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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1992

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REPORT

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

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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 December 1 through December 31, 1992, and planned actions for the period January 1 through January 31, 1993.

Highlights of activities in December include the following:

- Construction and initial operability testing of the Removal Action No. 3, South Groundwater Contamination Plume system was completed on December 7, 1992, meeting the commitment date.

- Phase II of Removal Action No. 7, Plant 1 Pad Continuing Release, was completed ahead of schedule on December 4, 1992.

- Ohio EPA approval of the final Work Plan for Removal Action No. 22, Waste Pit Area Containment Improvement, was received on December 7, 1992. Conditional U.S. EPA approval had been received on December 4.

- Comment responses to the U.S. EPA's conditional approval of the Removal Action No. 24, Pilot Plant Sump, were submitted on December 18, 1992.

- The Engineering Evaluation/Cost Analysis study for Removal Action No. 27, Management of Contaminated Structures at the FEMP, was submitted to the EPAs on December 14, 1992.

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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 December 1992. 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

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

Phase III Removal Actions

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

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CA Section IX. Removal Actions (continued)

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

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REMOVAL ACTIONS

RA No. 1, Contaminated Water Under FEMP Buildings

Plant 6 - Through December 1992, approximately 43,458 gallons of perched groundwater have been extracted and transported for treatment to the Plant 8 Volatile Organic Compound (VOC) treatment system. Permission to add water discharged from the existing four motor bay sumps to the Plant 6 collector system was received from the U.S. EPA. Permanent piping of the sumps to a collection tank is being designed. Until the permanent system is installed, water collected from the four motor bay sumps will be pumped to drums and then transferred to the Plant 8 VOC Treatment System. The preliminary design of the motor bay sumps collection system was issued for review. Responses to design review comments were issued on December 22, 1992. The design drawings are being revised to reflect the changes that resulted from the design review comments.

Plants 2/3 and Plant 8 - Through December 1992, approximately 125,443 gallons of perched water have been collected for treatment from Plant 2/3, and approximately 92,922 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 December 1992.

Plant 8 - Through December 1992, approximately 284,631 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 submitting to U.S. and Ohio EPAs a revised sampling and analysis procedure for Plant 8 VOC Treatment System and continuing the Plant 6 Motor Bay Sump design. The revised sampling and analysis plan was prepared to reduce the excessive costs anticipated for future operation of this facility based on the costs incurred in the last year of operation. The plan is based on one year's data which verifies the success of the Plant 8 VOC Treatment System. The basic concept for the plan, as presented at the December 7 Managers' meeting with EPA, is to change the logic of monitoring from verifying below detectable levels at the effluent to monitoring for breakthrough of the first two carbon tanks.

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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 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 of the system were completed on December 7, 1992, meeting the Consent Agreement milestone date. However, the system will not be placed in operation until plan approval is received from the Ohio EPA. The Ohio EPA recently requested additional analysis of the water supply wells. Samples of the wells were taken and the results are being submitted directly to the Ohio EPA from the laboratory. Following Ohio EPA approval, a sixty day operating acceptance period will be implemented prior to system turnover to Albright and Wilson Americas.

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. Part 2 follow-on activities include:

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REMOVAL ACTIONS

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

Package 2A - Pipeline installation is progressing. Construction in the areas of Manholes 176B and 177B was placed on hold in mid-December pending a design for the installation of a single NPDES monitoring facility for the total combined discharge from the FEMP. The decision was made to install the single NPDES monitoring facility based on changes which have occurred since the original Part 2/3 Work Plan was written. These changes include the addition of the aeration facility downstream of the Storm Water Retention Basin (SWRB) valve house, the changeover in FEMP water treatment from line softening to Electro Dialysis Reversal (EDR) which results in a larger clean water discharge, and a recent decision to delete the Sewage Treatment System, and clean General Sump wastewater discharges from the Advanced Wastewater Treatment facility because the uranium concentration is less than the 20 parts per billion AWWT treatment goal. Invert elevations, slopes, and lengths for the pipeline have been reestablished to accommodate the single NPDES monitoring facility to be located between Manholes 176B and 177B. Design of the facility is underway, including expedited prepurchasing of the prefabricated partial flume.

Package 2B1 - Excavation for the Outfall Cofferdam was completed. The pipeline has been placed in the coffercell and backfilling over the pipeline was completed. Placement of the concrete cap has started which indicates that this work package is currently ahead of schedule. However, late delivery of the blowers will likely delay the originally scheduled completion date.

Package 2B2 - Construction of the Oxygen Augmentation System is progressing as scheduled.

Part 3

The Work Plan for Part 3 was prepared as one work plan with Part 2. 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 Biodenitrification Effluent Treatment System (IAWWT[BDN-ETS]) has a nominal capacity of 100 gpm. Current activities are described below.

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REMOVAL ACTIONS

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

IAWWT(BDN-ETS) Unit

The unit continues to be shut down because of colloidal blinding of the ion exchange units. The design effort for the addition of a flocculation/clarification step upstream of the IAWWT(BDN-ETS) is on schedule for 90% submittal by January 7, 1993.

Part 4

Part 4 of the South Groundwater Contamination Plume Removal Action Work Plan involves groundwater monitoring and institutional controls. Current activities are described below.

- 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.

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. Current activities are described below.

- Preparation to proceed with partial installation of six of twelve monitoring wells and related hydropunching for Phase II work is progressing. The remaining six wells will be held up pending condemnation of property (Part 2). A request was made at the December 7 EPA Managers' Monthly Meeting to relocate one of the well pairs on private property, just north of the intersection of the Delta Steel, Weber, and Knollman properties. This was requested to reduce impact to Knollman farming activities in this area and will not affect the planned purpose for the well pair. U.S. EPA and Ohio EPA gave verbal approval for the change.

On December 1, 1992, responses to Ohio EPA Comments on the Conditionally Approved Part 5 Work Plan, Transmittal of the Revised Part 5 Work Plan and a Revised Soil Vapor Sampling Procedure were transmitted to DOE-FN.

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REMOVAL ACTIONS

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

Future work on RA No. 3, Parts 1 through 5, will include: obtaining plan approval of Part 1 from the Ohio EPA and beginning continuous operation of the system; continuing construction of Parts 2A, 2B1 and 2B2; continuing condemnation of properties for Parts 2C and 2D; completing 90% review of IAWWT(BDN-ETS) system modification; and installing partial set of monitoring wells for Part 5, Phase II.

RA No. 4, Silos 1 and 2

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

As previously discussed at the Program Managers' Meeting on July 21, 1992, the DOE has prepared an evaluation detailing a revised method for determining the effectiveness of the bentonite in the silos. The reduction in radon emanation, as a result of bentonite installation, was evaluated in the report by measuring the radon concentration in the silo headspace and then analyzing the relationship of these results to observed radon concentration in the vicinity of the silos and at the site boundary. The report was submitted to EPA for approval on December 17, 1992. A subsequent meeting between DOE and EPA was held on January 7, 1993. This meeting resulted in overall approval of the DOE proposal with only six minor document revisions/clarifications requested. The revised pages and a document change request for the K-65 Removal Action Work Plan will be developed and submitted to EPA for approval.

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

RA No. 5, K-65 Decant Sump Tank

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

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.

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REMOVAL ACTIONS

RA No. 5, K-65 Decant Sump Tank (continued)

U.S. EPA approval of the Response to Comments document were 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.

December activities included the addition of one door per structure and the posting of additional signage to comply with life safety code requirements, resulting in the completion of Phase II activity on December 4, 1992. The Invitation for Bid for Phase III activity is expected in February.

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.

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REMOVAL ACTIONS

RA No. 9, Removal of Waste Inventories

During December 1992, 3,498 drum equivalents (DEs) of low-level waste (LLW) were dispositioned. The FY1993 shipment goal through December was 11,574 DEs. Currently, LLW shipping is 342 DEs ahead of schedule. The FY1993 goal is to dispose of 67,000 DEs of LLW at the Nevada Test Site (NTS).

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

Waste shipping activities for January include shipping 3,156 DEs of LLW to the NTS. Waste shipping activities will be accelerated beginning in January 1993.

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

RA No. 10, Active Flyash Pile Controls

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

RA No. 11, Pit 5 Experimental Treatment Facility

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

RA No. 12, Safe Shutdown

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

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

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

The preliminary assessments for each major process area are continuing. Activity this month focused on completing the conversion of supporting information to one consistent database. 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 database as it is being made available.

Inventorying of expense equipment items continued. A total of 2,720 expense items are currently in the database; 1,253 have been field verified, 578 are on a "shopping list" to ascertain on-site use, 35 have been transferred to Maintenance, and 108 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.

An estimated 1,697 total number of items are included as capital equipment. Of these, 1,212 have been put on AC-563 Forms to be excessed, and 485 have been identified as "In Use/Future Use" items. The initial evaluation for capital equipment disposition has been completed.

Negotiations between the Army and the NTS are continuing on Phase II of the 4A Metal Removal Project. This project includes shipments of rolled scrap to the NTS for burial. The Army has advised that the FEMP should not prepackage any of the material until after the NTS performs an on-site audit in February.

To date, 136 Work Orders have been issued to isolate utilities. Twenty-nine of these have been completed.

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

A meeting was held with Nuclear Systems Safety on September 16, 1992, to clarify the safety documentation requirements for the Safe Shutdown Program field activities. A Safety Assessment covering the Safe Shutdown work activities will be written utilizing any existing data accumulated for the site-wide Safety Analysis Report (SAR). Utility isolation of the process equipment is a routine maintenance activity not requiring specific safety analysis. Requests for Safety Assessments have been prepared for the tasks to remove excess materials from the process buildings, to gain entry and remove hold-up materials, and to remove radiological contamination.

The Health and Safety Plan for the Safe Shutdown Program was issued on September 28, 1992. The estimated completion date for the Safety Assessment Report is January 29, 1993. A global Risk Assessment and Risk Management Plan is being prepared for the Safe Shutdown Program, with a projected completion date of January 29, 1993.

The Requests for Proposals (RFPs) for the sale of normal and enriched uranium was released December 23, 1992, to thirteen companies responding to the *Commerce Business Daily* notices. (This met our commitment date of December 31, 1992.) Responses are due February 1. The RFP for depleted uranium is being finalized and should be issued early in January.

Planned activities for January include continuing the capital equipment disposition effort; releasing the depleted uranium RFP to interested companies; continuing to issue work orders for utility isolation work; continuing reconciliation of Safe Shutdown database; completing Safety Assessment Report; and completing Risk Assessment and Risk Management Plan.

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.

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REMOVAL ACTIONS

RA No. 13, Plant 1 Ore Silos (continued)

DOE-OR approval of award of the subcontract for the silo dismantling was received on September 9, 1992. The Construction Work Order was consequently issued to a subcontractor. Mobilization of the subcontractor began in October. WEMCO forces completed field work in preparation of removal action activities. November and December activities included the receipt and contractor review of the subcontractor's Removal Action Project Plan (RAPP), which was returned to the subcontractor for revision. The RAPP is due back in January and work is scheduled to begin in February.

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.

A draft Work Plan Addendum was submitted to the DOE on December 23. DOE comments will be incorporated and the draft Work Plan Addendum will be transmitted to the EPAs in January 1993. The draft Work Plan Addendum will include a new schedule. Future activities also will include revision of the Work Plan Addendum pending receipt of EPA comments.

Excavation activities began on September 9 and were completed on October 15. Sampling activities began on September 21 and were completed on October 13. November activities included the obtaining of off-property access and further excavation and sampling activity. Weather conditions precluded activity in December. Upon approval of the new schedule, on-property excavation of two areas exceeding 100 pCi will begin. The schedule will include a planned completion of off-property and additional on-property excavation by May 15, 1993.

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REMOVAL ACTIONS

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

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 - Est. for submittal of Report Summarizing all field activities and analytical results	Open, on schedule	April 30, 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.

During November, U.S. and Ohio EPA comments were resolved and the revised Removal Action Project Plan for Phase I activities was submitted to the EPAs on November 24, 1992.

Initial containerization of the scrap copper pile, including the scrap copper ingots, began on September 29, 1992. This containerization was completed on October 26, 1992, ahead of the schedule date of November 13, 1992. Containerization of the bulk scrap copper will begin in January. The containerization is anticipated to be completed by April 1993.

The Notification of the Request for Proposal for Phase IIB occurred on December 18, 1992.

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REMOVAL ACTIONS

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: Forecasted Submittal of Subcontractor's Removal Action Plan	Open, on schedule	September 30, 1993
Phase IIB: Forecasted 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; 100-200 lineal feet of trench has been excavated and the trench base has been poured.

Future work on RA 16 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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REMOVAL ACTIONS

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

U.S. and Ohio EPA conditional approval, with comments, of the Work Plan were received on October 5. Comment responses were transmitted on November 18. U.S. EPA approved the flow diagram and comment responses on December 29, 1992. January activity will include discussion and review of these responses. The revision of the final Work Plan will be accomplished pending EPA approval of the comment responses.

RA No. 18, Control Exposed Material in Pit 5

Activities for December included the completion of the relocation of the existing sludge above the water line from the east end of the pit to the west end with a floating dredge and pump. Dredging was completed as of December 16, 1992. Additional liner separations were discovered at Pit 5 during dredging activities. These separations will be repaired to the extent possible as the weather permits. This will be a maintenance action.

Planned activities for January include removing the dredging unit from the pit, and decontaminating and winterizing it for storage. The draft training manual for operating the dredging unit will be reviewed and revised. Additional activities include berm modifications to ensure adequate freeboard is maintained at pit 5

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.

Subcontractor comment responses to the Work Plan were received in December. January activities will include review of comment responses and subcontractor revision of the Work Plan. A 90% Work Plan review is planned for the end of January. January activity will also include the submittal of the final Removal Site Evaluation to DOE.

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REMOVAL ACTIONS

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.

December activities included preparation of a draft test report for the System Operability Test and a draft procedure for further processing.

January's activities will include completion of the test report for the System Operability Test. Additional activities will include an evaluation of the process by the FERMCO operational readiness review and DOE operational readiness evaluation teams. Evaluation of the System Operability Test Report by a DOE-Oak Ridge Team is expected to be complete by the end of January 1993.

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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REMOVAL ACTIONS

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 will be issued in January 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. A Removal Site Evaluation was prepared in 1991, updated to include information on the berm for Pit 4 and the Burn Pit cap, and submitted to DOE. The Action Plan to address the Waste Pit Area Roads and Exposed Surfaces was transmitted to DOE on February 24, 1992. This Action Plan was used as the basis for developing a Work Plan. The final Work Plan was submitted to U.S. EPA and Ohio EPA. Ohio EPA approval was received on December 7, 1992 and U.S. EPA approval, with comment, was received December 4, 1992.

Planned activities for January include U.S. EPA comment resolution to the Work Plan and a 90% design review meeting to be held the middle of January.

RA No. 23, Inactive Flyash Pile

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

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REMOVAL ACTIONS

RA No. 24, Pilot Plant Sump

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

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

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

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.

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 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.

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REMOVAL ACTIONS

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

KEY MILESTONES	STATUS	DUE DATE
Submit Final Draft of Work Plan to U.S. EPA	Twenty day extension requested	January 8, 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.

December activities included continuing field activities in asbestos material identification and abatement and development of the large-scale asbestos removal specifications. January activities include reviewing and updating procedures in preparation for the April submittal of Work Procedures to the DOE.

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

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.

December activities included the transmittal of the EE/CA to the EPAs. January activities will include revision of the EE/CA pending receipt of EPA comments.

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Period Ending December 31, 1992

REMOVAL ACTIONS

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

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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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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

1.1.2 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, and 4. 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). 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.

Status:

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/m^2 sec.

The "Pit 4 Radon Flux Measurement" technical report has been prepared and is undergoing internal review. This report is scheduled to be transmitted to the U.S. EPA in January.

Issues/Corrective Actions:

None to report.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

1.1.3 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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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

1.2 Treatability Studies (continued)

Status:

Curing of cement stabilization Advanced Phase Stage 1 molds for Waste Pit 2 Strata 3 was completed on December 2, 1992, thereby completing all cement stabilization Advanced Phase Stage 1 molds. Radon emanation testing is 100% complete. Five-day static leach is complete. Permeability testing was 33% complete on December 17, 1992. Advanced Phase Stage 1 experiments are complete. Product consistency test preparation is complete and samples were sent to Oak Ridge National Laboratories for analysis.

Issues:

Severe damage to the platinum crucibles used for vitrification melts has occurred. This has impacted Advanced Phase Stage 1 completion schedules.

Corrective Actions:

Crucibles made from 446 stainless steel were put in use on October 26, 1992, thus avoiding further schedule slips.

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:

An independent peer review of the validation results for samples collected under the RI/FS program was completed during September 1992. The findings of the review have been resolved, and changes to the data quantifiers in the database have been made. 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.

Issues\Corrective Actions:

None to report.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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 January 1993

- Complete work on the Advanced Phase Stage 1 Cement Stabilization and Vitrification treatability experiments.
- Prepare first draft of Remedial Investigation Report including the baseline risk assessment.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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. However, the contract laboratory has not completed the analysis of the groundwater samples taken November 18, 1992.

Issues/Corrective Actions:

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

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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.

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 contaminative 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

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

2.3 Remedial Investigation (continued)

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. The U.S. EPA has suggested additional data be procured for the Operable Unit 2 RI.

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.

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	01/14/93 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.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

2.4 Feasibility Study (continued)

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.

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 January 1993

- Complete contract laboratory analysis of the groundwater samples taken from Monitoring Well 1433.
- Continue observations and measurements of groundwater levels for Monitoring Well 1433.
- Meet with EPA to discuss RI comments.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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 U.S. 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.

Issues/Corrective Actions:

None to report.

OU 3 WORK PLAN ADDENDUM **WORK PLAN**

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 12/17/18 A

C = Consent Agreement Date A = Actual

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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 December, including development of field sampling procedures and on-site logistics planning. Receipt of equipment procured for sampling activities also began.

Issues/Corrective Actions:

None to report.

3.3 Treatability Studies

Scope:

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

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.

Issues/Corrective Actions:

None to report.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

3.4 Remedial Investigation Report

Scope:

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

Status:

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

3.5 Feasibility Study

Scope:

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

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 January 1993

- Evaluate current schedule of Operable Unit 3 activities for resource baseline and for potential reordering of schedule elements for improved workability.
- Continue analytical procedure validation process, focussing on those procedures without direct ties to contract laboratory program or SW-846 pedigrees.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

3.6 Planned Activities for January 1993 (continued)

- 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.
- Provide responses for U.S. EPA comments on the example Field Work Package (FWP) submittal, and refine and initiate FWP development for OU3 components.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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:

This investigation is to further define the western (downgradient) extent of contamination in the water bearing zone(s) within the glacial overburden underlying the K-65 area. Two wells will target the main perched water bearing zone west of Silos 1 and 2. One well or lysimeter will target the area below the main perched water zone, at a location downgradient of the decant sump tank. Three lysimeters will be installed in the east bank of Paddy's Run.

Status:

The completed Work Plan Addendum which was included as a part of the Operable Unit 5 Sampling and Analysis Plan that was transmitted to the DOE-FN on November 16, 1992, is currently being reviewed by DOE-FN and FERMCO.

Issues/Corrective Actions:

The results from this sampling effort will be included in the Operable Unit 5 RI Report. The information obtained from this investigation program will be considered in the Operable Unit 4 FS.

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.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

4.2 Treatability Studies (continued)

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.

Status:

Stabilization Experiments - Complete.

Chemical Extraction tests - Complete.

Vitrification Treatability Tests - Complete

Optional Treatability Tests - radon leaching and emanation tests on stabilized material and material from Chemical Separation are on-going.

Issues/Corrective Actions:

The durability testing was to be performed at a local university laboratory. However, due to the silo material activity levels exceeding the laboratory's radiation license, these tests will be performed elsewhere. Schedule impacts are currently being assessed, but no Consent Agreement dates are expected to be impacted.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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:

Comments from DOE and WEMCO on the RI Report, including the Baseline Risk Assessment, were transmitted to a subcontractor on November 23, 1992. These comments are currently being reviewed and responses are being written. Submittal of the revised RI Report is tentatively set for February 1993.

Issues:

Delays in completion of data validation and database entry have delayed evaluation of the RI data. No impact to the Consent Agreement delivery date for the RI is anticipated.

Corrective Action:

A recovery plan was initiated to ensure that the RI will be completed and delivered to the U.S. EPA per Consent Agreement dates.

OU 4 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

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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 to the disposition of Silos 1 and 2 contents are being created; alternatives for Silo 3 contents only are being revised; 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.

OU 4 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.	09/09/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

4.5 Planned Activities for January, 1993

- Complete revision of FS alternative descriptions and continue risk assessment activities.
- Complete Toxicity Characteristic Leaching Procedure analyses of Treatability Program vitrified material leachate.

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4.5 Planned Activities for January 1993 (continued)

- Continue PCT analyses of Treatability Program vitrified material leachate.
- Continue radon emanation and leaching tests as part of the Optional Treatability Program.
- Continue revisions to RI, based on internal comments.

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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 (Formally Auger and Cable Tool Sampling Program)

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:

Additional comments were received from the Ohio EPA and U.S. EPA in December 1992. Responses to the new December 1992 comments were completed and are being internally reviewed for transmittal to the respective agencies. 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. All field investigations are continuing; however, investigations related to the KC-2 Warehouse have not started until resolutions to specific comments addressed to this area are complete.

Field characterization of the K-65 Slurry and Clearwell Line continued according to the Work Plan. Currently, the first round of groundwater samples from ten existing wells (1150, 1154, 1167, 1206, 1207, 1208, 1213, 1215, 1226, 1237) and eight of the nine new wells are being analyzed for hazardous Substance List (HSL) volatiles, general water quality, and full radiological parameters. A well was not installed at location 0841 because groundwater was not encountered. Monitoring Well 1842 was re-installed to meet the requirements of the Work Plan.

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5.1.1 Operable Unit 5 Work Plan Addenda (Formally Auger and Cable Tool Sampling Program) (continued)

The contract laboratory completed all analyses from the first round of groundwater sampling of the ten existing and eight new wells.

The second round of groundwater sampling for full HSL, general water quality, and full radiological parameters was completed in December 1992 for seven of the nine new wells.

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 initiated December 28, 1992. Development was delayed due to adverse weather conditions.
- 1843 Installation completed. Well development and first and second round of groundwater sampling completed.
- 1844 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 (Formally Auger and Cable Tool Sampling Program) (continued)

The Work Plan calls for first round only of groundwater sampling at existing Monitoring Wells 1173 and 1174 in the Southeast Quadrant. The Work Plan also requires the installation of Monitoring Wells 1866, 1867, 1868, and 1869. Groundwater sampling of Monitoring Wells 1173 and 1174 has not started. Monitoring Wells 1866 and 1868 were installed. Monitoring Well 1867 was installed per the Work Plan; however, no groundwater was encountered and the continued well was plugged and abandoned. First round of groundwater sampling was completed for Monitoring Wells 1866 and 1868.

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.

One hand auger sample was completed at the sump per the Work Plan. Four hand auger samples are still required at the stormwater ditch.

The Work Plan requires fourteen hand auger borings in the Plant 1 Pad Area. To date, none of the hand auger borings have been completed. First round of groundwater sampling was completed on existing Monitoring Wells 1338, 1339, 1343, and 1348.

Work Plan requirements for the KC-2 Warehouse are currently on hold pending resolution to the comments and concerns of the Ohio EPA and U.S. EPA.

Issues/Corrective Action:

Delays in implementing the remainder of this program were due to the need to resolve the regulatory agency's comments. This has caused a slip in the Operable Unit 5 Baseline Schedule. However, now that conditional approval has been secured from the regulatory agencies, recovery of the schedule slippage through acceleration of both the field characterization effort and subsequent sample analysis at the contract laboratories is expected.

Resolutions to the Ohio EPA and U.S. EPA comments must be completed prior to work commencing in the KC-2 Warehouse area.

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5.1.2 Outfall Line Investigation

Scope:

This Work Plan Addendum defines the sampling and analysis required to investigate potential leakage from the outfall line as part of the Operable Unit 5 RI. The installation of Monitoring Well 2119 and subsequent sampling program were based upon data from water samples collected from Well 2067 and documented 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.

Uranium contamination is present in groundwater samples at Well 2067. The installation of Well 2119 will determine if there is groundwater contamination associated with the pipeline failure between Manholes 179 and 180. If an off-FEMP plume is identified, then additional investigation may be required to determine the vertical and lateral extent of the plume.

Status:

Comments to the current Work Plan Addenda were received from the Ohio EPA and U.S. EPA. Responses were completed and transmitted to the DOE-FN and FERMCO for final review and transmittal to the respective regulatory agency. Based upon review of the comments and the resolutions, further field investigation may be required. However, the comments do not preclude the installation of Monitoring Well 2119 which will still be required. Preliminary results from the installation of Well 2119 may be helpful in determining a need for further field investigations.

Initial Hydropunch II operations commenced on Monitoring Well 2119 December 17, 1992. Preliminary on-site laboratory analysis was completed on groundwater samples obtained during Hydropunch operations. The results are as follows:

Depth (feet)	Results (ppb)
28.0	1.0
41.0	0.7
51.0	0.6
61.0	0.5

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5.1.2 Outfall Line Investigation (continued)

Issues/Corrective Actions:

Comments were received from the Ohio EPA and U.S. EPA on December 2, 1992, and December 7, 1992, respectively. Initial resolutions of comments from both regulators were completed and transmitted to the DOE-FN on December 30, 1992, for final review and transmittal to the respective agency. DOE-FN is awaiting final installation of the well and a sample from the aquifer. Upon availability of this data, DOE-FN will transmit the final response to comments and the Work Plan for U.S and Ohio EPA 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 measurable uranium concentration.

Homeowner well groundwater sampling has detected an increase in total uranium in water pumped from Homeowner Well 13 (total uranium approximately 33 µg/L). Homeowner Well 13 is completed approximately 20 feet beneath the water table contact. Monitoring Well 2398 indicates total uranium concentrations of 1.4 µg/L and 3.7 µg/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.

The total uranium concentrations determined from the groundwater sampling of Monitoring Well 2166 during Hydropunch II operations are as follows:

Depth (feet)	Uranium Concentrations (µg/L)
73.0	31.0 µg/L
84.0	47.0 µg/L
92.0	9.3 µg/L
102.0	8.8 µg/L
112.0	2.8 µg/L
122.0	2.8 µg/L
132.0	1.2 µg/L

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5.1.3 Installation of Monitoring Well 2166 (continued)

Status:

The installation of Monitoring Well 2166 was completed October 19, 1992. Well development and first round of groundwater sampling was completed in November 1992.

Awaiting analyses results from the contract laboratory from the first round of groundwater sampling.

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 come from the following areas: incinerator area (ID-A), Plant 1 Pad Area (ID-B), maintenance building area (Operable Unit 5-A), and underground storage tank soil piles (Operable Unit 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 continued in December 1992. Pilot plant design was completed for skid assembly and utilities. Fabrication of the skids is underway with a scheduled completion date of late January 1993. System startup is anticipated for February 1, 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 the alternatives.

Status:

A draft copy of the ISA Report was submitted to the U.S. EPA for review on November 13, 1992. Their comments are expected in January 1993. Document preparation is proceeding ahead of the Consent Agreement schedule.

Issues/Corrective Actions:

None to report.

OU 5 INITIAL SCREENING OF ALTERNATIVES **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Provides for initial evaluation against preselected criteria of candidate technologies assembled to remediate Operable Unit 5	04/15/93 C -	06/15/93 C	07/13/93 C

C = Consent Agreement Date

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5.4 Remedial Investigation

Scope:

The Remedial Investigation (RI) data compilation has been started. All data sources to be included in the RI are being identified and summarized. The geologic information contained in the 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.

Status:

This task is proceeding according to schedule.

Issues/Correction Actions:

None to report.

5.5 Planned Activities for January 1993

- Continue compiling, evaluating and summarizing all data sources to be included in the Operable Unit 5 RI.
- Respond to EPA comments on the ISA report.
- Revise the KC-2 Warehouse portion of the Operable Unit 5 Work Plan Addenda if review comments are received from the Ohio EPA and U.S. EPA regarding the previous comment resolutions.
- Complete the second and final round of groundwater sampling of all monitoring wells for the K-65 Slurry and Clearwell Line portion of the Operable Unit 5 Work Plan Addenda.
- Complete the remaining work of all portions of the Operable Unit 5 Work Plan Addenda except for the KC-2 Warehouse.

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5.5 Planned Activities for January 1993 (continued)

- Complete the development and first round of groundwater sampling of Monitoring Wells 1886, 1887, and 1890 in the Fire Training Area portion of the Operable Unit 5 Work Plan Addenda.

- Revise the Operable Unit 5 Work Plan Addenda for the Outfall Line if return comments are received from the Ohio EPA and U.S. EPA.

- Complete the installation of Monitoring Well 2119 for the Outfall Line project.

- Provide the U.S. EPA and the Ohio EPA with a summary of the surface water/groundwater background sampling. Also, identify any additional changes to the existing program.

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6.0 Engineered Waste Management Facility

This program will evaluate the ability of the Engineered Waste Management Facility (EWMF) to manage the remedial waste generated by the operable units. The technical approach for the evaluation will be based on a program-specific sampling and analysis plan and development of an EWMF Siting Report with comprehensive analysis.

6.1 EWMF General Siting Report

Scope:

The report will establish the feasibility of locating an EWMF at the FEMP by performing a detailed analysis of the EWMF as an on-property waste disposal/storage technology option per OSWER Directive 9355.3-01, "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988). The report will be divided into specific sections characterizing all pathways and associated risks. The report will be divided into the following sections: Geologic/Hydrogeologic, Geotechnical, Geochemical, Risk Assessment, RI/FS Environmental Impact Statement, and Applicable or Relevant and Appropriate Requirements (ARARs).

A draft of the report will be ready for internal review in January 1993.

Status:

A contract laboratory has not been able to provide the necessary data to perform the risk assessment as scheduled. As a result, the schedule for completion of the risk assessment and submittal of the study will be delayed approximately one month. A draft package, excluding the Fate and Transport modeling and the risk assessment was requested. This incomplete draft should be submitted sometime in January.

Issues/Corrective Actions:

A meeting is scheduled for January 26, 1993, between FERMCO, DOE-FN, and IT to determine status and to decide on a path forward.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

6.3 Planned Activities for January 1993

- Complete and submit all technical chapters on EWMF report.
- Review draft study.
- Decide if risk assessment should be completed based upon review of draft study.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

7.0 Site-Wide Characterization Report

7.1 Risk Assessment Work Plan Addendum

Scope:

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

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

Status:

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

Issues/Corrective Actions:

None to report.

