAWWT(BDN-ETS) unit. A decision is expected in mid-February 1993.

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 activities in the South Plume area continues. The two homeowner treatment systems installed south of the FEMP property continue to operate successfully.

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

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 currently undergoing a final review.

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 samplings 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 will be issued in February.

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

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. Comments on the proposal from the U.S. EPA are anticipated in February 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.

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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.

Responses to comments received from the U.S. EPA and the Ohio EPA on the Removal Action Final Report were transmitted to the EPAs on November 19, 1992.

U.S. EPA approval of the Response to Comments Document was received. The Final Report is currently being revised to reflect these responses.

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 in preparation for Phase III activity. The Invitation for Bid for Phase III activity is expected in February.

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RA No. 7, Plant 1 Pad Continuing Release (continued)

KEY MILESTONES	STATUS	DUE DATE
Complete Phase II	Completed December 4, 1992	December 21, 1992
Complete Phase III	Open, on schedule	February 21, 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 January 1993, 4,730 drum equivalents (DEs) of low-level waste (LLW) were dispositioned. The FY1993 shipment goal through January was 16,304 DEs. Currently, LLW shipping is 96 DEs ahead of schedule. The FY1993 goal is to dispose of 67,000 DEs of LLW at the Nevada Test Site (NTS).

Analysis for the three drums of thorium sampled in September were submitted. The analysis confirmed the process knowledge characterization of this waste stream. The results were transmitted to DOE-NV.

Waste shipping activities for February include shipping 4,976 DEs of LLW to the NTS. Waste shipping activities will be accelerated beginning this month. Disposition of Residues to the NTS through SEG and direct from the FEMP should begin this month. Shipment of recoverable metal to SEG will be initiated in February.

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

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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.

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. An evaluation of Plant 1 has been completed. The preliminary assessment data base is being updated to include this data.

Inventorying of expense equipment items continued; 2,722 expense items are currently in the data base; 1,255 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.

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RA No. 12, Safe Shutdown (continued)

The following is the status of capital equipment status: of an estimated 1,694 total number of items, 1,213 have been put on AC-563 Forms to be excessed, and 481 have been identified as "In Use/Future Use" items. The initial evaluation for capital equipment disposition has been completed.

Although negotiations between the Army and the NTS are still continuing on Phase II of the 4A Metal Removal Project (shipments of rolled scrap to the NTS for burial), we have received verbal approval to proceed with the packaging. Once the white metal boxes have been vented and all supporting documentation is in place, we will proceed with the packaging to the point of consolidating the materials, checking and resolving any moisture problems, placing visible absorbent in the boxes, and only sealing the boxes enough to transport back to the warehouse (corners bolted). This will allow the auditors to view the materials, if required. Delivery of the required vents is expected in early February and should coincide with delivery of the hydraulic punch needed for installation.

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.

The Health and Safety Plan for the Safe Shutdown Program was issued on September 28, 1992. The estimated completion date for the SAR is February 10, 1993. A global Risk Assessment and Risk Management Plan is being prepared for the Safe Shutdown Program, with a projected completion date of February 10, 1993.

Approval of the Safe Shutdown Environmental Assessment will allow personnel to proceed with removal of hold-up inventories from process equipment.

The status of the requests for Proposals (RFP) for the sale of uranium is as follows: Interest remains strong in the RFP for normal and enriched uranium released December 23, 1992, to thirteen companies. The deadline for proposals was extended to February 8. Two companies responded to the offer for a site visit to view the materials. The site visits were held the week of January 11; the information provided to the site visitors was also distributed to all potential bidders. The RFP for depleted uranium was distributed to six companies on January 15, 1993; proposals are due March 7, 1993.

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RA No. 12, Safe Shutdown (continued)

Planned activities for February include continuing the capital equipment disposition effort; 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; implementing the SAR; implementing the 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.

January activities included review and revision of the subcontractor's Removal Action Project Plan. A kick-off meeting is scheduled for February 8, with work beginning that week. This work includes erection of the size reduction building, scaffolding, and covering the UNH tanks.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open, ahead of schedule.	December 20, 1994

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.

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**RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator
(continued)**

A draft Work Plan Addendum was submitted to the DOE on December 23. After the incorporation of DOE comments, the draft Work Plan Addendum was transmitted to the EPAs on January 6, 1993. The draft Work Plan Addendum includes a new removal action schedule. February activities will include revision of the Work Plan Addendum pending receipt of EPA comments. Upon approval of the new schedule, on- and off-property excavation will begin in accordance with the Work Plan Addendum.

KEY MILESTONES	STATUS	DUE DATE
Submit Work Plan Addendum detailing need for further action based on analytical results	Completed January 6, 1993	January 6, 1993
Phase III - Completion of off-property excavation	Open, on schedule	May 15, 1993
Phase IV - Submit Final Report	Open, on schedule	August 15, 1993

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 bulk scrap copper began on January 14. Containerization of the small pile generated 17.5 top loaders. The Health and Safety Plan and the FERMCO Implementation Plan for Phase IIA were issued in January. February activities include proceeding with the containerization of the large pile.

The Statement of Work for Phase IIB will be issued in February.

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RA No. 15, Scrap Metal Piles (continued)

KEY MILESTONES	STATUS	DUE DATE
Phase IIB: Notification of Request for Proposal	Completed December 18, 1992	December 30, 1992
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; 300 lineal feet of trench drain has been completed, and two 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 will be submitted to the EPAs in February.

RA No. 18, Control Exposed Material in Pit 5

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

Activities for January included removing the floating dredge from Waste Pit 5, decontaminating and preparing it for winter storage, and preparing the training manual for operating the dredging unit. The training manual is undergoing final review. Efforts are underway to prepare the Preliminary Removal Action Final Report.

Planned activities for February include issuance of the Preliminary Removal Action Final Report.

KEY MILESTONES	STATUS	DUE DATE
Complete Field Work	Open, ahead of schedule	February 3, 1993

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.

January activities included the submittal of the Removal Site Evaluation to DOE and the distribution of the 90% Work Plan for review. February activity includes the submittal of the Work Plan to DOE.

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RA No. 19, Plant 7 Dismantling (continued)

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.

January activities included FERMCO approval of the Plant Test Authorization report for the System Operability Test.

February activities will include review and 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:

- 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.

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RA No. 21, Expedited Silo 3 (continued)

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.

The Expedited Silo 3 Removal Action Final Report is in internal review. The final report is expected to be submitted to DOE-FN for review in February 1993.

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 90% design review was submitted by Parsons to FERMCO with comments due by February 9, 1993. Following Parsons' incorporating the comments into the design, final construction documents should be released. The proposed completion date is June 30, 1993.

Planned activities for February include review and comment of the 90% design review package submitted by Parsons.

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.

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.

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RA No. 24, Pilot Plant Sump (continued)

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 EPA on December 18, 1992.

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. Other January activity included review and resolution of comments concerning related removal action documents, such as the Health & Safety Plan and Risk Assessment.

KEY MILESTONES	STATUS	DUE DATE
Submit Final Draft of Work Plan to U.S. EPA	Complete, October 14, 1992	October 14, 1992

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.

KEY MILESTONES	STATUS	DUE DATE
Submit Final Draft of Work Plan to U.S. EPA	Completed January 28, 1993	January 28, 1993

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 include in-situ repairs, encasement, and encapsulation as well as removals.

Field activities in asbestos material identification and abatement and development of the large-scale asbestos removal specifications continue. February activities will include reviewing and updating procedures in preparation for the April submittal of Work Procedures to the 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. February activities will include responding to EPA comments. The EE/CA will be revised upon EPA acceptance of comment-responses.

KEY MILESTONES	STATUS	DUE DATE
Submit Engineering Evaluation/Cost Analysis (EE/CA) to the U.S. EPA to support Proposed Removal Actions for Managing Contaminated Structures	Completed December 14, 1992	December 16, 1992

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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:

Approximately 100 LAACCs were placed on Waste Pits 1, 2, and 3. The LAACCs were left on the pits for 24 hours and then removed and analyzed. Continuous ambient air radon monitoring was also conducted during the period. Radon flux measurements were conducted during November 1992 on the Waste Pit 4 surface and vent pipes. Results confirmed that the radon flux density for Pit 4 was well below the NESHAP regulatory limit of 20 pCi/m² sec.

The "Pit 4 Radon Flux Measurement" technical report was approved by the DOE and a copy sent to the EPA in January 1993.

Issues/Corrective Actions:

None to report.

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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.

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:

All Advanced Stage I samples are complete for vitrification and cementation. The permeability testing for the final cement samples will be completed the week of February 15. Analytical results for the TCLP leachates for the cement samples and the TCLP and PCT leachates for the vitrified samples will be available in April following validation.

Issues:

There will be a significant delay in analysis for radon leaching due to priority of Operable Unit 4 samples for this testing. Complete results will be available in August and a report addendum with revised tables will be issued.

Corrective Actions:

Due to changes in the treatability schedule instituted by FERMCO and the decision to prepare the final treatability report in-house the Operable Unit 1 RI/FS schedule will not be impacted by this delay.

1.3 Remedial Investigation

Scope:

An 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:

Validation of CIS data is complete and 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. Validation of WEMCO-collected analytical data from Pits 5, 6 and Clearwell is nearly complete with Clearwell data left to validate.

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 February 1993

- Complete permeability testing on Advanced Stage I cement samples and begin preparation of Stage I cement samples for durability testing.
- Submit first draft of Remedial Investigation Report including the baseline risk assessment to the DOE-FN.

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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 FERMC0.

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 Southfield 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 December 1992 included completion of major revisions in response to EPA comments. The revision included extensive component-specific information identifying sampling plans and locations for each. The draft final version of the document was transmitted December 17, 1992. Comment responses for U.S. EPA and Ohio EPA Work Plan and Revision Approach comments were also transmitted December 17, 1992. EPA comments are anticipated in mid-February.

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 Operable Unit 3 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 January, 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.

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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.

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.

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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.

Status:

Formal activities associated with the FS have not been initiated for Operable Unit 3, although ISA research is underway.

Issues/Corrective Actions:

None to report.

3.6 Planned Activities for February 1993

- Evaluate current schedule of Operable Unit 3 activities for resource baseline and for potential reordering of schedule elements for improved workability.
- 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.
- Initiate lesson plan development for field investigation activities.
- Submit a draft outline of a Focused Feasibility Study/Proposed Plan (FFS/PP) for an accelerated component D&D and interim waste storage to DOE and EPA.
- Initiate FFS/PP document preparation to achieve an interim Record of Decision for Operable Unit 3.

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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 is schedule to begin on February 8, 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.

Chemical Extraction tests - Complete.

Vitrification Treatability Tests - Complete

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:

The durability testing will be performed by IT Corporation at their Knoxville laboratories. The laboratory has been given Notice to Proceed to purchase the necessary equipment. Durability samples have been prepared and currently are curing for 30 days prior to testing. No Consent Agreement deliverables/milestones are impacted by this course of action.

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 Response to Comments Document from the DOE and FERMCO initial review was received from International Technologies Corporation (IT) on January 8, 1993. On January 21, 1993, a comment resolution meeting was held with DOE-HQ, DOE-FN, FERMCO, and IT to resolve outstanding issues on the draft Operable Unit 4 RI report. The Air modeling for Operable Unit 4 is being rerun, chapters 1, 2, 3, and 4 are being edited, and a Quality Assurance Section is being added to Chapter 2. On February 22, 1993, the revision of the RI will be submitted to DOE-FN and FERMCO for review.

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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 February 1993

- Continue Risk Assessment activities.
- Validate the Toxicity Characteristic Leaching Procedure analytical data for the vitrified material leachate.
- Validate the PCT analytical data for the vitrified material leachate.
- Continue leaching tests 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:

The responses to the December 1992 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.

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.

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 and eight of the nine new monitoring wells are now complete. The RI/FS contract laboratory completed the analysis of the first round of groundwater samples for Hazardous Substance List (HSL) volatiles, general water quality, and full radiological parameters. The contract laboratory is approximately 95 percent complete in their analysis of the second round of groundwater samples for the ten existing 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)

Well development activities for Monitoring Well 1842, which was reinstalled in December 1992, have been delayed due to construction activities in the vicinity of the well. Attempts were made to develop the well prior to the initiation of construction activities. However, water-level measurements indicated a very slow groundwater recharge rate.

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 round of groundwater sampling completed. Second round was initiated December 21, 1992. The recharge rate of this monitoring well only allows for the collection of two liters of groundwater per day.
- 1841 Boring complete. Well not installed because groundwater was not encountered at this location.
- 1842 Re-installation completed. Well development was attempted in January 1993; however, due to a very slow recharge rate, the activity is now delayed. Also, construction operations around the well have precluded further attempts at development and initial groundwater sampling activities.
- 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 and 1174 has not yet begun.

The Work Plan 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; 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 only.

The Work Plan requires the installation of Monitoring Wells 1886, 1887, and 1890 in the Fire Training Area. All three monitoring wells were installed in December 1992, but still need first and second rounds of groundwater sampling.

The single hand auger sample located at the sump in the Fire Training Area was not completed as previously reported. However, the four hand auger samples were completed at the stormwater ditch in December 1992. Due to standing stormwater in the sump, sampling there has been delayed until the water dissipates or is removed by mechanical means.

The Work Plan requires 14 auger borings in the Plant 1 Pad Area. All of the auger borings were completed in January 1993. First round of groundwater sampling was completed on existing Monitoring Wells 1338, 1339, 1343, and 1348 in December 1992.

Field investigations for the KC-2 Warehouse Area, Scrap Metal Pile, and Electrical Substation were initiated. The intent is to complete the field sampling requirements per the existing Work Plan and, if required after further comment resolution, perform additional sampling according to comment resolution agreements.

Issues/Corrective Action:

Final comment resolution to the Ohio EPA and U.S. EPA comments that were received in December 1992 should be addressed by FERMCO and the DOE-FN, with resolutions transmitted back to the respective regulatory agency for final review and approval.

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5.1.1 Operable Unit 5 Work Plan Addenda (continued)

Lack of comment resolution has caused 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 Remedial Investigation (RI). The installation of Monitoring Well 2119 and subsequent sampling program were based upon possible failure of the pipeline between Manhole 179 and 180.

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, than additional investigation may be required to determine vertical and lateral extent of the plume.

Status:

Responses to the December 1992 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.

Hydropunch II operations and subsequent installation of Monitoring Well 2119 was completed in January 1993. Preliminary on-site laboratory analysis was completed on groundwater samples obtained during Hydropunch operations. The results are as follows:

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5.1.2 Outfall Line Investigation (continued)

<u>Depth (feet)</u>	<u>Results (ppb)</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

Issues/Corrective Actions:

Final comment resolution to the Ohio EPA and U.S. EPA comments received in December 1992 should be addressed by FERMCO and the DOE-FN, 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.

Awaiting analyses results 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 four 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), maintenance building area (OU 5-A), and underground storage tank soil piles (OU 5-B).

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 March 1993. Pilot plant design for skid assembly and utilities and fabrication of the skids was completed with a scheduled construction completion date of mid-February 1993. System startup is anticipated for late February 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 is in preparation. 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:

The RI data compilation has been initiated. All data sources to be included in the RI are being identified and summarized. The geologic information contained in RI/FS project 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 are being 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.

Preparation of draft versions of Sections 1, 2 and 3 of the RI report has begun. Work on improving the current regional aquifer model has also started, along with development of additional fate and transport models needed for Operable Unit 5 activities. Work on evaluating groundwater and surface water background values has been undertaken.

Issues/Corrective Actions:

None to report.

5.5 Planned Activities for February 1993

- Continue compiling, evaluating and summarizing all data sources to be included in the Operable Unit 5 RI.
- Continue RI activities initiated in January 1993 with respect to RI report Sections 1, 2 and 3, fate and transport modeling, background values.
- Meet with EPA representatives to discuss approaches to ecological risk assessment.
- Respond to EPA comments on the ISA report.

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5.5 Planned Activities for February 1993 (continued)

- 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 Wells 1868 and 1869 for the S.E. Quadrant subtask of the Operable Unit 5 Work Plan Addenda.
- Complete the first round of groundwater sampling for existing Monitoring Wells 1173 and 1174 for the S.E. Quadrant subtask of the Operable Unit 5 Work Plan Addenda.
- Complete the development and first round of groundwater sampling of Monitoring Wells 1886, 1887, and 1890 in the Fire Training Area subtask of the Operable Unit 5 Work Plan Addenda.
- Complete auger sampling of sediments in the sump located in the Fire Training Area for 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.
- 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.
- Complete work on the Work Plan for Investigation of the Skeet Shooting Range and for Study of the Great Miami Riverbank in the vicinity of the outfall line.

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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".

In addition, a separate report will be prepared to perform a risk-based evaluation of an on-site disposal cell holding treated wastes. This report will require information on the volume and location of the disposal cell, geochemistry of treated waste forms and their derivative leachates, the seepage rate of leachate exiting the disposal cell, fate and transport of constituents of concern along groundwater pathways, reasonable maximum exposure received at identified receptors, and the risk associated with the exposure. This report was originally scoped to evaluate the leachate derived only from cement stabilized waste but has been expanded to include vitrified waste forms.

Status:

A contract has been placed for IT Corporation to complete the six above mentioned technical reports. It is anticipated that all six (6) technical reports will be issued by February 28, 1993. A separate contract is currently being scoped for IT Corporation to initiate the risk-based evaluation for on-site disposal as described above. It is anticipated that all work for this contract will be completed by September 30, 1993.

