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**07/20/93**

**DOE-FN/EPA  
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REPORT**

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

The Consent Agreement (CA) As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a), the Federal Facility Compliance Agreement (FFCA), and the Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA) signed September 20, 1991, July 18, 1986, and November 19, 1991, respectively, require that monthly reports be submitted to the U.S. EPA regarding progress made to meet the provisions of those agreements. This report fulfills those requirements by describing actions undertaken at the Fernald Environmental Management Project (FEMP) during the period June 1 through June 30, 1993, and planned actions for the period July 1 through July 31, 1993.

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**WORK ASSIGNMENTS AND PROGRESS**

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

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

**CA Section IX. Removal Actions**

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

Phase I Removal Actions

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

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Phase II Removal Actions

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

Phase III Removal Actions

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

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**CA Section IX. Removal Actions (continued)**

- o RA No. 25, Nitric Acid Tank Car and Area.
- o RA No. 26, Asbestos Removals (Asbestos Program).
- o RA No. 27, Management of Contaminated Structures at the FEMP.
- o RA No. 28, Contamination at the Fire Training Facility

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**REMOVAL ACTIONS**

**RA No. 1, Contaminated Water Under FEMP Buildings**

Pumping at all Plants and treatment of perched groundwater remained halted during June due to the Uranyl Nitrate Hexahydrate (UNH) incident of April 27 and the subsequent shutdown of all Plant 8 operations.

**RA No. 2, Waste Pit Area Runoff Control**

This removal action was completed on August 30, 1992.

**RA No. 3, South Groundwater Contamination Plume**

**Part 1**

The Work Plan for Part 1, Alternate Water Supply for two industrial users (Albright & Wilson Americas [AWA] and Delta Steel) was approved by the U.S. EPA on January 3, 1991. Subsequently, Delta Steel was deleted from the current scope of the project with approval of the U.S. EPA and the 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:

A 60-day continuous testing period was completed on May 24, 1993. The continuous test was delayed until plan approval was received from the Ohio EPA. The system continues to operate satisfactorily. Provisions are being made to turn possession of the system over to AWA. Final acceptance of Alternate Water Supply by AWA is now being handled by legal representatives from the Department of Justice and AWA. Negotiations for easement payments to several affected property owners continues. A court hearing was held June 7, 1993, on the Linesch property: awaiting final court determination.

**Part 2**

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

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

The Part 2A and 2B1 portions of the projects were installed and operational on May 1, 1993.

The last phase of the Part 2D pump test was successfully completed on June 5. The data obtained from each phase of the pump test (step drawdown, constant rate, and recovery period) were analyzed to evaluate the various hydrogeologic parameters of the aquifer in the immediate vicinity of the South Plume Well Field. Based on the results, a vertical capture letter was prepared. The letter assessed preliminary pump test results, determined that the planned normal pumping rate for the South Plume Recovery System should be adequate, and confirmed the previously recommended lengths and depths of the screened interval for the remaining four South Plume recovery wells.

Installation of the new 700 gpm pumps at the Stormwater Retention Basin (SWRB) was completed. This increased flow rate will increase the probability that no overflow of the SWRB will occur in the future.

The Constant Rate Test of the test well was completed on May 1, 1993. All phases of Part 2D were completed by June 19, 1993. Final analysis of data and a pump test report are in progress. The new outfall pipeline portion of Part 2 was placed into service on May 1 and the existing outfall pipeline was removed from service. This removes an EPA concern that the existing pipeline was subject to leaking.

**Part 3**

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

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

IWWT(SWRB) Unit

The resin beds experienced excessive headlosses due to surface plugging by suspended solids passing through the upstream filters. As a result, sluicing and recharging with fresh resin of the IWWT(SWRB) was performed. Both the north and the south trailers were operated for a combined flow of 300 gpm for several hours before the filters plugged. The filter elements were subsequently changed out, and the system was restarted. The second set of filters lasted approximately three hours prior to plugging. Due to a lack of cartridge filter availability, both trailers were shut down on May 15. Replacement cartridge filters have been received in limited quantities. Both units were brought on line briefly on June 18; however, the filters soon plugged with solids limiting flow. Filters were scheduled to be changed and the system restarted. A decision was made to install sand filters upstream of the existing filters because of the problems experienced. This equipment will be installed in the building planned for installation of the supplemental project discussed hereinafter.

IWWT(BDN-ETS) Unit

The bids received for the new sand filter system to be installed upstream of the IX system were evaluated and an order was placed during the week of June 1. Because of concern over ensuring that the system functions properly when restarted, a decision was made to purchase two new IX columns. These columns were placed on order during June. Drawings to reflect the layout changes required to install the new sand filters and IX columns were completed in June. The final materials list was communicated to FERMCO construction June 23. Engineering completed final piping details and equipment layout on June 25. Construction is scheduled to start on July 6, 1993, with completion anticipated by July 30.