7.2 SWCR Report Preparation

Scope:

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

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7.2 SWCR Report Preparation (continued)

Status:

The SWCR was submitted to the U.S. EPA on August 5, 1992. Comments were received on October 8, 1992. Responses to comments were submitted on November 30, 1992. U.S. EPA has invoked the additional 20 days of review, as stipulated in the Amended Consent Agreement.

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	09/08/92 C	12/18/92 C

C = Consent Agreement Date A = Actual

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8.0 Community Relations

Status

DOE-FN received notice from U.S. EPA approving the revised Community Relations Plan, Volume III of the Remedial Investigation/Feasibility Study (RI/FS) Work Plan.

The transcript from the November 9, 1992, Community Meeting was placed in the Administrative Record and reading room.

The 45 day public comment period on six removal actions at the FEMP concluded on December 18, 1992. No written or oral comments were received from the public. An addendum to the Community Relations Plan for each removal action has been written to comply with EPA requirements. The removal actions are:

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

The Engineering Evaluation/Cost Analysis (EE/CA) to RA No. 27, Management of Contaminated Structures, was submitted to U.S. EPA on December 16, 1992, as scheduled. A Notice of Availability (NOA), opening a 45 day public comment period, was issued in three local newspapers on December 23, 1992. To better help the public understand the technicalities of the EE/CA and to provide an opportunity to make oral comments, a public workshop will be held. The workshop is scheduled for January 12, 1993. A transcript will be available at the Public Environmental Information Center within two weeks. A responsiveness summary will be prepared to address all significant oral or written comments received from the public.

On December 9, 1992, an NOA was issued in three local newspapers, opening a 30 day public comment period on the Operable Unit 2 Remedial Investigation Report.

8.2 Issues/Corrective Action

None to report.

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8.3 Planned Activities for January 1993

- On January 12, 1993, a public workshop on the EE/CA for Removal Action No. 27 will be held.
- On January 26, 1993, a roundtable discussion, focusing on the RI/FS Environmental Impact Statement process will be held.
- The public comment period on the Operable Unit 2 RI will conclude on January 8, 1993.

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ENCLOSURE A

WASTEWATER FLOWS AND RADIONUCLIDE CONCENTRATIONS UNDER CA SECTION XXIII.B

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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 December 1992.

Summary - December 1992

The total quantity of uranium discharged from the FEMP to the Great Miami River via Manhole 175 (Outfall 1I000004001) was 47.52 kilograms. The average uranium concentration for the previous 12 months was 0.55 mg/L. This is 61.8% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

There was no discharge from the Stormwater Retention Basin (Outfall 1I000004002) to Paddy's Run via the Storm Sewer Outfall Ditch in December 1992. Based on 0.90 inches of rainfall in December 1992, the total quantity of uranium discharged to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 2.56 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: 1I000004001 Month: December 1992
001 Total Discharge
Manhole 175 (Effluent to the Great Miami River)

Day	Flow (MGD)	Total Alpha (pCi/L)	Total Beta (pCi/L)	Total U (mg/L)	Total U (kgs)	Calculated Total U-238 (pCi/L) (1)
1	0.726	514	171	0.85	2.33	287
2	0.636	185	122	0.30	0.72	101
3	0.951	369	140	0.58	2.09	196
4	0.804	315	108	0.58	1.76	196
5	0.307	72	54	0.11	0.13	37
6	0.358	266	77	0.32	0.43	108
7	0.471	369	171	0.83	1.48	280
8	0.376	104	68	0.18	0.26	61
9	0.349	995	293	1.75	2.31	591
10	0.468	455	149	0.68	1.20	230
11	0.524	347	176	0.64	1.27	216
12	0.449	410	149	0.73	1.24	247
13	0.291	455	162	0.85	0.94	287
14	0.445	320	140	0.66	1.11	223
15	0.531	405	171	0.73	1.47	247
16	0.500	477	171	0.93	1.76	314
17	0.426	599	194	1.02	1.64	345
18	0.630	401	131	0.80	1.91	270
19	0.568	360	149	0.63	1.35	213
20	0.602	401	203	0.70	1.59	236
21	0.439	523	248	0.98	1.63	331
22	0.528	505	185	0.73	1.46	247
23	0.588	640	266	1.06	2.36	358
24	0.771	365	99	0.48	1.40	162
25	0.543	779	270	1.41	2.90	476
26	0.443	914	315	1.76	2.95	595
27	0.337	910	266	1.55	1.98	524
28	0.499	396	153	0.77	1.45	260
29	0.419	518	176	1.01	1.60	341
30	0.596	329	122	0.55	1.24	186
31	0.598	365	135	0.69	1.56	233
TOTAL	16.173				47.52	

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project

Location: 001 Total Discharge

Month December 1992

	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.	0.522	442	166	0.78	1.53	262
Max.	0.951	995	315	1.76	2.95	595
Min.	0.291	72	54	0.11	0.13	37

The average uranium concentration for the previous twelve months was 0.55 mg/L. This is 61.8% 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.

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

Period Ending December 31, 1992

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: 1I000004002
002 Discharge (Overflow) to Storm Sewer Outfall Ditch
Stormwater Retention Basin Spillway (Effluent to Paddy's Run)

Month: December 1992

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

Based on 0.90 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 2.56 kgs.

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

PERIOD ENDING DECEMBER 31, 1992

ENCLOSURE B

FFCA: INITIAL REMEDIAL MEASURES

AND OTHER OPEN ACTIONS

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

Period Ending December 31, 1992

INTRODUCTION

Enclosure B describes actions undertaken at the FEMP during the period December 1 through December 31, 1992 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 COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending December 31, 1992

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

3. Reports and Record Keeping

Section B

The RI/FS Monthly Technical Progress Report for November 1992 was transmitted to the U.S. EPA on December 21, 1992, 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 October 1992, was transmitted to the U.S. EPA on December 21, 1992, 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.

TABLE 1

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

DECEMBER 31, 1992

ACTION	DESCRIPTION	COMPLETION TIME AFTER FFCA SIGNED	FY1992 STATUS
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 November 1992 was transmitted to the U.S. EPA on December 21, 1992. (DOE-0693-93)
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

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

DECEMBER 31, 1992

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 testing during FY1993. Procurement activities are in process to obtain services for performance of the tests.
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 testing during FY1993. Procurement activities are in process to obtain services for performance of the tests.
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

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

DECEMBER 31, 1992

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	November's FFCA Monthly Progress Report was transmitted to the U.S. EPA on December 21, 1992. (DOE-0693-93)

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

PERIOD ENDING DECEMBER 31, 1992

ENCLOSURE C

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

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

Period Ending December 31, 1992

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 December 1 through December 31, 1992, 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).

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

Period Ending December 31, 1992

FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
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 is preparing a revision to the methodology.)
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 November 1992.

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FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
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.

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

Period Ending December 31, 1992

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. In addition, radon grab samples were taken, as noted in the Selected Radon Data Report. A program to develop sampling procedures, in accordance with the SCQ, and validation of the data presented in this report is currently being developed by FERMCO

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).

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

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

K-65 SILO REPORT

LOCATION: Silo # 1 DATE: December 1992

Day	Ambient Temp Deg. F	Ambient Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
1	28.5	29.3	47.2	98.4	-0.009	37505
2	32.1	29.2	46.9	98.2	-0.010	20151
3	29.9	29.6	46.6	98.3	-0.009	41733
4	34.7	29.4	46.6	98.1	-0.009	35057
5	19.4	29.7	46.1	98.8	-0.012	15116
6	20.9	29.6	45.0	99.0	-0.010	61877
7	28.2	29.5	44.9	98.6	-0.010	10154
8	26.0	29.7	44.8	98.2	-0.010	14146
9	29.3	29.5	44.5	98.1	-0.010	55859
10	31.9	29.1	44.5	95.5	-0.048	27523
11	31.7	29.3	44.5	97.6	0.032	2574
12	33.0	29.6	44.5	98.0	0.022	2894
13	31.3	29.7	44.5	90.7	0.010	7708
14	32.1	29.6	44.4	95.8	-0.009	48556
15	41.8	29.4	44.3	97.4	-0.007	86812
16	43.7	29.4	45.1	97.3	0.014	30595
17	33.6	29.4	45.0	97.7	-0.009	33447
18	30.5	29.6	44.7	97.8	-0.009	57667
19	41.3	29.4	44.4	97.4	-0.008	45797
20	27.5	29.6	44.7	97.6	0.114	21254
21	26.8	29.5	43.6	95.8	-0.043	73004
22	30.9	29.5	43.5	97.7	-0.009	61055
23	39.9	29.5	43.7	97.2	-0.009	15135
24	17.1	29.9	43.3	97.9	-0.012	41828
25	22.8	29.6	42.3	98.0	-0.010	40859
26	15.9	29.9	41.6	97.9	-0.014	35897
27	24.9	29.8	40.9	97.6	-0.006	62344
28	37.1	29.8	41.4	97.3	-0.008	55412
29	43.7	29.7	42.1	97.0	-0.065	76637
30	54.1	29.5	43.1	97.0	-0.103	60022
31	42.6	29.5	44.1	96.9	0.057	17052
ARITHMETIC MEAN	31.7	29.5	44.3	97.4	-0.007	38570
MAXIMUM	54.1	29.9	47.2	99.0	0.114	86812
MINIMUM	15.9	29.1	40.9	90.7	-0.103	2574
MEDIAN	31.3	29.5	44.5	97.7	-0.009	37505

Notes: Report generated from a combination of field computer and peripheral computer data files.

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

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

K-65 SILO REPORT

LOCATION: Silo # 2 DATE: December 1992

Day	Ambient Temp Deg. F	Ambient Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
1	28.5	29.3	47.1	98.0	-0.006	140490
2	32.1	29.2	46.9	•	-0.007	125794
3	29.9	29.6	46.5	•	-0.007	170083
4	34.7	29.4	46.5	•	-0.007	145994
5	19.4	29.7	46.0	•	-0.006	82769
6	20.9	29.6	45.0	•	-0.006	111069
7	28.2	29.5	44.8	•	-0.006	110950
8	26.0	29.7	44.7	•	-0.006	137011
9	29.3	29.5	44.5	•	-0.005	134219
10	31.9	29.1	44.4	•	-0.006	135146
11	31.7	29.3	44.3	•	-0.006	125723
12	33.0	29.6	44.3	•	-0.006	124672
13	31.3	29.7	44.3	•	-0.007	133889
14	32.1	29.6	44.2	•	-0.006	179909
15	41.8	29.4	44.1	•	-0.006	209618
16	43.7	29.4	45.0	•	-0.007	101589
17	33.6	29.4	44.9	•	-0.006	160903
18	30.5	29.6	44.6	•	-0.006	179144
19	41.3	29.4	44.4	•	-0.007	117366
20	27.5	29.6	44.6	•	0.120	92121
21	26.8	29.5	43.6	•	•	111728
22	30.9	29.5	43.5	•	•	146631
23	39.9	29.5	43.7	•	•	89846
24	17.1	29.9	43.4	•	•	68921
25	22.8	29.6	42.5	•	•	54062
26	15.9	29.9	41.8	•	•	42734
27	24.9	29.8	41.1	•	•	95943
28	37.1	29.8	41.6	•	0.021	172334
29	43.7	29.7	42.3	•	-0.021	171137
30	54.1	29.5	43.2	98.0	-0.053	152207
31	42.6	29.5	44.1	98.0	-0.006	110595
ARITHMETIC MEAN	31.7	29.5	44.3	98.0	-0.002	126922
MAXIMUM	54.1	29.9	47.1	98.0	0.120	209618
MINIMUM	15.9	29.1	41.1	98.0	-0.053	42734
MEDIAN	31.3	29.5	44.3	98.0	-0.006	125794

Notes:
1. • – Data not available
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

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

LOCATION: Selected Sampling Locations

DATE: DECEMBER, 1992

Date	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
12/01/92	0.8	0.5	0.8	0.5
12/02/92	0.5	0.4	0.7	0.4
12/03/92	0.4	0.3	0.6	0.3
12/04/92	0.5	0.4	0.7	0.4
12/05/92	0.7	0.5	1.3	0.4
12/06/92	0.8	0.6	1.2	0.6
12/07/92	0.5	0.4	0.7	0.4
12/08/92	0.5	0.4	0.7	0.4
12/09/92	0.5	0.4	0.7	0.4
12/10/92	0.5	0.4	0.7	0.4
12/11/92	0.5	0.4	0.7	0.4
12/12/92	0.4	0.3	0.5	0.3
12/13/92	0.4	0.3	0.5	0.2
12/14/92	0.5	0.3	0.6	0.4
12/15/92	0.9	0.7	1.0	0.6
12/16/92	0.6	0.5	0.7	0.5
12/17/92	1.0	0.9	0.8	0.6
12/18/92	0.7	0.5	0.8	0.5
12/19/92	0.6	0.5	0.7	0.4
12/20/92	0.6	0.4	0.9	0.5
12/21/92	0.8	1.2	1.2	0.6
12/22/92	0.7	0.6	0.9	0.6
12/23/92	0.5	0.4	0.6	0.5
12/24/92	0.6	0.8	1.2	0.4
12/25/92	M	0.8	0.9	0.4
12/26/92	M	0.9	1.6	0.6
12/27/92	M	0.5	2.4	0.6
12/28/92	0.5	0.8	0.8	0.5
12/29/92	0.5	0.4	0.6	0.4
12/30/92	0.3	0.3	0.5	0.3
12/31/92	0.4	0.4	0.6	0.4

AVERAGE	0.6	0.5	0.9	0.4
MAXIMUM	1.0	1.2	2.4	0.6
MINIMUM	0.3	0.3	0.5	0.3
MEDIAN	0.5	0.4	0.7	0.4
Std. Dev	0.2	0.2	0.4	0.1

M – Monitor malfunction
I – Data censored, inconsistent data not included.

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

LOCATION: Selected Sampling Locations

DATE: DECEMBER, 1992

Date	K-65 NW (pCi/L)	K-65 SW (pCi/L)	K-65 NE (pCi/L)	K-65 SE (pCi/L)
12/01/92	1.4	1.5	M	M
12/02/92	1.0	1.0	M	M
12/03/92	1.1	0.8	M	M
12/04/92	1.3	1.2	M	M
12/05/92	1.7	1.5	M	M
12/06/92	1.9	2.0	M	M
12/07/92	1.0	1.2	1.1	1.6
12/08/92	1.2	1.4	1.5	1.6
12/09/92	3.7	1.3	0.6	0.8
12/10/92	1.3	1.2	1.4	1.1
12/11/92	0.8	1.0	1.0	3.3
12/12/92	0.7	1.0	0.3	2.7
12/13/92	1.5	1.9	0.3	1.3
12/14/92	1.9	1.8	1.2	1.9
12/15/92	2.0	2.2	4.0	4.1
12/16/92	1.3	1.1	1.6	2.2
12/17/92	2.2	3.2	2.1	2.7
12/18/92	2.1	1.8	2.0	2.2
12/19/92	1.2	1.4	1.6	1.7
12/20/92	1.2	1.3	2.1	2.6
12/21/92	2.4	2.7	5.5	4.3
12/22/92	1.3	1.7	5.0	3.4
12/23/92	0.8	1.0	2.2	1.1
12/24/92	1.8	2.6	0.8	1.5
12/25/92	1.4	1.9	1.3	1.1
12/26/92	2.8	1.3	3.5	4.0
12/27/92	1.8	1.0	7.2	7.1
12/28/92	1.9	1.6	1.2	1.5
12/29/92	1.5	1.0	0.5	0.7
12/30/92	0.7	0.7	0.5	0.7
12/31/92	0.7	0.8	0.8	1.8

AVERAGE	1.5	1.5	2.0	2.3
MAXIMUM	3.7	3.2	7.2	7.1
MINIMUM	0.6	0.7	0.5	0.2
MEDIAN	1.4	1.3	1.4	1.6
Std. Dev	0.6	0.6	1.7	1.4

M– Monitor malfunction
I– Data censored, inconsistent data not included.

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

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

K-65 SILO REPORT
RADON CONCENTRATIONS

MONTH: DECEMBER, 1992 REPORT GENERATED: 01/06/93

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

	SILO 1				SILO 2			
Date	Average	Maximum	Minimum	Std. Dev.	Average	Maximum	Minimum	Std. Dev.
12/01/92	37505	128390	2590	32902	140490	202830	25630	50810
12/02/92	20151	157320	1920	40267	125794	337500	20520	55202
12/03/92	41733	130560	1920	39804	170083	238100	60910	38539
12/04/92	35057	132730	1920	36944	145994	410030	28430	75484
12/05/92	15116	95930	1920	22463	82769	158320	6020	45773
12/06/92	61877	139590	20320	29045	111069	173980	54310	33907
12/07/92	10154	91250	2090	10466	110950	166570	25300	41537
12/08/92	14146	75530	4600	10768	137011	391070	43600	37718
12/09/92	55859	114840	10960	24794	134219	192450	84970	24449
12/10/92	27523	226240	4100	48787	135146	411680	39310	81200
12/11/92	2574	6770	2090	826	125723	170690	57120	25869
12/12/92	2894	17480	2090	1717	124672	183050	41290	39404
12/13/92	7708	50770	2090	9884	133889	181900	92550	15028
12/14/92	48556	121030	8280	28543	179909	338320	92720	34158
12/15/92	86812	188610	19660	37861	209618	359750	42770	69835
12/16/92	30595	141430	1920	35779	101589	272390	9970	77611
12/17/92	33447	154980	1920	40827	160903	273210	27280	70526
12/18/92	57667	140260	3430	43710	179144	242060	90250	27593
12/19/92	45797	127720	4600	30261	117366	240410	13930	63432
12/20/92	21254	133070	1920	27402	92121	243710	31240	41881
12/21/92	73004	164350	2590	41850	111728	210080	42940	45717
12/22/92	61055	156490	1920	49071	146631	265800	44920	56308
12/23/92	15135	102120	1920	19827	89846	192120	29260	41312
12/24/92	41828	143770	2090	38983	68921	150080	3050	45393
12/25/92	40859	160840	2090	47065	54062	145630	6510	43559
12/26/92	35897	103290	6770	18625	42734	169860	2550	45184
12/27/92	62344	142770	11960	31277	95943	297940	2550	88533
12/28/92	55412	127210	7280	34583	172334	283100	45080	52472
12/29/92	76637	148290	7110	38409	171137	264480	34530	67889
12/30/92	60022	132230	10620	31934	152207	281460	44420	61202
12/31/92	17052	91750	2090	18114	110595	280800	37500	54672

Grab Samples of Headspace

Date	SILO 1 Concentration	SILO 2 Concentration
12/02/92	60581	521827
12/04/92	57586	707644
12/14/92	77081	354640
12/31/92	11781	403506

Notes:
1. All values reported in pCi/L.
2. 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 DECEMBER 31, 1992

ENCLOSURE D

DRILLING/BORING LOGS

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER: 60250.03.07	PROJECT NAME: OU-3 Addendum Fire Training Area	
BORING NUMBER: 1844	COORDINATES:	DATE 12/16/92
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1440 098726 12/16/92	3 ND 12/16/92	3	Loose 2.5Y (4/6) olive yellow, coarse sand w/ large gravel, well graded, dry	SP	NA	HNU = 0 ppm BX = 100 cpm
	NA	4 12/16/92	0	No Recovery	NA	NA	
1	NA	5	0	SAA	NA	NA	
	1445 093727 12/16/92	3	6	V. Stiff. 10YR (4/4) dark yellowish brown, silty clay w/sand, dry.	CL	2.5	HNU = 0 ppm BX = 80 cpm
2	NA	4	0	No Recovery	NA	NA	
	NA	6	0	SAA	NA	NA	

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 C Cyclone
Driller: Craig Coulter
Kevin Myers

Samples collected per ASTM std. practice for D2488. Colors identified using Munsell Color Chart

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

VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER: 60250.03.07	PROJECT NAME: OU-5 Addendum Fire Training Area		
BORING NUMBER: TB16	COORDINATES:		DATE 12/16/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 2 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1448 098728 12/16/92	5	4/6	Stiff. 2.5Y(4/6) Olive yellow clay, low plasticity, slightly moist	CL	1.25	HNU = 0ppm BX = 100cpm
	1443 098729 12/16/92	7	1	Med. Dense. 2.5Y (4/6) Olive yellow coarse sand & gravel, well graded, slightly moist	SW	NA	
4	NA	12	0	No Recovery	NA	NA	
	1450 098730 12/16/92	3	6	V. Stiff. 10YR(4/4) Dark yellowish brown silty clay low plasticity, slightly moist	CL	2.25	HNU = 0ppm BX = 100cpm
5	1450 098731 12/16/92	4	6	SAA	CL	2.25	
	NA	7	0	No Recovery	NA	NA	

NOTES:

SAA - Same as above
NA - Not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 C Cyclone
Driller: Craig Carter
Kevin Myers

402-11-86

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-5 Addendum Fire Training Area		
BORING NUMBER: 1786	COORDINATES:		DATE 12/16/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 3 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1500 098832 12/16/92	11	6	V. Stiff. 10YR (4/4) Dark yellowish brown silty clay w/gravel low plasticity, slightly moist	CI	3.5	HNU = 0ppm BS = 80cpm
	1500 098833 12/16/92	21	6	SAA	CI	2.5	
7	1500 098834 12/16/92	27	3	SAA	CI	2.75	
	1515 098835 12/16/92	16	6	V. Stiff. 2.5Y (5/4) Light olive brown, gravelly clay, low plasticity, slightly moist	CI	3.5	HNU = 0ppm BS = 40cpm
8	NA	23	0	No Recovery	NA	NA	
	NA	27	0	SAA	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 C Helons

Driller: Craig Coulter
Kevin Myers

SAA - Same as above
NA - Not applicable

407-11-86

VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER: 60250.03.07	PROJECT NAME: OU-5 Addendum Fire Training Area	
BORING NUMBER: 1886	COORDINATES:	DATE 12/16/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool		PAGE 4 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1340 098736 12/16/92	6	6	V. Stiff. 2.5Y (4/4) Olive brown silty clay w/gravel, no plasticity slightly moist	CL	3.0	HNU = 0 ppm BG = 40 cpm
	1340 098737 12/16/92	8	3	SAA	CL	3.5	
10	NA	14	0	No Recovery	NA	NA	
	1345 098738 12/16/92	11	6	V. Stiff. 2.5Y (4/4) Olive brown silty clay w/gravel, no plasticity slightly moist	CL	4.25	HNU = 0 ppm BG = 40 cpm
11	NA	14	0	No Recovery	NA	NA	
	NA	17	0	SAA	NA	NA	

NOTES:

SAA - Same as above
NA - Not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 C Bolone
Driller: Craig Coulter
Kevin Myers

402-11-86

4

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-5 Addendum Fire Training Area	
BORING NUMBER: 17816	COORDINATES:	DATE 12/16/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1600 098739 ~~098740~~ ~~050~~ ~~12/16/92~~ 12/16/92	8	6	V. Stiff, 2.5(4/4) Olive brown mottled w/ gray gravelly clay no plasticity, ~~slightly moist~~	CL	3.5	HNU = 0 ppm BG = 40 cpm
	1605 098740 12/16/92	14	3	V. Stiff 2.5Y (1/3) gray gravelly clay, no plasticity, ~~slightly moist~~	CL	3.5	
13	NA	20	0	No Recovery	NA	NA	
	1605 ~~050~~ ~~12/16/92~~ ~~098741~~ 098741 12/16/92	11	6	V. Stiff. 2.5Y (3/1) Gray gravelly clay, low plasticity, ~~slightly moist~~	CL	3.5	HNU = 0 ppm BG = 60 cpm
14	1605 098742 12/16/92	17	6	SAA	CL	3.75	
	NA	21	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 C Failing

Driller: Craig Coulter
Kevin Myers

SAA - Same as above
NA - Not applicable

402-11-46

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VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-3 Addendum Fire Training Area		
BORING NUMBER: 1888	COORDINATES:		DATE 12/16/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 6 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1620 098143 12/16/92	4	4	St. Ff. 2.5Y(5/1) Gray gravelly clay, no plasticity, slightly moist	CL	1.25	HNU=0ppm BG=60cpm
	NA	5	0	No Recovery	NA	NA	
-16	NA	6	0	SAA	NA	NA	
	1630 098144 12/16/92	6	6	St. Ff. 2.5Y(5/1) gray gravelly clay, low plasticity, slightly moist.	CL	1.5	HNU=0ppm BG= cpm
-17	1630 098145 12/16/92	7	6	SAA	CL	2.0	
	NA	14	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 C Failing

Driller: Craig Carter

Kevin Myers

SAA - Same as above

NA - not applicable

402-11-86

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER. 60240.03.07	PROJECT NAME. OU-3 Addendum Fire Training Area	
BORING NUMBER: 18816	COORDINATES:	DATE 12/16/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/16/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool		PAGE 7 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1640 DSO 12/16/92 0981HN 12/16/92	7	6	Stiff. 2.5Y (5/1) Gray gravelly clay, med. plasticity slightly moist	Cl	1.75	HNU = 0ppm BK = 60 cpm
	DSO 1640 12/16/92 0981HS	10	3	SAA	Cl	1.75	
19	12/16/92 NA	17	0	No Recovery	NA	NA	
	1645 DSO 12/16/92 0981HW	19	3	V. Stiff. 2.5Y (5/1) gray gravelly clay, med. plasticity slightly moist	Cl	2.0	HNU = 0ppm BK = 60cpm
20	12/16/92			Boring terminated at 20.0 ft			

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 C Failing

Driller: Craig Coulter

Kevin Myers

SAA - same as above

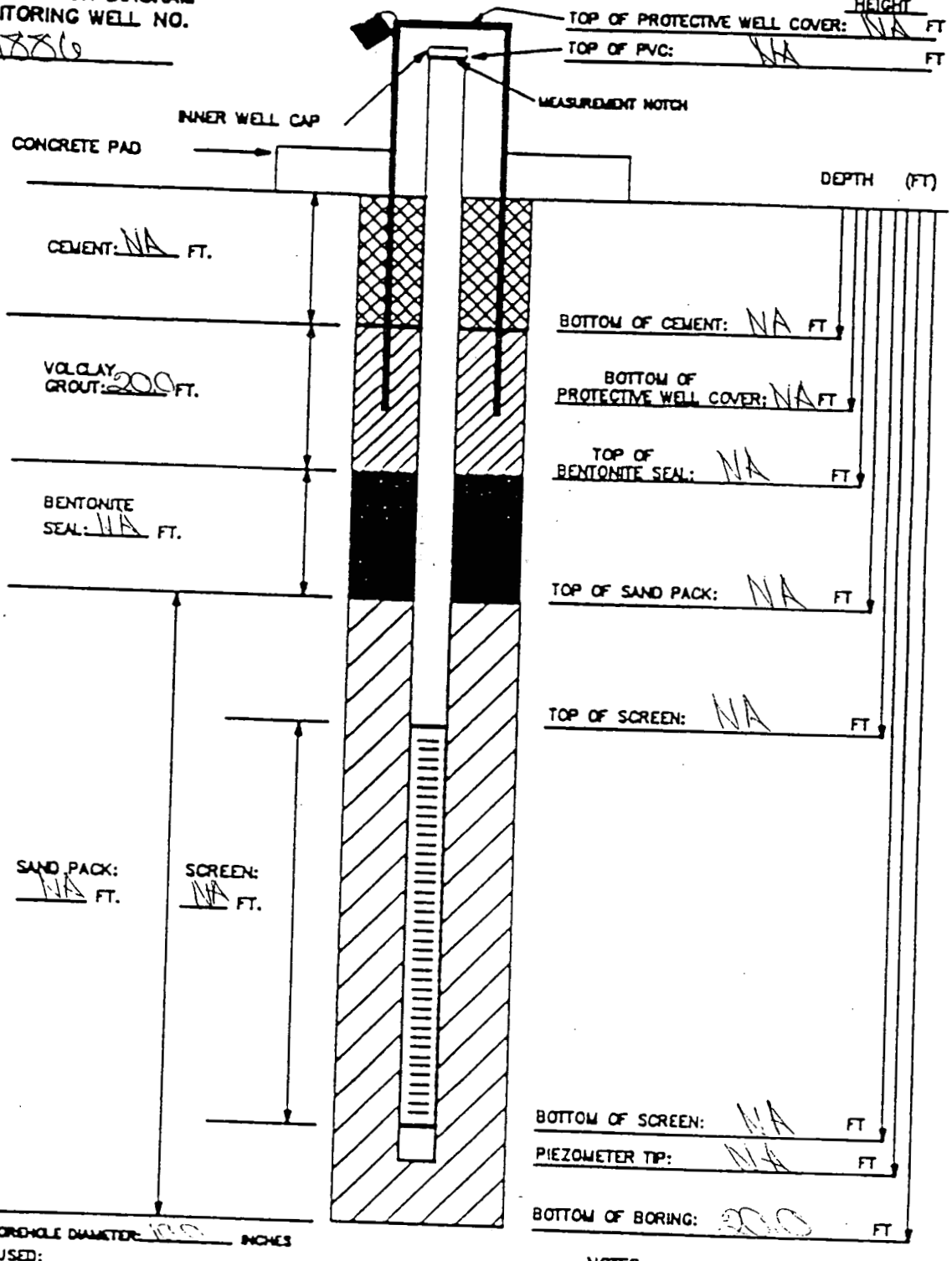
NA - not applicable

402-11-46

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 17816

INSTALLATION DATE: 12/17/95



BOREHOLE DIAMETER: 12.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: NA
OTHER:

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

NA

TASK: 102 KO.03.07 GEOLOGIST/ENGINEER: D C Brian

FERNALD RI/FS

7134 48019 12/21/92

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU-5 Firetraining area FIELD ENG./GEO. D. O'Brien DATE 12/21/92
PROJECT NO. 102.30.03.07 CHECKED BY _____ DATE _____
BORING NO. 17816
PIEZOMETER NO. 17816 DATE OF INSTALLATION 12/17/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 ft TO 20.0 ft	SIZE 10.0 ID FROM 0.0 ft TO 20.0 ft
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 20.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	~~0.0~~ NA			

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

REMARKS No water bearing zone ~~water~~ was encountered. Well was let set over night - no water accumulated. Boring was plugged and abandoned.