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6.1 EWMF General Siting Report (continued)

Issues/Corrective Actions:

A meeting was held on January 26, 1993 between FERMCO, IT Corporation and DOE-FN to determine the most appropriate method for completing the work. It was agreed that the development of six stand-alone technical reports would expedite the document delivery and provide a cost savings.

6.2 Planned Activities for February 1993

Complete the following technical reports:

- Technical Report 5.1A, Engineering Evaluation Report for On-Site Disposal
- Technical Report 5.1B, Site Characterization/Geological Report for On-Site Disposal
- Technical Report 5.1C, Material Source Survey for On-Site Disposal
- Technical Report 5.4, ARARs for On-Site Disposal Cell Concept
- Technical Report 5.3A, Geological Report for Off-Site Disposal
- Technical Report 5.3B, Ecological Characterization of the Off-Property Disposal Cell Study Area

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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:

On January 21, 1993, DOE received U.S. EPA approval of the majority of the comment responses. The SWCR was approved, pending resolution of several remaining issues.

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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CONTROL AND ABATEMENT OF RADON-222 EMISSIONS
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Period Ending January 31, 1993

REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

8.0 Community Relations

Status

On January 5, 1993 DOE and FERMCO senior management met to consider concepts for formulation of a Fernald Advisory Committee comprised of representatives from government, industry, academia, and citizen's groups.

On January 8, 1993 the 30-day public comment period on the Operable Unit 2 Remedial Investigation Report concluded. There were no written or oral comments received from the public.

On January 12, 1993 DOE held a workshop to better help the public understand the technicalities of the EE/CA for Removal Action No. 27. Approximately 18 members of the public attended. The entire session was transcribed and the transcript was added to the Administrative Record on January 27, 1993. Handouts consisted of an acronym list, a list of the 25 structures to be decontaminated and decommissioned, a list of Potential Environmental Impacts of the Proposed Action, a packet including all overheads used in the presentation, and a pre-addressed comment card. The EE/CA document was also available for anyone who had not received one. The remainder of the evening was spent answering questions from the public.

The EE/CA began a 45-day public comment period on December 23, 1992 which will conclude on February 8, 1993. Comments from U.S. EPA and Ohio EPA were received on January 19. Both agencies conditionally approved the document pending incorporation of their comments. A Responsiveness Summary will be prepared addressing these comments and any received from the public.

On January 15, 1993, six removal action addenda to the RI/FS Community Relations Plan were submitted to U.S. EPA. The addenda had completed a 45-day public comment period. No written or oral comments from the public were received. The removal actions are:

- | | |
|--------|---|
| No. 15 | Scrap Metal Piles |
| No. 17 | Improved Storage of Soils & Debris (Revised Plan) |
| No. 18 | Control of Exposed Material in Pit 5 |
| No. 22 | Waste Pit Area Containment Improvement |
| No. 24 | Pilot Plant Sump |
| No. 25 | Nitric Acid Tank Car and Area |

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

8.0 Community Relations (continued)

As part of a January 20, 1993, Hamilton County Commissioner's meeting, DOE-FN presented a ceremonial "check" representing DOE's \$4.5 million share of the proposed public water supply project for the Crosby Township area. Following the meeting, the commissioners visited the Fernald site for a tour of the former process area.

On January 26, 1993, a Roundtable focusing on the RI/FS Environmental Impact Statement (EIS) process was held. Eleven community members attended.

On January 28, 1993, FERMCO Community Relations gave a brief summary on the Fernald cleanup status at the monthly FRESH (Fernald Residents for Environment, Safety and Health) meeting. The presentation included:

- Announced Removal Action No. 18, Control of Exposed Material in Pit 5 is completed.
- Update on the public water supply project for the Crosby Township area.
- Explained the new procedure concerning the warning sirens, one part of an Emergency Warning System at Fernald, and how they will be activated for a general emergency at the Fernald site or for severe weather warnings.
- Highlights from the EE/CA Workshop held January 12.
- Highlights from the EIS Roundtable held January 26.

Approximately 250 residents attended. The large attendance was due in part to the presence of the trustees who manage the \$78 million settlement from the 1989 class-action lawsuit. Payments for emotional distress had recently been mailed to local residents and there were many inquiries.

Issues/Corrective Action

None.

Planned Activities for February 1993

On February 8, 1993 the 45-day Public Comment Period on the EE/CA ends.

On February 16, 1993 a weeklong summary jury trial begins focusing on the \$100 million class-action lawsuit brought against National Lead of Ohio (NLO), former operators of the Fernald plant, by former NLO employees and subcontractors.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

8.0 Community Relations (continued)

On February 18, 1993 the Centers for Disease Control (CDC) will hold a Technical Workshop to discuss the draft Task 4 Report, Environmental Pathway Analysis - Models and Validation. The workshop is part of the ongoing Fernald Dosimetry Reconstruction Project.

On February 23, 1993 the DOE will hold a Community Meeting to discuss the status of cleanup at the Fernald site. The exhibits and availability session will be offered prior to the start of the meeting.

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ENCLOSURE A

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

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR
CONTROL AND ABATEMENT OF RADON-222 EMISSIONS
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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 January 1993.

Summary - January 1993

The total quantity of uranium discharged from the FEMP to the Great Miami River via Manhole 175 (Outfall 11000004001) was 63.51 kilograms. The average uranium concentration for the previous 12 months was 0.54 mg/L. This is 60.7% 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 January 1993. Based on 3.95 inches of rainfall in January 1993, the total quantity of uranium discharged to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 11.22 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
001 Total Discharge
Manhole 175 (Effluent to the Great Miami River)

Month: January 1993

<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	0.482	541	185	0.93	1.70	314
2	0.527	369	122	0.60	1.20	203
3	0.341	473	126	0.94	1.21	318
4	0.833	234	189	0.40	1.26	135
5	1.539	365	68	0.61	3.55	206
6	1.233	365	113	0.58	2.71	196
7	0.913	234	99	0.34	1.17	115
8	0.700	455	140	0.74	1.96	250
9	1.080	297	72	0.49	2.00	166
10	1.014	523	90	0.91	3.49	307
11	0.548	613	234	1.06	2.20	358
12	0.462	505	99	0.92	1.61	311
13	0.616	572	149	0.98	2.28	331
14	0.464	414	108	0.85	1.49	287
15	0.372	505	113	0.85	1.20	287
16	0.336	617	194	1.12	1.42	378
17	0.247	315	54	0.55	0.51	186
18	0.522	270	59	0.40	0.79	135
19	0.939	306	90	0.64	2.27	216
20	0.747	428	144	0.71	2.01	240
21	1.131	405	149	0.60	2.57	203
22	1.131	464	158	0.64	2.74	216
23	0.642	550	180	0.93	2.26	314
24	0.539	815	171	1.39	2.83	470
25	0.701	491	117	0.87	2.31	294
26	0.718	171	72	0.33	0.90	111
27	0.612	347	99	0.53	1.23	179
28	0.661	495	122	0.91	2.28	307
29	0.720	622	176	1.38	3.76	466
30	0.445	874	279	1.95	3.28	659
31	<u>0.575</u>	721	230	1.53	<u>3.33</u>	517
TOTAL	21.790				63.51	

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project

Location: 001 Total Discharge

Month: January 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.	0.703	439	130	0.77	2.05	260
Max.	1.539	874	279	1.95	3.76	659
Min.	0.247	171	54	0.33	0.51	111

The average uranium concentration for the previous twelve months was 0.54 mg/L. This is 60.7% 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: January 1993

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

Based on 3.95 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 11.22 kgs.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE
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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 January 1 through January 31, 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).

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY
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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 December 1992 was transmitted to the U.S. EPA on January 20, 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 December 1992, was transmitted to the U.S. EPA on January 20, 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**

JANUARY 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 December 1992 was transmitted to the U.S. EPA on January 20, 1993. (DOE-0889-93)
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).

TABLE 1

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

JANUARY 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.

TABLE 1

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

JANUARY 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.
-----	---	---------	---

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.
-----	--	--------	---

REPORTING REQUIREMENTS

B.	Issue monthly progress report of actions taken to ensure compliance with FFCA requirements.	monthly	December's FFCA Monthly Progress Report was transmitted to the U.S. EPA on January 20, 1993. (DOE-0889-93)
----	---	---------	--

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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 January 1 through January 31, 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 January 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.

**FFA Part,
Paragraph(s)**

Description of Commitment

**FFA Due
Date**

Status of Commitment

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

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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

LOCATION: Silo # 1

DATE: January 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	21.7	29.9	43.4	97.1	0.042	12344
2	26.4	29.8	42.5	97.1	-0.040	44589
3	45.2	29.6	42.6	97.0	-0.072	53758
4	54.1	29.3	43.6	97.0	0.001	89316
5	35.5	29.6	44.1	97.0	0.096	22774
6	31.3	29.6	43.7	97.0	0.037	47837
7	30.6	29.5	43.0	97.1	-0.003	63542
8	30.1	29.5	42.8	96.9	•	7725
9	27.1	29.6	42.4	97.0	•	2482
10	27.4	29.6	42.0	97.0	•	9744
11	27.4	29.7	41.7	97.0	-0.051	18504
12	33.9	29.4	41.7	96.7	-0.117	55600
13	33.6	29.4	42.0	94.1	0.065	29015
14	24.5	29.7	41.6	92.7	-0.010	11846
15	25.5	29.6	41.3	96.6	-0.010	26477
16	24.4	29.4	40.9	96.1	-0.010	48672
17	27.2	29.4	40.7	96.5	-0.011	21813
18	16.6	29.8	40.1	96.6	-0.011	16134
19	22.6	29.9	39.5	95.8	-0.010	10273
20	33.1	29.8	39.3	96.3	-0.008	48094
21	42.1	29.4	40.0	96.0	-0.013	98069
22	33.5	29.4	40.5	96.7	0.078	18890
23	39.5	29.4	40.3	96.5	0.039	65304
24	33.7	29.4	40.8	96.9	0.058	42865
25	24.5	29.8	40.1	96.8	0.098	25297
26	25.2	29.6	39.4	96.7	0.041	68632
27	30.8	29.5	39.3	96.8	*	28086
28	42.2	29.4	39.6	96.4	•	44543
29	25.1	29.8	40.0	96.9	-0.013	9435
30	24.4	29.8	39.2	96.7	-0.010	28987
31	37.8	29.3	39.1	96.5	-0.008	27051
ARITHMETIC MEAN	30.9	29.6	41.2	96.5	0.006	35409
MAXIMUM	54.1	29.9	44.1	97.1	0.098	98069
MINIMUM	16.6	29.3	39.1	92.7	-0.117	2482
MEDIAN	30.1	29.6	40.9	96.7	-0.009	28086

Note: * Data censored - data questioned.

1. Report generated from previously edited data files.
2. Report generated from a combination of field computer and peripheral computer data files.

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

4119

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

LOCATION: Silo # 2

DATE: January 1993

Day	Ambient		Temperature	Inter.	Diff.	Head Space
	Temp Deg. F	Pres In. Hg.	Head Space Deg. F			
1	21.7	29.9	43.5	98.0	-0.005	124547
2	26.4	29.8	42.6	98.0	-0.005	135894
3	45.2	29.6	42.7	*	-0.006	164290
4	54.1	29.3	43.7	•	-0.002	210138
5	35.5	29.6	44.2	•	0.127	109642
6	31.3	29.6	43.7	98.0	0.035	174597
7	30.6	29.5	43.1	98.0	-0.005	191225
8	30.1	29.5	43.0	96.4	-0.007	87418
9	27.1	29.6	42.6	*	-0.007	61612
10	27.4	29.6	42.1	*	0.034	82402
11	27.4	29.7	41.8	95.0	0.011	62404
12	33.9	29.4	41.7	96.3	-0.006	52469
13	33.6	29.4	42.0	*	0.049	51125
14	24.5	29.7	41.7	94.3	-0.005	*
15	25.5	29.6	41.3	97.0	-0.005	*
16	24.4	29.4	41.0	97.0	-0.005	*
17	27.2	29.4	40.9	*	-0.006	•
18	16.6	29.8	40.2	96.5	-0.005	*
19	22.6	29.9	39.7	•	-0.006	*
20	33.1	29.8	39.6	•	-0.005	*
21	42.1	29.4	40.3	•	0.028	•
22	33.5	29.4	40.7	97.1	0.093	60215
23	39.5	29.4	40.5	*	0.037	144779
24	33.7	29.4	41.0	*	0.059	105679
25	24.5	29.8	40.4	•	-0.005	90080
26	25.2	29.6	39.7	•	-0.005	98652
27	30.8	29.5	39.7	•	-0.005	128538
28	42.2	29.4	40.0	*	-0.006	85648
29	25.1	29.8	40.4	•	-0.005	31883
30	24.4	29.8	39.7	•	-0.006	41336
31	37.8	29.3	39.5	•	-0.007	34802
ARITHMETIC MEAN	30.9	29.6	41.4	96.8	0.011	101277
MAXIMUM	54.1	29.9	44.2	98.0	0.127	210138
MINIMUM	16.6	29.3	39.5	94.3	-0.007	31883
MEDIAN	30.1	29.6	41.0	97.0	-0.005	90080

Note: * Data censored - data questioned.

1. Report generated from previously edited data files.
2. Report generated from a combination of field computer and peripheral computer data files.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY 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: JANUARY, 1993 REPORT GENERATED: 02/08/93

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)
01/01/93	1.0	1.2	0.6	1.3
01/02/93	4.0	1.4	0.4	0.7
01/03/93	1.1	1.1	0.7	1.2
01/04/93	1.2	1.5	0.9	1.1
01/05/93	0.8	0.8	1.9	1.6
01/06/93	1.3	1.4	4.6	3.8
01/07/93	1.9	2.1	4.1	4.1
01/08/93	0.9	1.5	0.4	0.7
01/09/93	0.9	3.1	0.3	0.7
01/10/93	0.9	1.8	0.4	0.8
01/11/93	0.9	1.9	0.4	0.7
01/12/93	1.4	3.4	0.7	1.2
01/13/93	0.9	1.1	1.9	1.3
01/14/93	0.8	0.8	1.6	1.0
01/15/93	0.7	0.9	1.3	M
01/16/93	1.3	1.5	5.9	M
01/17/93	1.1	1.0	1.2	M
01/18/93	1.2	1.5	1.2	M
01/19/93	1.2	1.9	0.4	0.6
01/20/93	2.3	2.6	0.5	0.7
01/21/93	1.7	0.9	0.7	0.7
01/22/93	0.9	0.9	1.3	1.0
01/23/93	2.0	2.0	2.7	2.7
01/24/93	0.7	0.8	1.3	1.5
01/25/93	1.6	1.4	2.1	1.7
01/26/93	1.5	1.6	7.9	5.6
01/27/93	2.0	1.8	3.8	2.3
01/28/93	1.2	1.3	3.0	1.9
01/29/93	0.9	1.0	1.1	1.9
01/30/93	1.1	1.0	2.7	1.1
01/31/93	0.8	0.9	1.8	0.8

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	1.3	1.5	2.0	1.6
MAXIMUM	4.0	3.4	7.9	5.6
MINIMUM	0.6	0.7	0.5	0.2
MEDIAN	1.1	1.4	1.3	1.2
Std. Dev	0.6	0.6	1.9	1.2

Notes: 1. M - Data unavailable due to monitor malfunction.
2. I - Incomplete data.

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

4119

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: JANUARY, 1993

REPORT GENERATED:

02/08/93

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
01/01/93	0.5	0.6	0.7	0.4
01/02/93	0.5	0.5	0.7	0.5
01/03/93	0.5	0.4	0.6	0.4
01/04/93	0.4	0.5	0.5	0.5
01/05/93	0.4	0.4	0.6	M
01/06/93	0.6	0.5	0.7	M
01/07/93	0.7	0.7	0.9	M
01/08/93	0.4	0.4	0.6	0.3
01/09/93	0.4	0.4	0.6	0.3
01/10/93	0.5	0.5	0.7	0.4
01/11/93	0.4	0.4	0.6	0.3
01/12/93	0.6	0.5	0.7	0.4
01/13/93	0.4	0.4	0.7	0.4
01/14/93	0.5	0.4	0.7	0.4
01/15/93	0.4	0.4	0.7	0.4
01/16/93	0.6	0.5	0.9	0.5
01/17/93	0.6	0.5	0.8	0.4
01/18/93	0.6	0.7	1.4	0.6
01/19/93	0.4	0.7	0.9	0.4
01/20/93	0.6	0.5	0.7	0.4
01/21/93	0.4	0.4	0.6	0.4
01/22/93	0.4	0.4	0.6	0.4
01/23/93	0.6	0.5	0.7	0.6
01/24/93	0.4	0.4	0.6	0.4
01/25/93	0.5	0.4	0.6	0.4
01/26/93	0.6	0.5	0.8	0.6
01/27/93	0.5	0.5	0.8	0.5
01/28/93	0.6	0.4	0.7	0.5
01/29/93	0.5	0.4	0.7	0.4
01/30/93	0.5	0.4	0.6	0.4
01/31/93	0.4	0.3	0.7	0.3

Summary of Daily Averages

	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
AVERAGE	0.5	0.5	0.7	0.4
MAXIMUM	0.7	0.7	1.4	0.6
MINIMUM	0.3	0.3	0.5	0.3
MEDIAN	0.5	0.4	0.7	0.4
Std. Dev	0.1	0.1	0.2	0.1

Notes: 1. M - Data unavailable due to monitor malfunction.
2. I - Incomplete data.