**Part 4**

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

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

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

**Part 5**

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

The geochemical investigation is divided into four phases: Phase I - two traverse lines of hydropunch borings within the alluvium area and concurrent sampling of existing nearby wells; Phase II - two traverse lines of monitoring wells with corresponding hydropunch sampling north and south of the proposed recovery well field; Phase III - seven piezometers clustered near proposed extraction well R-4; and Phase IV - soil vapor sampling. A need and location for a soil vapor survey will be determined after 20 ppb isopleth is located and Phase I, II, III, data and proposed pumping under the Design, Monitoring, and Evaluation Program Plan (DMEPP) are evaluated.

Phase I was completed on August 25, 1992. Only one hydropunch sample exceeded 20 ppb uranium.

Phase II, installation of the twelve wells, was started in late March 1993. Three 2000-series wells (the primary wells) and one 3000-series well were installed prior to the Part 2D Pump Test. The remaining wells continued to be installed during June.

Phase III: The seven piezometer cluster located near proposed Recovery Well No. 4 was installed in early May as part of the Part 2D pump test construction package. Samples from these piezometers were taken to evaluate the vertical extent of the uranium contamination within the aquifer. After all uranium data is collected from Phases I, II, and III, a summary report of the 20 ppb isopleth will be prepared.

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**RA No. 4, Silos 1 and 2**

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

The DOE submitted an evaluation detailing a revised method for determining the effectiveness of the bentonite in the silos to the U.S. EPA on December 17, 1992. As discussed with U.S. EPA on April 13, 1993, information contained in the revised Bentonite Effectiveness Evaluation document will be incorporated into the Removal Action Final Report.

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.

Ongoing activities include monitoring the liquid level of the K-65 Decant Sump Tank and implementing maintenance actions as required. Per requirements of the Work Plan, Operable Unit 4 will advise DOE-FN when pumping operations are to resume.

**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, 22,500 square feet of the Phase III work area will be enclosed beneath a tension support structure.

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

Drum movements, which began in January 1993, continued and are due to be completed by July 23, 1993. The drum movements are required to clear areas for construction. A pre-bid meeting with the contractors was held June 3 and bids were received June 18, 1993, as scheduled. A pre-award survey was conducted with the low bidder on June 22, 1993. DOE approval of this contract and the issuance of the Notice to Proceed will occur by July 30, 1993.

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

**RA No. 8, Inactive Flyash Pile Control**

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

**RA No. 9, Removal of Waste Inventories**

During June 1993, 8,248 drum equivalents (DEs) of low-level waste (LLW) were dispositioned. Repackaging material has reduced disposal volume shipped to the Nevada Test Site (NTS) by 2,931 DEs year-to-date. The FY1993 goal is to dispose of 67,000 DEs of LLW at the NTS and 50,000 DEs of LLW through subcontractors.

The activities completed in June include the first shipment of compacted residues from SEG to the NTS was delivered to the NTS on June 1, 1993. The FEMP Application to Ship Waste to the Nevada Test Site, Revision 5.0, was submitted to DOE-NV for review. The review is in preparation for the annual recertification audit scheduled for the week of July 26, 1993. The Addendum to the revised application, which included the information for the AMCCOM metal (4A), was submitted for DOE-NV review. This waste will be included with the four new waste streams included in the revised application. The other four waste streams are regulated asbestos, metal melt slag from SEG, and two new thorium waste streams. The Annual Work Procedures for 1993 were submitted on June 30, 1993.

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

Waste shipping activities for July will include the annual recertification audit conducted by DOE-NV. The audit is required to maintain the FEMP waste shipping/certification program approval and continued shipment to the NTS. The arrival update of the administrative record of waste shipments for the past six months will be submitted in July.

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Completed on June 30, 1993	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 properly disposition the removed materials off site.

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

Equipment and Material Assessments (formerly Preliminary Assessments) are continuing. Field evaluations of Plants 1, 7, and 8 have been completed. The field evaluation of Plants 4 and 9 are in process.

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**RA No. 12, Safe Shutdown (continued)**

The following is the status of expense items: 2,878 expense items are currently in the data base; 1,411 have been field verified, 578 are on a "shopping list" to ascertain on-site use, 1,042 have been transferred to Maintenance, and 110 have been placed on AC-563 Forms to be excessed. These numbers are expected to fluctuate from month to month as field verification is conducted.

The following is the status of capital equipment: of an estimated 1,696 total number of items, 1,195 have been put on AC-563 Forms to be excessed, and 501 have been identified as "In Use/Future Use" items. The number of items on AC-563 Forms and the "In Use/Future Use" listing may vary due to change of status of equipment items.

Six hundred nine maintenance work orders to isolate and disconnect all utilities/energy sources from equipment not in use have been prepared. Of these, 183 have been completed. Field verification of the completed orders is ongoing. Completion of these work orders is a preliminary step for removal of hold-up material from the equipment in preparation for equipment removal and decontamination and decommissioning. These numbers may vary from month-to-month due to change in status of the equipment.