409-11-86 9

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER: 60250.03.07	PROJECT NAME: OU-5 Addendum Fire Training Area		
BORING NUMBER: 1890	COORDINATES:	DATE	12/18/92
ELEVATION:	GWL: Depth 4.97ft Date/Time 12/18/92 1418	DATE STARTED:	12/18/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED:	12/18/92
DRILLING METHODS: Cable Tool		PAGE	OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0835 0987165 12/18/92	4	6	V. Stiff. 2.5Y (4/3) Olive Brown silty clay w/sand, no plasticity dry	CL	4.0	HNU = 0 ppm BX = 40 cpm
1	NA	7	0	No Recovery	NA	NA	
	NA	7	0	SAA	NA	NA	
2	0840 0987166 12/18/92	6	6	V. Stiff, 2.5Y (4/3) olive brown, silty clay, no plasticity, slightly moist	CL	2.5	HNU = 0 ppm BX = 60 cpm
	0840 0987167 12/18/92	6	3	SAA	CL	2.5	
	NA	9	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - same as above
NA - not applicable

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

Bkgd: HNU = 0ppm BX = 40-60cpm

402-11-46

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VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-5 Addendum Fire Training Area		
BORING NUMBER: 1890	COORDINATES:	DATE 12/18/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/18/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/18/92	
DRILLING METHODS: Cable Tool		PAGE 2 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0845 0871 12/18/92	5	6	V. Stiff. 2.5Y (4/3) olive brown silty clay. lr. plasticity slightly moist	CL	2.75	HNU = 0ppm BG = 60cpm
	0845 0871 12/18/92	9	6	SAA, 2.5Y (5/4) light olive brown.	CL	3.0	
4	NA	10	0	No Recovery	NA	NA	
	0855 0871 12/18/92	8	5	V. Stiff. 2.5Y (6/4) Light yellowish brown silty clay w/ gravel low plasticity, moist.	CL	2.0	HNU = 0ppm BG = 40cpm
5	NA	10	0	No Recovery	NA	NA	
	NA	12	0	SAA	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 C Helong

Driller: Craig Carter, Kevin Hughes

SAA - Same as above
NA - Not applicable

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-3 Addendum Fire Training Area		
BORING NUMBER: TB90	COORDINATES:	DATE 12/18/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/18/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/18/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	7	0	No Recovery	NA	NA	HNU = 0 ppm BZ = 40 cpm Raw spoon twice
	NA	8	0	SAA	NA	NA	
7	NA	10	0	SAA	NA	NA	
	DO 0871 12/18/92	2	6	Stiff 2.5Y (5/1) Gray mottled with light olive brown, silty clay w/gravel, moist	CL	1.0	HNU = 0 ppm BZ = 40 cpm
5	NA	5	0	No Recovery	NA	NA	
	NA	7	0	No Recovery	NA	NA	

Water Zone (12/18/92)

NOTES:

SAA - Same as above
NA - not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 C Cyclone
Driller: Craig Coulter
Kevin Myers

-07-11-46

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VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER. 60270.03.07	PROJECT NAME. OU-3 Addendum Fire Training Area		
BORING NUMBER: 1890	COORDINATES:	DATE 12/18/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/18/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/18/92	
DRILLING METHODS: Cable Tool		PAGE 4 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1015 098772 12/18/92	8	6	V. Stiff. 10YR (4/6) Dark yellowish brown Silty clay w/gravel, no plasticity dry.	CL	3.0	HNU = 0 ppm RX = 60 cpm
	098773	12	4	SAA.	CL	2.5	
10		18	0	No Recovery	NA	NA	
				Boring terminated @ 10.5 ft			HNU = RX = CB 12/21/92

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 Cyclone

Driller: Craig Cotter

Kevin Myers

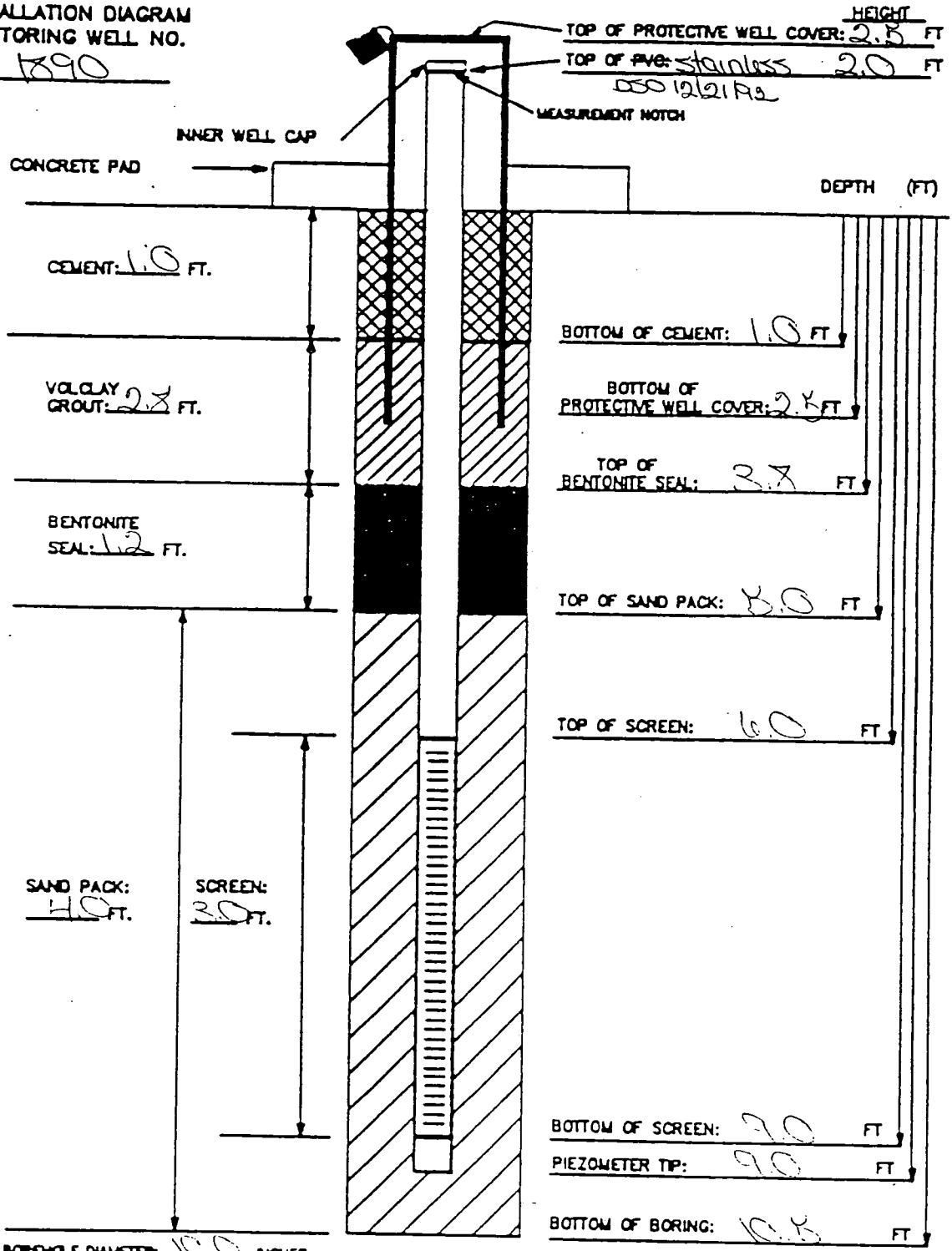
SAA - same as above
NA - not applicable

407-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1890

INSTALLATION DATE: 12/18/92



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 1000 3/1055
BENTONITE PELLETS (5-GALLON BUCKETS): 1 bucket
BAGS OF VOLCLAY GROUT: 1 bag
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 100 gal
OTHER:

NOTES: DC 12/21/92
1) RISER PIPE IS 2-INCH ~~SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS~~ 4 316 55
2) SCREEN IS 2-INCH I.D. ~~SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS~~ 3/1655
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 4.94 12/18/92

TASK: 100 1000.07 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

7134 6 of 6

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU-3 Firetraining area FIELD ENG./GEO. D. O'Brien DATE 12/21/92
PROJECT NO. 102.50.03.07 CHECKED BY C. Brien DATE 12/31/92
BORING NO. 1890
PIEZOMETER NO. 1890 DATE OF INSTALLATION 12/18/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Chum Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 ft TO 10.0 ft	SIZE 10.0 in FROM 0.0 TO 10.0
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 1-3 ft
AVERAGE SIZE OF PERFORATIONS 0.020 in	JOINING METHOD flush joint threaded
TOTAL PERFORATED AREA 3.0 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft	OTHER PROTECTION wood protective
PROTECTIVE PIPE O.D. 10 3/4 in	cover w/ installed padlock

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: Cement	Top 0.0	Bottom 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 3.5	TOP	BOTTOM
BENTONITE	TOP 3.5	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 9.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 6.0	BOTTOM 9.0	TOP	BOTTOM
PIEZOMETER TIP	9.0			
BOTTOM OF BOREHOLE	10.5			
GWL AFTER INSTALLATION	4.9			

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

000096

409-11-86
i6

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER: 60250.03.07	PROJECT NAME: OU-3 Addendum Fire Training Area		
BORING NUMBER: ~~1890~~ 1887	COORDINATES:		DATE: 12/17/92
ELEVATION: ~~1880~~ 12/17/92	GWL: Depth 7.8	Date/Time 12/17/92 1500	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 1 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1300 C98749 12/17/92	14 20 30	4	V. Dense. 10YR(5/6) Yellowish brown coarse sand, poorly graded w/ large limestone pieces, dry	SP	NA	HNU = 0ppm BX = 150cpm
	NA	22	0	No Recovery	NA	NA	
1	NA	49	0	SAA	NA	NA	
	1310 C98750 12/17/92	3	3	V. Stiff. ~~30 blows~~ 2.7 10YR(3/2) V. dark grayish brown, silty clay, no plasticity, dry	CL	2.7	HNU = 0ppm BX = 40cpm
2	NA	5	0	No Recovery	NA	NA	
	NA	7	0	SAA	NA	NA	

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 Cyclone
Driller: Craig Coulter, Kevin Myers

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

Bkgd. HNU = 0 ppm BX = 40-150 cpm

407-11-66

VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER. 10250.03.07	PROJECT NAME. OU-5 Addendum Fire Training Area	
BORING NUMBER: 1887	COORDINATES:	DATE 12/17/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	B12 C9B7B4 12/17/92	6	6	V. Stiff. 10YR(5/6) Yellowish brown, silty clay, low plasticity dry	CI	2.5	HNU=0 ppm BG=60 cpm
	NA	6	0	No Recovery	NA	NA	
4	NA	4	0	SAA	NA	NA	
	B13 C9B7B2 12/17/92	4	6	V. Stiff. 2.5Y(5/6) Light olive brown silty clay w/gravel, low plasticity dry.	CI	2.5	HNU=0 ppm BG=60 cpm
5	B13 C9B7B3 12/17/92	6	5	Stiff. 2.5Y(5/6) Light olive brown silty clay w/gravel, mod plasticity moist	CI	1.5	
	NA	4	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 C Failing

Driller: Craig Carter
Kevin Hughes

SAA - same as above
NA - not applicable

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-3 Addendum Fire Training Area		
BORING NUMBER: TBG 1787	COORDINATES:		DATE 12/17/92
ELEVATION: 12/21/92	GWL: Depth	Date/Time	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 3 OF 7

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1320 0935 12/17/92	3	4	Stiff. 2.5Y (5/6) Light olive brown silty clay w/gravel, low plasticity moist	CL	1.0	HNU = 0 ppm BZ = 60 cpm
	NA	5	0	No Recovery	NA	NA	
7	NA	6	0	No Recovery	NA	NA	
	1325 0935 12/17/92	6	6	Stiff 2.5Y (5/6) Light olive brown silty clay w/gravel, low plasticity, moist	CL	1.0	HNU = 0 ppm BZ = 60 cpm
8	1325 0935 12/17/92	9	6	SAA, V. Stiff	CL	2.5	
	1325 0935 12/17/92	7	6	SAA, Stiff	CL	1.75	

NOTES:

SAA - Same as above
NA - Not applicable

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 42 Cyclone
Driller: Craig Coulter
Kevin Myers

407-11-86

VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-3 Addendum Fire Training Area		
BORING NUMBER: 1887	COORDINATES:		DATE 12/17/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 4 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1327 098158 12/17/92	11	6	V. Stiff. 2.5Y(5/6) Light olive brown silty clay w/gravel, mod. plast. moist	CL	3.25	HNU = 0ppm BZ = 60cpm
	1327 098159 12/17/92	16	6	SAA	CL	2.25	
10	1327 098160 12/17/92	20	6	SAA, mod. stiff	CL	.75	
460	1335 098161 12/17/92	14	3	V. Stiff. 2.5Y(5/6) Light olive brown silty clay w/gravel, low plast. wet	CL	3.0	HNU = 0ppm BZ = 60cpm
11	NA	17	0	No Recovery	NA	NA	
	NA	20	0	No Recovery	NA	NA	

NOTES:

SAA - Same as above
NA - not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 C Failing
Driller: Craig Colter
Kevin Myers

402-11-86

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VISUAL CLASSIFICATION OF SOILS 7134

PROJECT NUMBER. 60250.03.07	PROJECT NAME. OU-5 Addendum Fire Training Area		
BORING NUMBER: TB90 TB7	COORDINATES:		DATE 12/17/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/17/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 12/17/92
DRILLING METHODS: Cable Tool			PAGE 5 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1345 0975 62 059 12/17/92 12/17/92	19	6	V. Stiff. 2.5Y (5/6) Light olive brown, silty clay w/ organic low plasticity, dry	CL	3.75	HNU = 0 ppm BZ = 10 ppm
	1345 0975 63 12/17/92	23	6	SAA	CL	4.5	
13	1345 0975 64 12/17/92	36	6	SAA	CL	4.5	
				Boring terminated at 13.5 ft.			HNU = 0 BZ = 12/31/92
14							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 42 Chalone

Driller: Craig Coulter
Kevin Myers

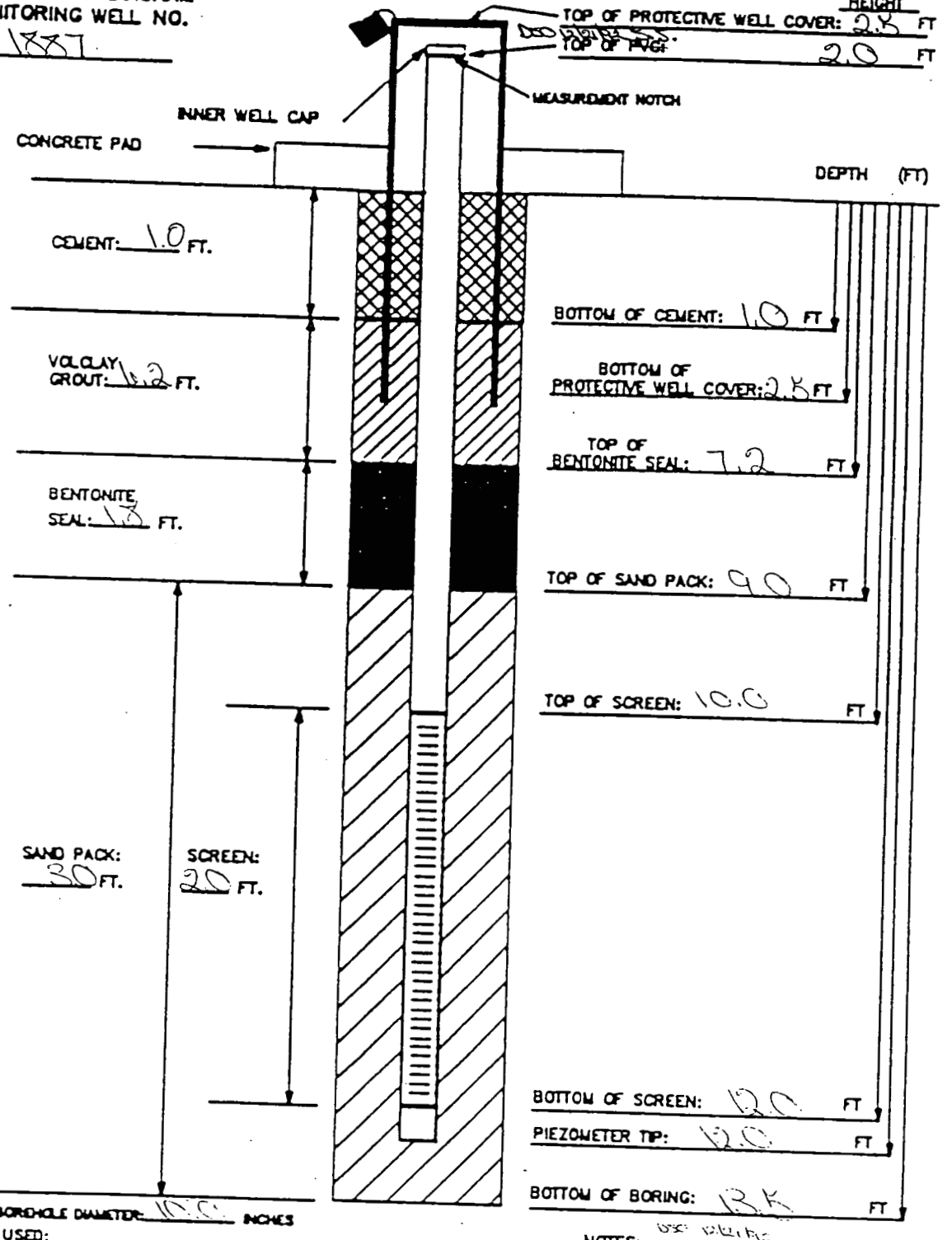
SAA - same as above
NA - not applicable

407-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1887

INSTALLATION DATE: 12/17/92



BOREHOLE DIAMETER: 10.5 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 1000 31000
BENTONITE PELLETS (5-GALLON BUCKETS): 5 buckets
BAGS OF VOLCLAY GROUT: 2 1000
AMOUNT OF CEMENT: 1 1500
AMOUNT OF WATER USED: 2 1000 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH ~~SCHEDULE 40~~ PVC PIPE, FLUSH-THREADED JOINTS. 316 SS
2) SCREEN IS 2-INCH I.D. ~~SCHEDULE 40~~ PVC PIPE WITH 0.020-INCH SLOTS. 316 SS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 7.34 12/17/92

2 sandchunks

TASK: 102.10.03.07 GEOLOGIST/ENGINEER: D. O'Brien

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FERNALD RI/FS

7134 ~~9019~~ 7017

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU-5 Fire training area FIELD ENG./GEO. D.O'Brien DATE 12/21/92
PROJECT NO. 102.50.03.07 11 CHECKED BY _____ DATE _____
BORING NO. 1551
PIEZOMETER NO. 1551 DATE OF INSTALLATION 12/17/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augs	TYPE OF BIT Augs Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM — TO —
FLUID — FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 1-10 ft 1-2 ft
AVERAGE SIZE OF PERFORATIONS 0.020 in	JOINING METHOD Wire 25 screen
TOTAL PERFORATED AREA 2.0 ft	Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION Lined protection
PROTECTIVE PIPE O.D. 10 3/4 in	Cover w/ installed padlock

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:	TOP 0.0	BOTTOM 1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 7.2	TOP	BOTTOM
BENTONITE	TOP 7.2	BOTTOM 9.0	TOP	BOTTOM
SAND	TOP 9.0	BOTTOM 12.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP N.C.C.	BOTTOM ~~12.0~~	TOP	BOTTOM
PIEZOMETER TIP	12/21/92 ~~R.F.~~ 12.0			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	1.3			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS _____

409-11-86

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Work plan Addenda - SE Quad	
BORING NUMBER: 1866	COORDINATES:	DATE 12-18-92
ELEVATION:	GWL: Depth 2.72 FT Date/Time 12-20-92/1200	DATE STARTED: 12-18-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 12-18-92
DRILLING METHODS: Auger (Hollow Stem)		PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0845 98551 12-18-92	Hand auger N/A	6	Soft (10YR, 5/4) light yellowish brown silty clay, organics, slightly moist, non-plastic	Cl	0.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
1	0940 98552 12-18-92	7	6	Stiff (10YR, 5/3) brown clay, medium plasticity, slightly moist	Cl	1.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
	0940 N/A 12-18-92	7	0	NO RECOVERY	N/A	N/A	OVM = ppm Bγ = N/A cpm α = cpm
2	0940 N/A 12-18-92	7	0	NO RECOVERY	N/A	N/A	OVM = ppm Bγ = N/A cpm α = cpm
	1015 98555 12-18-92	3	6	Medium stiff (10YR, 5/6) Gray mottled, yellowish brown clay, medium plasticity, moist	Cl	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
3	1015 98556 12-18-92	6	6	Very soft (10YR, 5/6) Gray mottled yellowish brown silty clay, Non-plastic, moist	Cl	<.25	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1015 98557 12-18-92	6	6	~~Loose~~ Medium Dense (10YR, 5/8) yellowish brown ~~wet~~ poorly graded silty sand, trace gravel, wet (M.W. 12-18-92)	SM	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
4	1015 N/A 12-18-92	8	0	NO RECOVERY	N/A	N/A	OVM = ppm Bγ = N/A cpm α = cpm
	1030 98559 ~~98558~~ M.W. 12-18-92 12-18-92	2	6	Loose (10YR, 5/8) yellowish brown silty sand, trace gravel, wet	SM	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
5	1030 98560 12-18-92	10	6	Loose (10YR, 5/6) yellowish brown silty sand, trace gravel, wet	SM	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

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

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Work plan Addenda	
BORING NUMBER: 1866	COORDINATES:	DATE 12-18-92
ELEVATION:	GWL: Depth 2.72 ft Date/Time 12-20-92/800	DATE STARTED: 12-18-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 12-18-92
DRILLING METHODS: Auger		PAGE 2 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1100 98561 12-18-92	38	6	Very dense (10YR, 5/4) yellowish brown silty sand, trace gravel, wet	SM	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
6	1100 98562 12-18-92	32	6	Very stiff (10YR, 5/4) yellowish brown clay, low plasticity, trace gravel, moist	CI	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1100 98563 12-18-92	45	5	SAA	CI	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
7	1120 98564 12-18-92	6	6	Stiff (10YR, 5/6) yellowish brown silty clay, low plasticity moist, trace gravel	CI	1.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1120 98565 12-18-92	10	6	Very stiff, SAA	CI	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
8	1120 98566 12-18-92	16	6	SAA	CI	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1315 98567 12-18-92	10	6	Medium stiff (2.5Y, 5/2) grayish brown clay, trace gravel, low plasticity, slightly moist	CI	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
9	1315 98568 12-18-92	16	5	Very stiff, SAA	CI	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1315 98569 12-18-92	16	2	SAA	CI	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
10	1330 98570 12-18-92	8	6	SAA	CI	3.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: OVM = 0 ppm, Bγ = 30 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: 1866	COORDINATES:	DATE 12-18-92
ELEVATION:	GWL: Depth 2.72 Date/Time 12-20-92/1200	DATE STARTED: 12-18-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 12-18-92
DRILLING METHODS: Auger		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1330 98571 12-18-92	17	6	Very stiff (2.5Y, 5/2) grayish brown clay, trace gravel, low plasticity, slightly moist	CI	3.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1330 98572 12-18-92	19	6	SAA	CI	4.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
11				Bottom of sampling and bottom of boring at 11.0 ft.			OVM = ppm Bγ = cpm α = cpm
							OVM = ppm Bγ = cpm α = cpm
12							OVM = ppm Bγ = cpm α = cpm
							OVM = ppm Bγ = cpm α = cpm
13							OVM = ppm Bγ = cpm α = cpm
							OVM = ppm Bγ = cpm α = cpm
14							OVM = ppm Bγ = cpm α = cpm
							OVM = ppm Bγ = cpm α = cpm
15							OVM = ppm Bγ = cpm α = cpm

M.W. 12-18-92

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Acker Auger Rig

Driller: Joe Barile
Rick Pierce

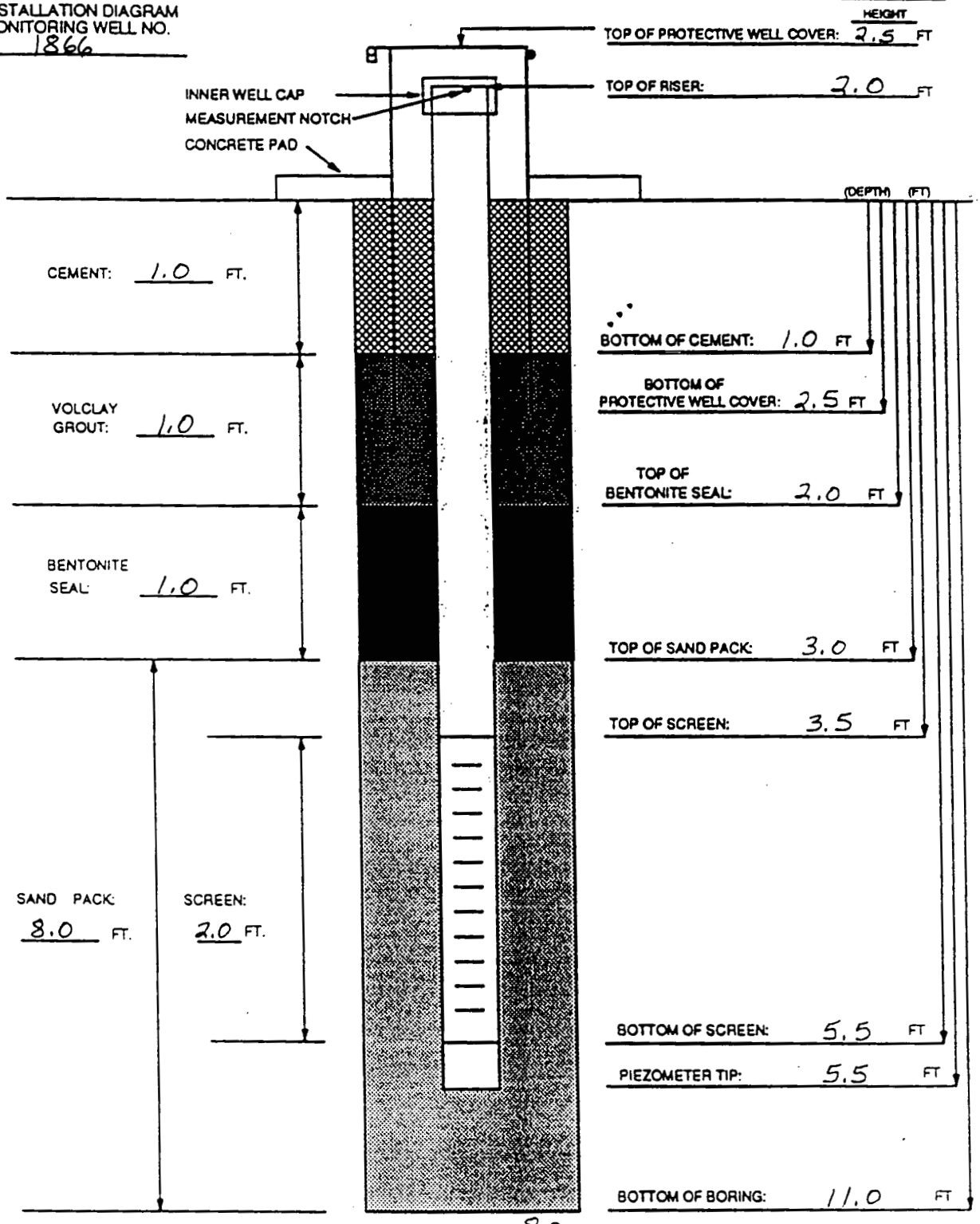
SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

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

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1866

INSTALLATION DATE: 12-18-92



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30, 4 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 0.5
AMOUNT OF CEMENT: 0.5 bags
AMOUNT OF WATER USED: 10 gallons
OTHER: 1-water drum, 1 soil drum
TASK: 602.50.03.07

NOTES:

1) RISER PIPE IS 2.0 IN. ID. ~~316 STAINLESS STEEL~~ Schedule 40 PVC PIPE, FLUSH-THREADED JOINTS. MW 12-18-92
2) SCREEN IS 2.0 IN. ID. ~~316 STAINLESS STEEL~~ Schedule 40 PVC PIPE WITH 0.020 IN. SLOTS. MW 12-18-92
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 2.72 FT/ 12-20-92
5) TOP OF CASING IS SECURED WITH A ~~STAINLESS STEEL~~ PVC CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: Michael Worley

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU 5 Addenda
PROJECT NO. 602.50.03.07
BORING NO. 1866
PIEZOMETER NO. 1866

FIELD ENG./GEO. Michael Worley DATE 12-20-92
CHECKED BY C Brien DATE 12/31/92
DATE OF INSTALLATION 12-18-92

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE N/A FROM — TO —
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 2.0 in. ID.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 2.0 FT.

RISER PIPE MATERIAL Schedule 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 in I.D. 2.0 in.
LENGTH OF PIPE SECTIONS ~~3.5~~ 5.5 FT
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 4 3/8 in.