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

4119

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
RADON CONCENTRATIONS

MONTH: JANUARY, 1993

REPORT GENERATED: 02/03/93

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.
01/01/93	12344	58970	2090	8407	124547	149920	82990	11211
01/02/93	44589	125710	10790	29188	135894	202010	57770	25175
01/03/93	53758	140090	10620	32927	164290	280630	47390	55358
01/04/93	89316	190610	15310	49188	210138	441350	47230	91813
01/05/93	22774	148290	1920	31536	109642	244530	28930	53925
01/06/93	47837	144110	5270	35635	174597	273210	74420	36718
01/07/93	63542	243810	8110	46998	191225	504810	43930	68545
01/08/93	7725	111660	1920	13143	87418	158160	25960	26299
01/09/93	2482	12290	2090	876	61612	88100	40630	11056
01/10/93	9744	84560	2090	14761	82402	138870	46570	23641
01/11/93	18504	82550	5600	14487	62404	347390	10630	40707
01/12/93	55600	156320	5440	41996	52469	164090	8650	35257
01/13/93	29015	174390	2090	52576	51125	222610	2550	74618
01/14/93	11846	107310	2260	16582	M	M	M	M
01/15/93	26477	112330	4930	22459	M	M	M	M
01/16/93	48672	135410	4430	34425	M	M	M	M
01/17/93	21813	137250	2090	30531	M	M	M	M
01/18/93	16134	63820	2090	13834	M	M	M	M
01/19/93	10273	30530	80	6803	M	M	M	M
01/20/93	48094	130390	3430	38080	M	M	M	M
01/21/93	98069	177230	2090	60236	M	M	M	M
01/22/93	18890	123200	80	22501	60215	180910	10630	39119
01/23/93	65304	159160	9790	39453	144779	353160	43430	77950
01/24/93	42865	192120	2260	59637	105679	339150	9970	105807
01/25/93	25297	96940	2590	17079	90080	269920	19530	66335
01/26/93	68632	149290	11960	31804	98652	277340	26460	56507
01/27/93	28086	139590	2590	30589	128538	280630	46900	46873
01/28/93	44543	177560	1920	58293	85648	180740	18710	57200
01/29/93	9435	47420	1920	13010	31883	103100	4700	16872
01/30/93	28987	108480	2590	27575	41336	118930	7340	24953
01/31/93	27051	118180	1920	30590	34802	95360	6680	17884

Grab Samples of Headspace

Date	SILO 1	SILO 2
	Concentration	Concentration
01/04/93	189131	416169
01/07/93	419574	77622
01/11/93	39305	574099
01/22/93	25874	435029

- Notes:
1. All values reported in pCi/L.
 2. "M" Denotes data unavailable due to radon monitor malfunction.
 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 JANUARY 31, 1993

ENCLOSURE D

DRILLING/BORING LOGS

VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER: 602.50.03.10	PROJECT NAME: RI/FS
BORING NUMBER: 2119	COORDINATES:
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430
ENGINEER/GEOLOGIST: Ken Grippa	Depth 18.4 ft Date/Time 1/20/93 1400
DRILLING METHODS: Cable Tool	PAGE 1 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	105430	4		Stiff Dark Grayish Brown (10YR 4/2) Silty Sandy clay with some gravel slight plasticity, slightly moist	CL	1.5	H _{nu} = 0 ppm P _s = 40 cpm L = 0 cpm
	1550	12	13				
	12/17/92	13					
1.5	105431	11		medium Dense Brown (10YR 5/3) poorly graded gravelly sand	SP	N/A	H _{nu} = 0 ppm P _s = 40 cpm L = 0 cpm Appears to be some brick fragments
	1555	14	6				
	12/17/92	15					
3.0	NA	13	0	NO RECOVERY	NA	NA	
		10	2				
		9	12/17/92				
4.5	105432	7		Stiff Dark Grayish Brown (10YR, 4/2) Silty Clay with some sand and gravel slightly plastic, slightly moist	CL	1.0	H _{nu} = 0-1 ppm P _s = 40 cpm L = 0 cpm
	1605	3	17				
	12/17/92	21					
6.0	105433	7		Very Stiff Dark Grayish Brown (10YR, 4/2) Silty Clay with some sand and gravel, slightly moist	CL	2.0	H _{nu} = 0 ppm P _s = 40 cpm L = 0 cpm
	1615	10	16				
	12/17/92	10					
7.5	12/17/92			Slightly plastic			

PRELIMINARY

NOTES:

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

Samples collected for ASTM Standard Penetration Test. Colors identified using munsell color chart.

Background Levels

H_{nu} = 0 ppm
P_s = 40 cpm
L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER: 602 50 03 10	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE: 12/17/92
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/02 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken Geisler	Depth 18.4 ft Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 2 OF 16	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (G.N.)	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
7.5	105434	7		very stiff Dark Grayish Brown (10YR 4/2) silty clay with some sand and gravel medium plasticity, slightly moist	CL	2.0	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1625	10	12				
	12417/92	10					
9.0	105435	13		very stiff Dark Grayish Brown silty clay with some sand and gravel medium plasticity, slightly moist	CL	2.0	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1635	21	7				
	12117/92	29					
10.5	105436	6		very stiff Dark Brown (10YR 3/3) silty clay with a trace of sand and gravel medium plasticity, moist	CL	1.5	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1055	9	6				
	1215/92	12					
14.0	105437	7		very stiff Dark Brown (10YR 3/3) silty clay with some sand and gravel medium plasticity, moist	CL	1.5	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1115	9	5				
	1215/92	12					
13.5	105438	10		medium stiff Brown (10YR 4/3) silty gravelly clay with some sand, medium plasticity, moist	CL	1.0	H _{nu} = 0 ppm P _y = 40 cpm L = 0 cpm
	1125	21	5				
	1215/92	32					

NOTES:
 SEE PAGE 1
 12/17/92 Background Levels
 H_{nu} = 0 ppm
 P_y = 40 cpm
 L = 0 cpm
 12/19/92 Background Levels
 H_{nu} = 0 ppm
 P_y = 40 cpm
 L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER: 6625-0310	PROJECT NAME: RI/FS	
BORING NUMBER: 2117	COORDINATES:	DATE: 12/18/92
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken C. G. 2117	Depth 18.4 ft Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 3 OF 16	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 10 cm	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	105439 1345 12/15/92	10 24 32	6	Very Dense Brown (10gr, 5/3) poorly graded gravelly sand Dry	SP	N/A	H _u = 0 ppm P _y = 40 cpm L = 0 cpm
16.5	105440 1400 12/18/92	14 24 32	8	Very Dense yellowish Brown (10gr 5/4) poorly graded medium sand with some gravel, Dry	SP	N/A	H _u = 0 ppm P _y = 40 cpm L = 0 cpm
18.0	105441 1420 12/18/92	5/4	4	Same as Above w.t. 18.4 ft	SP	N/A	H _u = 0 ppm P _y = 40 cpm L = 0 cpm
19.5	105442 1620 12/15/92	32 35 10	13	Dense yellowish Brown (10gr 5/6) well graded medium sand with some gravel, wet	SW	N/A	H _u = 0 ppm P _y = 40 cpm L = 0 cpm
21.0	105443 950 12/21/92	15 16 21	12	Dense yellowish Brown (10gr, 5/6) poorly graded sandy gravel, wet	GP	N/A	H _u = 0 ppm P _y = 20 cpm L = 0 cpm

NOTES:

See page 1

Background Levels
12/15/92
H_u = 0 ppm
P_y = 10 cpm
L = 0 cpm

Background Levels
12/21/92
H_u = 0 ppm
P_y = 10-20 cpm
L = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER: 102.500310	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE: 12/21/92
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken G. ...	Depth 18.4 ft Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE: 4	OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (ft)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	105444	17		Dense Yellowish Brown (10YR, 5/6) Poorly Graded Sandy Gravel, WLT	GP	N/A	H _{nu} = 0 ppm P _y = 20 cpm L = 0 cpm
	1000	21	12				
	12/21/92	25					
24.0	105445	21		Very Dense Brownish Yellow (10YR, 6/6) Poorly Graded Sandy Gravel, WLT	GP	N/A	H _{nu} = 0 ppm P _y = 20 cpm L = 0 cpm
	1330	25	12				
	12/21/92	32					
25.5	105446	32		SAME AS ABOVE	GP	N/A	H _{nu} = 0 ppm P _y = 20 cpm L = 0 cpm
	1350	45	16				
	12/21/92	32					
27.0	105447	32		Very Dense, Brownish Yellow (10YR, 6/6) Poorly Graded Sandy Gravel with a Trace of Silt, WLT	GP	N/A	H _{nu} = 0 ppm P _y = 20 cpm L = 0 cpm
	1410	45	16				
	12/21/92	48					
28.5	105449	18		Very Dense, Brownish Yellow (10YR, 6/6) Poorly Graded Sandy Gravel with some silt, WLT	GP	N/A	H _{nu} = 0 ppm P _y = 20-30 cpm L = 0 cpm
	0820	27	13				
	12/24/92	34					
30.0							

PRELIMINARY

NOTES	Background Levels 12/21/92 H _{nu} = 0 ppm P _y = 10-20 cpm L = 0 cpm	Background Levels 1/20/93 H _{nu} = 0 ppm P _y = 10-20 cpm L = 0 cpm
SEE PAGE 1		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 50 03.10	PROJECT NAME: RLIFS	
BORING NUMBER: 2119	COORDINATES:	DATE: 12/22/92
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth 18.4 ft Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 5 OF 16	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	105450 0830 12/21/92	29 33 38	18	very Dense yellowish Brown (10gr, 5/16) poorly graded Gravelly Sand with some silt, wet	SP	M/H	H _{nu} = 0 ppm P _r = 20 cpm L = 0 cpm
31.5				No samples taken. Samples to be taken every five feet starting at 35.0 ft			
35.0	105451 0935 12/21/92	10 21 29	18	very Dense yellowish Brown (10gr, 5/16) poorly graded Gravelly Sand with a trace of silt wet	SP	M/H	H _{nu} = 0 ppm P _r = 20 cpm L = 0 cpm
36.5							
37.5							

PRELIMINARY

NOTES

SEE PAGE 2

Background Levels
 H_{nu} > 0 ppm
 P_r = 10-20 cpm
 L > 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 50 03 10	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE 12/22/92
ELEVATION:	GWL: Depth 2.0 ft Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken Cooper	Depth 18.4 ft Date/Time 11/20/93 1400	DATE COMPLETED: 11/19/93
DRILLING METHODS: Cable Tool	PAGE 6	OF 16

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5							
40.0	105452 1000 12/24/92	7 10 12	12	medium Dense Yellowish Brown (0.4R 5/6) Poorly Graded Sandy Gravel with a trace of silt, WLT	GP	N/A	H _N U = 0 p _u m B _y = 20 c _p m λ = 0 c _p m
41.5							
45.0	105454 1430 12/22/92	9 15 21	14	Dense Brown (0.4R, 5/3) Poorly Graded coarse sand with some Gravel, WLT	SP	N/A	H _N U = 0 p _u m B _y = 20 c _p m λ = 0 c _p m
46.5							
50.0	105455 1520 12/22/92	10 25 42	11	Very Dense Dark Grayish Brown (2.5 Y 4/2) well Graded medium Sand with a trace of Gravel WLT	SW	N/A	H _N U = 0 p _u m B _y = 20 c _p m λ = 0 c _p m
51.5							
52.5							

NOTES

SEE PAGE 1

Background levels

H_NU = 0 p_um
B_y = 10-20 c_pm
λ = 0 c_pm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. <i>602.50.03.10</i>	PROJECT NAME. <i>RI/FS</i>	
BORING NUMBER. <i>2119</i>	COORDINATES:	DATE <i>12/23/92</i>
ELEVATION:	GWL: Depth <i>21.0 ft</i> Date/Time <i>1/21/92 1430</i>	DATE STARTED: <i>12/17/92</i>
ENGINEER/GEOLOGIST <i>Ken Geiger</i>	Depth <i>18.4 ft</i> Date/Time <i>1/20/92 1400</i>	DATE COMPLETED: <i>1/19/93</i>
DRILLING METHODS: <i>Cable Tool</i>	PAGE <i>7</i> OF <i>16</i>	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55.0	<i>105457 1010 12/23/92</i>	<i>25 50/5</i>	<i>11</i>	<i>VERY DENSE DARK GRAYISH BROWN (2.54, 4/2) POORLY GRADED COARSE GRAVELLY SAND, WET</i>	<i>SP</i>	<i>N/A</i>	<i>H₂O = 0 ppm P_r = 40 cpm L = 0 cpm</i>
56.5							
60.0	<i>105457 105495 105458 1105 12/23/92</i>	<i>4 7 10</i>	<i>15</i>	<i>MEDIUM DENSE DARK GRAYISH BROWN (2.54, 4/2) POORLY GRADED COARSE GRAVELLY SAND, WET</i>	<i>SP</i>	<i>N/A</i>	<i>H₂O = 0 ppm P_r = 30 cpm L = 0 cpm</i>
61.5							
65.0	<i>105460 1615 12/23/92</i>	<i>7 13 19</i>	<i>18</i>	<i>DENSE DARK GRAYISH BROWN (2.54, 4/2) POORLY GRADED SANDY GRAVEL, WET</i>	<i>GP</i>	<i>N/A</i>	<i>H₂O = 0 ppm P_r = 40 cpm L = 0 cpm</i>
66.5							
67.5							

NOTES:

See Page 1

Background Levels

*H₂O = 0 ppm
P_r = 20-40 cpm
L = 0 cpm*

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 50 0310	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE: 12/28/92
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken Geigler	Depth 18.4 ft Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 8 OF 16	

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
69.5							
70.0							
70.5	105461	10		Medium Dense Dark Grayish Brown (2.5Y, 4/2) Poorly Graded Sand with some gravel, WET	SP	N/A	H _u = 11 p.m. β _r = 40 c.p.m. λ = 0 c.p.m.
	1105	12	18				
71.5	12/27/92	14					
75.0							
75.5	105464	18		Dense Dark Grayish Brown (2.5Y, 4/2) Poorly Graded Sand with some gravel, WET	SP	N/A	H _u = 11 p.m. β _r = 20 c.p.m. λ = 0 c.p.m.
	1525	19	18				
76.5	12/27/92	20					
80.0							
80.5	105466	8		Dense Dark Grayish Brown (2.5Y, 4/2) Poorly Graded Sand with some gravel, WET	SP	N/A	H _u = 11 p.m. β _r = 40 c.p.m. λ = 0 c.p.m.
	840	15	12				
81.5	12/27/92	21					
92.5							

NOTES:

See Page 1

Background Levels
12/28/92
H_u = 11 p.m.
β_r = 40-60 c.p.m.
λ = 0 c.p.m.