Phase II of the 4A Metal Removal Project covers the shipment of approximately 1028 metric tons uranium (MTU) of the Army's rolled scrap (228 Material) to the NTS. The Army had been negotiating their own application with the NTS; however, during a meeting held June 3, 1993, at NTS, with representatives of the Army, DOE-FN, DOE-NV, and FERMCO, it was decided that the material will be shipped under FERMCO's permit. To support this effort, a revised cost estimate is being prepared to cover the additional funds needed for certification, classified freight, burial, and so on. NTS will be including this project in their annual audit beginning July 26. Timing for removal of the material depends on the results of the audit. To date, over 450 Nucfil vents have been installed and 222 white metal boxes packaged of the projected 345 total for the project.

Review of the bids received in response to Requests for Proposals (RFP) SD-417 for the sale of normal and enriched uranium and RFP SD-416 for depleted uranium has been completed and a recommendation on awarding of contract(s) will be made to DOE-HQ in the near future. No further information is available at this time.

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**RA No. 12, Safe Shutdown (continued)**

Planned activities for July include continuing packaging of the Army materials for off-site shipment and revising the estimate to cover the extended scope of the project; continuing to follow the progress on the sale of uranium; continuing to issue work orders for utility isolation work; continuing reconciliation of the Safe Shutdown data base; pursuing completion of the Operational Readiness Review; and continuing issuance of task orders to develop implementing plans for removal of hold-up inventories from process equipment.

**RA No. 13, Plant 1 Ore Silos**

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

June activities included the removal of a concrete wall, the relocation of steel to the Decontamination and Decommissioning facility, and the installation of five geotechnical borings to check the subsurface for crane placement. The installation of cover over the UNH tanks began in May and was completed in June. The Size Reduction Building (SRB) arrived on site May 26, 1993. The erection of the SRB will be completed in July. July activities will also include the installation of electrical and ventilation systems in the SRB, the installation of the Gantry Crane, stack monitors, and scaffolding and containment of the concrete silos.

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

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

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

The 187 white metal boxes from Phase II sampled for RCRA determination in May have been determined to be non-RCRA; these soils, therefore, will eventually be stockpiled per Removal Action Number 17, Improved Storage of Soil and Debris.

The revision of the Work Plan Addendum continues. Other June activities included laying out grids for additional off-property sampling. The initial walkover survey for off-property contamination was completed in June.

The revised Work Plan Addendum is to be submitted to EPA by July 16, 1993.

KEY MILESTONES	STATUS	DUE DATE
Phase III - Completion of off-property excavation	Additional sampling to determine boundary of contamination	To be determined based on sampling results
Phase IV - Submit Final Report	Open	To be determined

**RA No. 15, Scrap Metal Piles**

The Scrap Metal Piles Removal Action will detail the stabilization and disposition of LLW scrap metal currently stockpiled on site. This removal action will minimize material releases to the environment. Approximately 1,400 tons of scrap copper along with approximately 2,200 tons of recoverable scrap metals are the focus of this removal action.

Containerization of the Phase I scrap metal pile at the B69 pad began in February. A total of 17.5 tons of non-ferrous metal has been shipped to Quadrex and 1,148 tons of ferrous metal have been shipped to SEG.

The pre-proposal meeting for the Phase IIB subcontract was held on March 18. The due date for bids was June 30, 1993.

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**RA No. 15, Scrap Metal Piles (continued)**

<b>KEY MILESTONES</b>	<b>STATUS</b>	<b>DUE DATE</b>
Complete Phase I	Open, on schedule	March 30, 1994
Phase I - Submit Final Report	Open, on schedule	September 30, 1994
Phase IIB: Submittal of Subcontractor's Removal Action Plan	Open, behind Schedule	September 30, 1993
Phase IIB: Submittal of Final Report	Open, on schedule	March 30, 1995

**RA No. 16, Collect Uncontrolled Production Area Runoff -- Northeast**

The scope of this removal action is to collect the remaining stormwater runoff from the perimeter of the 136 acre former production area that currently discharges to Paddy's Run and divert it through the existing storm sewer system to the Storm Water Retention Basin. Construction continues on the trench drain portion of the project with 2,650 linear feet of the 3,952 feet of trench drain completed plus 535 linear feet of bottom. Construction is complete on 5 of the 13 new catch basins. Construction is in process on two additional basins. An additional work crew has been added to accelerate work to recover schedule time in order to meet the commitment date of August 30.

<b>KEY MILESTONES</b>	<b>STATUS</b>	<b>DUE DATE</b>
Complete Removal Action	Open, on schedule	August 30, 1993

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**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 final remediation under Operable Unit 3.