OTHER PROTECTION Hinged protective cover with padlock

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: CEMENT GROUT / ~~SLURRY~~ M.W. 12-20-92	TOP 0.0	BOTTOM 1.0		
	TOP 1.0	BOTTOM 2.0	TOP	BOTTOM
BENTONITE	TOP 2.0	BOTTOM 3.0	TOP	BOTTOM
SAND	TOP 3.0	BOTTOM 11.0	TOP	BOTTOM
~~GRAVEL~~ M.W. 12-20-92	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 3.5	BOTTOM 5.5	TOP	BOTTOM
PIEZOMETER TIP	5.5			
BOTTOM OF BOREHOLE	11.0			
GWL AFTER INSTALLATION	2.72			

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

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.50.03.07	PROJECT NAME. OU-5 Work plan Addenda-SE Quad.	
BORING NUMBER: 1868	COORDINATES:	DATE 12-19-92
ELEVATION:	GWL: Depth 12.2 ft Date/Time 12-20-92/1400	DATE STARTED: 12-19-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 12-19-92
DRILLING METHODS: Auger (Hollow Stem)		PAGE 1 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
NW 12-19-92	0815 98631 98673 12-19-92	N/A Hand Auger	6	Very stiff (10YR, 3/4) dark yellowish brown organic silty clay, trace gravel, Non plastic dry	OL	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
1	0830 98632 12-19-92	16	6	Very dense (2.5Y, 5/4) light olive brown silty gravel, dry	GM	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0830 98633 12-19-92	50/4 NW 12-19-92	6	Very dense (2.5Y, 6/4) light yellowish brown silty gravel, dry	GM	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
2	0830 N/A 12-19-92	50/.4	0	* Construction rubble encountered * NO RECOVERY - Coarse gravel is causing refusal of split spoon	N/A	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0900 98635 12-19-92	8	6	Stiff (2.5Y, 5/4) Gray mottled light olive brown silty clay, trace gravel, dry Non-plastic	CI	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
3	0900 98636 12-19-92	10	6	SAA	CI	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0900 98637 12-19-92	10	6	SAA, with organics (wood), slightly moist	CI	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
4	0910 98638 12-19-92	3	6	Stiff (2.5Y, 5/4) light olive brown silty clay, trace gravel, Non-plastic, slightly moist	CI	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0910 98639 12-19-92	5	6	Stiff (2.5Y, 4/2) dark grayish brown clay, trace gravel, low plasticity, slightly moist.	CI	2.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
5	0910 98640 12-19-92	8	2	SAA	CI	2.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Acker Auger Rig

Driller: Joe Barile

Rick Pierce

SAA - SAME AS ABOVE

NA - NOT Applicable

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

* Samples Collected per ASTM Standard Penetration Test

* All colors identified by the Munsell Color Chart

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Work plan Addenda	
BORING NUMBER: 1868	COORDINATES:	DATE 12-19-92
ELEVATION:	GWL: Depth 12.2 FT Date/Time 12-20-92/1400	DATE STARTED: 12-19-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 12-19-92
DRILLING METHODS: Auger		PAGE 2 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0920 98641 12-19-92	8	6	Very stiff (2.5Y, 3/3) dark olive brown silty clay, trace gravel and organics, low plasticity slightly moist	Cl	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
6	0920 98642 12-19-92	19	6	Very stiff ~~SAA~~ (2.5Y, 3/2) very dark grayish brown clay, trace gravel and organics, low plasticity, slightly moist	Cl	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0920 98643 12-19-92	22	6	SAA	Cl	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
7	0930 98644 12-19-92	5	6	Very stiff (2.5Y, 5/4) light olive brown clay, trace gravel and organics, medium plasticity, moist	Cl	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0930 98645 12-19-92	8	6	SAA	Cl	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
8	0930 98646 12-19-92	10	6	SAA	Cl	2.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0945 98647 12-19-92	3	6	stiff, SAA, with reddish mottling	Cl	1.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
9	0945 98648 12-19-92	7	6	stiff (2.5Y, 5/3) light olive brown clay, trace gravel, medium plasticity, moist	Cl	2.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	0945 98649 12-19-92	7	6	medium stiff, SAA	Cl	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
10	0955 98650 12-19-92	5	6	medium stiff, SAA	Cl	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

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

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.50.03.07	PROJECT NAME. OU-5 Workplan Addenda	
BORING NUMBER: 1868	COORDINATES:	DATE 12-19-92
ELEVATION:	GWL: Depth 12.2 Ft Date/Time 12-20-92/1400	DATE STARTED: 12-19-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 12-19-92
DRILLING METHODS: Auger		PAGE 3 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0955 98651 12-19-92	14	6	Very stiff (2.5Y, 6/6) olive yellow clay, trace gravel, low plasticity moist	CL	3.0	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
11	0955 98652 12-19-92	18	6	SAA	CL	2.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
	1000 98653 12-19-92	8	6	Very stiff (2.5Y, 5/4) light olive brown silty clay, ~~St~~ MW 12-19 slightly moist, low plasticity	CL	2.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
12	1000 98654 12-19-92	9	6	SAA	CL	2.0	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
	1000 98655 12-19-92	10	6	stiff, SAA	CL	1.0	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
13	1015 98656 12-19-92	5	6	stiff, SAA	CL	1.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
	1015 98657 12-19-92	5	6	~~Medium stiff~~ ~~Soft~~, SAA, moist CB 12/31/92	CL	1.0	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
14	1015 98658 12-19-92	13	6	Very soft, SAA, wet	CL	<.25	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
	1025 98659 12-19-92	13	6	Medium dense (2.5Y, 5/4) light olive brown poorly graded silty sand, wet	SM ~~SP~~ CB 12/31/92	N/A	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
15	1025 98660 12-19-92	13	6	SAA	SM ~~SP~~ CB 12/31/92	N/A	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: OVM = 0 ppm, Bγ = 30 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: 1868	COORDINATES:	DATE 12-19-92
ELEVATION:	GWL: Depth 12.2 FT Date/Time 12-20-92/1400	DATE STARTED: 12-19-92
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 12-19-92
DRILLING METHODS: Auger		PAGE M.W. 12-19-92 34 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1025 98661 12-19-92	10	6	Soft (2.5Y, 5/2) grayish brown clay, medium plasticity moist	CI	0.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
16	1030 98662 12-19-92	4	6	SAA	CI	0.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
	1030 98663 12-19-92	5	6	SAA	CI	0.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
17	1030 98664 12-19-92	7	6	SAA Bottom of sampling at 17.0 Ft. Bottom of boring at 17.0 ft.	CI	0.5	OVM = 0 ppm Bγ = 40 cpm α = 0 cpm
							OVM = ppm Bγ = cpm α = cpm
18							OVM = ppm Bγ = cpm α = cpm
							OVM = ppm Bγ = cpm α = cpm
19							OVM = ppm Bγ = cpm α = cpm
							OVM = ppm Bγ = cpm α = cpm
20							OVM = ppm Bγ = cpm α = cpm

M.W. 12-19-92

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

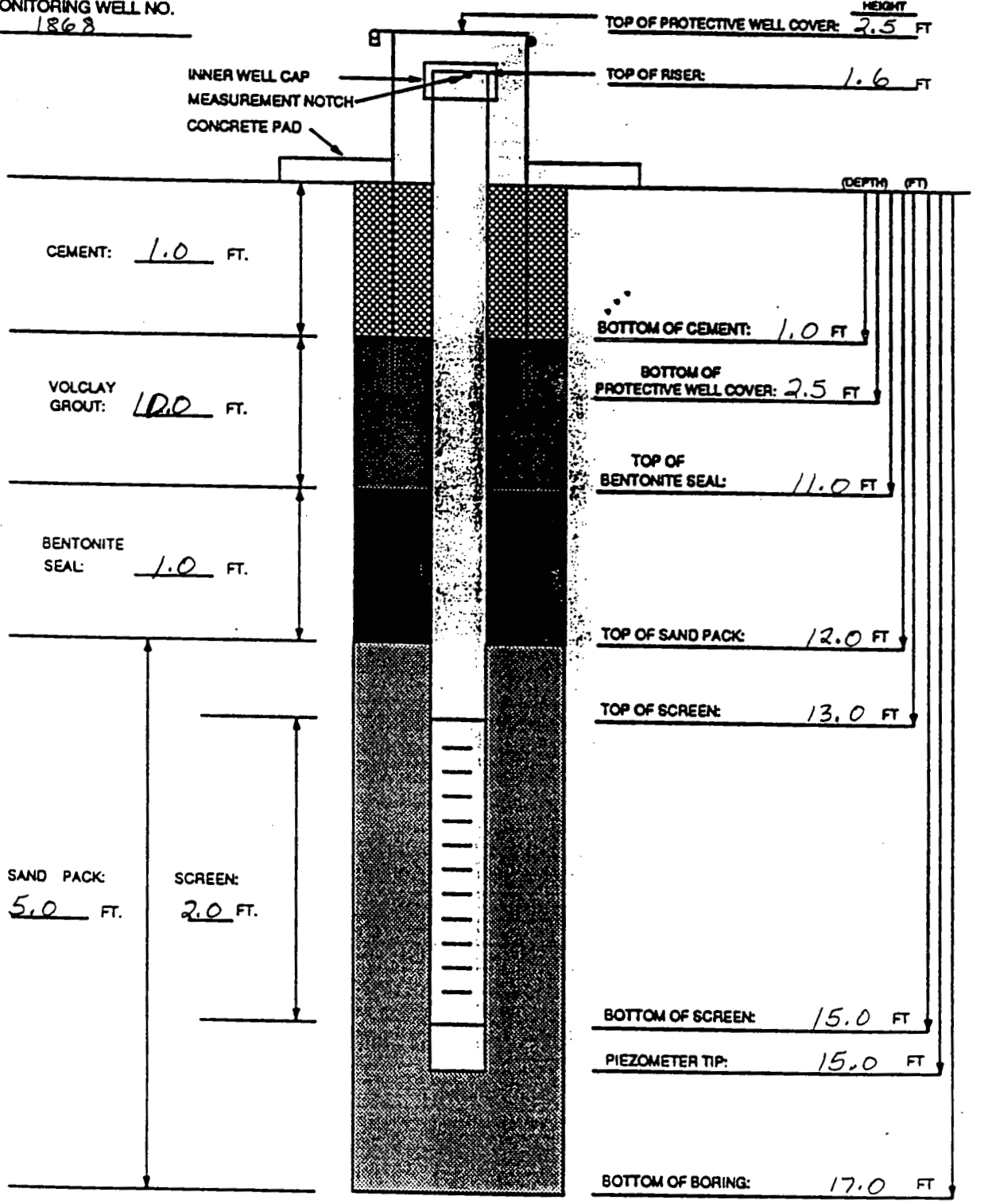
Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

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

FERNALD RI/FS

Piezometer / INSTALLATION DIAGRAM MONITORING WELL NO. 1868

INSTALLATION DATE: 12-19-92



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30, 4 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1 bucket
BAGS OF VOLCLAY GROUT: 1 1/3 bags
AMOUNT OF CEMENT: 1 - 80 lb. bag
AMOUNT OF WATER USED: 30 gallons
OTHER: 1 - soil drum
TASK: OU-5 Addenda 602.50.03.07 (SEQuad)

NOTES:

1) RISER PIPE IS 2.0 IN. ID. ~~316 STAINLESS STEEL~~ schedule 40 PVC PIPE, FLUSH-THREADED JOINTS. MW 12-19-92
2) SCREEN IS 2.0 IN. ID. ~~316 STAINLESS STEEL~~ schedule 40 PVC PIPE WITH 0.020 IN. SLOTS. MW 12-19-92
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 12.2 FT / 12-20-92
5) TOP OF CASING IS SECURED WITH A PVC ~~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

PROJECT NAME OU 5 Addenda
PROJECT NO. 602.50.03.07
BORING NO. 1868
PIEZOMETER NO. 1868

FIELD ENG./GEO. Michael Worley DATE 12-21-92
CHECKED BY (Brill) DATE 12/31/92
DATE OF INSTALLATION 12-19-92

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE N/A FROM — TO —
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 2.0 in. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in.
TOTAL PERFORATED AREA 2.0 FT.

RISER PIPE MATERIAL Schedule 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 in I.D. 2.0 in.
LENGTH OF PIPE SECTIONS 15.0 FT.
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0
PROTECTIVE PIPE O.D. 4 3/8 in

OTHER PROTECTION Hinged protective cover with padlock.

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: VOLCLAY GROUT / ~~SLURRY~~ CEMENT M.W. 12-20-92	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 11.0	TOP	BOTTOM
BENTONITE	TOP 11.0	BOTTOM 12.0	TOP	BOTTOM
SAND	TOP 12.0	BOTTOM 17.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 13.0	BOTTOM 15.0	TOP	BOTTOM
PIEZOMETER TIP	15.0			
BOTTOM OF BOREHOLE	17.0			
GWL AFTER INSTALLATION	12.2			

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.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.50.03.07	PROJECT NAME. OU-5 Workplan Addenda		
BORING NUMBER: 1867	COORDINATES:	DATE 12-19-92	
ELEVATION:	GWL: Depth N/A Date/Time —	DATE STARTED: 12-19-92	
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 12-19-92	
DRILLING METHODS: Auger (Hollow Stem)		PAGE 1 OF 6	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1400 98591 12-19-92	hand Auger	6	Medium dense (2.5Y, 4/2) dark grayish brown well graded sand (backfill) moist	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
1	1415 98592 12-19-92	8	6	Medium dense (2.5Y, 5/4) light olive brown well graded sand, appears to be backfill, moist	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1415 98593 12-19-92	9	6	Stiff (2.5Y, 5/3) light olive brown clay, trace sand and gravel, moist, low plasticity	CI	1.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
2	1415 N/A 12-19-92	5	0	NO RECOVERY * Refusal of split spoon encountered after 2 tries.	N/A	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1430 98595 12-19-92	7	6	Very stiff (2.5Y, 5/6) light olive brown (gray mottled) clay, trace gravel, low plasticity, slightly moist	CI	2.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
3	1430 98596 12-19-92	14	6	SAA	CI	2.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1430 98597 12-19-92	19	6	SAA	CI	2.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
4	1440 98598 12-19-92	4	6	SAA	CI	3.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
M.W. 12-19-92	1440 98599 ~~98598~~ 12-19-92	8	6	SAA	CI	3.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
M.W. 12-19-92 5	1440 ~~98660~~ ~~98599~~ 98600 12-19-92	14	6	SAA	CI	3.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Acker Auger Rig

Driller: Joe Barile

Rick Pierce

* Samples Collected per ASTM Standard Penetration Test

§ All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: OU-5 Workplan Addenda	
BORING NUMBER: 1867	COORDINATES:	DATE: 12-19-92
ELEVATION:	GWL: Depth N/A Date/Time —	DATE STARTED: 12-19-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 12-20-92
DRILLING METHODS: Auger		PAGE 2 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
	1445 98601 12-19-92	8	6	Very stiff (2.5Y, 5/6) Gray mottled light olive brown clay, trace gravel, low plasticity, moist	CI	2.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
6	1445 98602 12-19-92	5	6	SAA	CI	3.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1445 98603 12-19-92	10	6	SAA	CI	3.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
7	1450 98604 12-19-92	16	6	SAA	CI	3.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1450 98605 12-19-92	22	6	SAA	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
8	1450 98606 12-19-92	25	6	SAA	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1500 98607 12-19-92	10	6	SAA, medium plasticity, moist	CI	2.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
9	1500 98608 12-19-92	14	6	SAA	CI	2.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1500 98609 12-19-92	16	6	SAA	CI	2.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
10	1515 98610 12-19-92	5	6	Hard, SAA, low plasticity	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile

Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: OVM = 0 ppm; Bγ = 30 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. Workplan Addenda	
BORING NUMBER: 1867	COORDINATES:	DATE: 12-19-92
ELEVATION:	GWL: Depth N/A Date/Time —	DATE STARTED: 12-19-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 12-20-92
DRILLING METHODS: Auger		PAGE 3 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1515 98611 12-19-92	25	6	Hard (2.5Y, 5/6) Gray mottled light olive brown clay, low plasticity, slightly moist	CI	4.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
11	1515 98612 12-19-92	40	6	SAA	CI	4.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1525 98613 12-19-92	16	6	SAA	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
12	1525 98614 12-19-92	20	6	Hard (2.5Y, 5/3) light olive brown clay, trace cobble size gravel, low plasticity, slightly moist	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1525 98615 12-19-92	30	6	Very stiff, SAA	CI	3.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
13	1600 98616 12-19-92	14	6	M.W. ~~SAA~~ Very stiff (2.5Y, 5/2) grayish brown clay, trace crystalline limestone, low plasticity, slightly moist	CI	3.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1600 98617 12-19-92	22	6	SAA	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
14	1600 98618 12-19-92	27	6	SAA Bottom of boring at 14.0 ft.	CI	4.0	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
	1630 98619 12-19-92	20	6	Hard, SAA	CI	>4.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm
15	1630 98620 12-19-92	22	6	SAA	CI	>4.5	OVM = 0 ppm; Bγ = 30 cpm; α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: OVM = 0 ppm; Bγ = 30 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: 1867	COORDINATES:	DATE 12-19-92	
ELEVATION:	GWL: Depth N/A Date/Time —	DATE STARTED: 12-19-92	
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 12-20-92	
DRILLING METHODS: Auger		PAGE 4 OF 6	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1630 98621 12-19-92	35	6	Hard (2.5Y, 5/2) grayish brown clay, trace crystallive limestone low plasticity, slightly moist	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
16	1645 98622 12-19-92	21	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1645 98623 12-19-92	35	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
17	1645 98624 12-19-92	44	0	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1700 98625 12-19-92	23	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
18	1700 98626 12-19-92	48	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1700 98627 12-19-92	50	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
19	1715 98628 12-19-92	20	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	1715 98629 12-19-92	36	6	SAA	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0. cpm
20	1715 98630 12-19-92	52	6	SAA Bottom of sampling at 20.0 ft. ~~Bottom of boring at 20.0 ft.~~ MW. 12-8-92	Cl	>4.5	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Auger Rig

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

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

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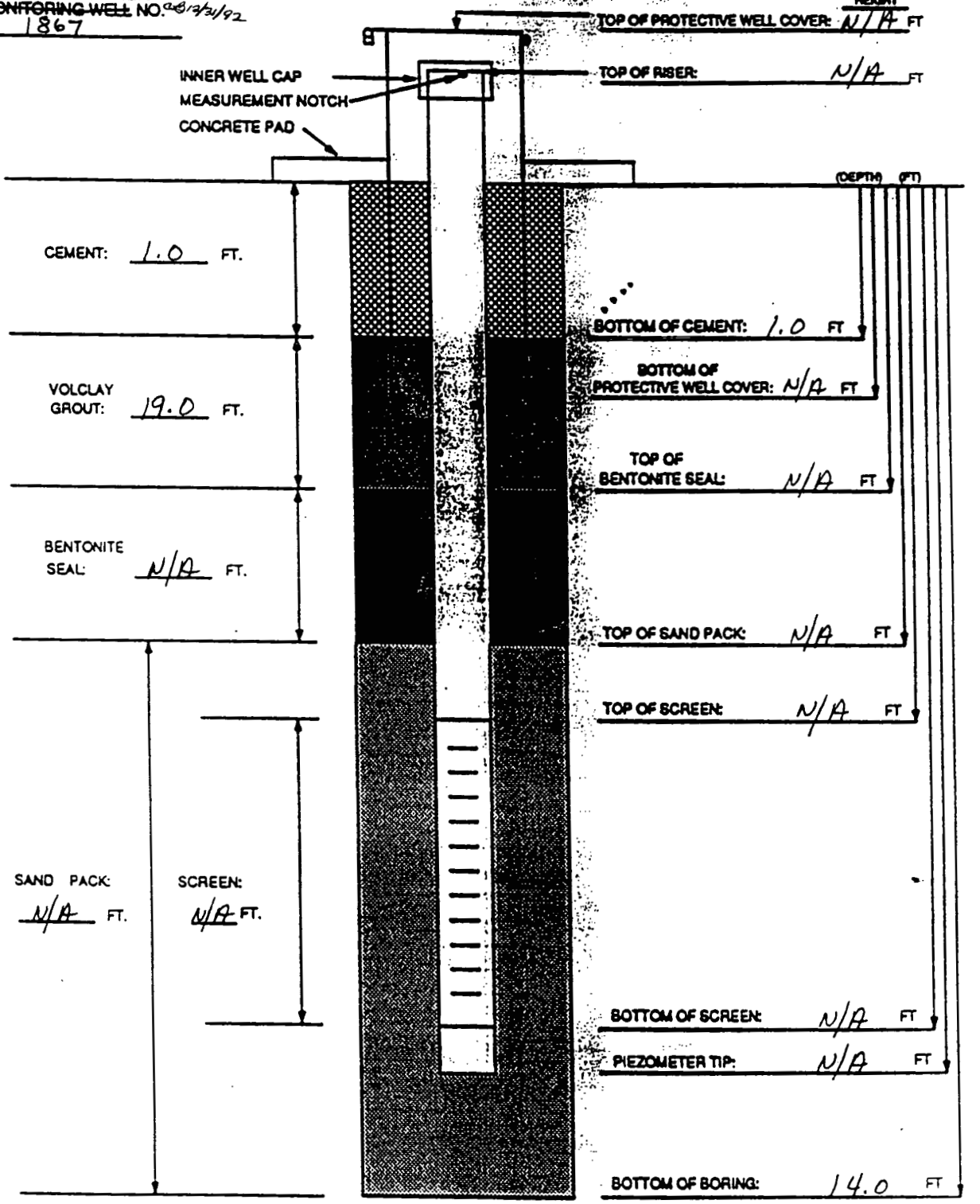
FERNALD RI/FS
INSTALLATION DIAGRAM

Boring ~~MONITORING WELL~~ NO. 8/31/92 1867

INSTALLATION DATE: 12-19-92



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 2 - 50 lb bags
AMOUNT OF CEMENT: 1 - 80 lb. bag
AMOUNT OF WATER USED: 60 gallons
OTHER: 1 soil drum
TASK: OU5 Addendum 602.50.03.07 SE Quad.

NOTES:

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE N/A FT/ N/A
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

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME 045 Addenda-SE Quad. FIELD ENG./GEO. Michael Worley DATE 12-21-92
PROJECT NO. 602.50.03.07 CHECKED BY _____ DATE _____
BORING NO. 1867
PIEZOMETER NO. N/A DATE OF INSTALLATION 12/19/92

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Hollow Auger (8 inch)
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE N/A	RISER PIPE MATERIAL N/A
DIAMETER OF PERFORATED SECTION N/A	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. N/A I.D. N/A
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS N/A
AVERAGE SIZE OF PERFORATIONS N/A	JOINING METHOD N/A
TOTAL PERFORATED AREA N/A	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A	OTHER PROTECTION N/A
PROTECTIVE PIPE O.D. N/A	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
VOLCLAY GROUT / ~~SLURRY~~ CEMENT M.W. 12-21-92	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 20.0	TOP	BOTTOM
BENTONITE NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	14.0			
GWL AFTER INSTALLATION	N/A			

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

REMARKS No water bearing zone encountered - boring was plugged with volclay grout and capped with cement. NOTE: From 14.0 Ft to ∞ the boring was completed by split spoon and was not augered.

FERNALD
RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 60250.03.07	PROJECT NAME. RI/FS		
BORING NUMBER: 1842 (Re-drill)	COORDINATES:	DATE 12/16/92	
ELEVATION:	GWL: Depth 10.4 ft Date/Time 12/10/92/800	DATE STARTED: 12/9/92	
ENGINEER/GEOLOGIST Ken Geiger	Depth 7.0 ft Date/Time 12/14/92/1500	DATE COMPLETED: 12/14/92	
DRILLING METHODS: Auger (Hollow Stem)		PAGE 1 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				For visual classification of soils see origional Log By Ken Marion 6/15/92 0.0 - 7.5 ft			
				water Table 7.0 ft ▽			
7.5							

NOTES

Contractor: Pennsylvania Drilling
Rig : Auger
Driller: Dave Newman

Samples Collected Per ~~ASE~~ RI 12/15/92 ASTM Standard Penetration Test.
Colors Identified using Munsell color chart

Background Levels HNU = 0 ppm
PID = [illegible] ppm
[illegible] = 0 ppm

000121

402-11-86

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.50.03.07	PROJECT NAME RI/FS		
BORING NUMBER 1842 (Redrill)	COORDINATES:	DATE 12/16/92	
ELEVATION:	GWL: Depth 10.4 ft Date/Time 12/10/92/800	DATE STARTED 12/9/92	
ENGINEER/GEOLOGIST Ken Geiger	Depth 7.0 ft Date/Time 12/14/92/1500	DATE COMPLETED 12/14/92	
DRILLING METHODS Auger		PAGE 2 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	98501 12/9/92 1040	4	6	Stiff light olive brown (2.5Y 5/3) silty clay with a trace of sand and some gravel, med plasticity moist	CL	1.0	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
	98502 12/9/92 1040	5	6	Same As Above	CL	1.0	
9.0	98503 12/9/92 1040	5	4	Stiff grayish brown (2.5Y, 5/2) silty clay with a trace of gravel med plasticity, moist	CL	1.0	
	98504 12/9/92 1100	9	6	Stiff light olive brown (2.5Y, 5/4) silty clay, with a trace of gravel, med plasticity, moist	CL	1.0	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
	98505 12/9/92 1100	15	6	Same As Above	CL	1.5	
10.5	98507 12/9/92 1335	12	6	Stiff light olive brown (2.5Y, 5/4) silty clay with a trace of gravel med plasticity slightly moist	CL	1.5	
	98508 12/9/92 1335	19	6	Dense yellowish brown (10YR 5/4) clayey sand with a trace of gravel, moist	SC	N/A	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
	98508 12/9/92 1335	21	6	Same As Above	SC	N/A	
				Stiff Dark Gray (2.5Y 4/1) silty clay with a trace of gravel, med plasticity, moist	CL	1.5	
12.0	98509 12/9/92 1530	9	6	Stiff Dark Gray (2.5Y, 4/1) silty clay with a trace of gravel, med plasticity moist	CL	1.0	
	98510 12/9/92 1530	11	6	Stiff Dark Gray (2.5Y, 4/1) silty clay with a trace of gravel med plasticity moist	CL	1.0	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
	98511 12/9/92 1530	14	2	Same As Above	CL	1.0	
13.5	98512 1550 12/9/92	18	6	Same As Above	CL	1.0	
	98513 1550 12/9/92	29	6	Stiff Dark Gray (2.5Y 4/1) silty clay with a trace of gravel med plasticity moist	CL	1.0	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
	98514 1550 12/9/92	45	5	Same As Above	CL	1.0	
15.0	98515 1625 12/9/92	17	6	Stiff Dark Gray (2.5Y 4/1) silty clay with some sand and gravel med plasticity slightly moist	CI	1.5	

NOTES:

SEE PAGE 1

Background Levels
Hnu = 0 ppm
Bg = 40-60 cpm
α = 0 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.50.03.07	PROJECT NAME: RI/FS	
BORING NUMBER: 1842 (Re-drill)	COORDINATES:	DATE 12/16/92
ELEVATION:	GWL: Depth 10.4 ft Date/Time 12/10/92/800	DATE STARTED: 12/9/92
ENGINEER/GEOLOGIST: KEN Geiger	Depth 7.0 ft Date/Time 12/14/92/1500	DATE COMPLETED: 12/14/92
DRILLING METHODS: Auger		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	98517 1625 12/9/92	21	6	Stiff Dark Gray (2.5Y, 4/1) Silty Clay with Some Sand and Gravel low Plasticity, Slightly moist	CL	1.0	HNU = 0ppm
	98518 1625 12/9/92	47	6	Same As Above	CL	1.0	B_γ = 40cpm
	98519 1645 12/9/92	15	6	Same As Above	CL	1.0	κ = 0cpm
16.5	98520 1645 12/9/92	21	6	Stiff Dark Gray (2.5Y, 4/1) Silty Clay with a Trace of Gravel med Plasticity, Slightly moist	CL	1.5	HNU = 0ppm
	98521 1645 12/9/92	29	5	Same As Above	CL	1.0	B_γ = 40cpm
17.5				Drilled To Depth of 17.5 ft Split Spoon Sampled To 17.5 ft			κ = 0cpm

NOTES

See Page 1

Background Levels
HNU = 0 ppm
B_γ = 40-45 cpm
κ = 0 cpm

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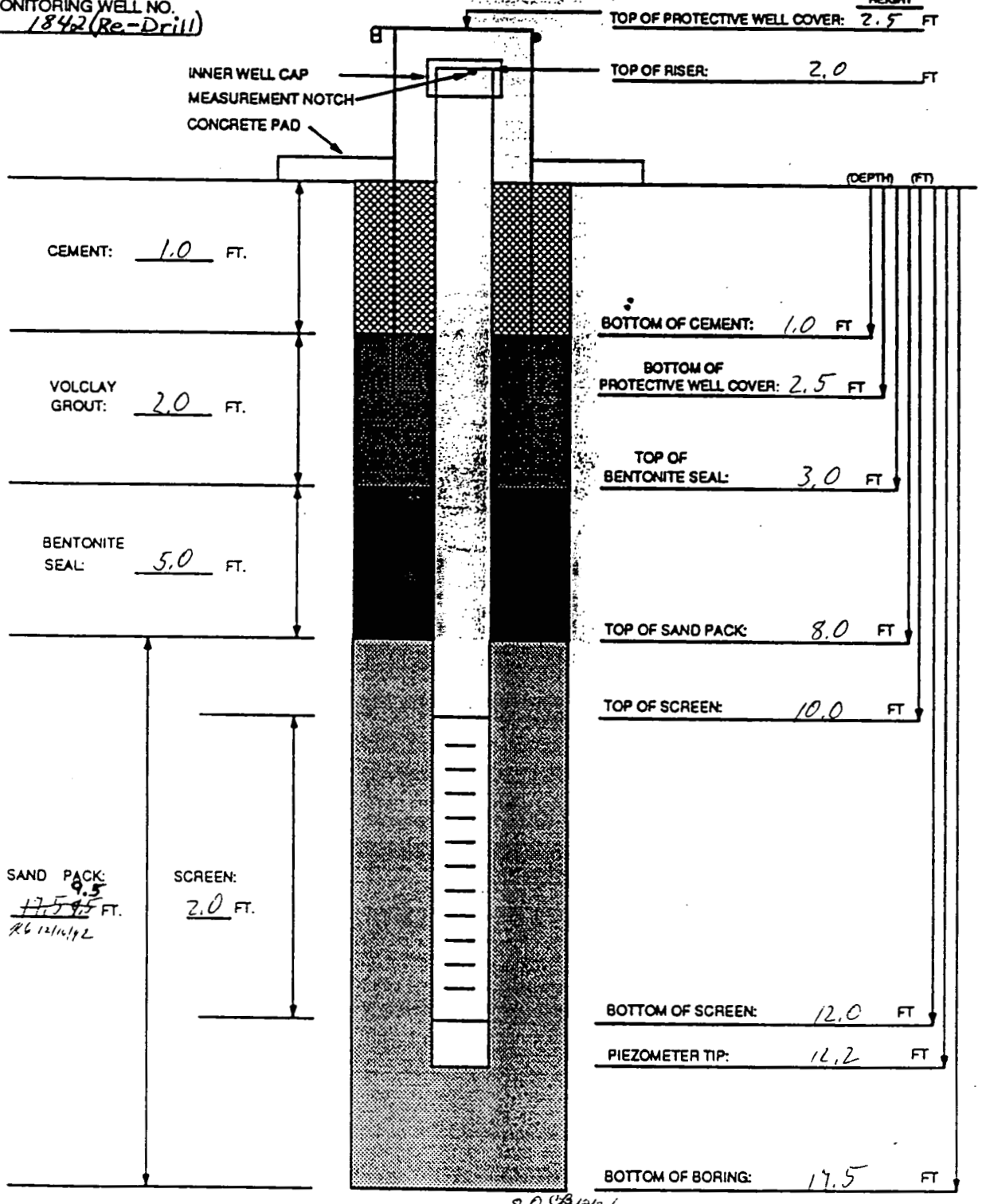
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1842 (Re-Drill)

INSTALLATION DATE: 12/14/92



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	2.5 FT	
TOP OF RISER:	2.0 FT	
BOTTOM OF CEMENT:		1.0 FT
BOTTOM OF PROTECTIVE WELL COVER:		2.5 FT
TOP OF BENTONITE SEAL:		3.0 FT
TOP OF SAND PACK:		8.0 FT
TOP OF SCREEN:		10.0 FT
BOTTOM OF SCREEN:		12.0 FT
PIEZOMETER TIP:		12.2 FT
BOTTOM OF BORING:		17.5 FT

BOREHOLE DIAMETER: ~~9.0~~ CB 12/31/92 IN.
10.0" to 7.5 FT
8.0" to 17.5 FT

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30 Sand - 7-50lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: 1-50lb bag
AMOUNT OF CEMENT: 1-50lb bag
AMOUNT OF WATER USED: 23 gallons (For Grout)
OTHER: 1-2ft Screen, 1-10ft, 1-2ft Risers
TASK: 602 50.03 07

NOTES:

1) RISER PIPE IS 2.0 IN. ID. ~~316 STAINLESS STEEL~~ SCHEDULE 40 PVC RG 12/14/92 PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2.0 IN. ID. ~~316 STAINLESS STEEL~~ SCHEDULE 40 PVC RG 12/14/92 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 12/14/92 FT/ 7.0
5) TOP OF CASING IS SECURED WITH A ~~STAINLESS STEEL~~ PVC CAP. CB 12-14-92
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: KEN GEIGER

2 Drums Soil Cuttings
1 Drum Decon Water
RG 12/14/92

SI FORM 0157 REV. (0)

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FERNALD RI/FS

7134 5 of 5

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RI/FS
PROJECT NO. 602.50.03.07
BORING NO. 1842 (Re-Drill)
PIEZOMETER NO. 1842 (Re-Drill)

FIELD ENG./GEO. Ken Geiger DATE 12/15/92
CHECKED BY C Briers DATE 12/31/92
DATE OF INSTALLATION 12/14/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE 10 in OD FROM 0.0 TO 7.5 ft
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION 2.0 in I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .020 in
TOTAL PERFORATED AREA 2.0 ft

RISER PIPE MATERIAL PVC-Schedule 40
RISER PIPE DIAMETERS:
O.D. 2 5/16 in I.D. 2.0 in.
LENGTH OF PIPE SECTIONS 1-2 ft SCREEN, 1-10 ft, 1-2 ft
JOINING METHOD Screw Type Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 4 3/4 in

OTHER PROTECTION Hinged locking cover with Lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
CEMENT GROUT/SLURRY	TOP 0.0	BOTTOM 1.0		
	TOP 1.0	BOTTOM 3.0	TOP	BOTTOM
BENTONITE (PELLETS)	TOP 3.0	BOTTOM 8.0	TOP	BOTTOM
SAND	TOP 8.0	BOTTOM 17.5	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 10.0	BOTTOM 12.0	TOP	BOTTOM
PIEZOMETER TIP	CTS 12/31/92 ~~12.0~~ 12.2			
BOTTOM OF BOREHOLE	17.5			
GWL AFTER INSTALLATION	7.0			

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

REMARKS Surface casing (10 in) was permanently installed from 0.0 – 7.5 ft to eliminate the possibility of cross-contamination from the original well installation. Original well riser and screen were removed and the borehole was drilled out, deepened, and the new piezometer was installed.