Background Levels
12/28/92
H_u = 11 p.m.
β_r = 40-60 c.p.m.
λ = 0 c.p.m. 89

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602 50 03 10	PROJECT NAME. RI/FS	
BORING NUMBER. 2119	COORDINATES.	DATE 12/29/92
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430	DATE STARTED 12/17/92
ENGINEER/GEOLOGIST Ken Geyer	Depth 18.4 ft Date/Time 1/10/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS Cable Tool	PAGE 9 OF 16	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82.5							
85.0	105467 955	19 20	18	VERY DENSE DARK GRAYISH BROWN (2.5Y, 4/2) POORLY GRADED SAND WITH SOME GRAVEL, WAT	SP	N/A	H ₂₅ = 1ppm P ₂₅ = 40cpm L = 0cpm
86.5	12129192	42					
90.0	105469 1100	10 15	8	DENSE DARK GRAYISH BROWN (2.5Y, 4/2) POORLY GRADED SANDY GRAVEL, WAT	GP	N/A	H ₂₅ = 1ppm P ₂₅ = 40cpm L = 0cpm
91.5	115193	17					
95.0	105470 935	2 7	4	MEDIUM DENSE DARK GRAYISH BROWN (2.5Y, 4/2) POORLY GRADED SANDY GRAVEL, WAT	GP	N/A	H ₂₅ = 1ppm P ₂₅ = 40-50cpm L = 0cpm
96.5	115193	10					
97.5							

LABORATORY

NOTES:

See Page 1

Back Ground Levels
12/29/92
H₂₅ = 1ppm
P₂₅ = 40-60cpm
L = 0cpm

Background Levels
1/14/93
H₂₅ = 1ppm
P₂₅ = 40-60cpm
L = 0cpm

Background Levels
1/15/93
H₂₅ = 1ppm P₂₅ = 40-60 L = 0cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602 50 03.10	PROJECT NAME. RI/FS	
BORING NUMBER. 2119	COORDINATES:	DATE 1/5/93
ELEVATION:	GWL: Depth 21.0 ft Date/Time 1/21/92 1470	DATE STARTED 12/17/92
ENGINEER/GEOLOGIST Ken Gaiser.	Depth 18.4 ft Date/Time 1/21/93 1700	DATE COMPLETED: 1/19/93
DRILLING METHODS Cable Tool	PAGE 10 OF 16	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
97.5							
100.0	105471	17		VERY DENSE DARK GRAYISH BROWN (2.5%, 4/2) well graded medium sand with a trace of gravel, wet.	SW	N/A	H ₂₅ = 1 ppm P _T = 40 cpm L = 0 cpm
	1000	38	9				
101.5	115193	47					
105.0	105473	32		VERY DENSE DARK GRAYISH BROWN (2.5%, 4/2) poorly graded gravelly sand, wet	SP	N/A	H ₂₅ = 1 ppm P _T = 40 cpm L = 0 cpm
	1045	50	10				
106.5	115193	5					
110.0	105417	28		VERY DENSE DARK GRAYISH BROWN (2.5%, 4/2) poorly graded gravelly sand, wet	SP	N/A	H ₂₅ = 1 ppm P _T = 40 cpm L = 0 cpm
	1010	42	15				
111.5	116193	45					
112.5							

NOTES

See Page 1

Background Levels
115193
H₂₅ = 1 ppm
P_T = 40-60 cpm
L = 0 cpm

Background Levels
116193
H₂₅ = 1 ppm
P_T = 40-60 cpm
L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.10	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE: 11/19/93
ELEVATION:	GWL: Depth 21.0 ft Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth 18.4 ft Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 11 OF 16	

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
112.5							
115.0	105477 117193	24 32 35	12	Very Dense Dark Grayish Brown (2.5Y, 4/2) well graded sand with some gravel, wet	SW	u/A	H _{nu} = 1 ppm P _y = 400 cpm L = 0 cpm
116.5							
120.0	105477 1030 117193	15 25 29	9	Same AS Above	SW	u/A	H _{nu} = 1 ppm P _y = 400 cpm L = 0 cpm
121.5							
125.0	105479 1435 117193	5 1/5	3	Very Dense Dark Grayish Brown (2.5Y, 4/2) well graded silty sand with some gravel, wet	SM SW 032/433	u/A	H _{nu} = 1 ppm P _y = 200 cpm L = 0 cpm
126.5							
127.5							

NOTES:

See Page 1

Background Levels 1/19/93
 H_{nu} = 1 ppm
 P_y = 400 cpm
 L = 0 cpm

Background Levels 1/19/93
 H_{nu} = 1 ppm
 P_y = 10-200 cpm
 L = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 102 50 03 10	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE: 1/11/93
ELEVATION:	GWL: Depth 21.0 FT Date/Time 12/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken L. Ziegler	Depth 18.4 FT Date/Time 1/20/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 12 OF 16	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16" (16.2")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
129.5							
130.0	105440	22		Very Dense & Dark Grayish Brown (2.54 4/12) well graded Fine sand with a trace of gravel, wet	SW	N/A	H ₂₅ = 11 p ₁₀₀ B ₂₅ = 20 c _{pm} L = 0 c _{pm}
	1530	33	6				
131.5	1/10/93	41					
135.0	105482	32		Very Dense Olive Brown (2.54 4/13) well graded silty fine sand with a trace of gravel, wet	SW/SM	N/A	H ₂₅ = 11 p ₁₀₀ B ₂₅ = 20 c _{pm} L = 0 c _{pm}
	1010	50	4				
136.5	1/12/93						
140.0	105493	24		Very Dense Olive Brown (2.54 4/13) well graded silty fine sand with some gravel, wet	SW/SM	N/A	H ₂₅ = 11 p ₁₀₀ B ₂₅ = 20 c _{pm} L = 0 c _{pm}
	1045	32	7				
141.5	1/14/93	46					
142.5							

NOTES:

see Page 1

Background Levels
1/11/93
H₂₅ = 11 p₁₀₀
B₂₅ = 10 - 20 c_{pm}
L = 0 c_{pm}

Background Levels
1/12/93
H₂₅ = 11 p₁₀₀
B₂₅ = 20 - 40 c_{pm}
L = 0 c_{pm}

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.10	PROJECT NAME: RI/FS	
BORING NUMBER: 2119	COORDINATES:	DATE: 1/12/93
ELEVATION:	GWL: Depth 21.0 ft Date/Time 2/21/92 1430	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: Ken Grigak	Depth 18.4 ft Date/Time 1/22/93 1400	DATE COMPLETED: 1/19/93
DRILLING METHODS: Cable Tool	PAGE 13 OF 16	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
142.5							
145.0							
146.5	105485 1640 1/12/93	17 50/4	6	Very Dense Olive Brown (2.54, 4/3) Well Graded Fine Sand with a Trace of Gravel, WET	SW	N/A	H _{nu} = 1ppm β _γ = 20 cpm λ = 0 cpm
150.0							
151.5	105486 1610 1/13/93	7 10 15	4 7	Medium Dense Dark Gray (2.54, 4/1) Well Graded Fine Sand with a Trace of Gravel, WET	SW	N/A	H _{nu} = 1ppm β _γ = 40 cpm λ = 0 cpm
155.0							
156.5	105488 1510 1/13/93	50 4	4	Very Dense Dark Grayish Brown (2.54, 4/2) Poorly Graded Fine Sand with some Gravel, WET	SP	N/A	H _{nu} = 1ppm β _γ = 40 cpm λ = 0 cpm
157.5							

NOTES:

See Page 1

Background Levels
1/12/93
H_{nu} = 1ppm
β_γ = 20-40 cpm
λ = 0 cpm

Background Levels
1/13/93
H_{nu} = 1ppm
β_γ = 10-60 cpm
λ = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <i>602 50.03.10</i>	PROJECT NAME: <i>RI/FS</i>	
BORING NUMBER: <i>2119</i>	COORDINATES:	DATE: <i>11/13/93</i>
ELEVATION:	GWL: Depth <i>21.0 ft</i> Date/Time <i>12/21/92 1430</i>	DATE STARTED: <i>12/17/92</i>
ENGINEER/GEOLOGIST: <i>Ken Geipert</i>	Depth <i>18.4 ft</i> Date/Time <i>1/20/93 1400</i>	DATE COMPLETED: <i>1/19/93</i>
DRILLING METHODS: <i>Cable Tool</i>	PAGE: <i>14</i> OF <i>16</i>	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
157.5							
159.0	<i>105489 1625 11/13/93</i>	<i>50/4</i>	<i>4</i>	<i>Very Dense Gray (104R, 5/1) shale Bedrock</i>	<i>N/A</i>	<i>N/A</i>	<i>H₂₅ = 1 ppm B₂₅ = 40 cpm L = 0 cpm</i>
160.0				<i>Bedrock AT 159' Bottom of Boring at 160'</i>			

NOTES:

See Page 1

Background Levels

H₂₅ = 1 ppm

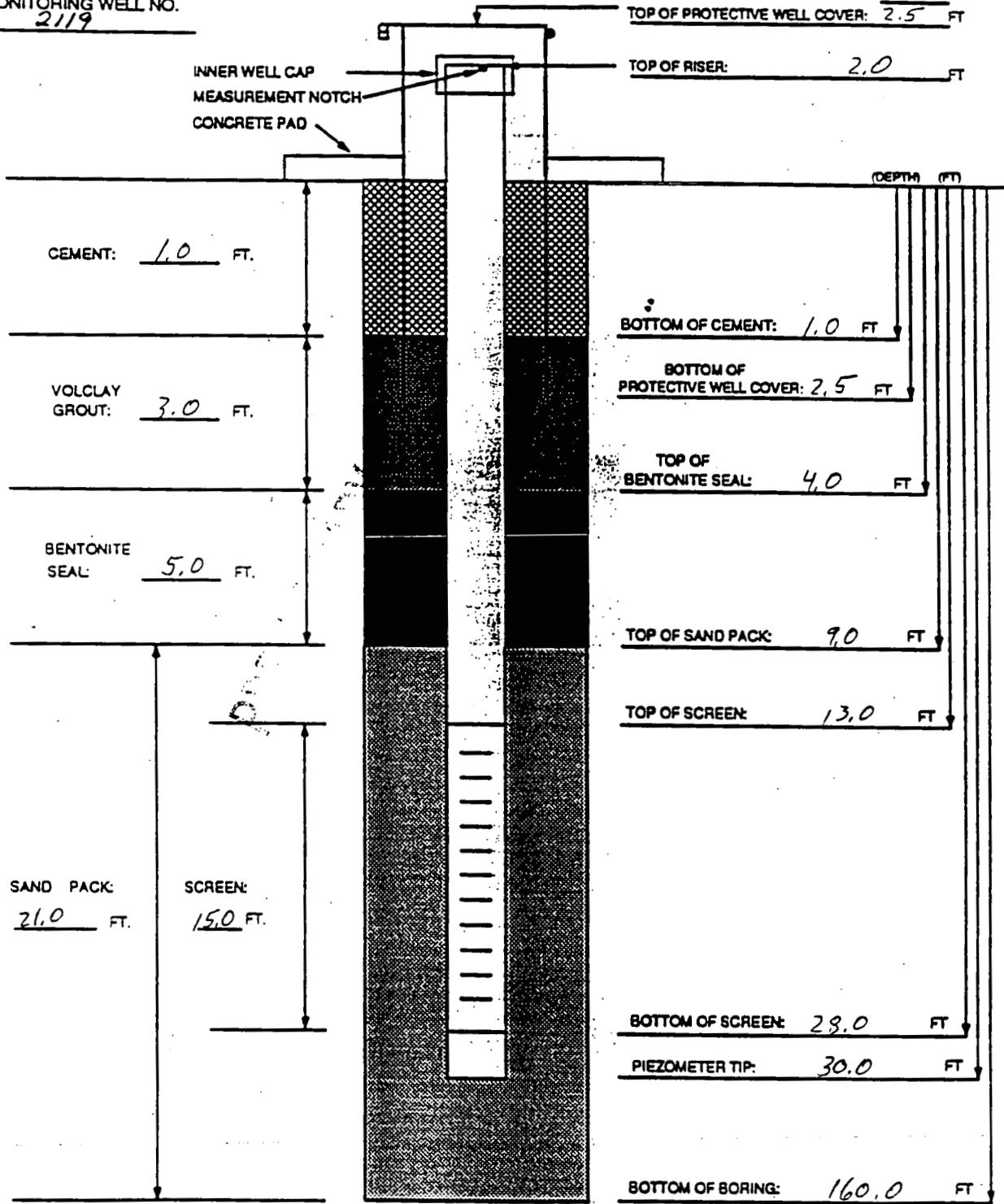
B₂₅ = 40-60 cpm

L = 0 cpm

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FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
2119

INSTALLATION DATE: 1/19/93



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 - 71/50 lb bags
 BENTONITE PELLETS (5-GALLON BUCKETS): 6 Buckets
 BAGS OF VOLCLAY GROUT: 1 - 50 lb bag
 AMOUNT OF CEMENT: 3 bags
 AMOUNT OF WATER USED: 33 gallons
 OTHER: 1-15' Screen with 2' Sump, 1-10ft, 1-5ft
 TASK: 602.50.03.10

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.
- GEOLOGIST/ENGINEER: KEN GEIGER

- 4) WATER DEPTH AND DATE 18.4 FT / 1/20/93
- 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.

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME RI/FS FIELD ENG./GEO. Ken Geiger DATE 1/20/93
 PROJECT NO. 602, 50, 03 10 CHECKED BY C. Zinner DATE 2/2/93
 BORING NO. 2119 DATE OF INSTALLATION 1/19/93
 PIEZOMETER NO. 2119
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>21.0 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>160.0 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 ft, 1-5 ft, 1-15 ft screen with 2' slump</u>
AVERAGE SIZE OF PERFORATIONS <u>.010</u>	JOINING METHOD <u>Screw Type - flush joint</u>
TOTAL PERFORATED AREA <u>15.0 ft</u>	<u>Threaded</u>

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	<u>2.0</u>			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	<u>2.5</u>			
BOREHOLE FILL MATERIALS: <small>CONCRETE</small> GROUT/SLURRY BENTONITE SAND GRAVEL	TOP	<u>0.0</u>		
		<u>1.0</u>		
		<u>4.0</u>		
		<u>9.0</u>		
		<u>N/A</u>		
PERFORATED SECTION	TOP	<u>13.0</u>	TOP	<u>30.0</u>
PIEZOMETER TIP				
BOTTOM OF BOREHOLE		<u>160.0</u>		
GWL AFTER INSTALLATION		<u>18.4</u>		

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

REMARKS Well bore collapsed from 160.0 ft to 30.0 ft as the temporary well casing was removed. Well was drilled to 160.0 ft in order that 97 Hydropunch samples could be taken every 10 ft after groundwater was reached.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 6020427	PROJECT NAME. RCIS Phase I	
BORING NUMBER. 3426	COORDINATES.	DATE 12-21-92
ELEVATION:	GWL: Depth 38 ft Date/Time 1/20/93	DATE STARTED 12-14-92
ENGINEER/GEOLOGIST Kevin J. Fulk / D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/20/93
DRILLING METHODS (Cable Tool)	PAGE 1	OF 4

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1/4	RECOVERY 1/4	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				* For Soil Characterization of C.O. to 145.0 ft See boring Log for well 4426			
75							
145				* Continuous sampling will begin at 145.0 ft through 155.0 ft for sieve screen analysis			

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller Jim Spaccani
Kevin Carrough

Samples collected per ASTM standard
penetration test
All colors identified by the Munsell
Color Chart.
Background { H₂O = 0 ppm
B₅ = 300 ppm
X = 0 ppm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <u>602.04.27</u>	PROJECT NAME: <u>RCRA Phase I</u>	
BORING NUMBER: <u>342E</u>	COORDINATES:	DATE: <u>12/21/96</u>
ELEVATION:	GWL: Depth <u>See p. 1</u> Date/Time	DATE STARTED: <u>12/14/92</u>
ENGINEER/GEOLOGIST: <u>Kevin S. J. / D. O'Brien</u>	Depth Date/Time	DATE COMPLETED: <u>1/20/93</u>
DRILLING METHODS: <u>Cable Tool</u>		PAGE: <u>2</u> OF <u>24</u>

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ITS)	REMARKS
145.6				11.1 cm			
146.5	14-26 103376 103376 12-2174	24 37 33	18	Very Dense (4/5 y 4/2) Olive gray well graded gravelly sand wet	SW	NA	H _N U = 0 ppm B _S = 500 cpm
148.0	15-46 103376 103376 12-2174	21 19 14	18	Dense (5 y 4/2) Olive gray well graded gravelly sand wet	SW	NA	H _N U = 0 ppm B _S = 500 cpm
149.5	16-17 103376 103376 12-2174	33 37 34	18	Very Dense (5 y 4/2) Olive gray well graded sandy gravel wet	GW	NA	H _N U = 0 ppm B _S = 500 cpm
151.0	GA10 103376 103376	31 36 32	15	V. Dense (5 y 4/2) Olive gray coarse sand, well graded, wet	SP	NA	H _N U = 0 ppm B _S = 400 cpm
152.5	103376 103376	42 43	13	V. Dense (5 y 4/2) Olive gray coarse sand, well graded, wet	SW	NA	H _N U = 0 ppm B _S = 400 cpm
154	103376 103376	33 42	17	V. Dense (5 y 4/2) Olive gray coarse sand, well graded, wet	SP	NA	H _N U = 0 ppm B _S = 500 cpm
155	103376 103376	37 30	17	SMA	SP	NA	H _N U = 0 ppm B _S = 400 cpm
157				Boring terminated at 157 cm			

050
1125/96

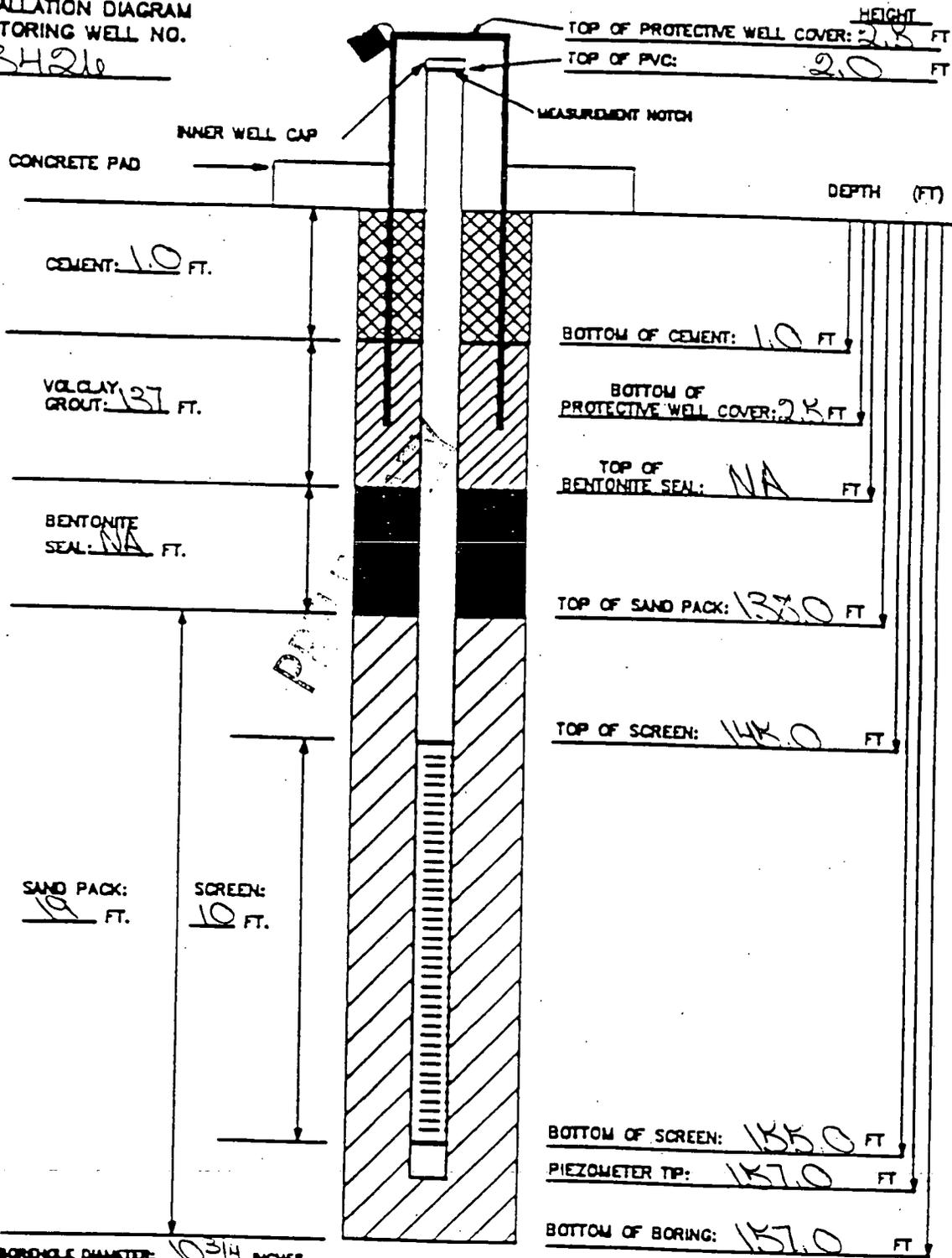
NOTES
 Drilling Company: Pennsylvania Drilling
 Drilling Equipment: Cable Tool
 Driller: Jim Sorocini
 Steve Casavoy