The sampling of the Third Street Dirt Pile for RCRA characterization was completed on April 26, 1993. May accomplishments included the approval of the Safety Assessment on May 11, 1993. Review comments were submitted to Parsons on the 90% design of all RA No. 17 Phase I structures on May 26, 1993.

The Davis-Bacon ruling for the first design and construction package for this removal action was received on June 7. The revised Request for Exemption for installing automatic sprinklers in tension support structures was submitted to DOE-HQ on June 7. All design issues for the first design package have been concurred upon by DOE-FN and FERMCO as of June 11.

The Part II design package (Decontamination Facility Pad and the soil and rubble pile cover) will begin in July.

**RA No. 18, Control Exposed Material in Pit 5**

Field activities associated with re-submerging pit material for this removal action concluded in December 1992. Fall activities associated with berm repairs were terminated in June 1993.

RA No. 18 was completed on June 4, 1993, and the final report has been prepared.

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**RA No. 19, Plant 7 Dismantling**

The Plant 7 Dismantling Removal Action will include dismantling and dispositioning 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, gross decontamination, removal, dismantling, containerization, and disposition and the potential beneficial re-use of the materials making up the above-ground portion of the facility.

The draft Removal Action Work Plan (RAWP) was submitted to the U.S. EPA on April 20. Ohio and U.S. EPA comments were received on May 19 and June 1, 1993, respectively. The draft final RAWP was submitted on July 1.

Phase I activities were initiated in May 1993 and are being accomplished under the Safe Shutdown Program. Phase I activities will continue and Phase II activities will be initiated in July.

KEY MILESTONES	STATUS	DUE DATE
Receive U.S. EPA comments	Completed on June 1, 1993	May 20, 1993
Submit Final Work Plan to the U.S. EPA	Completed on July 1, 1993	July 1, 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.

Processing remains on hold pending implementation of the recommendations resulting from the Class B investigation of an incident that occurred on April 27.

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**RA No. 21, Expedited Silo 3**

The Expedited Silo 3 Removal Action Final Report was submitted to the U.S. EPA on February 24, 1993.

**RA No. 22, Waste Pit Area Containment Improvement**

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

All construction activities were completed during June 1993, except minor items which are outside of the original scope of work. Plans have been established to complete all these items.

RA No. 22 was completed on June 30, 1993, and a final report is being prepared.

**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, 1992, contaminated debris from three of the regulated areas identified in the survey report were collected and placed in interim controlled storage. The contaminated items collected were a plastic bag (approximately 1 gallon) containing soil, a 1 foot x 2 feet section of transite and two small pieces of yellow material. Results of the survey were submitted on June 29, 1992. As a result of removal of the debris, DOE-FN determined that no additional action is required until remediation.

**RA No. 24, Pilot Plant Sump**

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

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**RA No. 24, Pilot Plant Sump (continued)**

Monthly pump-outs of the sump have been discontinued in anticipation of the sump removal. The final pump-out will occur simultaneously with the sump removal.

The detailed schedule for the removal is being prepared. The removal is expected to occur in July. A pre-bid meeting will be held on July 6, to review the internal drain line inspection requirements. Bids for this work are due July 12, 1993.

**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 by 40 feet long by 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.

Samples of the soil underneath and around the tank car are scheduled to be collected in July. Decontamination and dismantlement of the tank car is scheduled to be completed by the end of September.

**RA No. 26, Asbestos Removals (Asbestos Program)**

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

The June 1993 Work Procedures submittal included Large-Scale Asbestos Work Practices, which applies to all asbestos abatement on-site (both small- and large-scale). This submittal also provided generalizations of all abatement activities to date as well as planned abatement activities for the next year, including several large-scale abatement projects.

The large-scale Asbestos Work Practices will be utilized to perform the asbestos abatement activities associated with Removal Action 19, Plant 7 Dismantling.

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**RA No. 26, Asbestos Removals (Asbestos Program) (continued)**

KEY MILESTONES	STATUS	DUE DATE
Submit draft Work Procedures for 1993 to the U.S. EPA	Completed, June 30, 1993	June 30, 1993

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

This removal action was completed when the final EE/CA was submitted to the U.S. and Ohio EPAs on June 16, 1993.

**RA No. 28, Contamination at the Fire Training Facility**

This removal action will address removal, decontamination and disposal, treatment or storage of all structures, tanks, equipment, the underground sump and oil/water separator, in addition to addressing "hot spots" soil staining, and any other surface soils from which a threat of migration of contamination exists.

The Removal Action Work Plan/Closure Plan Information and Data Package For Contamination at the Fire Training Facility was revised and submitted to DOE on June 24, 1993 for submittal to the U.S. and Ohio EPAs on June 29, 1993.