409-11-86

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RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/20/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1625 104801 10-20-92	4 5 7	16	Stiff, (7.5 YR, 5/4) Brown, Silty Clay with roots, Non-plastic, Dry	CL	1.0	HNU = 0 ppm βγ = 80-100 cpm
2 3	1630 104802 10-20-92	5 9 9	16	SAA	CL	1.0	HNU = 0 ppm βγ = 80-100 cpm
4	1635 104803 10-20-92	7 10 17	11	Stiff (7.5 YR, 4/2) Dark Brown, Silty Clay with trace gravel, Non-plastic, Dry.	CL	1.0	HNU = 0 ppm βγ = 40-60 cpm
5 6	1640 104804 10-20-92	14 16 20	17	Very Stiff (10 YR, 5/4) Yellowish Brown, Silty Clay with trace gravel, Non-plastic, Dry	CL	3.0	HNU = 0 ppm βγ = 60-80 cpm
7	1700 104805 10-20-92	24 24 33	12	Very stiff (10 YR, 6/4) Light Yellowish Brown, Silty Clay with trace gravel, Non-plastic, Dry	CL	3.5	HNU = 0 ppm βγ = 40-60 cpm
8 9	1710 104806 10-20-92	29 23 26	18	Very stiff (10 YR, 6/4) Light Yellowish Brown, Silty Clay with trace gravel, Non-plastic, Dry	CL	2.5	HNU = 0 ppm βγ = 40-60 cpm
10	1030 104807 10-21-92	6 14 29	15	Very stiff (10 YR, 5/8) Yellowish Brown Silty Clay with trace pea size gravel, Non-plastic, slightly moist	CL	2.5	HNU = 1 ppm βγ = 60-80 cpm
11 12	1045 104808 10-21-92	13 26 29	14	Hard (10 YR, 5/8) Yellowish Brown Silty Clay with trace gravel, Non-plastic, slightly moist	CL	4.0	HNU = 0 ppm βγ = 60-80 cpm
13	1100 104809 10-21-92	6 10 22	10	Very Stiff (10 YR, 5/1) Gray Silty Clay, Non-plastic, slightly moist	CL	3.5	HNU = 0 ppm βγ = 60-80 cpm
14 15	1415 104810 10-21-92	6 19 18	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = N/A cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

10/20/92 Background Readings: HNU = 0 ppm, βγ = 40-60 cpm

10/21/92 Background Readings: HNU = 0 ppm, βγ = 40-60 cpm

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/21/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1430 104810 10-21-92	6 9 14	9	Very Stiff (7.5 YR, N5/) Gray Clayey silt with trace gravel, non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 20-40 cpm
17 18	1500 104811 10-21-92	5 10 18	14	SAA	ML	N/A	HNU = 1 ppm βγ = 40-60 cpm
19	1510 10-21-92	10 16 18	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = cpm
20 21	1650 104812 10-21-92	7 15 23	11	Dense (7.5 YR, N5/) Gray Clayey Silt with trace gravel non-plasticity, slightly moist	ML	N/A	HNU = 8 ppm βγ = 40-60 cpm
22	1700 104813 10-21-92	12 15 25	12	Dense (7.5 YR, N4/) Dark Gray Clayey silt with trace gravel non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 40-60 cpm
23 24	0830 104814 10-22-92	6 14 33	7	Dense (7.5 YR, N4/) Dark Gray Clayey Silt with trace gravel, non-plastic, moist	ML	N/A	HNU = 0 ppm βγ = 40-60 cpm
25	0850 10-22-92	7 17 36	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = cpm
26 27	0910 104815 10-22-92	8 17 17	14	Dense (7.5 YR, N5/) Gray Clayey Silt with trace gravel, non-plastic, moist	ML	N/A	HNU = 1 ppm βγ = 20-40 cpm
28	0920 10-22-92	6 10 43	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = cpm
29 30	1030 104816 10-22-92	4 6 13	10	Medium Dense (2.5 YR, N5/) Gray Silty Sand, non-plastic, moist	SM	N/A	HNU = 0 ppm βγ = 20-40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson
Bob Yost

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

10/21/92 Background Readings: HNU = 0 ppm, βγ = 40-60 cpm

10/22/92 Background Readings: HNU = 0 ppm, βγ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER: 4432	COORDINATES:		DATE 10/22/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool			PAGE 3 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1040 104817 10/22/92	6 15 13	15	Stiff (2.5YR, N5/) Gray, ~~Silt~~ Silt/Sand, Low plasticity, moist KP 10-22-92	ML	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 20-40 cpm
32 33	1050 104818 10/22/92	10 25 13	10	Stiff (2.5YR, N5/) Gray, Clayey Silt with trace gravel, low plasticity, moist.	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 40-60 cpm
34	1305 104819 10/22/92	3 7 14	11	SAA	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 40-60 cpm
35 36	1320 104820 10/22/92	9 14 24	17.	SAA	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 20-40 cpm
37	1330 104821 10/22/92	9 15 18	16	SAA	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 60-80 cpm
38 39	1340 104822 10/22/92	7 23 25	14	Very Dense (7.5YR, 5/8) Strong Brown, Sandy Silt, non-plastic, moist	ML ~~CL~~ KP 10-22-92	N/A	HNU = 0 ppm βγ = 20-40 cpm
40	1355 104823 10/22/92	21 27 34	12	Very Dense (10YR, 6/8) brownish yellow, silty sand, non-plastic, Dry	SM	N/A	HNU = 0 ppm βγ = 20-40 cpm
41 42	1450 104824 10/22/92	10 15 44	9	Very Dense (10YR, 5/6) Yellowish Brown, Silty sand, non-plastic, Dry	SM	N/A	HNU = 0 ppm βγ = 20-40 cpm
43	N/A	N/A	N/A	No Sample Collected Begin Sampling Every 5 Feet	N/A	N/A	N/A
44 45	N/A	N/A	N/A	SAA	N/A	N/A	N/A

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

10/22/92 Background Readings: HNU = 0; βγ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/22/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 4 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1510 104825 10-22-92	42 50	9	Very Dense (10YR, 6/3) pale brown Gravely Sand, Non-plastic, Dry	SW	N/A	HNU = 0 ppm Bγ = 20-40 cpm
47							
48							
49							
50							
51	1615 104826 10-22-92	23 50	8	Very Dense (10YR, 7/3) very pale brown Gravely Sand, non-plastic, Dry	SW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
52							
53							
54							
55	0950 104827 10-23-92	17 50	3	Very Dense (10YR, 6/4) Light Yellowish Brown, Gravely Sand, non-plastic, Dry	SW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
56							
57							
58							
59							
60							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

10/22/92 Background Readings: HNU = 0 ppm, Bγ = 40-60 cpm

10/23/92 Background Readings: HNU = 0 ppm, Bγ = 20-40 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04-27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/23/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 7 80

KPD 12-15-92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	0930 104828 10-28-92	30 50	6	Very Dense (10YR, 5/3) Brown Gravely Sand, Non-plastic, Dry	GM	N/A	HNU = 0 ppm βγ = 60-80 cpm
62							
63							
64							
65							
66	1330 104829 10-28-92	29 50	13	Very Dense (10YR, 5/4) Yellowish Brown Gravely Sand, Non-plastic, Slightly moist	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
67							
68							
69							
70							
71	1410 104830 10-28-92	19 40 42	16	Very Dense (10YR, 5/3) Brown Gravely Sand, Non-plastic, Dry	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
72							
73							
74							
75							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: Bob Johnson

Bob Yost

SAA - SAME AS ABOVE
NA - NOT Applicable

10/23/92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

10/29/92 Background Readings { HNU = 0 ppm, βγ = 60-80 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME: RCRA Plant	
BORING NUMBER: 4432	COORDINATES:	DATE 10/28/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 6 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	1525 10-28-31 10/28/92	30 50	3	Very Dense (10YR, 5/3) Brown Gravely Sand, Non-Plastic, Slightly Moist	SW	N/A	HNU = 0 ppm BG = 60-80 cpm
77							
78							
79							
80	1600 10-28-32 10/28/92	12 26 50	7	Very Dense (5YR, 5/8) Yellowish Red Gravely Sand, Non-Plastic, Slightly Moist	SW	N/A	HNU: 0 ppm BG = 60-80 cpm
81							
82							
83							
84							
85							
86	1100 ~~10-28-33~~ 10-30-93	12 50	N/A	No Recovery	N/A	N/A	HNU = ~~0~~ KP 10-30-92 ppm BG = ~~60-80~~ KP 10-30-92 cpm
87							
88							
89							
90							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT Applicable

10/28/92 Background Readings { HNU = 0 ppm, BG = 60-80 cpm

Background Readings { HNU = 0 ppm, BG = 60-80 cpm

402-11-46

51

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10-30-92
ELEVATION:	GWL: Depth 86.1 Date/Time 11-2-92/1425	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: ~~10-30-92~~ ~~KP 10-30-92~~ 12-3-92
DRILLING METHODS: Cable Tool		PAGE 7 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	1345 104833 10-30-92	12 12 12	13	medium Dense (10YR, 4/3) Brown medium Sand with trace Gravel, Non-plastic, wet	SP	N/A	HNU = 0 ppm BY = 80-100 cpm
92							
93							
94							
95							
96	1500 10-30-92	10 12 15	N/A	No Recovery	N/A	N/A	HNU = ppm BY = N/A cpm
97							
98							
99							
100							
101	1550 KP 10-30-92 ~~104834~~ 10-30-92	7 13 18	N/A	No Recovery	N/A	N/A	HNU = ppm BY = N/A cpm
102							
103							
104							
105							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: Bob Johnson
Bob Yeat

SAA - SAME AS ABOVE
NA - NOT Applicable

10-30-92 Background Readings { HNU = 0 ppm, BY = 60-40 cpm

11-2-92 Background Readings { HNU = 0 ppm, BY = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-3-92
ELEVATION:	GWL: Depth 85.9' Date/Time 11-3-92/0815	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 8 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	0925 104836 11-3-92	9 11 38	7	Dense (2.5Y, ~~Dark~~ 4/2) Dark Grayish Brown, well graded gravel, trace sand, non-plastic, wet	GW	N/A	HNU = 0 cpm βγ = 40-60 ppm
107	~~KP 11-3-92 104837~~						
108							
109							
110	1000 104837 11-3-92	9 23 21	18	Dense (2.5Y, 4/3) Olive Brown, well graded gravel, non-plastic, wet	GW	N/A	HNU = 0 cpm βγ = 80-100 ppm
112							
113							
114							
115							
116	1445 104838 11-3-92	16 27 39	7	Very Dense (2.5Y, 5/2) Grayish Brown, well graded gravel, non-plastic, wet	GW	N/A	HNU = 0 cpm βγ = 60-80 ppm
117							
118							
119							
120							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 412

Driller: Bob Johnson

Mark Rebold

11-3-92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.24	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-3-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 9 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121	1520 104839 11-3-92	9 15 23	16	SAA	GW	N/A	HNU = 0 ppm βγ = 80-100 cpm
122							
123							
124							
125							
126	0940 104841 11-4-92	1 12 18	9	Medium Dense (5Y, 4/2) Olive gray well graded ~~medium~~ gravel, non-plastic, wet (RP 11-4-92)	GW	N/A	HNU = 0 ppm βγ = 20-40 cpm
127							
128							
129							
130							
131	1020 104842 ~~104843~~ ~~RP 11-4-92~~ 11-4-92	17 21 25	9	Dense (2.5Y, 5/3) Lt. Olive Brown well graded medium gravel, non-plastic, wet	GW	N/A	HNU = 0 ppm βγ = 60-80 cpm
132							
133							
134							
135							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson

Mark Rebaid

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

11-3-92 Background Readings { HNU = 0 ppm; βγ = 40-60 cpm

11-4-92 Background Readings { HNU = 0 ppm; βγ = 20-40 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-4-92
ELEVATION:	GWL: Depth 85.9 Date/Time 11-4-92/1325	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 10 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136	1445 104843 11-4-92	13 27 28	14	Very Dense (2.5Y, 5/2) Grayish Brown Well graded medium gravel, non-plastic wet	GW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
137							
138							
139							
140							
141	1535 104844 11-4-92	11 21 28	13	SAA	GW	N/A	HNU = 0 ppm Bγ = 60-80 cpm
142							
143							
144							
145							
146	1500 104846 11-5-92	29 48 50/5	10	Very Dense (5Y, 4/2) Olive Gray, Well graded medium gravel, non-plastic, wet	GW	N/A	HNU = 0 ppm Bγ = 60-80 cpm
147							
148							
149							
150							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Jeff, David Holmes

11-4-92 Background Readings { HNU = 0 ppm, Bγ = 50-70 cpm

11-5-92 Background Readings { HNU = 0 ppm, Bγ = 60-80 cpm

SAA - SAME AS ABOVE
NA - NOT Applicable

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-5-92
ELEVATION:	GWL: Depth 86.3 Date/Time 11-5-92/1340	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST. K. Payne	Depth 86.9 Date/Time 11-6-92/0830	DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool		PAGE 11 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 UNIT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	1530 104847 11-5-92	12 25 21	11	Dense (5Y, 4/2) Olive Gray Coarse Sand with trace gravel, non-plastic, wet	SW ~~GW~~ 11-5-92	N/A	HNU = 0 ppm Bγ = 60-80 cpm
152							
153							
154							
155							
156	15-16 104848 11-6-92	9 23 44	N/A	No Recovery	N/A	N/A	HNU = ppm Bγ = N/A cpm
157							
158							
159							
160							
161	1630 104849 11-6-92	30 16 23	17	Very Dense (5Y, 4/2) Olive Gray Poorly Graded medium sand with trace gravel, non-plastic, wet	SP	N/A	HNU = 0 ppm Bγ = 60-80 cpm
162							
163							
164							
165							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ~~Bob Johnson~~ KR 11/5/92 Cyclone 42

Driller: Bob Johnson

David Holmes

John [illegible]

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

11-5-92 Background Readings { HNU = 0 ppm, Bγ = 60-80 cpm

11-6-92 Background Readings { HNU = 0 ppm, Bγ = 70-80 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602-04-27 | PROJECT NAME: RCRA Phase I
BORING NUMBER: 4432 | COORDINATES: | DATE: 11-9-92
ELEVATION: | GWL Depth: Date/Time: | DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST: K. Payne | Stabilized Depth: Date/Time: | DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool | PAGE 12 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (UNIT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
166	1000 104849 11-9-92	50/4	4	Very Dense (10YR, 5/3) Brown Poorly graded medium sand with trace gravel, non plastic, wet	SP	N/A	HNU = 0 ppm Bγ = 20-40 cpm
167							
168							
169							
170							
171	1050 104850 11-9-92	20 32 45	17	Very Dense (5Y, 4/2) Olive Gray Coarse Sand poorly graded, non plastic, wet	SP	N/A	HNU = 0 ppm Bγ = 60-80 cpm
172							
173							
174							
175							
176	1100 11-10-92 ~~11-9-92~~	50/1	N/A	No Recovery	N/A	N/A	HNU = Bγ = N/A
177							
178							
179							
180							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cyclone 42
Driller: Bob Johnson
Lonnie McGlocklin

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

11-9-92 Background Readings: HNU = 0 ppm; Bγ = 20-40 cpm
11-10-92 Background Readings: HNU = 0 ppm; Bγ = 40-60 cpm

407-11-46

57

VISUAL CLASSIFICATION OF SOILS

7134

PROJECT NUMBER: 602.04.27 | PROJECT NAME: RCRA Phase

BORING NUMBER: 4432 | COORDINATES: | DATE: 11/16/92

ELEVATION: | GWL: Date/Time: | DATE STARTED: 10/20/92

ENGINEER/GEOLOGIST: K. Payne | Date/Time: | DATE COMPLETED: 12-3-92

DRILLING METHODS: Cable Tool | PAGE 13 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
181	1540 104852 11-16-92	15 42 5/3	18	Very Dense (2.5Y, 4/3) Olive Brown Poorly Graded Medium Sand, non plastic, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
182							
183							
184							
185							
186	1655 11-16-92 ~~104859~~ 11-16-92	28 23 24	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = N/A cpm
187							
188							
189							
190							
191	0905 11-17-92 ~~104853~~ 11-17-92	9 15 15	6	Medium Dense (2.5Y, 4/3) Olive Brown Poorly Graded Medium Sand, non plastic, wet	SP	N/A	HNU = 0 ppm βγ = 80-100 cpm
192							
193							
194							
195							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Lennie McGlocklin, David Holmes

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

11/16/92 Background Readings: HNU = 0 ppm; βγ = 60-80 cpm

11/17/92 Background Readings: HNU = 0 ppm; βγ = 40-60 cpm

407-11-46

58

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER: 4432	COORDINATES:		DATE 11-17-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool			PAGE 14 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196	0945 KP 11-17-92 104854 11-17-92	10 11 30	5	Dense (2.5Y, 5/3) Light Olive Brown Silty Sand with trace layer of (2.5Y, N2/) Black organics, non-plastic, wet	SM	N/A	HNU = 0 ppm βγ = 100-120 cpm
197							
198							
199							
200	1440 KP 11-17-92 104856 11-17-92	6 12 20	8	Dense (2.5Y, 4/4) Olive Brown Poorly ~~Graded~~ KP 12-3-92 medium sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 80-100 cpm
202				Resume Continuous Sampling for Sieve Analysis			
203	1520 104857 11-17-92	19 27 35	10	Very Dense (2.5Y, 4/4) Olive Brown Poorly ~~Graded~~ KP 12-3-92 Fine sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
205	1200 104858 11-17-92	35 30 28	16	Very Dense (2.5Y, 4/2) Dark grayish brown, Poorly ~~Graded~~ KP 12-3-92 Fine Sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
207	0920 104859 11-18-92	45 43 50/5	18	Very Dense (2.5Y, 4/3) Olive Brown Poorly ~~Graded~~ KP 12-3-92 Silty Fine Sand non-plastic, wet	KP 11-18-92 ~~SP~~ SM	N/A	HNU = 0 ppm βγ = 40-60 cpm
209	0955 104860 11-18-92	23 33 28	16	Very Dense (2.5Y, 4/4) Olive Brown Poorly ~~Graded~~ KP 12-3-92 Silty Fine Sand non-plastic, wet	SM	N/A	HNU = 0 ppm βγ = 40-60 cpm
210	1025 104861 11-18-92	28 47 50/5	12	Very Dense (5Y, 4/4) Olive Poorly ~~Graded~~ KP 12-3-92 Fine Sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, David Holmes, Lonnie McGlocklin

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

11-17-92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

11-17-92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

59

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 4432	COORDINATES:		DATE 11-18-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST. K. Payne	Depth	Date/Time	DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool			PAGE 15 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
211	1040 104862 11-18-92	14 28 38	18	Very Dense (2.5 Y, 4/3) Olive Brown Poorly ~~Sorted~~ Graded Medium Sand, non-plastic, wet XP12-31-92	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
212	1350 104863 11-18-92	28 50/.1	12	(2.5Y, 4/4) Olive Brown Poorly ~~Sorted~~ Graded medium Sand, Bedrock XP12-31-92	SH	N/A	HNU = 0 ppm βγ = 40-60 cpm
213							
214							
215							
216							
217							
218							
219							
220							
221							
222							
223							
224							

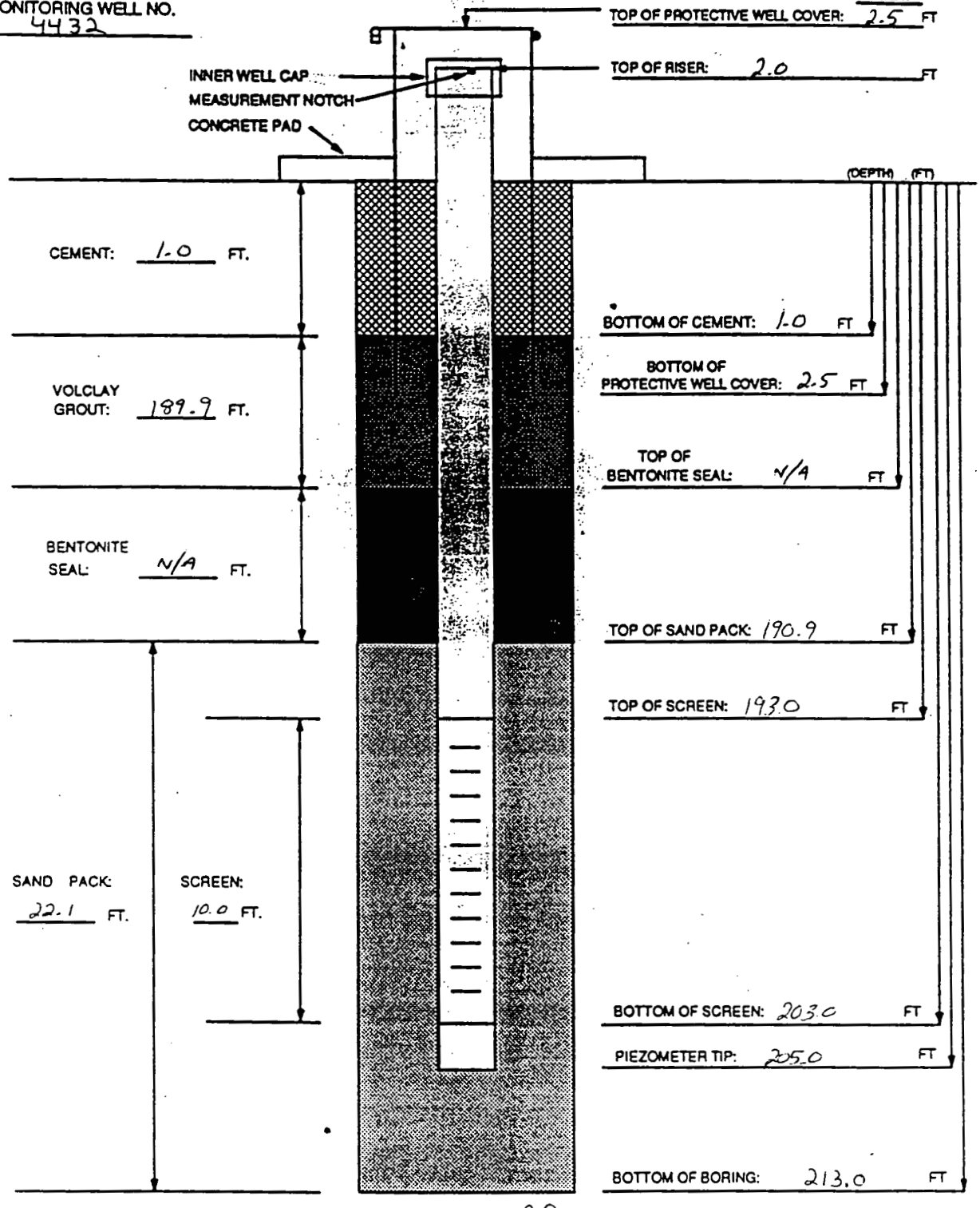
Contractor: Pennsylvania Drilling
Equipment: Cyclone 42
Bob Johnson
Lonnie McBlock

SAA - SAME AS ABOVE
NA - NOT Applicable

11-18-92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4432

INSTALLATION DATE: 12/3/92



TOP OF PROTECTIVE WELL COVER: HEIGHT 2.5 FT

TOP OF RISER: 2.0 FT

CEMENT: 1.0 FT.

VOLCLAY GROUT: 189.9 FT.

BENTONITE SEAL: N/A FT.

SAND PACK: 22.1 FT.

SCREEN: 10.0 FT.

BOTTOM OF CEMENT: 1.0 FT

BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF BENTONITE SEAL: N/A FT

TOP OF SAND PACK: 190.9 FT

TOP OF SCREEN: 193.0 FT

BOTTOM OF SCREEN: 203.0 FT

PIEZOMETER TIP: 205.0 FT

BOTTOM OF BORING: 213.0 FT

BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 15 - 50 lb. bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 48 - 50 lb bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2500 gallons
OTHER: 35 Drums Soil; 3 Drums Alconox/Water
TASK: 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 0.01 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 86.8 FT/ 12/3/92
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

3 lb Stainl Steel screen sections: 19 - 10.0 ft; 1 - 10.0 ft. screen with 2.0 ft. sump

ASI FORM 0157 REV. (0)

FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1
PROJECT NO. 602.04.27
BORING NO. 4432
~~PIEZOMETER NO.~~ MONITORING WELL No. ~~N/A~~ 4432 CB 12/31/92

FIELD ENG./GEO. Keith Payne DATE 12-3-92
CHECKED BY C Brier DATE 12/31/92
DATE OF INSTALLATION 12-3-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 120.0 FT
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 IN ID FROM 0.0 FT TO 213.0 FT
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE ~~Cable Tool~~ KS 12-92 Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 In
TOTAL PERFORATED AREA 10.0 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 19 - 10 FT
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft.
PROTECTIVE PIPE O.D. 10 3/4 IN.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0 FT			
GROUND SURFACE	0.0 FT			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0.0 Ft TOP 1.0 FT	BOTTOM 1.0 ft BOTTOM 190.9 FT	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 190.9 FT	BOTTOM 213.0 FT	TOP	BOTTOM
GRAVEL None used	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 193.0 FT	BOTTOM 203.0 FT	TOP	BOTTOM
PIEZOMETER TIP	205.0 FT			
BOTTOM OF BOREHOLE	213.0 FT			
GWL AFTER INSTALLATION	96.8 FT			

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

409-11-86

mw-4432

NOV-19-92 THU 17:55 WMCO ANALYTICAL FAX NO. 5137386667 P.01

172

Customer Number 104853

MATERIAL: _____ SAMPLE NUMBER: 921119-033

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 166.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	12.58	7.6	7.6	78.7
20	16.88	10.2	17.8	33.5
40	40.75	24.5	42.3	16.7
60	18.51	11.1	53.4	9.8
100	41.01	24.7	78.1	5.9
200	24.09	14.5	92.6	3.0
Pan	11.50	6.9	99.5	

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

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

Analyzed by: John Roberts

Checked by:

Date analyzed: 11-19-92

Grain Size 40% Retained 19 .001 inch

50% 15

90% 3

63

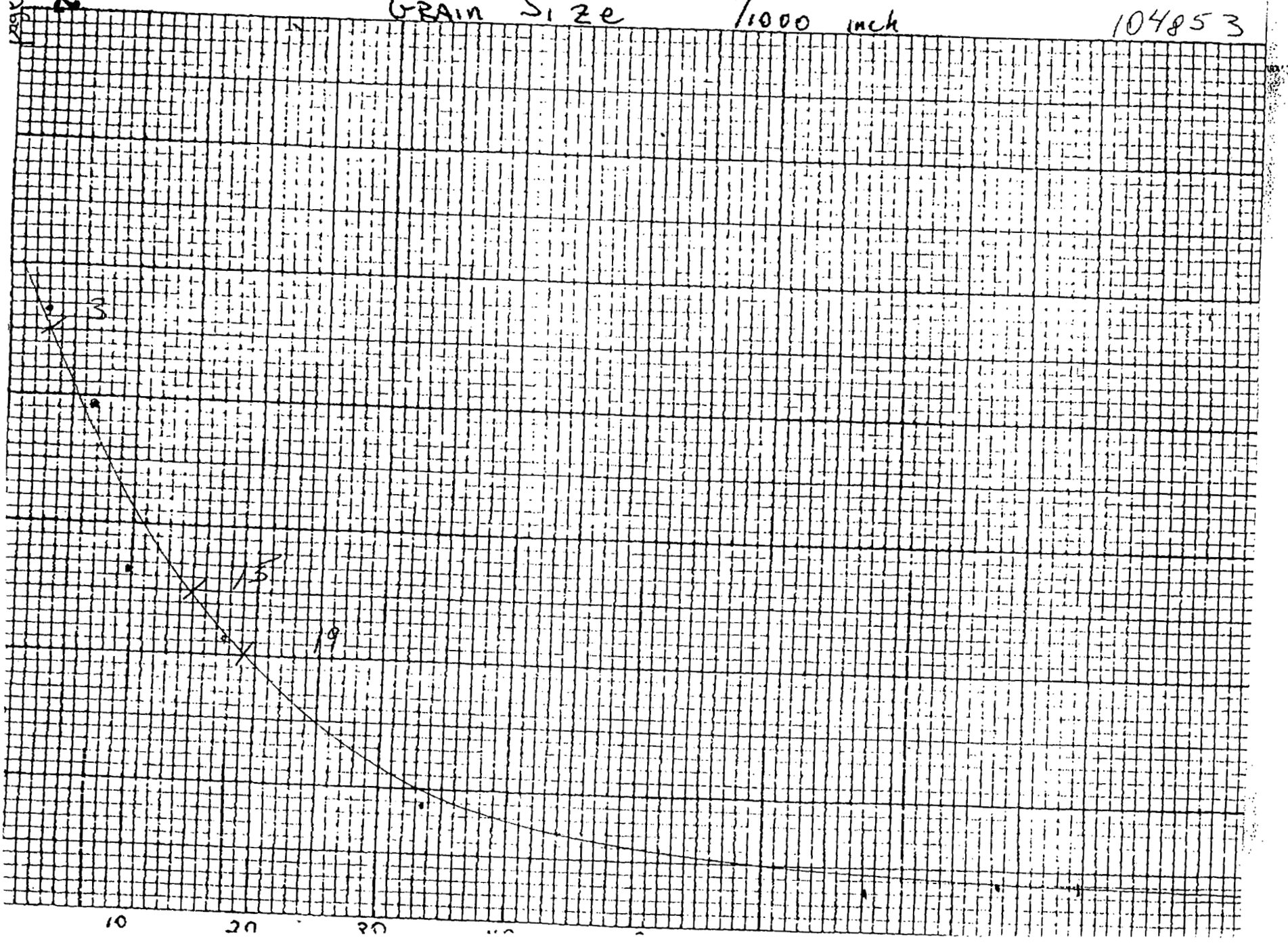
NO 340/ -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

MW-4432

Grain Size 1/1000 inch

104853



7134

000144

Well #4432

Retained Values

90% = .003

50% = .015

40% = .019

$\frac{40\%}{90\%} = \frac{.019}{.003} = 6.33$ 6.33 > 3 ∴ use factor of 4

(50%) .015 × 4 = .06

Since .06 is closer to the medium (10/20) sand curve than the coarse (4/30) sand curve; therefore, medium sand was choosen as a result.