* Samples collected per ASTM Standard Penetration Test
 * All tests identified by the manual cone chart
 Background: (H_NU = 0 ppm
 B_S = 500 cpm
 L = 0 cpm
 SMA Same as above
 SP Not applicable

FERNALD RI/FS

INSTALLATION DATE: 11/20/93

INSTALLATION DIAGRAM
MONITORING WELL NO. 3426



HEIGHT
 TOP OF PROTECTIVE WELL COVER: 2.5 FT
 TOP OF PVC: 2.0 FT

INNER WELL CAP
 CONCRETE PAD
 MEASUREMENT NOTCH
 DEPTH (FT)

CEMENT: 1.0 FT.
 BOTTOM OF CEMENT: 1.0 FT

VOLCLAY GROUT: 137 FT.
 BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT

BENTONITE SEAL: NA FT.
 TOP OF BENTONITE SEAL: NA FT

SAND PACK: 19 FT.
 TOP OF SAND PACK: 138.0 FT

SCREEN: 10 FT.
 TOP OF SCREEN: 148.0 FT

PIEZOMETER TIP: 157.0 FT

BOTTOM OF SCREEN: 155.0 FT

BOTTOM OF BORING: 157.0 FT

BORING DIAMETER: 10 3/4 INCHES

MATERIALS USED:

- SAND TYPE AND QUANTITY: 31 bag 4/30, 6 bag 10/20
- BENTONITE PELLETS (5-GALLON BUCKETS): NA
- BAGS OF VOLCLAY GROUT: 150 bags 0.50 1/25/93
- AMOUNT OF CEMENT: 1 bag
- AMOUNT OF WATER USED: 200 gal
- OTHER: 27.50 drums, 1 water drum

TASK: 04.27

NOTES:

- 1) RISER PIPE IS 4 in. 16085 stainless steel
 - PVC PIPE, FLUSH-THREADED JOINTS
 - 4 inch
- 2) SCREEN IS 2" HIGH 10" SCHEDULE 40 STAINLESS STEEL
 - PVC PIPE WITH 0.020" SLOT
- 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG.
- 4) WATER DEPTH/DATE: 73.84 11/25/93

GEOLOGIST/ENGINEER: D.O. BROWN

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA phase 1 FIELD ENG./GEO. D.O'Brien DATE 1/20
 PROJECT NO. 102 OH 27 CHECKED BY C. B. Miller DATE 2/2/93
 BORING NO. 3426
 PIEZOMETER NO. 3426 DATE OF INSTALLATION 1/20/93

BOREHOLE DRILLING

DRILLING METHOD <u>cable tool</u>	TYPE OF BIT <u>churn bit</u>
DRILLING FLUID(S) USED: FLUID <u>H₂O</u> FROM <u>0.0 FT</u> TO <u>80 FE</u> FLUID <u>NA</u> FROM <u>—</u> TO <u>—</u>	CASING SIZE (S) USED: SIZE <u>10³/₄ in ID</u> FROM <u>0.0 FT</u> TO <u>157.0 FT</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>0.020 in</u>	RISER PIPE DIAMETERS: O.D. <u>4³/₈ 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>14-10ft, 1-5ft, 1-2ft</u>
AVERAGE SIZE OF PERFORATIONS <u>0.020 in</u>	JOINING METHOD <u>flush joint threads</u>
TOTAL PERFORATED AREA <u>10.0 ft²</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5.0 ft</u>	OTHER PROTECTION <u>hinged locking cover</u>
PROTECTIVE PIPE O.D. <u>10³/₄ in</u>	<u>w/ padlock</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ()	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	123.2 <u>2.0</u>			
GROUND SURFACE		0.0		
BOTTOM OF PROTECTIVE PIPE		<u>2.5</u>		
BOREHOLE FILL MATERIALS: <u>Cement</u> GROUT/SLURRY BENTONITE SAND GRAVEL	TOP <u>0.0</u>	BOTTOM <u>1.0</u>	TOP	BOTTOM
	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP	BOTTOM
	TOP <u>138.0</u>	BOTTOM <u>157.0</u>	TOP	BOTTOM
	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP	BOTTOM
PERFORATED SECTION	TOP <u>145.0</u>	BOTTOM <u>155.0</u>	TOP	BOTTOM
PIEZOMETER TIP	<u>157.0</u>			
BOTTOM OF BOREHOLE	<u>157.0 ft</u>			
GWL AFTER INSTALLATION	<u>73.8 ft</u>			

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

REMARKS 4/30 sand installed from 157.0 ft to 143.0 ft, then 10/20 sand installed from 143.0 ft to 138.0 ft.

MW - 3426

Customer Number: 103576

MATERIAL: _____

SAMPLE NUMBER: 930106-087

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 176.7

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
<u>10</u>	<u>67.85</u>	<u>39.5</u>	<u>39.5</u>	<u>78.7</u>
<u>20</u>	<u>35.05</u>	<u>20.4</u>	<u>59.9</u>	<u>33.5</u>
<u>40</u>	<u>23.76</u>	<u>15.0</u>	<u>74.9</u>	<u>16.7</u>
<u>60</u>	<u>24.42</u>	<u>14.2</u>	<u>89.1</u>	<u>9.8</u>
<u>100</u>	<u>10.86</u>	<u>6.3</u>	<u>95.4</u>	<u>5.9</u>
<u>200</u>	<u>4.22</u>	<u>2.5</u>	<u>97.9</u>	<u>3.0</u>
Pan	<u>2.47</u>	<u>1.4</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:

1-7-93

40 %

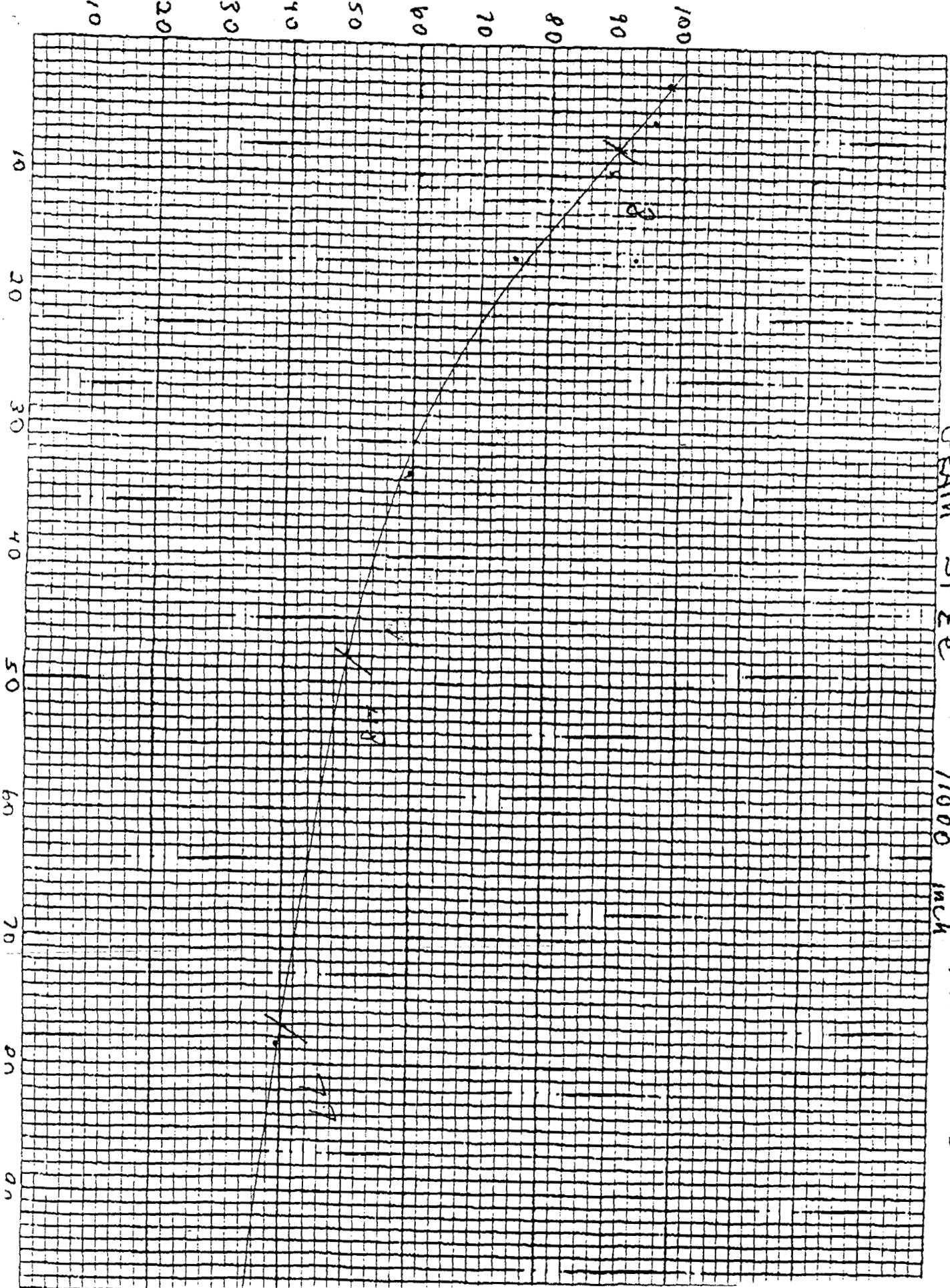
77

50 %

48

90 %

8



GRAIN SIZE

1/1000 inch

MW-3426

103

Sieve Analysis - 3426

$$40\% = 77 \quad 60\% = 48 \quad 90\% = 8$$

$$\frac{40\%}{90\%} = \frac{77}{8} = 9.625 \quad \text{use factor of 4}$$

$$60\% \times 4 = 0.48 \times 4 = 0.192$$

Note: 0.192 falls to the left of both the medium and coarse grain size distribution curves. However, this value most closely fits the coarse sand profile. Therefore, the sand pack for this well will consist of 4/30 coarse grained sand along with a 0.020 inch well screen.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Work plan Attenda	
BORING NUMBER: 1869	COORDINATES:	DATE 1-6-93
ELEVATION:	GWL: Depth 9.7 Ft Date/Time 1-7-93	DATE STARTED: 1-6-93
ENGINEER/GEOLOGIST: Michael Wouley	Depth Date/Time	DATE COMPLETED: 1-6-93
DRILLING METHODS: Auger	PAGE 1 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 10 IN	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	0930 Hand Auger 09671 1-6-93	Hand Auger	6	Soft (10YR, 3/3) dark brown organic silty clay, trace gravel, low plasticity, slightly moist	OL	0.5	OVM = 0 ppm β _s = 100 cpm α = 0 cpm
1	0945 09672 1-6-93	9	6	Soft (2.5Y, 5/6) light olive brown silty clay, trace gravel, low plasticity, slightly moist	CL	0.5	OVM = 0 ppm β _s = 100 cpm α = 0 cpm
1	0945 09673 1-6-93	8	6	Hard (2.5Y, 6/8) Gray mottled olive yellow clay, trace gravel, slightly moist, low plasticity	CL	4.5	OVM = 0 ppm β _s = 100 cpm α = 0 cpm
2	0945 09674 1-6-93	15	6	Stiff (2.5Y, 5/6) Gray mottled light olive brown gravelly clay, medium plasticity, slightly moist	CL	2.0	OVM = 0 ppm β _s = 100 cpm α = 0 cpm
2	1000 09675 1-6-93	2	6	SAA (2.5Y, 5/4) SAA	CL	2.0	OVM = 0 ppm β _s = 80 cpm α = 0 cpm
3	1000 09676 1-6-93	3	6	Stiff (2.5Y, 5/4) SAA, Gray mottled light olive brown clay, trace gravel, medium plasticity, slightly moist	CL	2.0	OVM = 0 ppm β _s = 80 cpm α = 0 cpm
3	1000 09677 1-6-93	6	6	SAA	CL	2.0	OVM = 0 ppm β _s = 80 cpm α = 0 cpm
4	1010 09678 1-6-93	3	6	SAA (2.5Y, 5/6) SAA	CL	2.0	OVM = 0 ppm β _s = 60 cpm α = 0 cpm
4	1010 09679 1-6-93	5	6	SAA	CL	2.0	OVM = 0 ppm β _s = 60 cpm α = 0 cpm
5	1010 09680 1-6-93	7	2	SAA	CL	2.0	OVM = 0 ppm β _s = 60 cpm α = 0 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling
 Drilling Equipment Acker Auger Rig
 Driller: Joe Barile
Rick Pierce / Kevin Muers

SAA - SAME AS ABOVE
 NA - NOT APPLICABLE

Background { OVM = 0 ppm
 β_s = 60 cpm
 α = 0 cpm

* Samples Collected per ASTM standard Penetration Test
 * All colours identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Workplan Addenda	
BORING NUMBER: 1869	COORDINATES:	DATE 1-6-93
ELEVATION:	GWL: Depth 9.7 ft Date/Time 1-7-93	DATE STARTED: 1-6-93
ENGINEER/GEOLOGIST: Michael Worley	Depth	Date/Time
DRILLING METHODS: Auger	DATE COMPLETED: 1-6-93	
		PAGE 2 OF 5

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 10 IN	RECOVERY %	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	1015 09681 1-6-93	2	6	Stiff (2.54, 5/6) light olive brown clay, trace gravel, Gray mottled, medium plasticity, slightly moist	CL	2.0	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm
	1015 09682 1-6-93	5	6	Hard, SAA	CL	4.0	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm
	1015 09683 1-6-93	7	6	stiff, SAA	CL	2.0	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm
7	1020 09684 1-6-93	7	6	Soft, SAA, medium plasticity, moist	CL	0.5	o _{vm} = 0 ppm β _s = 60 cpm α = 0 cpm
	1020 09685 1-6-93	7	6	SAA	CL	0.5	o _{vm} = 0 ppm β _s = 60 cpm α = 0 cpm
8	1020 09686 1-6-93	6	6	SAA	CL	0.5	o _{vm} = 0 ppm β _s = 60 cpm α = 0 cpm
	1030 09687 1-6-93	4	6	Very stiff (2.54, 5/4) light olive brown silty clay, low plasticity, slightly moist	CL	3.5	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm
9	1030 09688 1-6-93	11	6	SAA	CL	3.5	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm
	1030 09689 1-6-93	17	6	SAA	CL	3.5	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm
10	1040 09690 1-6-93	10	6	Med. Dense Very stiff (2.54 5/3) light olive brown inorganic silt, non-plastic, wet	ML CL	NA 3.0	o _{vm} = 0 ppm β _s = 80 cpm α = 0 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling
 Drilling Equipment Acker Auger Rig
 Driller: Joe Barile
Rick Pierce / Kevin Myers

SAA - SAME AS ABOVE
 NA - NOT APPLICABLE
 Background { o_{vm} = 0 ppm
 β_s = 80 cpm
 α = 0 cpm

* Samples Collected per ASTM Standard Penetration Test
 * All colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Work plan Addenda		
BORING NUMBER: 1869	COORDINATES:	DATE: 1-6-93	
ELEVATION:	GWL: Depth 9.7 FT. Date/Time 1-7-93		DATE STARTED: 1-6-93
ENGINEER/GEOLOGIST: Michael Worley	Depth	Date/Time	DATE COMPLETED: 1-6-93
DRILLING METHODS: Auger	PAGE 3		OF 5