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RA No. 28, Contamination at the Fire Training Facility (continued)

<b>KEY MILESTONES</b>	<b>STATUS</b>	<b>DUE DATE</b>
Submit draft Work Plan to EPA	Completed on June 29, 1993	June 30, 1993

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**1.0 Operable Unit 1**

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

**1.1 Treatability Studies**

**Scope:**

The Operable Unit 1 treatability studies will evaluate several treatment process options identified in the Operable Unit 1 Initial Screening of Alternatives document including: drying agglomeration and polymer encapsulation, 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 where appropriate. 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.

A variety of drying methods will be investigated including flash drying, rotary drying, and microwave drying. Agglomeration of dried particles to reduce dusting will also be tested dependent on drying method and final particle size of the dried waste material. Polymer encapsulation will be studied using several types of low density polyethylene.

**Status:**

Samples for durability testing are being generated for submission to the University of Cincinnati. Data validation is complete. All other test work is complete.

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**1.1 Treatability Studies (continued)**

**Issues/Corrective Actions:**

None to report.

**1.2 Remedial Investigation**

**Scope:**

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

**Status:**

Sections 1 through 4 of the RI report will be submitted to DOE-HQ on July 15, 1993. The RI validated data has been received by FERMCO. Statistical evaluation has been completed on this data, and it has been transferred to Parsons Engineering for use in the Fate and Transport Modeling for the Operable Unit 1 Baseline Risk Assessment. Sections 5 and 6 and all appendices will be submitted to DOE-HQ August 15, 1993.

The U.S. EPA presentation will be conducted on July 7, 1993. Presentation material will cover: Remedial Investigation, Groundwater Modeling, Air Modeling, Risk Assessment, Data Adequacy, and the Feasibility Study.

**Issues\Corrective Actions:**

None to report.

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**1.2 Remedial Investigation (continued)**

**OPERABLE UNIT 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

**1.3 Feasibility Study**

**Scope:**

The FS evaluates remedial alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The remedial 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 Operable Unit 1 Feasibility Study team are working on an annotated outline of the Feasibility Study Report. Upon completion, the annotated outline will be used as the basis for an Operable Unit 1 specific Feasibility Study work plan. The Operable Unit 1 Regulatory Compliance staff are in the process of completing the draft Applicable or Relevant and Appropriate Report which will be integrated in the Feasibility Study Report and used as a basis for determining media-specific remedial alternative objectives. Discussions continue on the Leading Remedial Alternative for Operable Unit 1 and disposal options.

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**1.3 Feasibility Study (continued)**

**OPERABLE UNIT 1 FEASIBILITY STUDY**

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.	03/07/94 C	05/06/94 C	06/04/94 C

C = Consent Agreement Date

A = Actual

**1.4 Planned Activities for July 1993**

- Treatability report will be initiated upon completion of data validation
- The Fate and Transport Modeling for the RI Baseline Risk Assessment will be initiated.
- Sections 1 through 4 of the RI will be submitted to DOE-HQ on July 15, 1993.
- Work will be initiated on Operable Unit 1's Comprehensive Response Action Risk Evaluation (CRARE).
- The final draft of the Operable Unit 1 Applicable or Relevant and Appropriate Requirements report will be completed
- Data meeting with the U.S. and Ohio EPAs on July 7, 1993.

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**2.0 Operable Unit 2**

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

**2.1 Field Investigation**

**2.1.1 RI/FS Work Plan Addendum for Operable Unit 2**

**Scope:**

The Remedial Investigation (RI) Report for Operable Unit 2 was submitted by DOE-FN to the U.S. EPA and Ohio EPA in October 1992. Based on December 17, 1992 review comments from the U.S. EPA and Ohio EPA on the RI Report, and responses to those comments submitted by DOE-FN on February 7, 1993, a second phase of RI sampling and analysis is required for Operable Unit 2 in order to meet the objectives of the March 1988 Sitewide Remedial Investigation/Feasibility Study (RI/FS) Work Plan.

**Status:**

Collection and analysis of environmental samples is an integral part of the Operable Unit 2 RI/FS. This Sampling and Analysis Plan has been prepared in accordance with CERCLA Guidance for Conducting Remedial Investigations and Feasibility Studies.

The draft RI/FS Work Plan Addendum for Operable Unit 2 was submitted to DOE-FN on March 3, 1993. The draft RI/FS Work Plan Addendum for Operable Unit 2 was transmitted to the EPAs on March 8, 1993. Pursuant to the informal dispute resolution process with the U.S. EPA, field investigations were initiated on March 16, 1993.

**South Field**

**New Well and Hydropunch Locations**

- 2944 Wells sampled and completed June 27 & 21 respectively.  
2954 (2954 is an additional well)

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**2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)**

- 11085 Type I wells sampled and completed June 15 and respectively.  
11032 (additional wells)
- 1954 Type I well moved from proposed Inactive Flyash Pile Location, sampled June 21.
- 11082 Hydropunches completed June 3, 2, and 1 respectively.  
11083 (additional hydropunches)  
11084

Existing Monitoring Well Groundwater Sampling

Groundwater sampling and subsequent laboratory analysis is required for existing Monitoring Wells 2401, 1014, 2014, 1516, 1517, 1518, 1046, 2046, 1065, 2065, and 2085. Well 2085 was not sampled but is expected to be sampled in July.