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4426	COORDINATES:	DATE: 10-29-92	
ELEVATION:	GWL: Depth 78.95 Date/Time 12-9-92/1722	DATE STARTED: 10-29-92	
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 21	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	103300 10-29-92 0830	3 5 5	4	Loose light olive brown (2.5Y, 5/4) silt, some organic matter (grass), slightly moist	ML	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
1.5	103301 10-29-92 0835	2 5 8	8	Medium stiff light olive brown (2.5Y, 5/4) silty clay with sand and trace very fine gravel, trace root fragments, medium plasticity, moist	CL	.75	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
3.0	10-29-92 0848	8 9 14	0	No Recovery	N/A	N/A	Hnu = N/A Br = N/A α = N/A
4.5	103302 10-29-92 0850	10 12 15	6	Stiff light olive brown (2.5Y, 5/4) silty clay with sand and trace gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
6.0	103303 10-29-92 0900	19 18 27	18	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, medium plasticity, moist	CL	3.0	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
7.5							

NOTES:
Drilling Company: Pennsylvania Drilling
Driller: Jim Saccani

Colors Identified using Munsell color chart.
Samples collected per ASTM standard — Penetration Test

Background Levels
Hnu = 0 ppm
Br = 20 cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE 10-29-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 2 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	103304 10-29-92 0905	20 25 31	18	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, high plasticity, moist	CL	2.5	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
9.0	103305 10-29-92 0915.	20 22 32	18	very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, low plasticity, slightly moist	CL	3.75	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
10.5	103306 10-29-92 1010	6 10 15	12	Hard yellowish brown (10YR, 5/6) silty clay with sand and gravel, low plasticity, slightly moist	CL	4.0	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
12.0	10-29-92 1017	9 11 14	0	NO Recovery	NA	NA	Hnu = NA ppm Bq = NA cpm α = NA cpm
13.5	10-29-92 1329	7 16 23	0	NO Recovery	NA	NA	Hnu NA ppm Bq NA cpm α NA cpm
15.0							

NOTES

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402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 10-29-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 10-9-92 / 1212	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sellak	Depth Date/Time	DATE COMPLETED 10-9-92
DRILLING METHODS: Cable Tool		PAGE 3 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	10-29-92 1340	6 12 17	0	No Recovery	N/A	N/A	Hnu = N/A Bf = N/A α = N/A
16.5	103307 10-29-92 1405	7 13 18	2	Medium stiff gray (5Y, 5/1) gravelly sandy clay, medium plasticity, wet	CL	.75	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
18.0	103308 10-29-92 1530	6 8 9	6	Stiff gray (5Y, 5/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	1.75	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
19.5	103309 10-29-92 1550	3 7 9	4	Stiff dark gray (5Y, 4/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	1.5	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
21.0	103310 10-29-92 1603	5 11 11	10	Stiff dark gray (5Y, 4/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	1.75	Hnu = ppm Bf = cpm α = cpm
22.5							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 9426	COORDINATES:	DATE: 10-29-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 4 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5 – 24.0	10-29-92 1611	6 10 11	0	No Recovery	N/A	N/A	Hnu = N/A Bf = N/A α = N/A
24.0 – 25.5	103311 10-29-92 1634	9 10 11	12	Stiff dark gray (5Y, 4/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
25.5 – 27.0	103312 10-29-92 1642	5 7 8	6	Same As Above	CL	2.0	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
27.0 – 28.5	103313 10-30-92 0800	6 8 10	10	Stiff gray (5Y, 5/1) silty clay with sand and fine gravel, medium plasticity, moist	CL	1.5	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
28.5 – 30.0	103315 10-30-92 0825	8 9 10	9	Same As Above	CL	2.0	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm

NOTES

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 607.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4426	COORDINATES:	DATE 10-30-92	
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 10-9-92/1722	DATE STARTED: 10-29-92	
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 10-9-92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 21	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	103316 10-30-92 0840	5 8 10	11	Stiff gray (5Y, 5/1) silty clay with sand and fine gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm BT = 20 cpm α = 0 cpm
31.5	103317 10-30-92 L.M. 10-30-92 0855	3 ~~7~~ 11 10	2	Same As Above	CL	1.5	Hnu = 0 ppm BT = 20 cpm α = 0 cpm
33.0	103318 10-30-92 0910	11 10 11	14	Same As Above	CL	1.5	Hnu = 0 ppm BT = 20 cpm α = 0 cpm
34.5	103319 10-30-92 0926	12 9 13	18	Stiff gray (5Y, 5/1) silty clay, medium plasticity, moist	CL	1.5	Hnu = N/A BT = 20 cpm α = 0 cpm
36.0	103320 10-30-92 0945	10 11 22	18	Dense gray (5Y, 5/1) silt, moist	ML	N/A	Hnu = N/A BT = 20 cpm α = 0 cpm
37.5							

NOTES

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Note: due to the high humidity the Hnu wasn't reliable today

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602-04-27	PROJECT NAME RCRA Phase 1		
BORING NUMBER 4426	COORDINATES	DATE 10-30-92	
ELEVATION	GWL: Depth 78.95 ft Date/Time 12-9-92/1782	DATE STARTED 10-29-92	
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 12-9-92	
DRILLING METHODS Cable Tool		PAGE 6 OF 21	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5	103321 10-30-92 1000	9 9 14	14 (38.5 ft)	Medium dense strong brown (7.5YR, 5/8) banded silt, moist	ML	N/A	Hnu = N/A BT = 20 cpm α = 0 cpm
39.0				Medium dense yellowish brown (10YR, 5/8) poorly graded medium sand, wet	SP	N/A	Top of sand and gravel aquifer material
				Beginning with the 45 ft. split spoon sample, samples will be collected at 5 ft. intervals			
45.0							

NOTES

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Note: due to the high humidity the Hnu wasn't reliable today

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE: 10-30-92
ELEVATION:	GWL: Depth 78.95 ft Date/Time 10-29-92 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 7 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0							
46.5	03322 1415 10-30-92	56 50/2	8	Very Dense yellowish brown (10YR, 5/6) well graded sand with trace gravel, moist	SW	N/A	Hnu = N/A ppm BT: 20 cpm α: 0 cpm
50.0							
51.5	03323 1430 10-30-92	25 18 50	14	Very dense light brownish gray (10YR, 6/2) well graded gravelly sand, dry	SW	N/A	Hnu = N/A ppm BT: 20 cpm α: 0 cpm
55.0							
56.5	03325 1125 11-3-92	25 41 57	18	Very Dense Very Pale brown (10YR, 7/4) poorly graded medium sand with gravel, dry	KM 11-3-92 ~~SW~~ SP	N/A	Hnu: 0 ppm BT: 20 cpm α: 0 cpm
60.0							

NOTES

Note: Due to the high humidity the Hnu wasn't reliable on 10-30-92

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE 11-3-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 10-9-92
DRILLING METHODS: Cable Tool		PAGE 8 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0							
61.5	103326 1345 11-3-92	12 21 43	18	Very Dense yellowish brown (10 YR, 5/6) poorly graded medium sand, trace gravel, dry	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
65.0							
66.5	103327 1442 11-3-92	50/.4	5	Very dense yellowish brown (10 YR, 5/6) poorly graded medium sand, trace gravel, dry	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
70.0							
71.5	103328 1515 11-3-92	18 31 49	8	Very dense pale yellow (2.5Y, 7/3) well graded sand with gravel, dry	SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
75.0							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER 4426	COORDINATES:	DATE 11-4-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 10-9-92
DRILLING METHODS Cable Tool		PAGE 9 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75.0							
76.5	103329 1130 11-4-92	109/.5	6	Very dense yellowish brown (10YR, 5/6) poorly graded sandy gravel, dry	GP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
78.95 ft							
80.0							
81.5	103330 1455 11-4-92	8 11 10	12	Medium dense dark grayish brown (2.5Y, 4/2) poorly graded gravelly coarse sand, wet	SP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
							Water Level = 78.95 ft. below ground surface
83.0							
86.5	103331 1520 11-4-92	6 6 7	9	Medium dense dark grayish brown (2.5Y, 4/2) poorly graded coarse sand with a little fine gravel, wet	SP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
90.0							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1		
BORING NUMBER: 4426	COORDINATES:	DATE 11-5-92	
ELEVATION:	GWL: Depth 78.95 Date/Time 11-9-92/1722	DATE STARTED: 10-29-92	
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 11-9-92	
DRILLING METHODS: Cable Tool		PAGE 10 OF 2	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90.0							
91.5	103333 0950 11-5-92	7 7 11	18	Medium dense dark grayish brown (2.5Y, 4/2) poorly graded Medium sand with trace gravel, wet	SP ~~SW~~ K.M. 11-5-92	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
95.0							
96.5	103334 1115 11-5-92	11 11 14	18	Medium dense dark grayish brown (2.5Y, 4/2) well graded sandy gravel, wet	GW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
100.0							
101.5	103335 1315 11-5-92	9 13 25	18	Dense dark grayish brown (2.5Y, 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = ppm Br = cpm α = cpm
105.0							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1		
BORING NUMBER 4426	COORDINATES	DATE 11-5-92	
ELEVATION:	GWL: Depth 78.95 Date/Time 10-9-92 / 1722	DATE STARTED 10-29-92	
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 10-9-92	
DRILLING METHODS Cable Tool		PAGE 11 OF 21	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105.0	103336 1710 11-5-92	10 17 30	18	Dense dark grayish brown (2.5Y 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
106.5							
110.0	103337 1006 11-6-92	5 8 9	18	Medium dense dark grayish brown (2.5Y 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
111.5							
115.0	N/A	N/A	N/A	N/A	N/A	N/A	Hnu = N/A Bq = N/A α = N/A This sample interval was accidentally drilled past
116.5							
120							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE 11-6-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 12 OF 21

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120.0							
121.5	103339 1450 11-6-92	3 9 12	18	Medium dense dark grayish brown (2.5Y, 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
125.0							
126.5	~~103342~~ ~~11-6-92~~ 103340 1725 11-6-92	6 50/2	8	Very dense dark grayish brown (2.5Y, 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
130.0							
131.5	103341 1010 11-9-92	25 28 31	18	Very dense dark grayish brown (2.5Y, 4/2) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
135.0							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1		
BORING NUMBER: 4426	COORDINATES:	DATE 11-9-92	
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92/1722	DATE STARTED: 10-29-92	
ENGINEER/GEOLOGIST: K. Marion, K. Sebok	Depth Date/Time	DATE COMPLETED: 12-9-92	
DRILLING METHODS: Cable Tool		PAGE 13 OF 21	

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135.0				very dense,			
136.5	103342 1355 11-9-92	18 29 31	18	Very dark grayish brown (2.5Y, 3/2) poorly graded fine sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
140.0	K.M. 11-10-92						
141.5	~~103343~~ 103344 1600 11-9-92	19 23 29	18	Very dense dark grayish brown (2.5Y, 4/2) poorly graded coarse sand, wet	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
145.0	K.M. 11-10-92						
146.5	~~103345~~ 103345 1700 11-9-92	47 19 32	18	Very dense, very dark grayish brown (2.5Y, 3/2) well graded sand and gravel, wet	GW & SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
150.0							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER 4426	COORDINATES:	DATE 11-9-92
ELEVATION:	GWL: Depth 78.85 ft. Date/Time 2-9-93 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sellak	Depth Date/Time	DATE COMPLETED 10-9-92
DRILLING METHODS Cable Tool		PAGE 14 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150.0	103346 1745 11-9-92	12 21 42	16	Very dense dark grayish brown (2.5Y, ~~3/2~~ 4/2) Coarse sand with trace fine gravel, wet	SP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
155.5							
155.0	K.M. 11-13-92 103346 103347 1100 11-13-92	50/5	4	Light olive brown K.M. 11-13-92 Very dense ~~gray~~ (2.5Y, 5/4) Gravel (poorly graded), wet	GP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
156.5							
160.0	103348 1400 11-13-92	18 11 8	2	Medium dense light olive brown (2.5Y, 5/4) Poorly graded gravel with a little sand, wet	GP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
161.5							
165.0							

NOTES

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER 4426	COORDINATES:	DATE 11-13-92
ELEVATION:	GWL: Depth 78.95 ft Date/Time 12-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sellak	Depth Date/Time	DATE COMPLETED 12-9-92
DRILLING METHODS Cable Tool		PAGE 15 OF 21

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
165.0	KM 114694						
166.5	~~103342~~ 103350 1715 11-13-92	11 50/5	6	Very dense very dark gray (5Y 3/1) well graded gravel with some sand and trace clay, wet	GW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
170.0	103351 1000 11-16-92	3 9 11	12	Medium dense dark gray (5Y, 4/1) well graded gravelly sand, wet	SW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
175.0	103352 1455 11-16-92	27 38 45	18	Very dense gray (5Y, 5/1) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
180.0							

NOTES

See Page 1

FERNALD RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER 4426	COORDINATES:	DATE 11-16-92
ELEVATION:	GWL: Depth 78.95 ft Date/Time 12-9-92/1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Selbak	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS Cable Tool		PAGE 16 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
180.0							
181.5	103353 1530 11-16-92	36 22 17	18	Dense dark gray (5Y, 4/1) well graded sand with a little gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
185.0							
186.5	103354 1000 11-17-92	8 11 47	18	Very dense olive gray (5Y, 4/2) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
190.0							
191.5	103356 1145 11-17-92	27 33 41	18	Same as above	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
195.0							

NOTES

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6020427	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 11-17-92
ELEVATION:	GWL: Depth 78.95 ft Date/Time 12-9-92 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 17 OF 21

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
195.0							
198.5	103357 1450 11-17-92	50/4	4	Very dense olive gray (5Y, 4/2) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
200							
201.5	103358 1510 11-17-92	29 50/3	8	Very dense light olive brown (2.5Y, 5/3) coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
205.0							
206.5	103359 1620 11-17-92	18 31 39	12	Very dense olive (5Y, 4/3) coarse sand with trace gravel, wet	SP K.M. 11-17-92	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
210.0							

NOTES

See Page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602-04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE: 11-17-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 18 OF 21

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
210.0							
211.5	103360 1700 11-17-92	5 5 17	18	Medium dense olive gray (5Y, 4/2) very coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
215.0							
216.5	103362 1020 11-18-92	18 47 32	18	Very dense light olive brown (2.5Y, 5/3) coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
220.0							
221.5	103363 1130 11-18-92	8 11 32	18	Dense grayish brown (2.5Y, 5/2) coarse sand with a little gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
223.0	103364 1440 11-18-92	27 18 34	18	Very dense grayish brown (2.5Y 5/2) well graded sand with a little gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
224.5	103365 1503 11-18-92	47 43 50/5	16	Very dense grayish brown (2.5Y, 5/2) well graded gravel including coal, granite, and limestone with a little sand, wet	GW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm

Continued on next Page

NOTES

See Page 1

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER 4426	COORDINATES	DATE 11-18-92
ELEVATION	GWL: Depth 78.95ft Date/Time 2-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion	Depth Date/Time	DATE COMPLETED 12-9-92
DRILLING METHODS Cable Tool		PAGE 19 OF 21

DEPTH (ft) 224.5	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	103366 1600 11-18-92	31 91/5	11	Very dense grayish brown (2.5Y, 5/2) well graded coarse limestone gravel with a little sand, wet	GW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
226.0	103367 1630 11-19-92	150/2	2	Gray (5Y, 6/1) weathered limey shale	(Sh) N/A	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
227.0	103369 1655 11-19-92	150/3	2	Same As Above	N/A	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
227.3				Bottom of Bore Hole			

NOTES

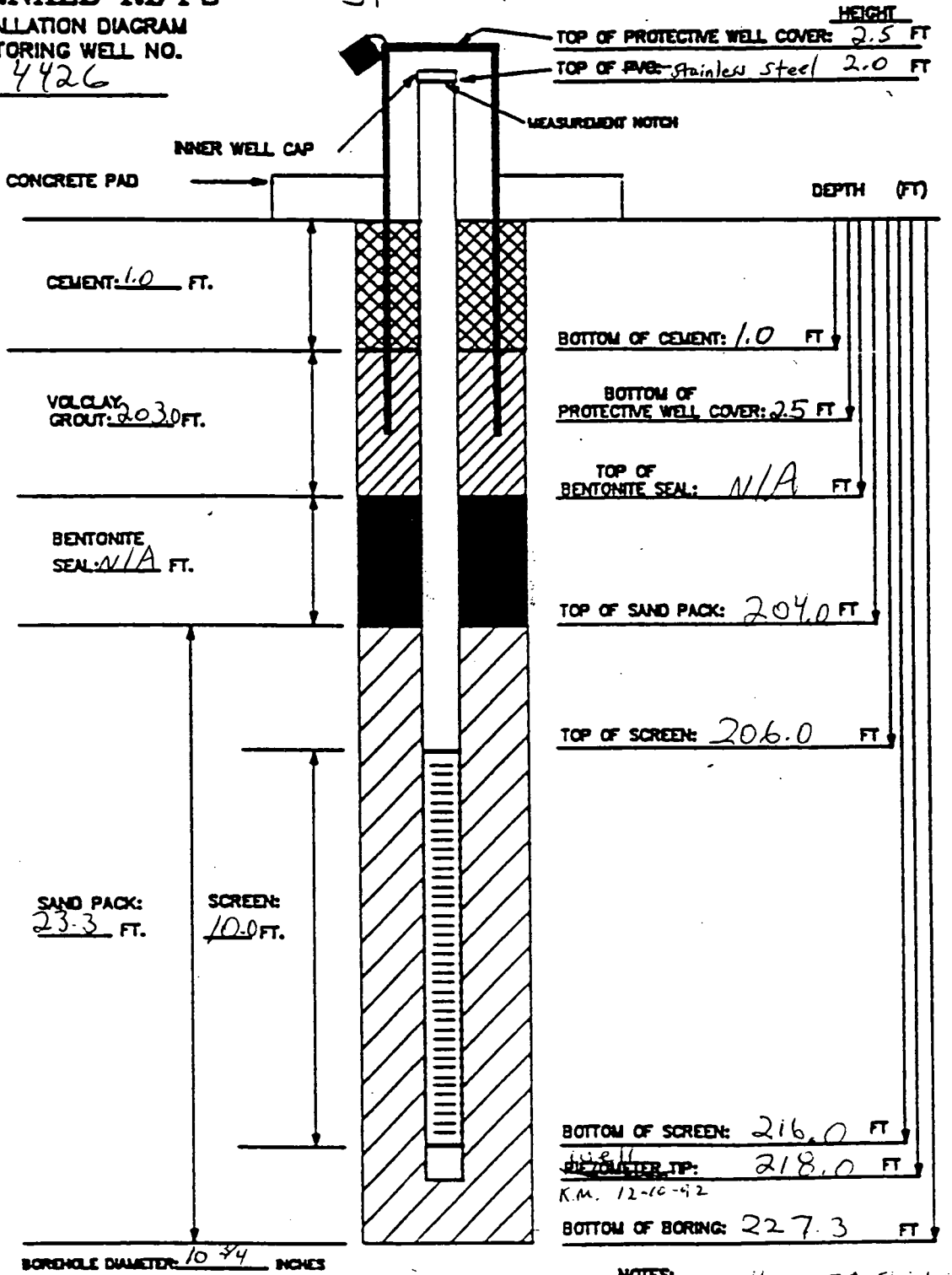
See Page 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 4426

Stickups

INSTALLATION DATE: 12-9-92



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 20-50lb. bags of 430 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 79-50 lb bags
AMOUNT OF CEMENT: 1-50 lb. bag
AMOUNT OF WATER USED: 1630 gallons
OTHER: 2 ft Sump, 10 ft. Screen, 20-10 ft. Sections, 1-8 ft. Section
42 soil drums
2 decon water drums

NOTES: 4 inch I.D. Stainless Steel
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~4-INCH I.D. SCHEDULE 40~~ 4 inch I.D. Stainless St PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 78.95 ft. /12-9-92

12-9-92 K.M.

TASK: 602.04.27 GEOLOGIST/ENGINEER: Ken Marion

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7134

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Ken Marion DATE 12-9-92
PROJECT NO. 602.04.27 CHECKED BY C Brien DATE 12/31/92
BORING NO. 4426
~~PIEZOMETER~~ Monitoring Well NO. ~~N/A~~ 4426 DATE OF INSTALLATION 12-9-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 TO 80.0 ft.
FLUID N/A FROM — TO —

TYPE OF BIT 10" Churn Bit
CASING SIZE (S) USED:
SIZE 10 in FROM 0.0 TO 227.3 ft
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Stainless Steel (Monitoring Well)
DIAMETER OF PERFORATED SECTION 4.0 in.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS ~~.020 in.~~ .020 in. KM. 12-10-92
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 1-2 ft. Sump, 20-10 ft. risers, 1-10 ft. Screen, 1-8 ft. riser
JOINING METHOD Threaded Flush Jointed

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft.
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Steel Well Cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 204.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
SAND	TOP 204.0	BOTTOM 227.3	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 206.0	BOTTOM 216.0	TOP	BOTTOM
PIEZOMETER TIP	218.0			
BOTTOM OF BOREHOLE	227.3			
GWL AFTER INSTALLATION	78.95			

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
IS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS The temporary steel casing was removed upon the installation of the well

36

11-20-92

Well # 4426

90% = .006 in.
50% = .024 in.
40% = .034 in.

$\frac{.034}{.006} = 5.6$ 5.6 > 3, so use a factor of 4

4 X .024 = .096

.096 most closely fits the coarse grain Sand and 20 Slot Screen Size.

mw-4426

Customer Number _____

MATERIAL: Sieve from C-29 SAMPLE NUMBER: 103368

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 200.3g

Sieve Number	Weight Retained, g	% Retained		Cumulative % Retained		Grain Size, 1/1000 inch
10	49.0	24.62	24.5	24.62	24.5	78.7
20	27.4	13.77	13.7	38.39	38.2	33.5
40	52.8	26.53	26.4	64.92	64.6	16.7
60	35.0	17.59	17.5	82.51	82.1	9.8
100	14.9	7.49	7.4	90.00	89.5	5.9
200	11.2	5.63	5.6	95.63	95.1	3.0
Pan	8.7	4.37	4.3	100.00	99.4	
	199.0					

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

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

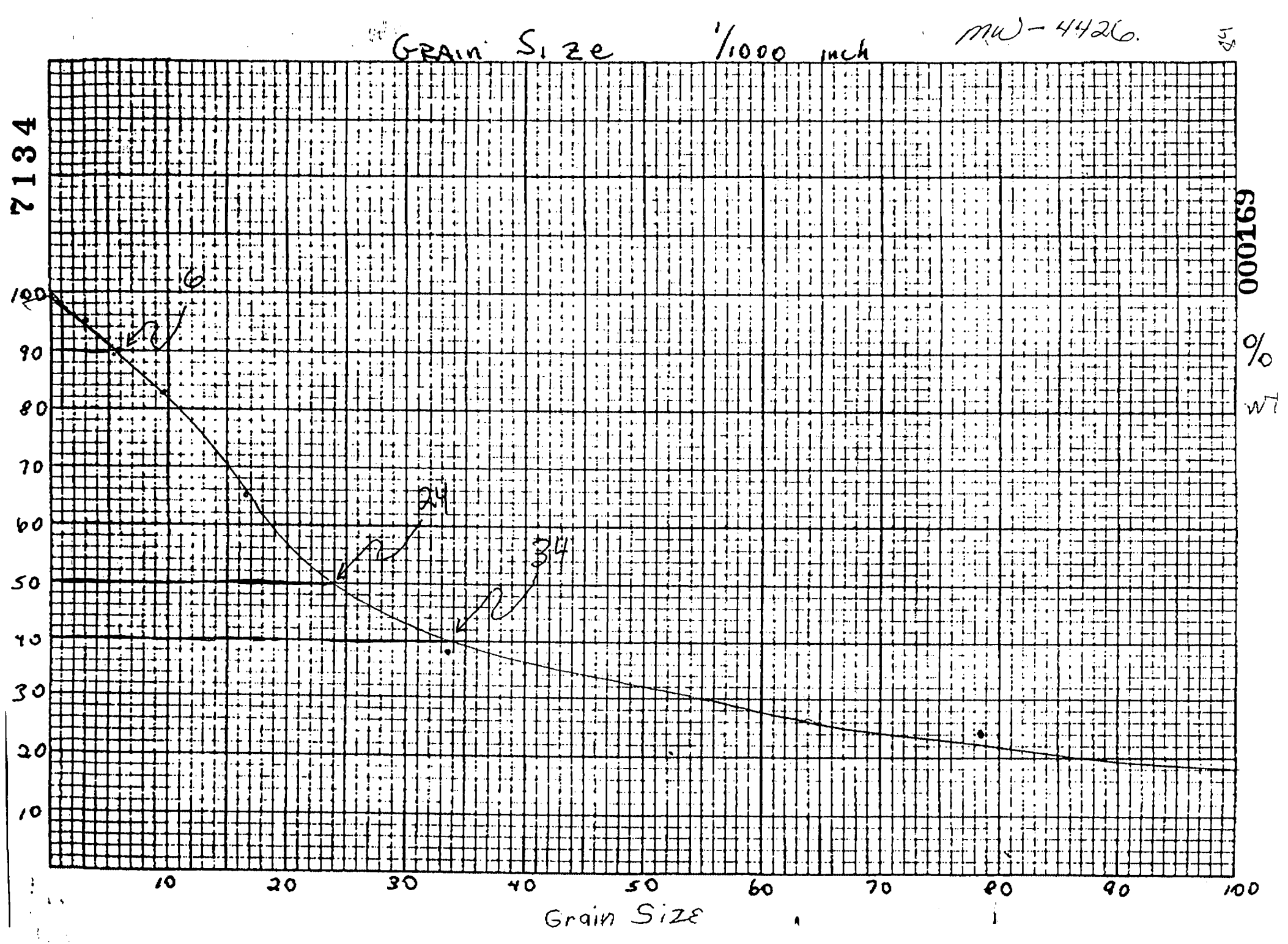
Analyzed by: Thomas McCullough Checked by: J Stoebel Date analyzed: 11-20-92

GRAIN SIZE 40% RETAINED - 34 .001 inch

50% 24

90% 6

85


Grain Size 1/1000 inch
MW-4426.
7134
000169
% wt
100
90
80
70
60
50
40
30
20
10
6
24
34
10
20
30
40
50
60
70
80
90
100
Grain Size

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 102.04.27	PROJECT NAME: RCRA phase I	
BORING NUMBER: 3425	COORDINATES:	DATE 12/3/92
ELEVATION:	GWL: Depth ~~70.74~~ ft Date/Time 12/14/92 1030	DATE STARTED: 11/20/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/14/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For descriptions of soils to 150.0 ft refer to boring log 4425			
75.0							
150.0							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cirbna

Driller: Craig Carlisle

Kevin Myers

SAA - Same as above

NA - Not Applicable

407-11-46

90

FERNALD RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3425	COORDINATES:	DATE 11/30/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/30/92
ENGINEER/GEOLOGIST: K. Geiger	Depth Date/Time	DATE COMPLETED: 12/14/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150	0920 11/30/92	26 35 50/5	7	Very Dense Grayish Brown (10YR 5/2) Poorly Graded medium Sand with some Gravel, wet	SP	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
151.5	1000 11/30/92	19 37 50/5	12	Very Dense Grayish Brown (10YR 5/2) Poorly Graded Gravelly Sand wet	SP	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
153.0	1030 11/30/92	31 41 50/5	13	Very Dense Grayish Brown (10YR 5/2) well Graded medium Sand with some Gravel wet	SW	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
154.5	1110 11/30/92	27 34 50/5	14	Very Dense Grayish Brown (10YR 5/2) well Graded medium Sand with a Trace of Gravel wet	SW	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
156	1405 11/30/92	50/4	4	Very Dense Grayish Brown (10YR 5/2) well Graded medium Sand with some Gravel wet	SW	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
157.5	1440 11/30/92	36 41 50/5	16	Very Dense Grayish Brown (10YR 5/2) well Graded medium Sand with a Trace of Gravel wet	SW	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
159.0	1530 11/30/92	39 45 50/5	12	Very Dense Grayish Brown (10YR 5/2) well Graded medium Sand with Trace of Gravel, wet	SW	N/A	HNU = 1 ppm BZ = 400 cpm α = 0 cpm
~~160~~ 160.5				For descriptions of soils refer to boring log HA25			
162							
163.5							
165				Boring terminated at 165 ft			