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 10 IN	RECOVERY %	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY TEST	REMARKS
11	1040 09691 1-6-93	10	6	Med. dense Very dense (2.54, 5/3) light olive brown inorganic silt, Non-plastic, wet	ML	NA	OVM = 0 ppm β = 80 cpm α = 0 cpm
	1040 09692 1-6-93	10	6	Very stiff (2.54, NS) gray clay, trace gravel, medium plasticity, slightly moist	CL	3.5	OVM = 0 ppm β = 80 cpm α = 0 cpm
				Bottom of sampling at 11.0 FT. Bottom of sampling during 11.0 FT. M.W. 1-6-93			OVM = ppm β = cpm α = cpm
12							OVM = ppm β = cpm α = cpm
							OVM = ppm β = cpm α = cpm
							OVM = ppm β = cpm α = cpm
							OVM = ppm β = cpm α = cpm
							OVM = ppm β = cpm α = cpm
							OVM = ppm β = cpm α = cpm
							OVM = ppm β = cpm α = cpm

NOTES:
 Drilling Contractor Pennsylvania Drilling
 Drilling Equipment Acker Auger Rig
 Driller: Joe Barile
Rick Pierce / Kevin Myers

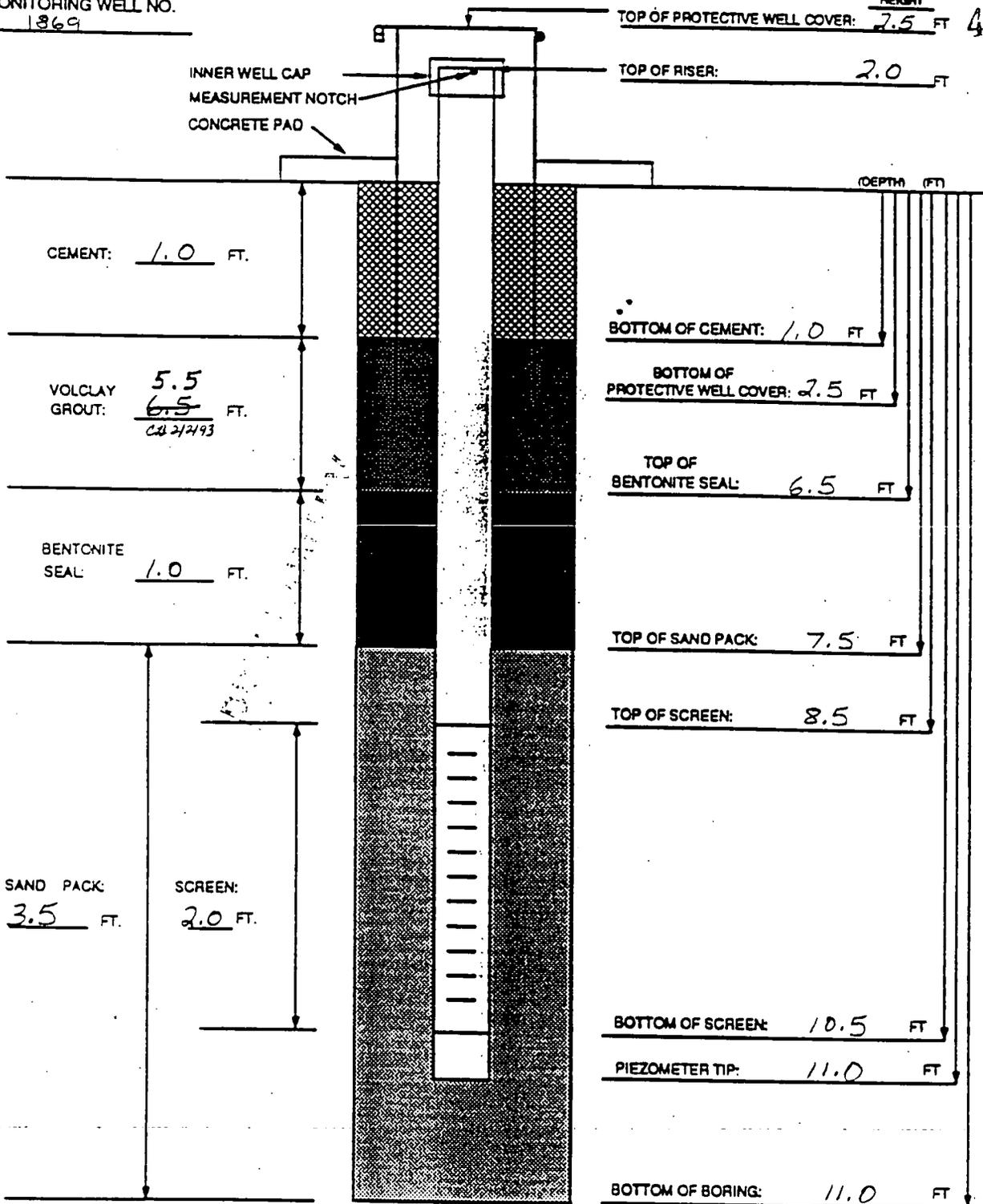
SAA - SAME AS ABOVE
 NA - NOT APPLICABLE

Background {
 OVM = 0 ppm
 β = 80 cpm
 α = 0 cpm

* Samples Collected per ASTM Standard Penetration Test
 * All colors identified by the Munsell Color Chart

FERNALD R/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
1369

INSTALLATION DATE: 1-6-93



HEIGHT
TOP OF PROTECTIVE WELL COVER: 2.5 FT 4119

TOP OF RISER: 2.0 FT

CEMENT: 1.0 FT.

VOLCLAY GROUT: 5.5
6.5 FT.
CA 2/2/93

BENTONITE SEAL: 1.0 FT.

SAND PACK: 3.5 FT.

SCREEN: 2.0 FT.

BOTTOM OF CEMENT: 1.0 FT

BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF BENTONITE SEAL: 6.5 FT

TOP OF SAND PACK: 7.5 FT

TOP OF SCREEN: 8.5 FT

BOTTOM OF SCREEN: 10.5 FT

PIEZOMETER TIP: 11.0 FT

BOTTOM OF BORING: 11.0 FT

BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

- SAND TYPE AND QUANTITY: 4/30 - 2 bags
- BENTONITE PELLETS (5-GALLON BUCKETS): ± bucket
- BAGS OF VOLCLAY GROUT: 1
- AMOUNT OF CEMENT: ± bag
- AMOUNT OF WATER USED: 15 gallons
- OTHER: 1 - Water drum, 1 - soil drum
- TASK: 602-50.03.07

NOTES:

- 1) RISER PIPE IS 2.0 IN. ID. PVC M.W. STAINLESS STEEL -7-93 PIPE, FLUSH-THREADED JOINTS.
- 2) SCREEN IS 2.0 IN. ID. PVC M.W. STAINLESS STEEL 1-7-93 PIPE WITH 0.020 IN. SLOTS.
- 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
- 4) WATER DEPTH AND DATE 9.7 FT/1-7-93
- 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: Michael Worley

PIEZOMETER INSTALLATION SHEET

4119

PROJECT NAME 04-5 Addenda FIELD ENG./GEO. Michael Worley DATE 1-6-93
 PROJECT NO. 602.50.03.07 CHECKED BY C. Bunn DATE 2/2/93
 BORING NO. 1869
 PIEZOMETER NO. 1869 DATE OF INSTALLATION 1-6-93

BOREHOLE DRILLING

DRILLING METHOD <u>Auger</u>	TYPE OF BIT <u>Hollow Auger</u>
DRILLING FLUID(S) USED:	CASING SIZE(S) USED:
FLUID <u>N/A</u> FROM <u>—</u> TO <u>—</u>	SIZE <u>N/A</u> FROM <u>—</u> TO <u>—</u>
FLUID <u>N/A</u> FROM <u>—</u> TO <u>—</u>	SIZE <u>N/A</u> FROM <u>—</u> TO <u>—</u>

PIEZOMETER DESCRIPTION

TYPE <u>Monitoring Piezometer</u>	RISER PIPE MATERIAL <u>Schedule 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2.0 in. ID.</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. <u>2 5/16 in.</u> I.D. <u>2.0 in.</u>
SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>1-10.5 FT.</u>
AVERAGE SIZE OF PERFORATIONS <u>0.020 in.</u>	JOINING METHOD <u>Screw type - flush joint threaded</u>
TOTAL PERFORATED AREA <u>2.0 FT.</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5.0</u>	OTHER PROTECTION <u>Hinged protective cover with padlock</u>
PROTECTIVE PIPE O.D. <u>4 3/8 in.</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: YOLCLAY GROUT / SLURRY M.W. 1-7-93	TOP	0.0	BOTTOM	1.0
	TOP	1.0	BOTTOM	6.5
	TOP	6.5	BOTTOM	7.5
	TOP	7.5	BOTTOM	8.5 10.0
BENTONITE	TOP	6.5	BOTTOM	7.5
SAND	TOP	7.5	BOTTOM	10.0
GRAVEL NONE USED	TOP	N/A	BOTTOM	N/A
PERFORATED SECTION	TOP	8.5	BOTTOM	10.5
PIEZOMETER TIP	11.0			
BOTTOM OF BOREHOLE	11.0			
GWL AFTER INSTALLATION	9.7			

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

REMARKS Cement placed from 0.0 to 10 FT. to hold protective cover in place.

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VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER	602.04.27	PROJECT NAME	RCRA Phase I
BORING NUMBER	2424	COORDINATES	DATE 1/27/93
ELEVATION:		GWL: Depth 94.8 ft Date/Time 1/25/93	DATE STARTED 1/6/93
ENGINEER/GEOLOGIST	B. Yeardley	Depth	Date/Time
DRILLING METHODS	Cable Tool	PAGE	OF 6

DEPTH (Fe)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in. 1	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USP)	REMARKS
0.0				For classification of soil see footage logs for 4424			
107.0				Bottom of hole at 107 ft			

NOTES

Drilling Contractor Pennsylvania Drilling
 Drilling Equipment 38 Cyclone
 Driller Chris Coulter
David Holmes

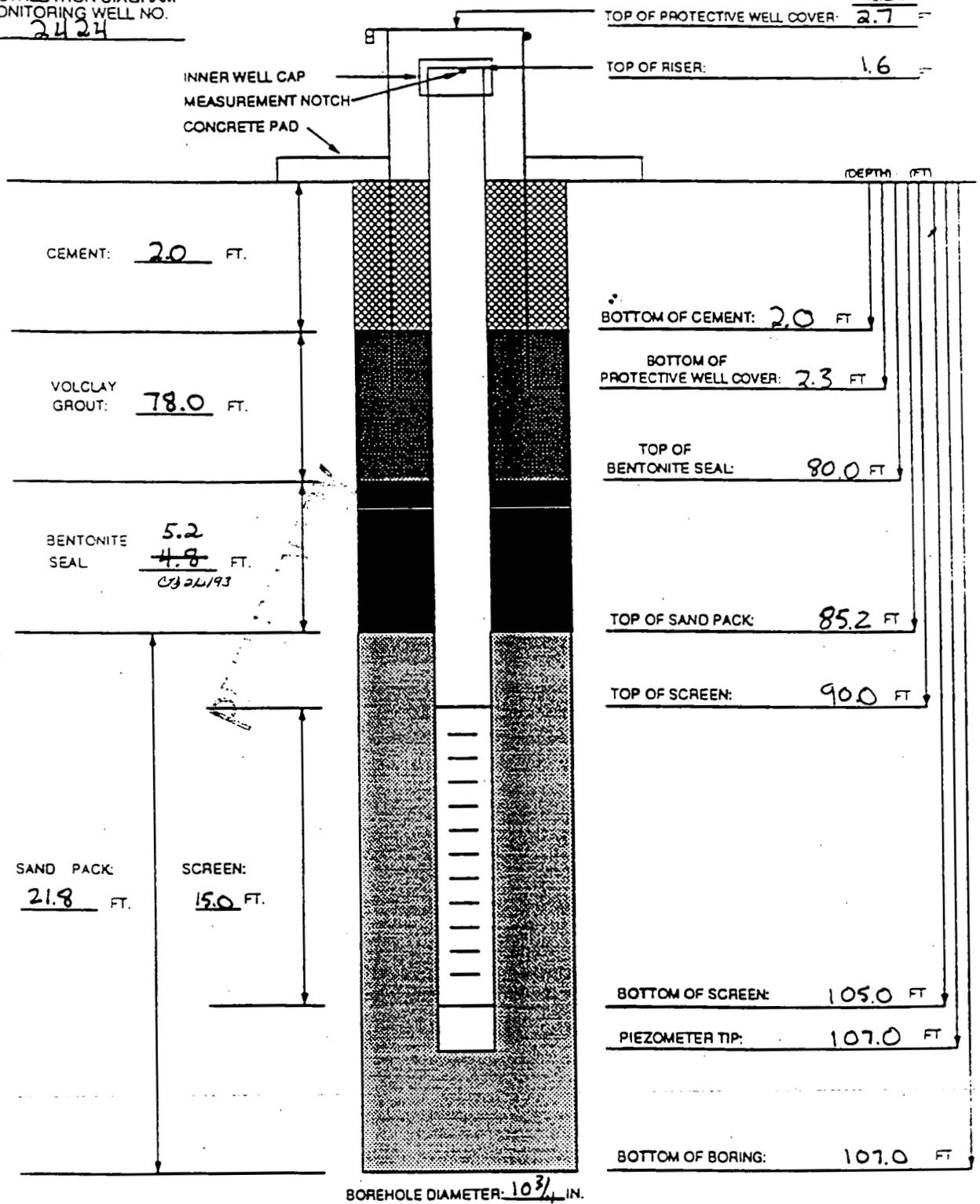
SAA - Same as above
 NA - Not Applicable

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

110

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
2424

INSTALLATION DATE: 1/6/93 - 1/25/93



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 25 bags coarse (420)
 BENTONITE PELLETS (5-GALLON BUCKETS): 6 buckets
 BAGS OF VOLCLAY GROUT: 16 bags
 AMOUNT OF CEMENT: 1 bag
 AMOUNT OF WATER USED: 1000 gal.
 OTHER: 17 drums soil
 TASK: WEA-05 (04.27)

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 0.02 IN. SLOTS.
 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
 GEOLOGIST/ENGINEER: Brian Yeardeley

4) WATER DEPTH AND DATE 94.8 FT. 1/25/93
 5) TOP OF CASING IS SECURED W/ STAINLESS STEEL CAP
 6) PARENTHESIS INDICATE DEPTH TO GROUND LEVEL
 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I FIELD ENG./GEO. B. Yearalen DATE 1/27/93
 PROJECT NO. WEA-05 CHECKED BY C. Bruin DATE 2/2/93
 BORING NO. 2424
 PIEZOMETER NO. 2424 DATE OF INSTALLATION 1/6/93 - 1/25/93

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</u> TO <u>95.0</u> FLUID <u>NA</u> FROM <u>-</u> TO <u>-</u>	CASING SIZE (S) USED: SIZE <u>100 in ID</u> FROM <u>0.0</u> TO <u>110.0</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 in ID</u>	RISER PIPE DIAMETERS: O.D. <u>4 3/8</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>9-10 ft</u> <u>2-2 ft</u>
AVERAGE SIZE OF PERFORATIONS <u>0.02 in</u>	JOINING METHOD <u>Screw type - flush</u>
TOTAL PERFORATED AREA <u>150 ft</u>	<u>joint threaded</u>

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>50 ft</u>	OTHER PROTECTION <u>Hinged locking</u>
PROTECTIVE PIPE O.D. <u>10 3/4 in</u>	<u>Cover with padlock</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ()	
TOP OF RISER PIPE	1.6			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.3			
BOREHOLE FILL MATERIALS: <u>CEMENT</u> <u>Voiding GROUT / SLURRY by 1/27/93</u> <u>BENTONITE Pellets</u> <u>SAND</u> <u>GRAVEL</u>	TOP 0.0	2.0		
	TOP 2.0	BOTTOM 80.0	TCP	BOTTOM
	TOP 80.0	BOTTOM 85.2	TCP	BOTTOM
	TOP 85.2	BOTTOM 107.0	TCP	BOTTOM
	TOP NA	BOTTOM NA	TCP	BOTTOM
PERFORATED SECTION	TOP 90.0	BOTTOM 105.0	TCP	BOTTOM
PIEZOMETER TIP	107.0			
BOTTOM OF BOREHOLE	107.0			
GWL AFTER INSTALLATION	94.8 (ground elev.)			

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

REMARKS _____

Monitor Well 2424

Brian Yeard

Sand Pack and Sieve Size Determination

I. Wemco values for grain size

$$40\% \text{ value} = 0.10$$

$$50\% \text{ value} = 0.10$$

$$90\% \text{ value} = 0.064$$

II. Uniformity Coefficient 40%/90% Ratio

$$0.10 \text{ in} / 0.064 = 1.56 \text{ which is } < 3$$

Use factor of (5)

III. 50% value \times (5)

$$0.10 \text{ in} \times 5 = 0.5$$

IV. 0.50 falls to left of both medium and coarse grain size distribution curves. However, this value is closer to coarse grain curve and therefore the coarse grain sand with the 20 slot (0.02 in) screen will be used. This allows for maximum flow of water into well and also retain formation.