Geophysical Survey/Trenching Activities

Geophysical survey was completed per the Work Plan Addendum. Subsequent anomalies will be identified and further investigated through trenching operations. Trenching activities to identify the anomalies from the survey were initiated in May and were completed June 22.

Solid Waste Landfill

New Well Locations

- 1950 Sampling of this well was completed on June 4.
- 2953 Sampling completed June 16.

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**2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)**

**Inactive Flyash Pile**

**New Well and Hydropunch Locations**

- 2955 A groundwater sample was collected June 22, 1993.
- 11050 Hydropunch completed June 7, 1993.

**Active Flyash Pile**

**New Well and Hydropunch Locations**

- 21033 Type II well was sampled on June 17.
- 11031 Additional hydropunch was completed on June 9.

**Lime Sludge Ponds**

**New Well Locations**

- 1940 Type I well was sampled on June 11.
- 2935 Type II well sampled on June 13.
- 2936 Type II sampled on June 12.
- 2939 Type II sampled on June 13.

**Soil Borings**

Borings 1956 through 1963 were completed in June 1993.

**Issues/Corrective Actions:**

None to report.

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**2.2 Feasibility Study**

**Status:**

The revised schedule for the Operable Unit 2 RI/FS program has been evaluated through the informal dispute resolution and is now finalized.

**Issues/Corrective Actions:**

None to report.

**OPERABLE UNIT 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.	04/29/94 C	06/27/94 C	07/25/94 C

C = Consent Agreement Date

**2.3 Planned Activities for July 1993**

- Initiate procurement in support of proposed maintenance and repair work for Active Flyash Pile.
- Submit permit request to U.S. Army Corps of Engineers for approval to implement final design requirements for erosion protection measures for Inactive Flyash Pile.
- Complete flood plain assessment of construction of the erosion protection measures for Inactive Flyash Pile.
- Complete Scope-of-Work for pre-design investigations for Solid Waste Landfill.
- Complete rebaseline efforts for Operable Unit 2 facilities.

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**2.3 Planned Activities for July 1993 (continued)**

- Complete draft work plan for Lime Sludge/Flyash Treatability Study
- Complete groundwater sampling of MW-2085 and MW-11032 (Southfield)
- Complete development of MW-2944 and collect groundwater sample.
- Collect core samples from concrete which was excavated during Southfield anomaly trenching.

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**3.0 Operable Unit 3**

Operable Unit 3, as defined in the Amended Consent Agreement, includes the Production Area and production-associated facilities and equipment (including 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:**

Comments and conditional approval of the RI/FS Work Plan Addendum (WPA) were received from the Ohio EPA on February 16, 1993. In an April 14, 1993, letter, the U.S. EPA approved the revised WPA, based on the comment-response package provided to the EPAs on March 19, 1993. The U.S. EPA approval stated, however, that the change proposed in the comment-response package must be incorporated into the WPA and a final version of the WPA be submitted to the U.S. EPA by May 15, 1993. The revised WPA was finalized and transmitted to the EPAs on May 14, 1993. In a letter dated June 10, 1993, the U.S. EPA informed DOE that this final document failed to incorporate all of the proposed changes. This letter gave DOE 30 days to incorporate the comments and provide an explanation for the deviations.

**Issues/Corrective Actions:**

None to report.

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**3.1 RI/FS Work Plan (continued)**

**OPERABLE UNIT 3 WORK PLAN ADDENDUM**

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

C = Consent Agreement Date

A = Actual

**3.2 Field Investigation**

**Scope:**

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

**Status:**

Radiological surveys to support the Field Work Packages are underway. Twenty-seven Operable Unit 3 RI/FS Characterization field sampling procedures have been issued; three additional procedures for newly identified equipment are in review. Lesson Plans for the Operable Unit 3 procedures are being developed and training is underway. A Readiness Review to begin the RI/FS characterization is completed. The Operable Unit 3 RI/FS Health and Safety Plan, is completed and ready for issuance. An Independent Assessment program is being developed. A portion of Building 5E is set up as a storage area for Operable Unit 3 sampling equipment. A cage has been assembled to secure the sampling equipment, unauthorized access to the building is being eliminated, and locks have been installed. Decontamination of Building 5E has been completed. A radiological survey and an X-ray fluorescence (XRF) screening has been conducted to document a clean area for sampling equipment. The XRF analyzer has arrived on site, the gas chromatograph is expected to arrive soon.

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**3.2 Field Investigation (continued)**

**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, engineering, and implementation. Specific studies will be structured to gather the information necessary for specific technologies identified through screening as part of leading alternatives.