NOTES

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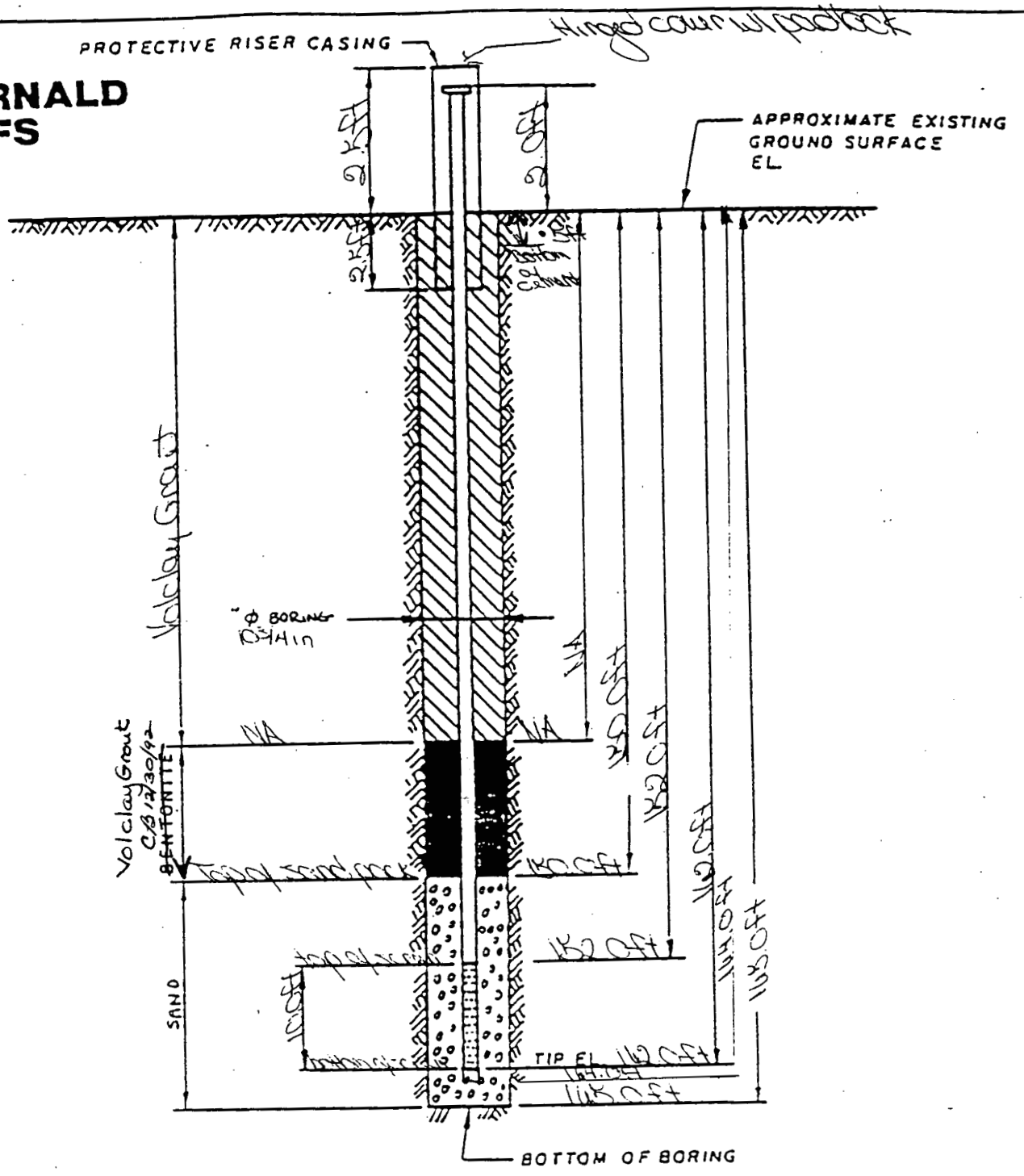
FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

NOTES:

1. RISER PIPE IS 4 IN. ON 10. SCHEDULE 316SS PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN. ON 1.0 316SS PIPE CONTINUOUS SLOT SCREEN (0.020 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 30.74 ft
5. WATER LEVEL READING ON 12/14/92

Materials used during well installation:
15 bags of sand
15 bags of volclay grout
2500 gal. of water

INSTALLATION DETAILS
MONITORING WELL #3405

PREPARED FOR
FEMP RI/FS

92

FERNALD RI/FS

7134 404

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA phase 1 FIELD ENG./GEO. D. O'Brien DATE 12/14/92
PROJECT NO. 102.04.27 CHECKED BY C. Brier DATE 12/30/92
BORING NO. 3425
PIEZOMETER NO. 3425 DATE OF INSTALLATION 12/14/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 ft TO 90.0 ft
FLUID — FROM — TO —

TYPE OF BIT Chisel Bit
CASING SIZE (S) USED:
SIZE 10.0 in FROM 0.0 ft TO 170.0 ft
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 10.0 ft²

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 15.10 ft 2.23 ft
JOINING METHOD flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	CB 12/30/92 ~~2.5~~ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement VOLCLAY GROUT/SLURRY	TOP 0.0 0.5	BOTTOM 0.5 150.0	TOP	BOTTOM
BENTONITE do not use	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND 4/30	TOP 150.0	BOTTOM 164.0	TOP	BOTTOM
GRAVEL - none used	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 152.0	BOTTOM 162.0	TOP	BOTTOM
PIEZOMETER TIP	164.0 ft			
BOTTOM OF BOREHOLE	165.0 ft			
GWL AFTER INSTALLATION	70.74 ft			

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

REMARKS

409-11-86

93

000173

Sieve Analysis MW-3425

40% = 31 50% = 24 90% = 6

40%/90% = 31/6 = 5.16 > 3 so use coeff of 5

~~50 size~~

50% x 4 = ~~24~~ .024 x 4 = .096

use coarse sand & .020 screen

G-1

56

7134

MW-3425

Customer Number 103086

MATERIAL: _____ SAMPLE NUMBER: 921204-015

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 160.1

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	22.17	13.8	13.8	78.7
20	35.11	21.9	35.7	33.5
40	44.92	28.1	63.8	16.7
60	32.79	20.5	84.3	9.8
100	12.10	7.6	91.9	5.9
200	5.72	3.6	95.5	3.0
Pan	6.42	4.0	99.5	

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

Analyzed by:	Checked by:	Date analyzed:
John Robert		12-1-92

GRAIN SIZE 40% RETAINED 31 .001 inch

50% 24

90% 6

95

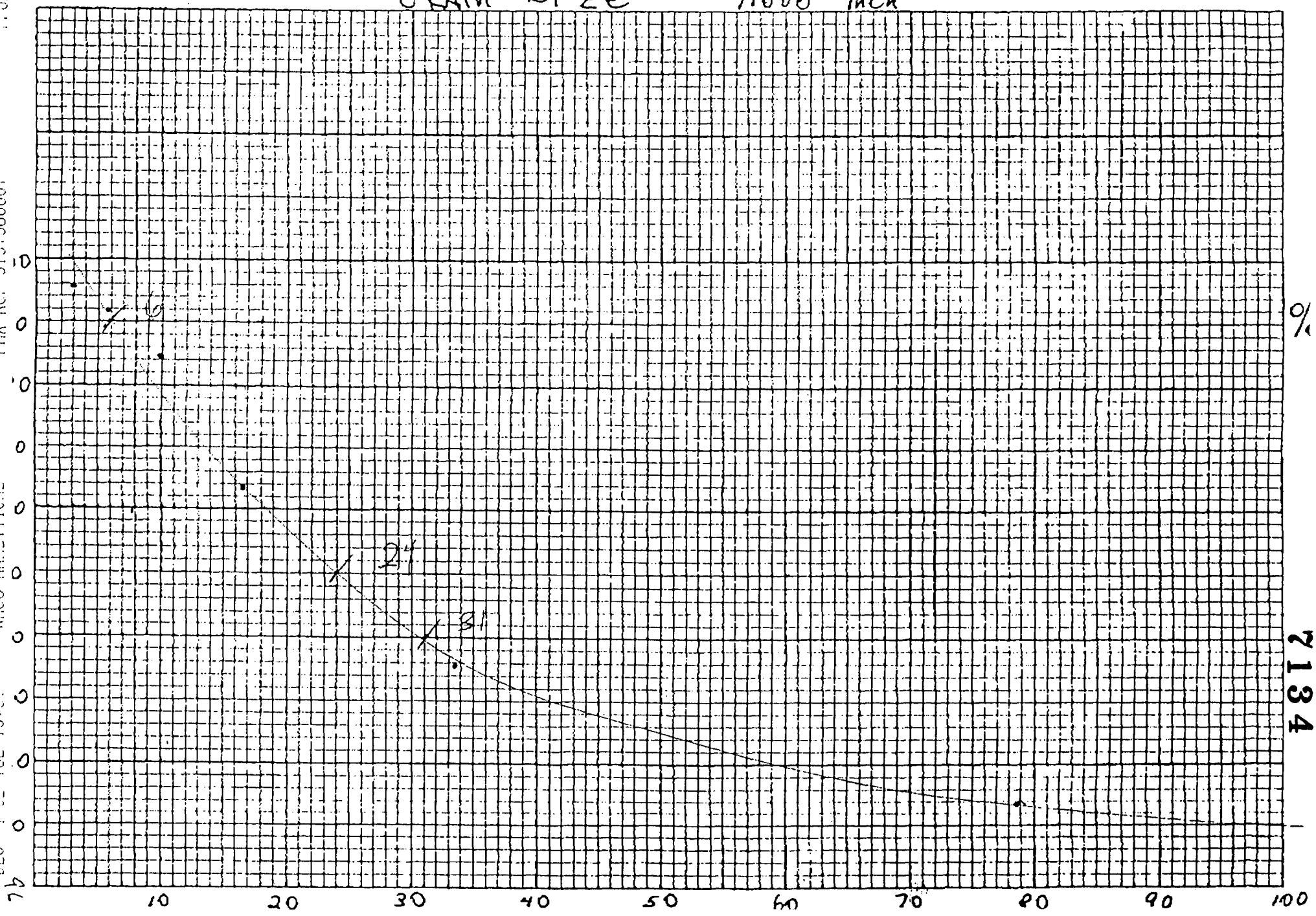
000175

NO 340/ -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

MW-3425

Grain Size 1/1000 inch



DEC- 1-92 TUE 15:51 FAX NO. 5137386667 P.02
BROO ANALYTICAL
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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 3424	COORDINATES:	DATE 12/30/92
ELEVATION:	GWL: Depth 95.0 Date/Time 12/30/92	DATE STARTED: 11/18/92
ENGINEER/GEOLOGIST: B. Yeardley	Depth Date/Time	DATE COMPLETED: 12/30/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For soil classification logs see #4424			
172.0				Bottom of Boring at 172.0 ft			

NOTES

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

SAA - Same as above
NA - Not Applicable

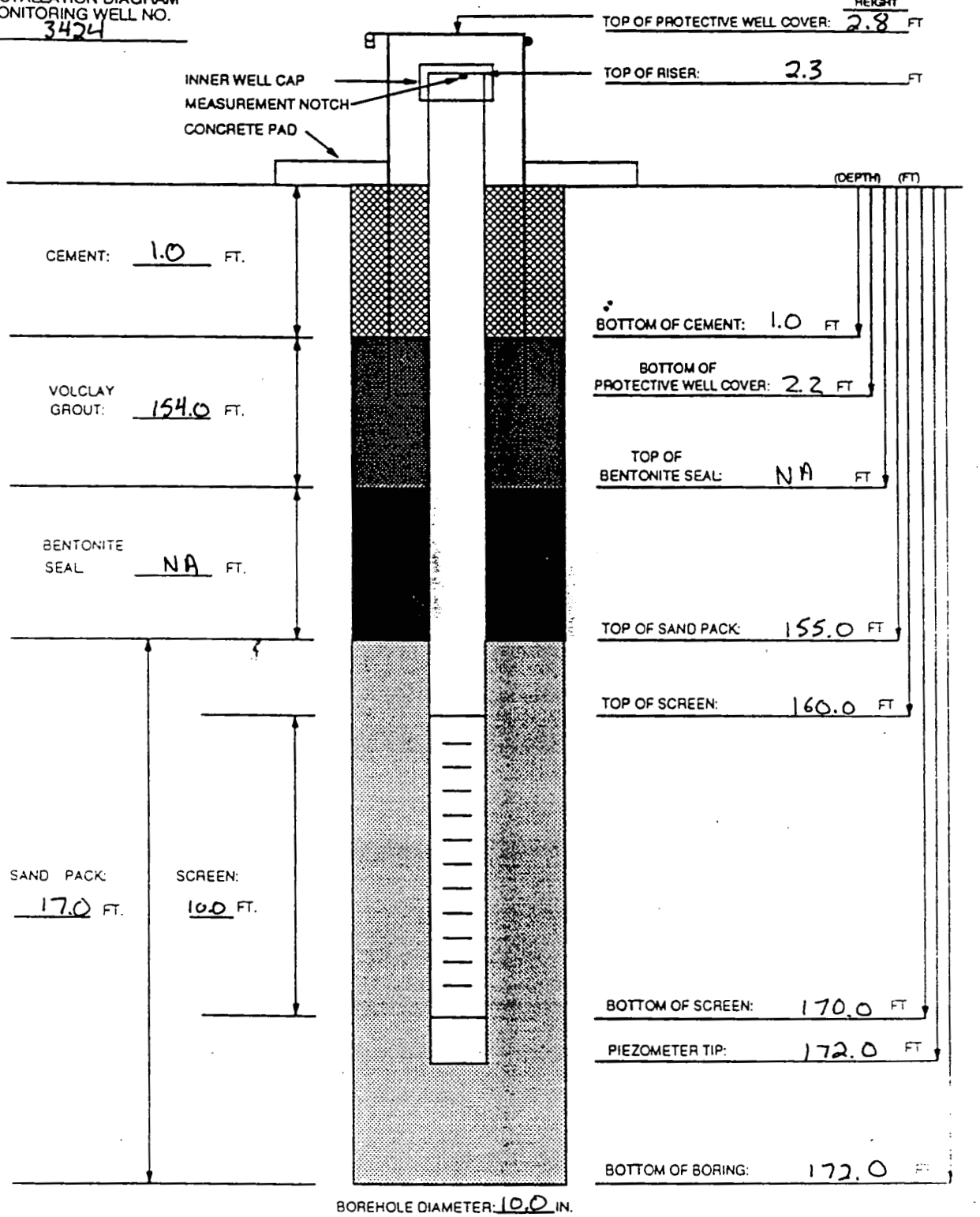
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

402-11-86

000177

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3424

INSTALLATION DATE: 12/21/92 - 12/30/92



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 17 bags of 4/30 coarse
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 52 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 1750 gals.
OTHER: 31 soil drums, 0 water
TASK: 602.04.27

NOTES:

1) RISER PIPE IS 4 in IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 in 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 95.0 12/30/92
5) TOP OF CASING IS SECURED W/ STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yeardley

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I FIELD ENG./GEO. B. Yeardley DATE 12/30/92
PROJECT NO. 602 04.27 CHECKED BY C Brier DATE 12/30/92
BORING NO. 3424
PIEZOMETER NO. 3424 DATE OF INSTALLATION 12/21/92 – 12/30/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT —
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID water FROM 0.0 TO 95.0	SIZE 10.0 in ID FROM 0.0 TO ~~172.0 ft~~ 175.0 BY 12/3
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 16-10 ft, 2-2 ft
AVERAGE SIZE OF PERFORATIONS 0.02 in	JOINING METHOD Flush Joint
TOTAL PERFORATED AREA 10.0 ft	threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cover
PROTECTIVE PIPE O.D. 10 3/4 in	with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.3			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.2			
BOREHOLE FILL MATERIALS:	0.0	1.0		
CEMENT GROUT / ~~SLURRY~~ By 12/30/92	TOP 1.0	BOTTOM 155.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 155.0	BOTTOM 172.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 160.0	BOTTOM 170.0	TOP	BOTTOM
PIEZOMETER TIP	172.0			
BOTTOM OF BOREHOLE	172.0			
SWL AFTER INSTALLATION	95.0			

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

REMARKS A variance was written on this well – a five (5) foot sand pack was installed above the top of the screen.

Monitor Well 3424 BRIAN YEARDLEY

Sand Pack and Sieve size determination

I. Wemco values for grain size
40% =
50% =
90% =

II 40% ÷ 90% Ratio or Uniformity Coefficient
0.100 in / .006 = 16.7 which is > 3
∴ use factor of 4

III 50% value × 4
.054 in × 4 = .216

IV 0.216 falls to left of both medium and coarse grain size distribution curves. Howevever, this value is closer to coarse grain curve and therefore the coarse grain sand (4/30) with the 20 slot (0.02 in) screen will be used. This allows for maximum flow of water into well and also retain formation

100

Customer Number 104690

MATERIAL: _____ SAMPLE NUMBER: 901217-053

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 124.7

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	54.14	43.4	43.4	78.7
20	24.18	19.4	62.8	33.5
40	18.83	15.1	77.9	16.7
60	8.88	7.1	85.0	9.8
100	5.27	4.2	89.2	5.9
200	6.14	4.9	94.1	3.0
Pan	7.14	5.7	99.8	

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

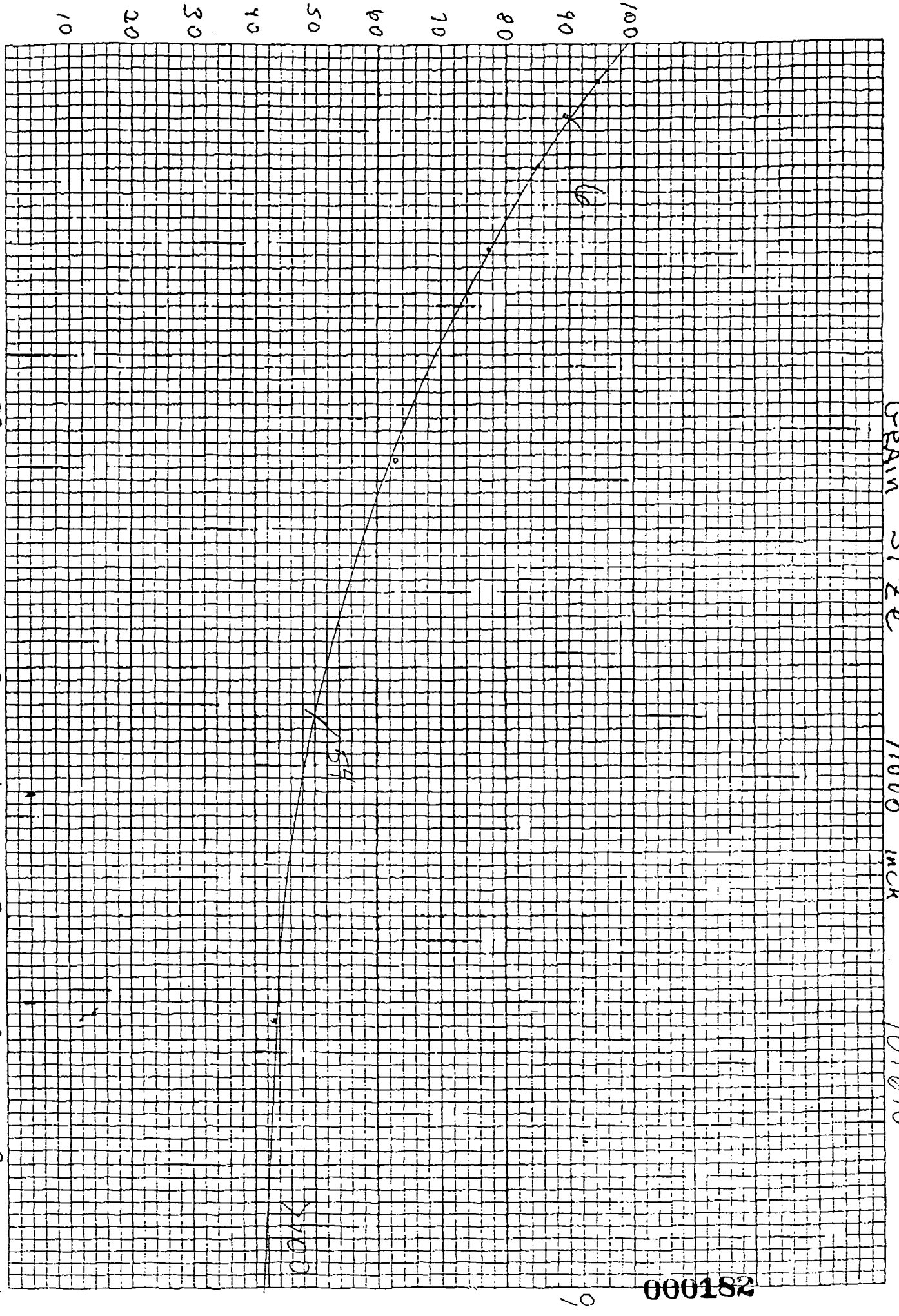
Analyzed by:	Checked by:	Date analyzed:
J Roberts		

GRAIN SIZE 40% RETAINED >100 .001 inch

50% 54

90% 6

101


10
20
30
40
50
60
70
80
90
100
GRAIN SIZE
1/1000 INCH
10 X 10 DIETZGEN GRAPH PAPER
EUGENE DIETZGEN CO
MADE IN U.S.A.

FERNALD RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/3/92
ELEVATION:	GWL: Depth 76.60 ft Date/Time 11/11/92 1250	DATE STARTED 11/3/92
ENGINEER/GEOLOGIST Ken Geiger	Depth 73.90 ft Date/Time 12/4/92 8:15	DATE COMPLETED 12/4/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	105000	3		med ~~Stiff~~ Dense Olive Brown (2.5Y 4/4)			HNu = 0 ppm
	1030	5	13	Clayey Silt with some	ML	N/A	Bγ = 40 cpm
	11/3/92	7		organic material, moist			α = 0 cpm
1.5							
	105001	7		Very stiff Light Olive Brown			HNu = 0 ppm
	1040	9	14	(2.5Y, 5/4) Silty Clay with			Bγ = 40 cpm
	11/3/92	11		some organic matter, med plasticity	CL	2.5	α = 0 cpm
				moist			
3.0							
	105002	6		med stiff, Light Olive Brown			HNu = 0 ppm
	1045	8	7	(2.5Y 5/4) Silty Clay with			Bγ = 40-60 cpm
	11/3/92	12		Trace of Gravel, low plasticity	CL	1.0	α = 0 cpm
				slightly moist			
4.5							
	105003	6		Stiff Light Olive Brown			HNu = 0 ppm
	1050	8	16	(2.5Y 5/4) Silt Clay with some			Bγ = 40-60 cpm
	11/3/92	12		Light Brownish gray (2.5Y, 6/2)	CL	1.5	α = 0 cpm
				mottling with some Gravel			
				low plasticity, slightly moist			
6.0							
	105004	9		very stiff Light Olive Brown			HNu = 0 ppm
	1105	10	18	(2.5Y, 5/4) Silty Clay with trace			Bγ = 40 cpm
	11/3/92	12		of Sand + Gravel some light	CL	2.0	α = 0 cpm
				Brownish Gray (2.5Y, 6/2) mottling			
				low plasticity, slightly moist			
7.5							

NOTES

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

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

Background Levels:
HNu = 0 ppm
Bγ = 40 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/3/92
ELEVATION:	GWL: Depth Stop / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Stop / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	105005 1350 11/3/92	12 13 12	18	Very Stiff Light Olive Brown (2.5Y 5/4) Silty Clay with Some Light Brownish gray (2.5Y, 6/2) mottling low plasticity slightly moist	CL	2.5	HNU = 0 ppm BY = 40 cpm α = 0 cpm
9.0	105006 1400 11/3/92	14 18 21	18	Very Stiff Olive Brown (2.5Y 4/4) Silty Clay with Some Sand and gravel Low plasticity, slightly moist	CL	3.0	HNU = 0 ppm BY = 40 cpm α = 0 cpm
10.5	105007 1405 11/3/92	21 24 28	18	Very Stiff Olive Brown (2.5Y 4/4) Silty Clay with Some Sand and Gravel Low plasticity, slightly moist	CL	3.0	HNU = 0 ppm BY = 40-60 cpm α = 0 cpm
12.0	105008 1400 11/6/92	6 21 35	12	Very Stiff Gray (2.5Y 5/1) Silty Clay with Some Sand + Gravel, medium plasticity slightly moist	CL	3.0	HNU = .2 ppm BY = 40 cpm α = 0 cpm
13.5 15.0	105009 1420 11/6/92	10 8 21	9	Very Stiff Gray (2.5Y 5/1) Silty Clay with Some Sand + Gravel Mid Plasticity slightly moist	CL	3.0	HNU = .2 ppm BY = 40 cpm α = 0 cpm

NOTES

See Page 1

Background Levels 11/3/92
HNU = 0 ppm
BY = 40 cpm
α = 0 cpm

Background Levels 11/6/92
HNU = .2 ppm
BY = 40 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04, 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/6/92
ELEVATION:	GWL: Depth Seep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Grigsa	Depth Seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 3 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	105010 0950 11/6/92	6 8 12	12	Stiff Gray (2.5Y 5/1) ~~with~~ AG 11/6/92 silty clay some Sand + Gravel medium plasticity slightly moist	CL	1.0	Hva = .2 ppm Bz = 40 cpm α = 0 cpm
16.5	105011 1005 11/6/92	7 9 12	13	Stiff Gray (2.5Y, 5/1) Silty Clay with some Sand + Gravel Med Plasticity, slightly moist	CL	1.5	Hva = .2 ppm Bz = 40 cpm α = 0 cpm
18.0	105012 1025 11/6/92	12 14 15	11	Stiff Gray (2.5Y, 5/1) Silty Clay with some Sand + Gravel Medium Plasticity, slightly moist	CL	1.5	Hva = .2 ppm Bz = 40 cpm α = 0 cpm
19.5	105013 1400 11/6/92	8 12 15	12	Very Stiff Gray (2.5Y, 5/1) Silty Clay ~~with~~ AG 11/6/92 with some Sand and Gravel medium plasticity, slightly moist	CL	2.0	Hva = .2 ppm Bz = 40 cpm α = 0 cpm
21.0 22.5	105014 1415 11/6/92	8 8 12	1	Same As Above	CL	2.0	Hva = .2 ppm Bz = 40 cpm α = 0 cpm

NOTES

See page 1

Background Levels
Hva = .2 ppm
Bz = 40 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME. RCRA Phase 1	
BORING NUMBER 3Y17	COORDINATES:	DATE 11/6/92
ELEVATION:	GWL: Depth see p. / Date/Time	DATE STARTED 11/3/92
ENGINEER/GEOLOGIST Ken Geiger	Depth see p. / Date/Time	DATE COMPLETED 12/4/92
DRILLING METHODS Cable Tool		PAGE 4 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	105015 1430 11/6/92	8 10 11	9	medium Stiff Gray (2.5Y, 5/1) Silty Clay with Sand + Gravel medium plasticity, moist	CL	0.5	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
24.0	105016 1440 11/6/92	8 11 12	11	Stiff Gray (2.5Y, 5/1) Silty clay with Sand + Gravel Medium plasticity, moist	CL	1.0	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
25.5	105017 1545 11/6/92	6 8 12	12	Very Stiff Gray (2.5Y, 5/1) Silty clay with Sand + Gravel medium plasticity, moist	CL	2.5	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
27.0	105018 1605 11/6/92	8 10 12	14	Stiff Gray (2.5Y, 5/1) Silty clay with Sand + Gravel medium plasticity slightly moist	CL	2.0	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
28.5	105019 1700 11/6/92	10 12 9	15	Very Stiff Gray (2.5Y, 5/1) Silty Clay with Sand and Gravel medium plasticity slightly moist	CL	2.5	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
30.0							

NOTES

See page 1

Background Levels
HNU = .2 ppm
Bγ = 40 cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/9/92
ELEVATION:	GWL: Depth seep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	105020	8		~~DB~~ RG 11/9/92 Very Stiff Gray (2.5Y, 5/1) Silty Clay with Sand and Gravel Low Plasticity / Slightly Moist			HNu = .2 ppm
	0940	10	17		CL	2.25	Bq = 40 cpm
	11/9/92	13					α = 0 cpm
31.5	105021	12		Medium Stiff Gray (2.5Y, 5/1) Silty Clay with Sand and Gravel Medium Plasticity Slightly Moist			HNu = .2 ppm
	0955	17	13		CL	1.0	Bq = 40-60 cpm
	11/9/92	19					α = 0 cpm
33.0	105022	19		Very Dense Dark Yellow Brown (10YR 4/4) Poorly Graded Very Fine Sand, with a Trace of Gravel, Dry	SP ~~SC~~ CJB 12/30/92		HNu = .2 ppm
	1025	28	12			N/A	Bq = 40 cpm
	11/9/92	42					α = 0 cpm
34.5	105023	19		Very Dense Yellowish Brown (10YR 5/6) Poorly Graded Medium Sand with Trace of Gravel, Dry			HNu = .2 ppm
	1045	25	13		SP	N/A	Bq = 40-60 cpm
	11/9/92	45					α = 0 cpm
36.0				No Sample Collected. Samples To Be Collected At 5.0 ft Intervals.			
37.5							

NOTES

See Page 1

Background Levels
HNu = .2 ppm
Bq = 40-60 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/9/92
ELEVATION:	GWL: Depth Sep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Sep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 6 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5				No Sample Collected			
40.0	105024 1105 11/9/92	35 38 49	12	Very Dense Yellowish Brown (10YR 5/4) Poorly Graded medium Sand with Some Gravel, Dry	SP	N/A	HNU = .2 ppm Bg = 40 cpm α = 0 cpm
41.5							
45.0	105025 1510 11/9/92	32 50/2	6	Very Dense Yellowish Brown (10YR, 5/4) Poorly Graded medium Sand with Some Gravel, Dry	SP	N/A	HNU = .2 ppm Bg = 40-60 cpm α = 0 cpm
46.5							
50.0	105026 1600 11/9/92	17 25 32	14	Very Dense Yellowish Brown (10YR, 5/4) Well Graded medium Sand with Some Gravel, Dry	SW	N/A	HNU = .2 ppm Bg = 40-60 cpm α = 0 cpm
51.5							
52.5							

NOTES

See page 1

Background Levels

HNU = .2 ppm
Bg = 40-60 cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE: 11/4/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 7 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55.0 56.5	105027 1700 11/9/92	H#6 11/9/92 30 28 41	13	Very Dense Yellowish Brown (10YR, 5/4) Well Graded Gravelly Sand Dry	SW	N/A	HNU = .2ppm Bg = 40cpm α = 0cpm
60.0 61.5	105028 0900 11/10/92	10 17 32	7	Dense Yellowish Brown (10YR, 5/4) Well Graded Sand with some Gravel, Dry	SW	N/A	HNU = .2ppm Bg = 60cpm α = 0 cpm
65.0 66.5	105030 1400 11/10/92	24 32 50	10	Very Dense Yellowish Brown (10YR, 5/4) Well Graded Sand with Some Gravel, Dry	SW	N/A	HNU = .2ppm Bg = 40-60cpm α = 0 cpm
67.5							