4119

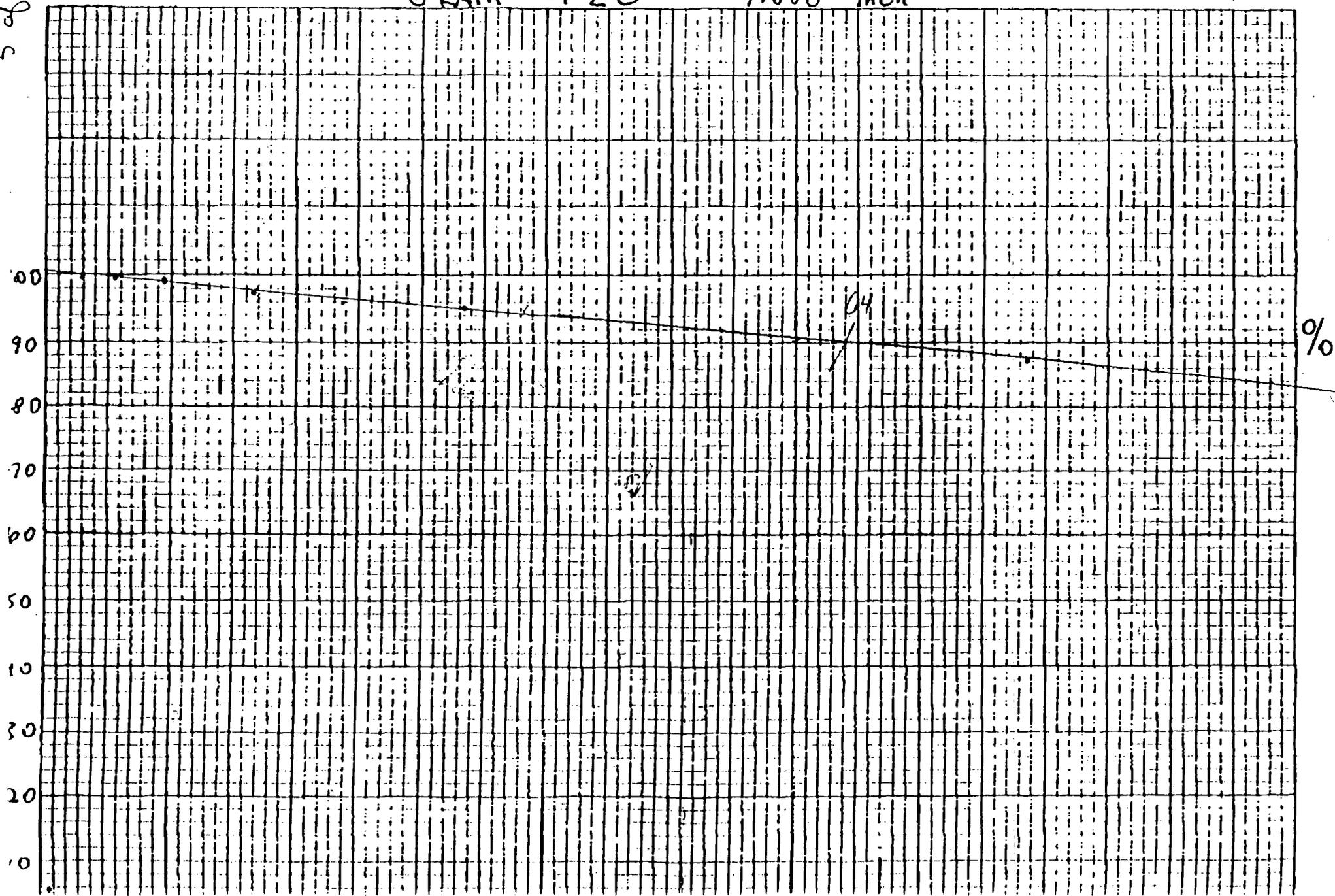
NO. 340. 10 USE
10 X 10 PER. 100

MW-2424

114
33

GRAIN SIZE $\frac{1}{1000}$ inch

5 of 6



MW-2424

6 of 6119

Customer Number 104692
930114-028
926

MATERIAL: Soil

SAMPLE NUMBER: 930114-028

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 179.8

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
<u>10</u>	<u>155.27</u>	<u>86.4</u>	<u>86.4</u>	<u>78.7</u>
<u>20</u>	<u>15.63</u>	<u>8.7</u>	<u>95.1</u>	<u>33.5</u>
<u>40</u>	<u>4.45</u>	<u>2.5</u>	<u>97.6</u>	<u>16.7</u>
<u>60</u>	<u>1.43</u>	<u>0.8</u>	<u>98.4</u>	<u>9.8</u>
<u>100</u>	<u>0.61</u>	<u>0.3</u>	<u>98.7</u>	<u>5.9</u>
<u>200</u>	<u>0.80</u>	<u>0.4</u>	<u>99.1</u>	<u>3.0</u>
Pan	<u>0.80</u>	<u>0.4</u>	<u>99.5</u>	

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

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

Analyzed by:

[Signature]

Checked by:

[Signature]

Date analyzed:

GRAIN SIZE 70% Retained > 100 .001 inch
 50% > 100
 90% 64

VISUAL CLASSIFICATION OF SOILS

R/FS

Page

4119

PROJECT NUMBER: 602.04.27 WEA 05	PROJECT NAME: RCR4 Phase 1
BORING NUMBER: 2432	COORDINATES:
ELEVATION:	GWL Depth: See p. 1 Date/Time:
ENGINEER/GEOLOGIST: K. Payne	Depth: See p. 2 Date/Time:
DRILLING METHODS: Cable Tool	DATE STARTED: 1/14/93
	DATE COMPLETED: 1/27/93
PAGE 2 OF 8	

DEPTH (ft)	SAMPLE TYPE AND NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
79	104932	65/6		Very Dense (10R, 4/6) Yellow Brown, well graded Gravelly Sand, Dry	SW	N/A	HNU = 0 ppm BR = 40-60 cpm
80	104993	10		Very Dense (10R, 5/4) Yellow-Brown, well graded coarse Gravelly Sand, moist	SW	N/A	HNU = 0 ppm BR = 40-60 cpm
81	104994	15		Very Dense (2.5Y, 5/3) light olive Brown, well graded fine Sand, moist	SW	N/A	HNU = 12 ppm BR = 60-80 cpm
82	104985	20		Very Dense (2.5Y, 6/3) light yellowish Brown, well graded medium Sand, wet	SW	N/A	HNU = 5 ppm BR = 60-80 cpm
83	104886	15		Very Dense (2.5Y, 4/3) Olive Brown, well graded Gravelly Sand, wet	SW	N/A	HNU = 2 ppm BR = 80-100 cpm
84	104887	27		Very Dense (2.5Y, 5/3) light Olive Brown, well graded gravelly Sand, wet	SW	N/A	HNU = 1 ppm BR = 60-80 cpm
85	104888	27		Very Dense (2.5Y, 5/4) light Olive Brown, poorly graded Sand, wet	SP	N/A	HNU = 0 ppm BR = 60-80 cpm
86	104889	41		Dense (2.5Y, 4/3) Olive Brown Well graded medium Sand, wet	SM	N/A	HNU = 0 ppm BR = 60-80 cpm
87	104890	15		Very Dense (2.5Y, 4/3) Olive Brown, poorly graded medium Sand, wet	SP	N/A	HNU = 0 ppm BR = 60-80 cpm
88	104891	15		Very Dense (2.5Y, 4/3) Olive Brown, well graded Sand, wet	GM	N/A	HNU = 0 ppm BR = 60-80 cpm
89	104892	85		Gravel, wet	GP	N/A	HNU = 0 ppm BR = 60-80 cpm

SHA - Same as above
NA - Not Applicable

Drilling Contractor: Pennsylvania Drilling
 Drilling Equipment: Cyclone 42
 Driller: Bob Johnson
 Lennie Ingelkin
 Kevin Cavanaugh
 Samples collected per ASTM standard penetration test
 Colors identified using Munsell Color Chart
 Background Readings: 1/19/93 HNU = 0 ppm BR = 60-80 cpm

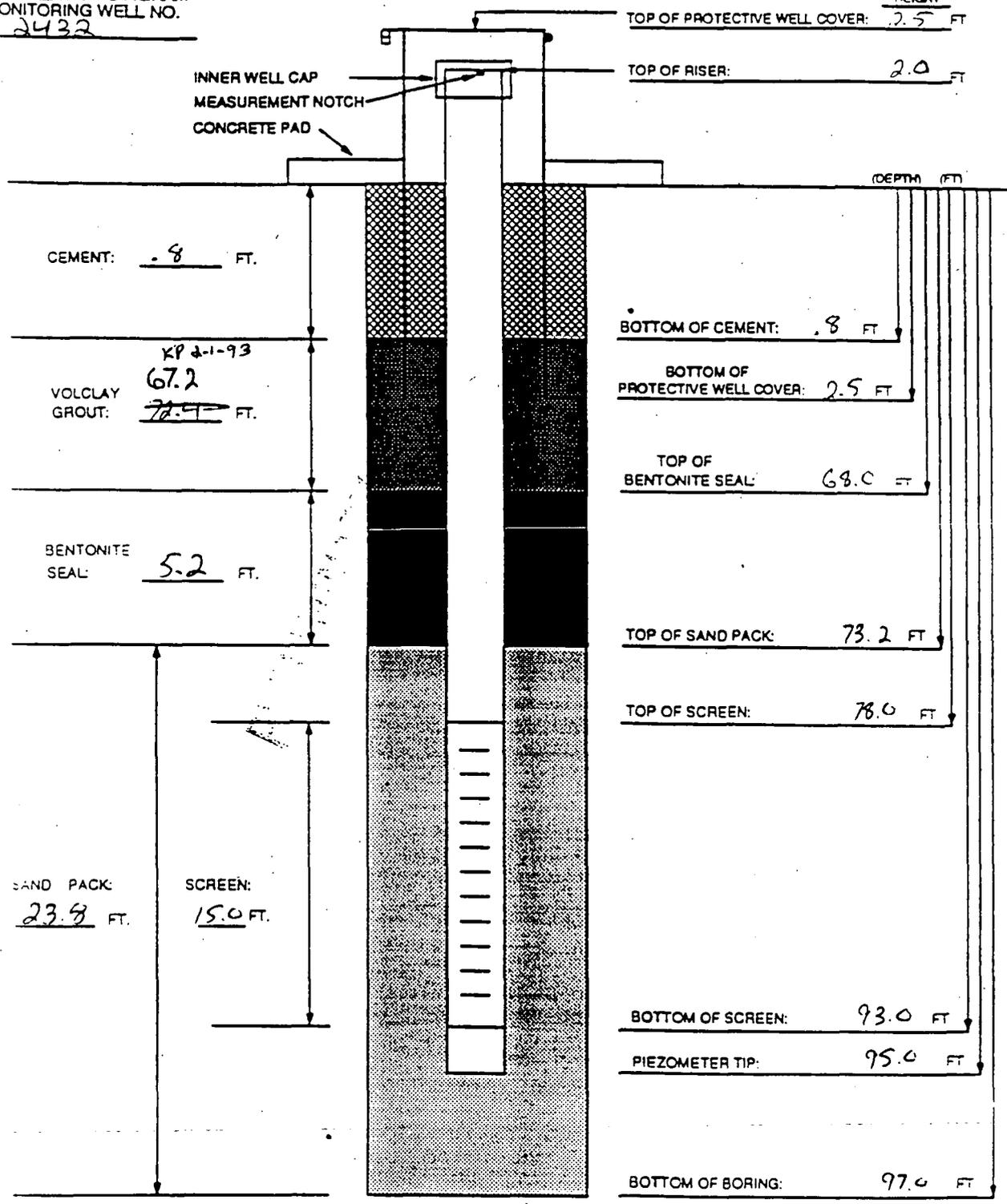
117

2-3-8
7

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
2432

INSTALLATION DATE: 1/27/93

4119



ATERIALS USED

- PIPE AND QUANTITY: 24 bags 4/30 sand
- CEMENT PELLETS (5-GALLON BUCKETS): 5 buckets
- VOLCLAY GROUT: 19 - 50 lb Bags
- CEMENT: 1 - 80 lb Bag
- WATER USED: 1400 gallons
- 18 Drums Soil, 1 Drum Alcohol/Water
- 602-04-27

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.
- GEOLOGIST/ENGINEER: K. Payne

- 4) WATER DEPTH AND DATE (Top of Riser) 94.6 - 1-27-93
- 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.

PIEZOMETER INSTALLATION SHEET

4119

PROJECT NAME RCRA Phase I FIELD ENG./GEO. K. Payne DATE 1-27-93
 PROJECT NO. 602.04.27 CHECKED BY C. Brill DATE 2/1/93
 BORING NO. 2432
 PIEZOMETER NO. 2432 DATE OF INSTALLATION 1-27-93

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>97.0 FT</u> FLUID <u>NA</u> FROM <u>-</u> TO <u>-</u>	CASING SIZE (S) USED: SIZE <u>0.0 IN ID</u> FROM <u>0.0 FT</u> TO <u>99.0 FT</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</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>3-10 FT</u>
AVERAGE SIZE OF PERFORATIONS <u>0.020 in</u>	JOINING METHOD <u>Screw type-flush joint threaded</u>
TOTAL PERFORATED AREA <u>15.0 FT</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u>	OTHER PROTECTION <u>Hinged locking cover with padlock</u>
PROTECTIVE PIPE O.D. <u>10 3/4 in</u>	

ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (FE)		ELEVATION ()	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: <u>Cement Grout / Slurry</u> KP 1-27-93 BENTONITE SAND GRAVEL	Top 0.0	Bottom 0.8		
	TOP 0.8	BOTTOM 68.0	TOP	BOTTOM
	TOP 68.0	BOTTOM 73.2	TOP	BOTTOM
	TOP 73.2	BOTTOM 97.0	TOP	BOTTOM
	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 78.0	BOTTOM 93.0	TOP	BOTTOM
PIEZOMETER TIP	95.0			
BOTTOM OF BOREHOLE	97.0			
GWL AFTER INSTALLATION	84.6 (Top of Riser)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO
 Notes: Cement placed from 0.0 to 0.8 FT to hold protective cover in place

DATE: 6-1-73

Customer Number: 104892

SAMPLE NUMBER: 430122-045

TESTER: _____

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 153.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	<u>32.05</u>	<u>20.9</u>	<u>20.9</u>	<u>78.7</u>
20	<u>37.87</u>	<u>24.6</u>	<u>45.4</u>	<u>33.5</u>
40	<u>44.65</u>	<u>29.0</u>	<u>74.4</u>	<u>16.7</u>
60	<u>21.32</u>	<u>13.9</u>	<u>88.3</u>	<u>9.2</u>
80	<u>2.18</u>	<u>5.3</u>	<u>93.6</u>	<u>5.4</u>
100	<u>3.72</u>	<u>2.4</u>	<u>96.0</u>	<u>3.0</u>
Pan	<u>5.03</u>	<u>3.3</u>	<u>99.3</u>	

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

Original - Duplicate

Average

$$\times 100\% = RPD$$

Analyzed by:

John Robert

Checked by:

Date analyzed:

1-25-73

GRAIN SIZE Retained

40 %

39

50 %

31

90 %

8

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4119

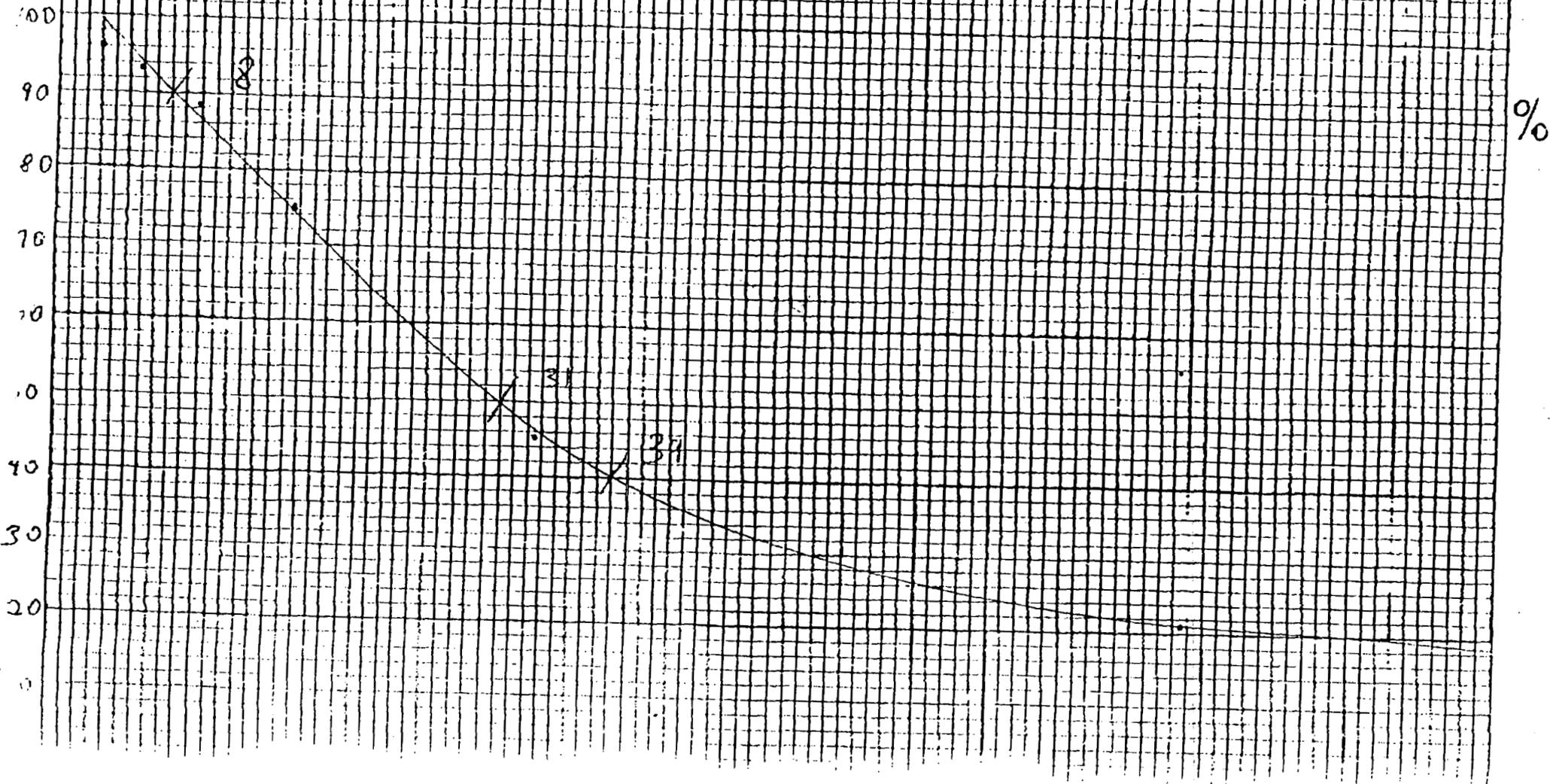
RESEARCH TRIANGLE CORP.
1000 PLYMOUTH

RESEARCH TRIANGLE CORP.
MADE IN U.S.A.