**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 Alternatives development. Development of an outline for a Treatability Study Work Plan (TSWP) was initiated in January and is continuing. Current actions involve the Screening of Alternatives to identify needed studies. The revision of the RI/FS Work Plan Addendum identifies a delivery date for the TSWP of January 1994. A current draft annotated outline for the TSWP was submitted to DOE for review on June 30, 1993.

**Issues/Corrective Actions:**

None to report.

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**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 alternatives research and document layout planning are underway. As a result of the development of a Proposed Plan for Interim Action, the Feasibility Study will not address initial decontamination or dismantlement (handled by the Proposed Plan). The FS will focus on treatment and disposition issues.

**Issues/Corrective Actions:**

None to report.

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**3.6 Planned Activities for July 1993**

- Continue focus on technology research and initiate identification of remedy screening tier treatability studies for preparation of the Treatability Study Work Plan.
- Submit Proposed Plan document (to achieve an interim Record of Decision for decontamination and dismantlement of components for Operable Unit 3) for second DOE-HQ review, prior to submittal to the U.S. EPA.
- Initiate preparation of the Remedial Design/Remedial Action Work Plan for the Proposed Plan for Interim Action.
- The full-scale writing of Field Work Packages (FWPs) will continue. Radiological screening to support the FWPs continue.
- The Operable Unit 3 RI/FS Health and Safety Plan will be issued in early July; training on the Health and Safety Plan will be completed prior to July 6.
- Training on chemical screening procedures will be completed prior to July 6; chemical screening will begin July 6.
- Radiological surveys will continue in July.
- Lesson plans for media sampling procedures continue to be written.

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**4.0 Operable Unit 4**

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

**4.1 Field Investigation**

**4.1.1 Sampling West of K-65 Silos 1 and 2**

**Scope:**

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

**Status:**

Monitoring Wells 1891, 1892, and 1893 were purged, developed, and sampled for the primary parameters as specified in the Work Plan. Hydropunch II samples are currently being analyzed by the FERMCO contract laboratory. No analyses have been completed for MW-1891. Analyses have been completed for the MW-1892 March 24 samples; only chemical analyses have been completed for the April 23 samples. Analyses for MW-1893 (radiological only) are complete.

Lysimeters 1894, 1895, and 1896 were installed and sampled for primary parameters as specified in the Work Plan. The samples were transported to the FERMCO contract laboratory for analysis. Preliminary results for the scanning of fluorescein dye were negative. Analyses for these lysimeters have been completed. This activity is considered complete and will not be updated in future reports.

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**4.1 Field Investigation (continued)**

Groundwater sampling at existing Monitoring Well 2032 was completed and results have not been received.

A formal response to the Ohio EPA and U.S. EPA comments on the Work Plan Addendum for additional characterization of the perched water west of the K-65 Silos was submitted to DOE-FN on April 30, 1993. The responses were forwarded to Ohio EPA and U.S. EPA.

The primary concern expressed by the agencies was the ability of the project, as described in the Work Plan, to result in an adequate characterization of the nature and extent of the groundwater contamination in the K-65 Area. As a result, a piezometer will be installed adjacent to each of the lysimeters (borings 1894, 1895 and 1896) in order to determine if a perched water condition exists in the glacial overburden adjacent to Paddy's Run. In addition, the Work Plan was revised to allow for the possibility of installing a piezometer southwest of boring 1891. The additional piezometer would be installed only if the total uranium sampling results from boring 1891 exceed 20 ug/l. Preliminary results from boring 1891 were received and total uranium was 330 ug/l, therefore the additional piezometer will be installed as indicated in the revised Work Plan.

Three piezometers (11204, 11205, and 11206) were installed in the east bank of Paddy's Run to verify that contamination from the vadose zone or perched water is not entering the stream. Piezometer 11204 was completed on June 22, 11205 was completed on June 24, and 11206 was completed on June 25, 1993. No sample collection from the piezometers was required by the Work Plan.

The contingency well (MW-11207) was initiated on June 25 and completed on June 28, 1993. Well development and groundwater sampling will be completed in July 1993.

**Issues/Corrective Actions:**

The information obtained from this investigation program will be considered in the Operable Unit 4 Feasibility Study. Highest priority must be given to these field investigations to avoid schedule delays to the Operable Unit 4 Feasibility Study Report submittal. The results from this sampling effort will be integrated into the Operable

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**4.1 Field Investigation (continued)**

Unit 5 Remedial Investigation Report. If the field investigation, perched groundwater analyses, and data validation is completed in a timely fashion, the information will be presented in the Final RI Report for Operable Unit 4.

**4.2 Treatability Studies**

**Scope:**

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

**Status:**

Cement Stabilization Preliminary and Advanced Phase Tests- Complete.  
Chemical Extraction tests - Complete.