NOTES

See Page 1

Back Ground Levels 11/9/92
HNU = .2ppm
Bg = 40-60cpm
α = 0cpm

Background Levels 11/10/92
HNU = .2ppm
Bg = 60cpm
α = 0cpm

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RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 P4.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/10/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 8 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
69.5							
70.0	105031 1500 11/10/92	32 39 50	16	Very Dense Yellowish Brown (10YR 5/4) well Graded Gravelly sand, Dry	SW	N/A	HNu = .2 ppm Bg = 40-60 cpm α = 0 cpm
71.5							
95.0	105032 1645 11/10/92	10 17 42	16	Very Dense Light Brownish Gray (10YR 6/2) Poorly Graded Sand with some Gravel, wet	SP	N/A	HNu = .2 ppm Bg = 40 cpm α = 0 cpm
96.5				▽ water level 96.5 ft			
90.0	105033 0835 11/11/92	17 25 32	6	Very Dense Grayish Brown (2.5Y 5/2) well Graded medium sand with some Gravel, wet	SW	N/A	HNu = .1 ppm Bg = 40 cpm α = 0 cpm
91.5							
82.5							

NOTES

See Page 1

Background Levels 11/10/92
HNu = .2 ppm
Bg = 60 cpm
α = 0 cpm

Background Levels 11/11/92
HNu = .1 ppm
Bg = 40-60 cpm
α = 0 cpm

402-11-86

110

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/11/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Grigger	Depth see p. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 9 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82.5							
85.0	105034 1340 11/11/92	17 24 33	13	Very Dense Dark Grayish Brown (2.5Y, 4/2) Poorly Graded Gravelly Sand, wet	SP	N/A	HNu = .1 ppm Bg = 40 cpm α = 0 cpm
86.5							
90.0	105036 0930 11/12/92	5 17 32	18	Dense Gray (2.5Y 5/1) Poorly Graded coarse sand with Some Gravel, wet	SP	N/A	HNu = .2 ppm Bg = 40 cpm α = 0 cpm
95.0	105037 1445 11/13/92	[illegible] 19 32	12	Dense Gray (2.5Y, 5/1) Poorly Graded Gravelly Sand wet	SP	N/A	HNu = .2 ppm Bg = 40 cpm α = 0 cpm
96.5							
97.5							

NOTES

See page 1

Background Levels 11/11/92
HNu = .1 ppm
Bg = 40-60 cpm
α = 0 cpm

Background Levels 11/12/92
HNu = .2 ppm
Bg = 40-60 cpm
α = 0 cpm

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE: 11/13/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
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	105035 1345 11/13/92	16 24 35	18	Very Dense Gray (2.5Y 5/1) Poorly Graded Gravelly Sand wet	SP	N/A	HNu = .2ppm Br = 40 cpm α = 0cpm
101.5							
105.0	105037 1345 11/13/92	32 42 45	13	Very Dense Gray (2.5Y 5/1) Poorly Graded Coarse Gravelly Sand wet	SP	N/A	HNu = .2ppm Br = 40 cpm α = 0 cpm
106.5							
110.0	105041 1345 11/13/92	2 15 17	12	Dense Grayish Brown (2.5Y 5/2) well ~~Sorted~~ Graded Medium Sand with some Gravel, wet	SW	N/A	HNu = 0ppm Br = 40cpm α = 0cpm
111.5							
112.5							

NOTES

See Page 1

Background Levels
HNu = .2ppm
Br = 40-60cpm
α = 0cpm

Background Levels
HNu = 0ppm
Br = 40cpm
α = 0cpm

112

FERNALD RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/6/92
ELEVATION:	GWL: Depth seep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 11 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
112.5	105042 11/6/92						
115.0	105042 1545 11/6/92	25 37 45	18	Very Dense, Gray (2.5Y 5/1) Poorly Graded Sand with Some Gravel, wet	SP	N/A	HNu = 0 ppm BZ = 40 cpm L = 0 cpm
116.5							
120.0	105043 1540 11/6/92	9 12 14	18	Medium Dense Gray (2.5Y 5/1) well Graded Sand with Some Gravel wet	SW	N/A	HNu = 0 ppm BZ = 40-60 cpm L = 0 cpm
121.5							
125.0	105044 1410 11/17/92	12 15 19	18	Dense Dark Greyish Brown (2.5Y 4/2) well Graded medium Sand with Some Gravel wet	SW	N/A	HNu = 0 ppm BZ = 40 cpm L = 0 cpm
126.5							
127.5							

NOTES

See Page 1

Background Levels
HNu = 0 ppm
BZ = 40 cpm
L = 0 cpm

Background Levels
HNu = 0 ppm
BZ = 40 cpm
L = 0 cpm

FERNALD RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE: 11/17/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 12 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
127.5							
130.0	105645 1435 11/17/92	9 14 18	15	Dense Dark Grayish Brown (2.5Y 4/2) Well Graded Medium Sand w/ Trace of Gravel, wet	SW	N/A	HNU = 0 ppm BZ = 40 cpm ∝ = 0 cpm
131.5							
135.0	105646 1600 11/17/92	12 16 21	16	Dense Dark Grayish Brown (2.5Y 4/2) Poorly Graded Medium Sand w/ Some Gravel, wet	SP	N/A	HNU = 0 ppm BZ = 40 cpm ∝ = 0 cpm
136.5							
139.0	105648 1645 11/17/92	8 13 14	16	Medium Dense Dark Grayish Brown (2.5Y 4/2) Well Graded Medium Sand w/ Some Gravel, wet	SW	N/A	HNU = 0 ppm BZ = 40 cpm ∝ = 0 cpm
139.5	105649 1705 11/17/92	6 9 12	12	Medium Dense Grayish Brown (2.5Y 5/2) Well Graded Medium Sand w/ Trace of Gravel wet	SW	N/A	HNU = 0 ppm BZ = 40 cpm ∝ = 0 cpm
141.0	105650 915 11/18/92	32 50 50/5	18	Dense Grayish Brown (2.5Y 5/2) Well Graded Medium Sand w/ Trace of Gravel wet	SW	N/A	HNU = 0 ppm BZ = 40 cpm ∝ = 0 cpm
142.5							

NOTES

See Page 1

Background Levels 11/17/92: HNU = 0 ppm, BZ = 40 cpm, ∝ = 0 cpm

Background Levels 11/18/92: HNU = 0 ppm, BZ = 40 cpm, ∝ = 0 cpm

Background Levels 11/19/92: HNU = 0 ppm, BZ = 40 cpm, ∝ = 0 cpm

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FERNALD RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 2	
BORING NUMBER: 3417	COORDINATES:	DATE 11/19/92
ELEVATION:	GWL: Depth Seep. / Date/Time	DATE STARTED 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS:		PAGE 13 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
142.5	105051 0940 11/19/92	9 13 17	18	Medium Dense Grayish Brown (2.5Y, 5/2) Well Graded Medium Sand with a Trace of Gravel, wet	SW	N/A	HNU = 0 ppm Bz = 40 cpm α = 0 cpm
144.0	105052 1010 11/19/92	13 21 32	18	Very Dense Grayish Brown (2.5Y, 5/2) Poorly Graded Medium Sand with Some Gravel, wet	SP	N/A	HNU = 0 ppm Bz = 40 cpm α = 0 cpm
145.5	105053 1110 11/19/92	12 19	9	Very Soft Dark Greenish Gray (5GY, 4/1) Silty Clay with Sand and Gravel Medium Plasticity, moist	CL	.25	HNU = 0 ppm Bz = 40 cpm α = 0 cpm
146.5				Pushed Shelby Tube - No Recovery			
147.5	105054 1110 11/20/92	Shelby Tube	14	Very Soft Dark Greenish Gray (5GY, 4/1) Silty Clay with Sand and Gravel Medium Plasticity, moist	CL	.25	HNU = 0 ppm Bz = 40 cpm α = 0 cpm
149.5				Bottom of Sampling at 148.5 ft Bottom of Boring at 149.0 ft			

NOTES

See Page 2

Background levels
HNU = 0 ppm
Bz = 40 cpm
α = 0 cpm

Background levels
HNU = 0 ppm
Bz = 40 cpm
α = 0 cpm

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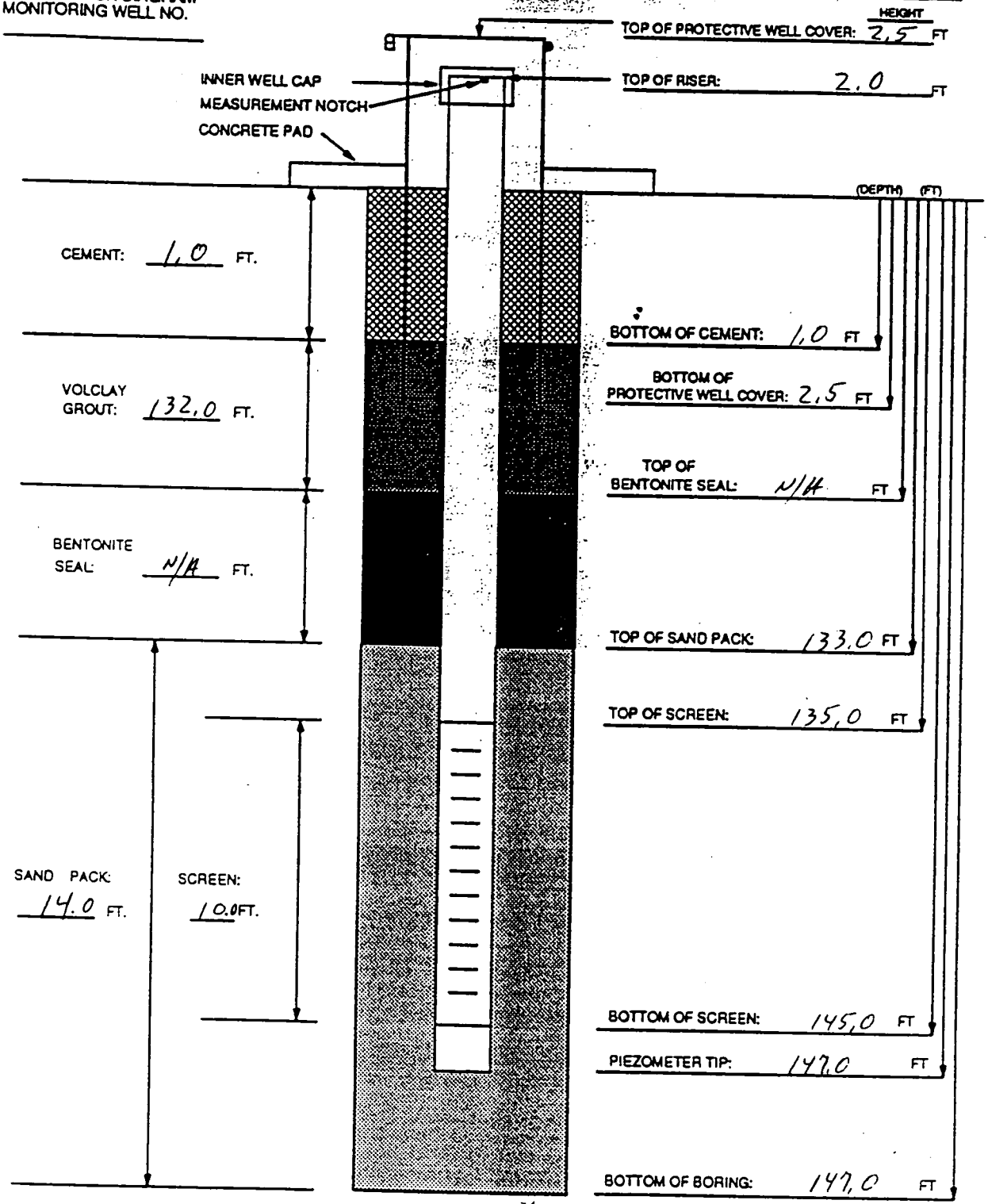
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

INSTALLATION DATE: 12/4/92



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 430 Sand / 17-50lb Bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 32 - 50lb Bags
AMOUNT OF CEMENT: 1.5 Bags
AMOUNT OF WATER USED: 339 Gallons
OTHER: 24 Drums Soil ; 20 Drums Decon Water
TASK: 6020427

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 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 76.60 FT / 11/11/92
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: KEN GEIGER

Length of Pipe Sections
R.C. ~~10 ft~~ 13-10 ft
11/5/92 1-5 ft
1-2 ft

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FERNALD RI/FS

7134

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Ken Geiger DATE 12/4/92
PROJECT NO. 602.04.27 CHECKED BY C. Bauer DATE 12/30/92
BORING NO. 3417
~~PIEZOMETER~~ monitoring well NO. 3417 DATE OF INSTALLATION 12/4/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 ft TO 76.60 ft
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 ft TO 147.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .020 in
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 1-10 ft screen with 2' sump, 1-5 ft, 1-2 ft
JOINING METHOD Screw Type - flush joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT/SLURRY	TOP 1.0	BOTTOM 133.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 133.0	BOTTOM 147.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 135.0	BOTTOM 145.0	TOP	BOTTOM
PIEZOMETER TIP	147.0			
BOTTOM OF BOREHOLE	147.0			
GWL AFTER INSTALLATION	73.90			

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

REMARKS

409-11-86

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Sieve Analysis **7134** 11/23/92 page 1 of 1

well # 3417

Retained Values

90% = .006

50% = .019

40% = .025

$\frac{.025}{.006} = 4.1$ 4.1 > 3 use a factor of 4

4X .019 = .076

.076 most closely fits the coarse grain sand and .020 screen size

000198

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MW-3417

Customer Number _____

MATERIAL: C-15 Sieve SAMPLE NUMBER: _____

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 111.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	22.4	20.07 20.1	20.07 20.1	78.7
20	7.7	6.89 6.9	26.96 27.0	33.5
40	32.8	29.39 29.5	56.35 56.5	16.7
60	29.5	26.43 26.5	82.78 83.0	9.8
100	10.4	9.32 9.4	92.10 92.4	5.9
200	4.6	4.12 4.1	96.22 96.5	3.0
Pan	4.2	3.76 3.8	99.98 100.3	
	111.6			

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

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

Analyzed by: Thomas O. McCullough

Checked by: [signature]

Date analyzed: 11/20/92

GRAIN SIZE 10% RETAINED 25 .001 inch

50% 19

90% 6

NO 340/ 10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

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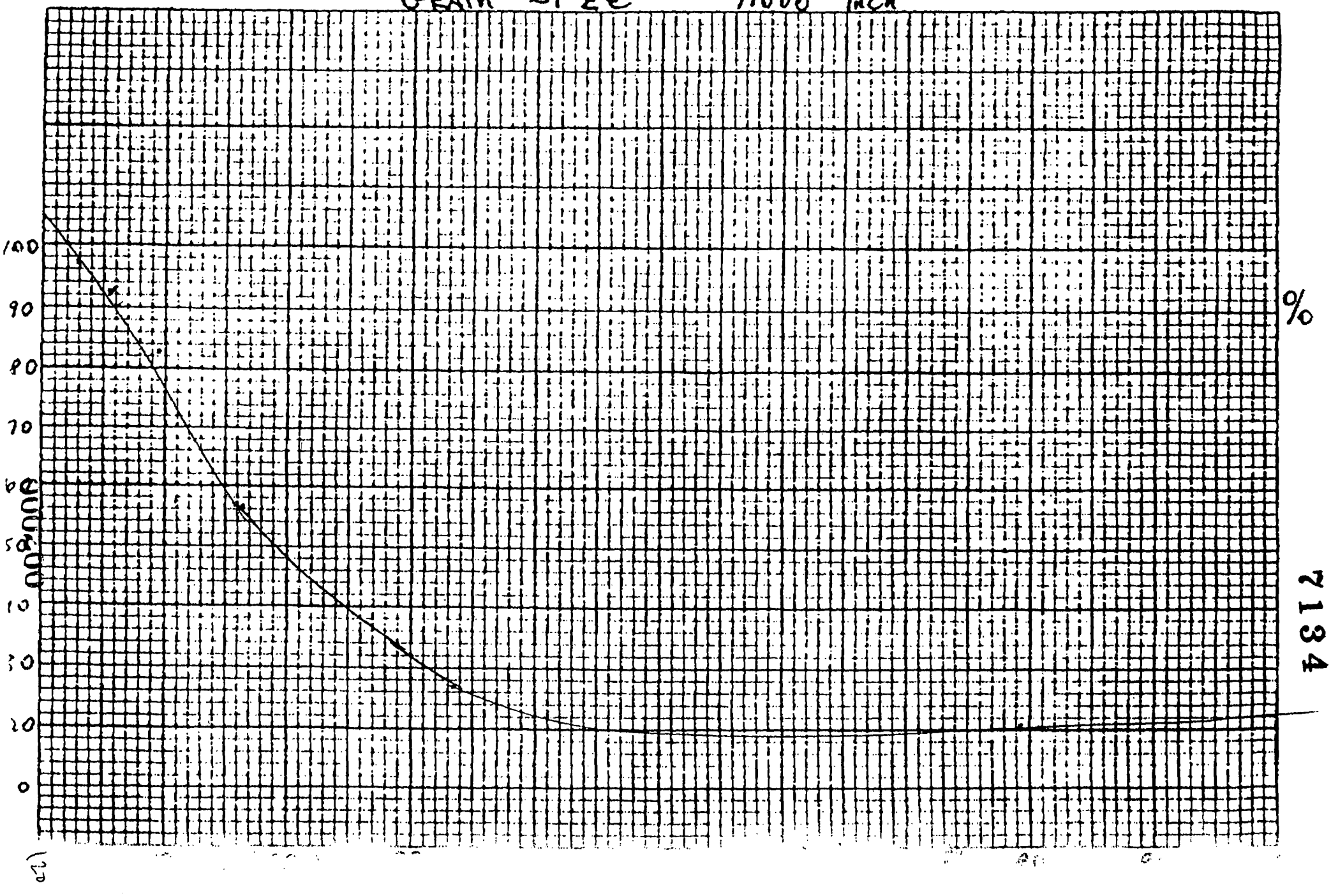
MW-3417

Grain Size 1/1000 inch



7134

RI/FS

7134

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2431	COORDINATES:	DATE 12-3-92
ELEVATION:	GWL: Depth 78.3 ft. Date/Time 12-18-92/1500	DATE STARTED: 12-3-92
ENGINEER/GEOLOGIST: Michael Worley	Depth 73.3 ft Date/Time 12-19-92/0800	DATE COMPLETED: 12-17-92
DRILLING METHODS: Cable Tool		PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				* For soil characterization of 0.0 to 68.0 Ft. see Boring log for well # 3431.			
34							
68				* Continuous sampling will begin at 68.0 through 83.0 ft. for sieve screen analysis.			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile

Rick Pierce

SAA - SAME AS ABOVE

NA - NOT Applicable

Background { OVM = 0 ppm, β = 30 cpm, α = 0 cpm

* Samples Collected per ASTM Standard Penetration Test

* All colors identified by the Munsell Color Chart

402-11-46

000201

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 2431	COORDINATES:	DATE 12-7-92	
ELEVATION:	GWL: Depth 73.3 ft. Date/Time 12-18-92/1500	DATE STARTED: 12-3-92	
ENGINEER/GEOLOGIST. Michael Worley	Depth 73.3 ft. Date/Time 12-17-92/0800	DATE COMPLETED: 12-17-92	
DRILLING METHODS: Cable Tool		PAGE 2 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
68							
69	1620 105232 12-7-92	21 45 50/.3	12	Very dense (2.5Y, 5/3) light olive brown well graded gravelly sand, dry	SW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
70–71	1640 105232 12-7-92	17 22 24	18	Dense (2.5Y, 5/4) light olive brown well graded sand, trace gravel, moist	SW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
72	0810 105232 12-8-92	18 21 23	18	SAA	SW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
73–74	1040 105232 12-8-92	50/.5	2	Very dense (2.5Y, 5/4) light olive brown well graded gravel, trace sand, wet	GW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
75	1330 105232 12-8-92	28 50/.3	8	SAA	GW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
76–77	1415 105232 12-8-92	50/.4	3	SAA	GW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
78	1430 105232 12-8-92	50/.5	3	SAA	GW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
79–80	1440 105232 12-8-92	50/.5	3	SAA	GW	N/A	βγ = 0 cpm; OVM = 30 ppm; α = 0 cpm
81	1500 105232 12-8-92	49 34 36	8	SAA	GW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm
82–83	1510 105232 12-8-92	45 37 40	6	SAA	GW	N/A	OVM = 0 ppm; βγ = 30 cpm; α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm; βγ = 30 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: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2431	COORDINATES:	DATE 12-8-92
ELEVATION:	GWL: Depth 77.3 FT Date/Time 12-18-92/1500	DATE STARTED: 12-3-92
ENGINEER/GEOLOGIST: Michael Worley	Depth 73.3 FT Date/Time 12-17-92/0800	DATE COMPLETED: 12-17-92
DRILLING METHODS: Cable Tool		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
84				* Bottom of sampling at 83.0 FT			
85				* Bottom of boring at 85.0 ft.			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Baile, Rick Pierce

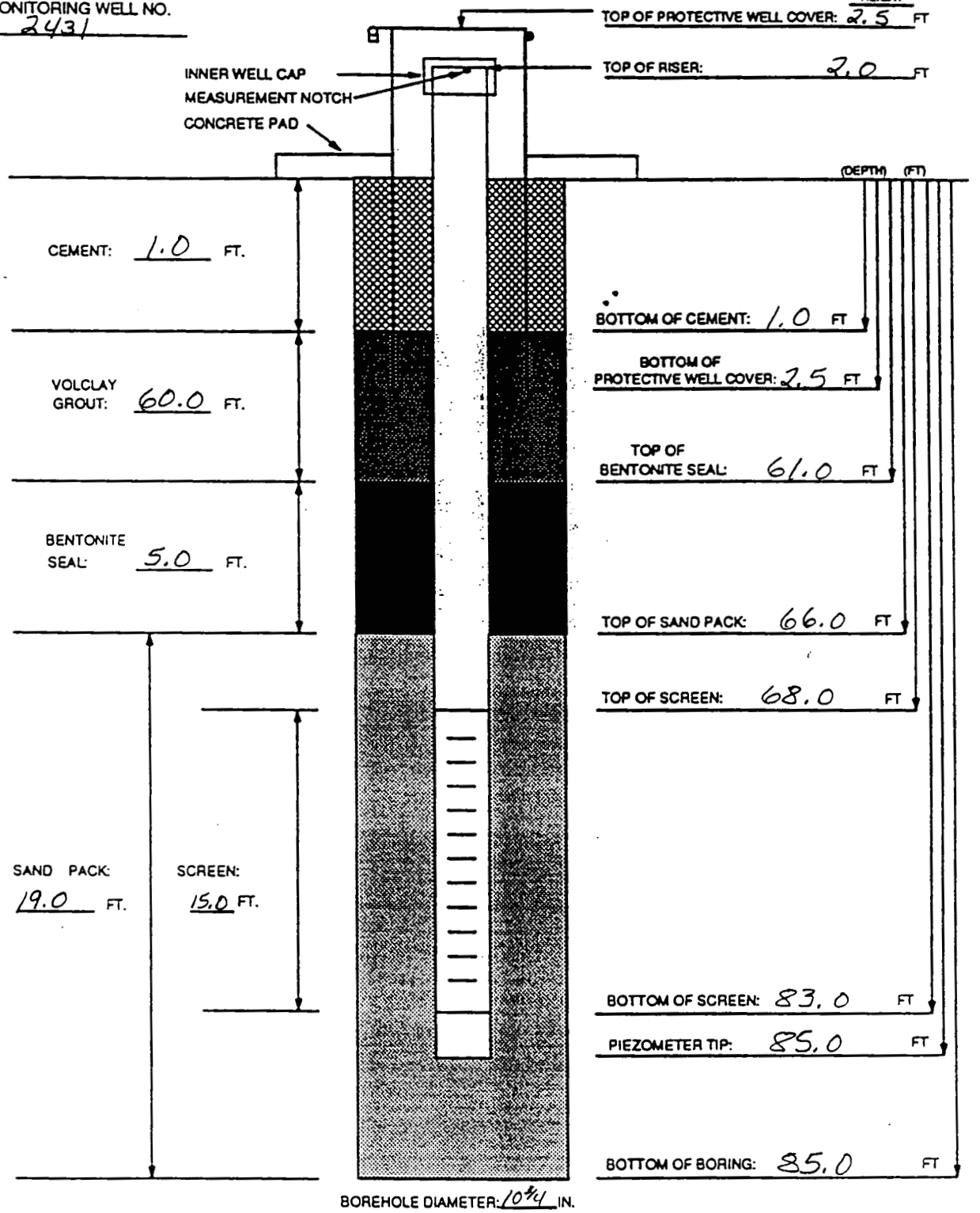
SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, β γ = 30 cpm, α = 0 cpm }

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

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2431

INSTALLATION DATE: 12-17-92



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30, 22-50lb.
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 18 - 50 lbs.
AMOUNT OF CEMENT: 1 - 80lb. bag
AMOUNT OF WATER USED: 1500 gallons
OTHER: 1-water drum, 14 soil drums
TASK: RCRA phase I, 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 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 71.3 FT/ 12-18-92
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

PROJECT NAME RCRA Phase I
PROJECT NO. 602.04.27
BORING NO. 2431
PIEZOMETER NO. 2431

FIELD ENG./GEO. Michael Worley DATE 12-20-92
CHECKED BY C. Brier DATE 12/30/92
DATE OF INSTALLATION 12-~~18~~ 17-92 CB 12/30/92.

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 TO 85.0
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in. I.D. FROM 0.0 FT TO 85.0 FT.
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in. ID.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020
TOTAL PERFORATED AREA 15.0 FT.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 1-2.0 FT., 7-10 Ft.
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	~~2.5~~ 2.0 M.W. 12-18-92			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
VOLCLAY CEMENT GROUT / ~~SLURRY~~ MW 12-18-92	TOP 1.0	BOTTOM ~~60.0~~ 61.0 MW 12-18-92	TOP	BOTTOM
BENTONITE	TOP ~~60.8~~ MW 12-18-92	BOTTOM 66.0	TOP	BOTTOM
SAND	TOP 66.0	BOTTOM 85.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 68.0	BOTTOM 83.0	TOP	BOTTOM
PIEZOMETER TIP	85.0			
BOTTOM OF BOREHOLE	85.0			
GWL AFTER INSTALLATION	73.3			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement placed 0.0 Ft to 1.0 FT. to hold protective cover in place.

Boring # 2431
Screen Sieve Analysis

12-18-92

1. 90% = .007
2. 50% = .073
3. 40% = >.100

2. $\frac{>.100}{.007}$ = 14.3, so use a factor of 4.

3. 4 X .073 = > 0.29

4. 0.29 most closely fits the curve for coarse (4/30) sand and medium (0.020) screen.

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Boring #2431

Customer Number 105232

MATERIAL: _____ SAMPLE NUMBER: 921208-153

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 191.6

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	93.06	48.6	48.6	78.7
20	31.90	16.6	65.2	33.5
40	25.00	13.0	78.2	16.7
60	16.95	8.8	87.0	9.8
100	7.72	4.0	91.0	5.9
200	6.15	3.2	94.2	3.0
Pan	11.77	6.1	100.3	

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

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

Analyzed by: Robert Checked by: [illegible] Date analyzed: 12-9-92

GRAIN SIZE 40% RETAINED 100 .001 inch

50% 73

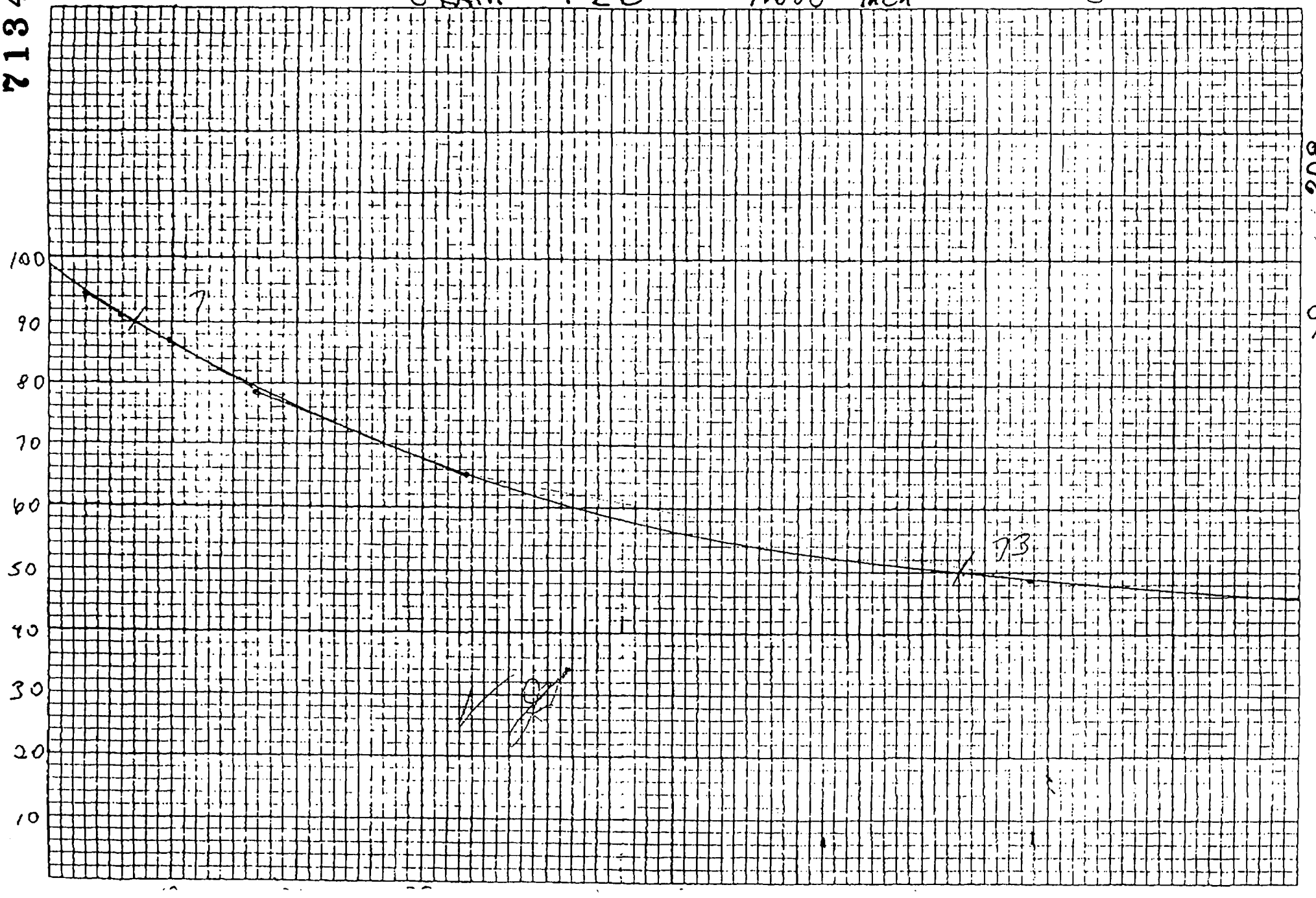
90% 7

127

NO 340/ .10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

7134

Grain Size 1/1000 inch

Boring-2431