2432

121

GRAIN SIZE $\frac{1}{1000}$ inch



4119

Well #2432

Retained Values

$$90\% = .008$$

$$50\% = .031$$

$$40\% = .039$$

$$\frac{.039}{.008} = 4.875$$

4.875 > 3 therefore a factor of
will be used

$$4 \times .031 = .124$$

The result most closely fits the coarse sand pack (4/30). Therefore a coarse sand pack along with a c. 0.020 inch well screen will be used in this monitoring well.

VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3432	COORDINATES:	DATE: 12-7-92
ELEVATION:	GWS Depth 92.6 Date/Time 1/14/93	DATE STARTED: 12-7-92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 1-11-93
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH feet	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER UNIT	RECOVERY UNIT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY TEST	REMARKS
0				* For Soil Classification from 0.0 to 148.0 feet, see Boring log of monitoring Well 4432			
74				HYDRO PUNCH TAKEN AT 97.0'			
149				* Continuous Sampling will begin at 148.0 and continue to 158.0 feet			

149
NOTES:

Drilling Contractor: Pennsylvania Drilling
 Drilling Equipment: Cyclone 42
 Operator: Bob Johnson
Lennie McGlothin

SAA - SAME AS ABOVE
 NA - NOT APPLICABLE

Samples collected per ASTM standard penetrometer test.
 Colors identified using Munsell color chart

VISUAL CLASSIFICATION OF SOILS

4119

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	DATE: 12-15-92
BORING NUMBER: 3432	COORDINATES:	DATE STARTED: 12-7-92
ELEVATION:	GW Depth: Sec. 1	DATE COMPLETED: 12-11-93
ENGINEER/GEOLOGIST: K. Payne	Depth: Date/Time:	PAGE: 2 OF 7
DRILLING METHODS: Cable Tool		

DEPTH ft	SAMPLE TYPE & NO	BLONS ON SAMPLER PER MIN	RECOVERY MIN	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY STATE	REMARKS
149	1410 12-15-92	45 50 .4	7	Very Dense (2.5Y, 4/2) Dark Grayish Brown, medium Gravel with trace sand, non-plastic, wet	GW	N/A	HNU = 0 ppm BX = 60-80 cpm
150	1440 12-15-92	50 .2	2	Very Dense (2.5Y, 4/2) Dark Grayish Brown, Gravelly Sand with trace sand, non-plastic, wet	SP	N/A	HNU = 0 ppm BX = 40-60 cpm
152	1555 12-15-92	50 .4	3	Very Dense (2.5Y, 4/3) Olive Brown Gravelly Sand, non-plastic, wet	SP	N/A	HNU = 0 ppm BX = 40-60 cpm
153	1620 12-15-92	50 .3	2	Very Dense (2.5Y, 4/3) Olive Brown, medium Gravel with trace sand, non-plastic, wet	GP	N/A	HNU = 0 ppm BX = 40-60 cpm
155	1645 12-15-92	100 .6	6	Very Dense (2.5Y, 4/4) Olive Brown, Gravelly Sand, non-plastic, wet	SP	N/A	HNU = 0 ppm BX = 40-60 cpm
156	0940	50 .4	4	Very Dense (2.5Y, 4/4) Olive Brown medium Gravel with trace sand, non-plastic, wet	GW SP	N/A	HNU = 0 ppm BX = 40-60 cpm
157	12-16-92 0900	45 50 .2	7	Very Dense (5Y, 4/3) Olive Fine Sand with trace gravel non-plastic, wet	SP	N/A	HNU = 0 ppm BX = 40-60 cpm
158	12-16-92	45 50 .2	7	Very Dense (5Y, 4/3) Olive Fine Sand with trace gravel non-plastic, wet	SP	N/A	HNU = 0 ppm BX = 40-60 cpm
159					SP	N/A	
160					SP	N/A	
161							
162				Bottom of Boring at 162.0 ft			
163							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Operator: Bob Johnson

Lennie McBlaklin

Craig Coulter

Kevin Myers

Background Readings

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

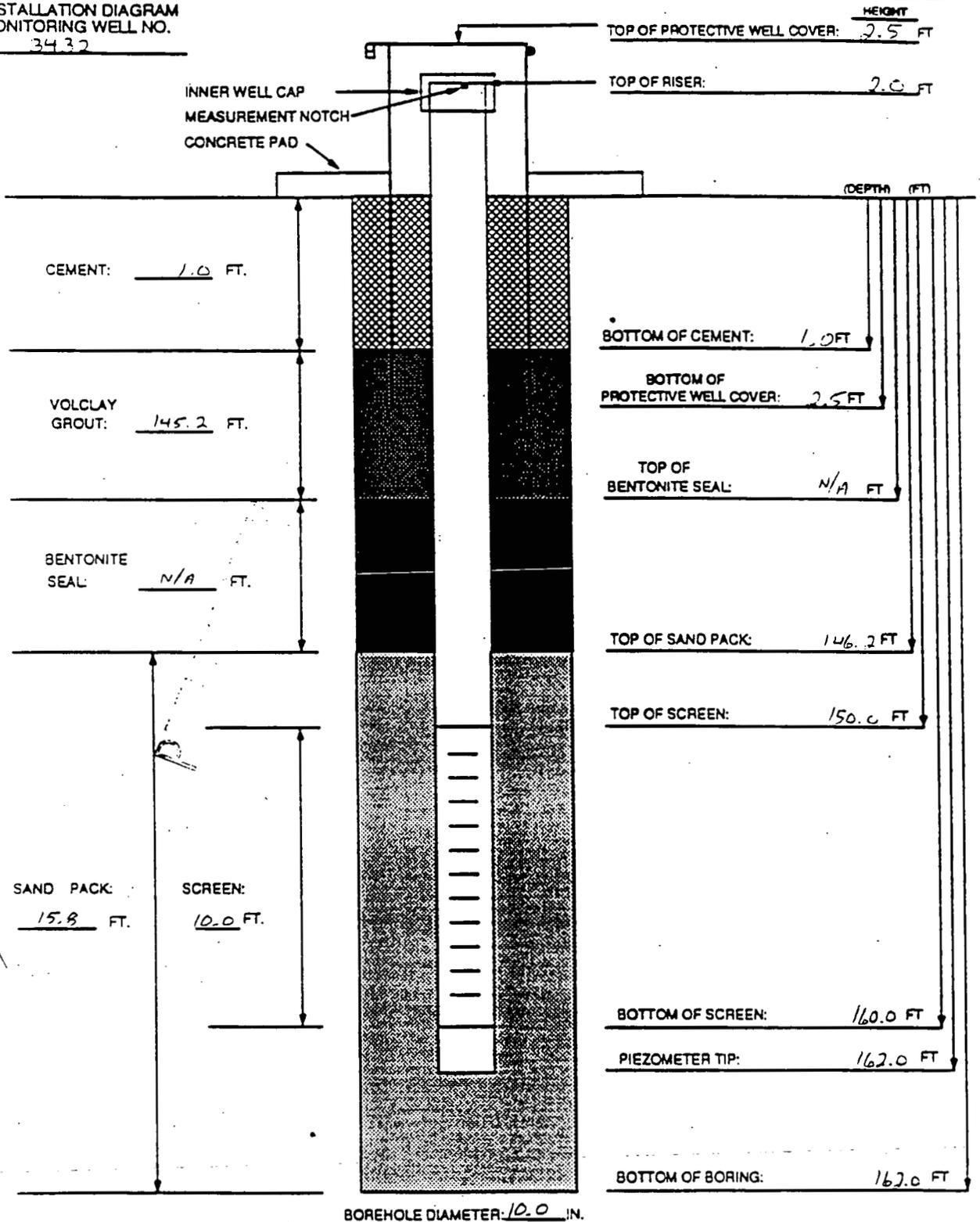
12/15/92 { HNU = 0 ppm
 { BX = 60-80 cpm

12/16/92 { HNU = 0 ppm
 { BX = 50-60 cpm

see p. 1

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
3432

INSTALLATION DATE: 1/11/92



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30 type 12 - 50 lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
AMOUNT OF VOLCLAY GROUT: 53 50 lb bags
AMOUNT OF CEMENT: 1 bag 90 lb bag
AMOUNT OF WATER USED: 2500 gallons
Soil: 1 Draw, Alconex; Water: 2 Draw, Great
602.04.27

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 0.02 IN. SLOTS.
 - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
 - 4) WATER DEPTH AND DATE 92.6 FT/1/17
 - 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: K. Payne

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. K. Parne DATE 1/11/93
 PROJECT NO. 602.04.87 CHECKED BY C. Brien DATE 02/01/93
 BORING NO. 3432
 PIEZOMETER NO. N/A ^{EA-10-13} 3432 DATE OF INSTALLATION 1/11/93

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>90.0 FT</u> FLUID <u>NA</u> FROM <u>-</u> TO <u>-</u>	CASING SIZE(S) USED: SIZE <u>10.0 in. ID</u> FROM <u>0.0 FT</u> TO <u>163.0 FT</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 ID</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>15-10 FT, 2-2 FT</u>
AVERAGE SIZE OF PERFORATIONS <u>.02 in.</u>	JOINING METHOD <u>Screw type - flush joint threaded</u>
TOTAL PERFORATED AREA <u>10.0 FT²</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u>	OTHER PROTECTION <u>Hinged locking cover with padlock</u>
PROTECTIVE PIPE O.D. <u>10 3/4 in.</u>	

ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (Ft)		ELEVATION ()	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	<u>162.0</u>	<u>157.0</u>		
GROUND SURFACE	<u>0.0</u>			
BOTTOM OF PROTECTIVE PIPE		<u>2.5</u>		
BOREHOLE FILL MATERIALS: <u>CEMENT GROUT / SLURRY KP 1-12-93</u>	<u>0.0</u>	<u>1.0</u>		
	<u>1.0</u>	<u>146.2</u>	TCP	BOTTOM
	<u>N/A</u>	<u>N/A</u>	TCP	BOTTOM
	<u>146.2</u>	<u>162.0</u>	TCP	BOTTOM
	<u>N/A</u>	<u>N/A</u>	TCP	BOTTOM
PERFORATED SECTION	<u>150.0</u>	<u>160.0</u>	TCP	BOTTOM
PIEZOMETER TIP	<u>162.0</u>			
BOTTOM OF BOREHOLE	<u>162.0</u>			
GWL AFTER INSTALLATION	<u>92.6</u>			

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

REMARKS Cement placed from 0.0 to 1.0 FT to hold protective cover in place

mw - 3432

4119

Customer Number 104880

MATERIAL: _____ SAMPLE NUMBER: 921216-069

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: ~~153.03~~ 138.3

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
<u>10</u>	<u>67.36</u>	<u>48.7</u>	<u>48.7</u>	<u>78.7</u>
<u>20</u>	<u>22.04</u>	<u>16.0</u>	<u>64.7</u>	<u>33.5</u>
<u>40</u>	<u>21.60</u>	<u>15.6</u>	<u>80.3</u>	<u>16.7</u>
<u>60</u>	<u>13.24</u>	<u>9.6</u>	<u>89.9</u>	<u>9.8</u>
<u>100</u>	<u>4.45</u>	<u>3.2</u>	<u>93.1</u>	<u>5.9</u>
<u>200</u>	<u>3.56</u>	<u>2.6</u>	<u>95.7</u>	<u>3.0</u>
Pan	<u>5.64</u>	<u>4.1</u>	<u>99.8</u>	

$$\frac{W_2 \times 100\%}{W_1} = R \quad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

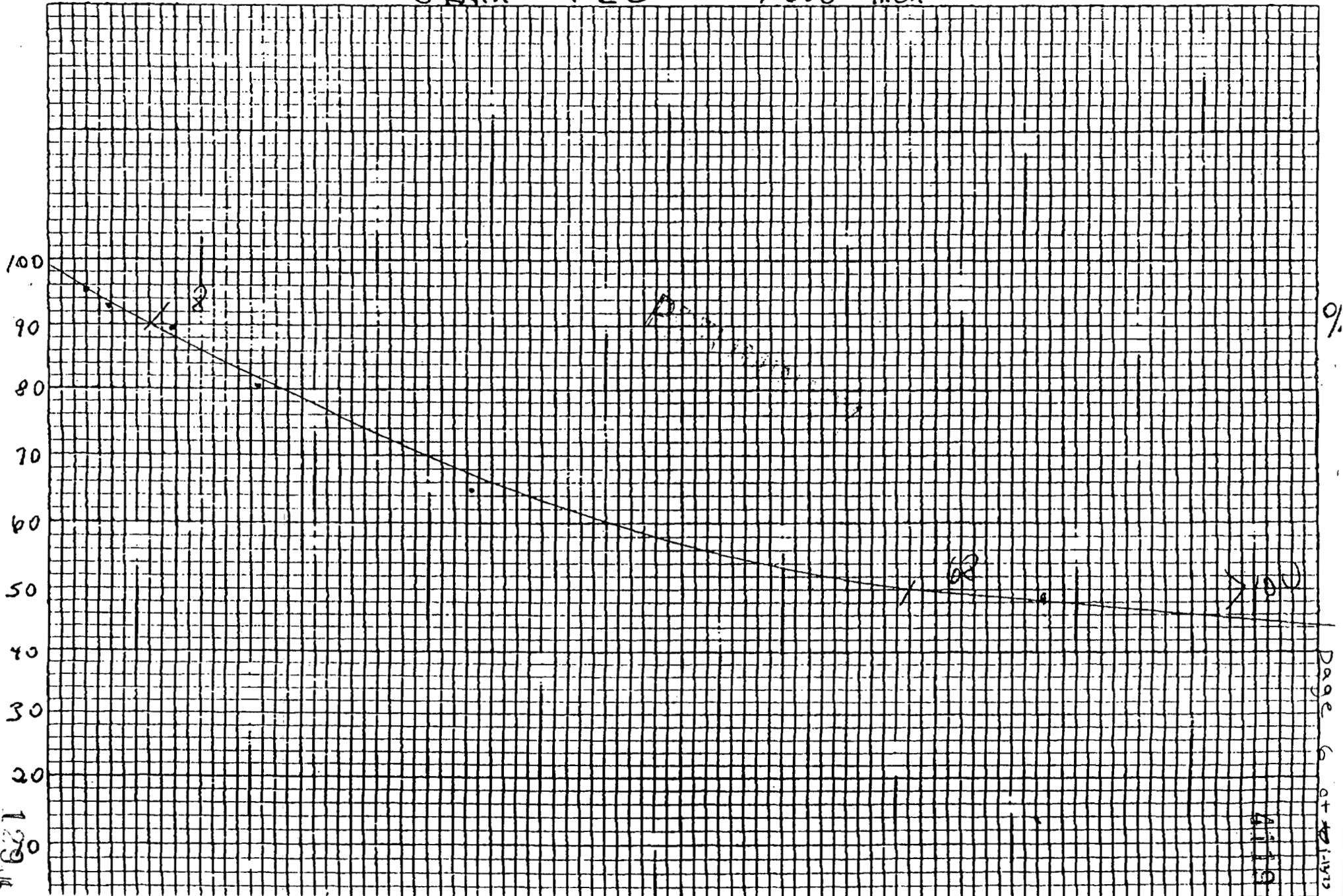
Analyzed by: J Robert Checked by: _____ Date analyzed: 12-18-96 929ur

GRAIN SIZE 40% RETAINED 7100 .001 inch
 50% 68
 90% 2

MW-3432

GRAIN SIZE $\frac{1}{1000}$ inch

104820



%

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4119

P. 04

FAX NO. 5137386667

WMCU ANALYTICAL

DEV-10-92 PKI 10:11

97621

4119

Well ~~3432~~³⁴³² KP 1-12-93

Retained Values

$$70\% = .008$$

$$50\% = .068$$

$$40\% = .100$$

$$\frac{.100}{.008} = 12.5$$

12.5 > 3 therefore a factor of 4 will be us

$$4 \times .068 = .272$$

The result most closely fits the coarse sand pack curve (4/30).

Therefore a coarse sand pack along with a 0.020 in. well screen will be used in this monitoring well.