The draft Cement Stabilization/Chemical Extraction Treatability Study Report was submitted for internal review on March 31, 1993. Comments were consolidated and are currently being incorporated, but due to competing manpower resources with the Operable Unit 4 Feasibility Study Report, the submittal date of the revised Draft Cement Stabilization/Chemical Extraction Treatability Study Report to the U.S. DOE has been extended to August 30, 1993.

Cement Stabilization Optional Phase Treatability Testing - Complete.

The draft Cement Stabilization Optional Phase Treatability Study Report was submitted for internal review in May 1993.

The revised draft Cement Stabilization Optional Phase Treatability Study Report will be submitted to the U.S. EPA as Appendix H of the Operable Unit 4 Feasibility Study Report.

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**4.2 Treatability Studies (continued)**

Vitrification Treatability Tests - Complete.

**Issues/Corrective Actions:**

None to report.

**4.3 Remedial Investigation Report**

**Scope:**

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

**Status:**

The revised draft Operable Unit 4 Remedial Investigation Report was submitted to the U.S. EPA on April 19, 1993, in accordance with the Amended Consent Agreement schedules. Comments from the U.S. EPA were submitted to the U.S. DOE on June 24, 1993.

In accordance with the Amended Consent Agreement, the U.S. DOE is to submit the Revised Remedial Investigation Report to the U.S. EPA on July 23, 1993. Due to the volume of comments received, an extension may be sought to the date to respond and resubmit the Revised Report.

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**4.3 Remedial Investigation Report (continued)**

**OPERABLE UNIT 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 A	06/18/93 C 06/24/93 A	07/23/93 C

C = Consent Agreement Date

A = Actual Date

**4.4 Feasibility Study**

**Scope:**

The FS evaluates remedial alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The remedial 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 draft Operable Unit 4 Feasibility Study/Environmental Impact Statement Report was completed and distributed for DOE-FN and DOE-HQ review on June 14, 1993.

The initial CRARE activities were completed and the draft CRARE was completed for internal review.

**Issues/Corrective Actions:**

The Operable Unit 4 Feasibility Study will contain the first site-wide integrated FS/EIS and also the first sitewide CRARE. Presentation of the required technical information and integration with the RI/FS guidance for both documents are priority issues.

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**4.4 Feasibility Study (continued)**

**OPERABLE UNIT 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.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

**4.5 Proposed Plan**

**Scope:**

The Proposed Plan identifies the remedial alternatives being considered for the remediation of Operable Unit 4 in the Feasibility Study for Operable Unit 4. The preferred alternative and the reasons for its selection will also be presented. The DOE and the U.S. EPA will solicit public comments on the alternatives presented including the preferred alternative.

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**4.5 Proposed Plan (continued)**

**Status:**

The draft Proposed Plan was issued for with the Operable Unit 4 FS/EIS for DOE-FN and DOE-HQ review on June 14, 1993.

**Issues/Corrective Actions:**

Development and submittal of the Proposed Plan is dependent on the completion of the FS. The Proposed Plan is being prepared concurrently with the FS and will be submitted with the FS.

**OPERABLE UNIT 4 PROPOSED PLAN**

**PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Identifies potential remedial alternatives as listed in the FS and presents the preferred alternative to the U.S EPA and the public.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

**4.6 Planned Activities for July 1993**

- Complete the response to the U.S EPA comments on the Operable Unit 4 Remedial Investigation Report.
- Complete the Revised Operable Unit 4 Remedial Investigation Report based on the U.S. EPA comments.
- Initiate revisions to the FS/EIS/PP based on comments received from DOE-FN and DOE-HQ.
- Initiate revisions to the internal review of the draft Cement Stabilization Optional Phase Treatability Study Report.

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**4.6 Planned Activities for July 1993 (continued)**

- Develop and collect groundwater samples from Well 11207.
- Prepare the Operable Unit 4 Remedial Investigation Report supporting documents for the inclusion in the Administrative Record.
- Prepare the outline for the Record of Decision for internal review.
- Additional Characterization: develop and collect groundwater sample from MW-11207.

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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**

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 Clearwell Line.

**Status:**

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

Attempts to sample Monitoring Well 1890 for the second round continue; however, due to extremely slow recharge rates, a variance to procedures has been approved and sampling is expected to be completed in July 1993.

**5.1.2 Additional Operable Unit 5 Field Investigation Tasks**

The scope and rationale for the following site characterization programs were presented to DOE-FN, DOE-HQ, U.S. EPA, and Ohio EPA at Technical Information Exchange (TIE) Meetings on April 1 and April 20, 1993:

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**5.1.2 Additional Operable Unit 5 Field Investigation Tasks (continued)**

- FEMP Trap Shooting Range Investigation
- Great Miami Riverbank Investigation
- Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation
- Surface and Subsurface Soil Sampling
- Additional Monitoring Well Installation and Well Abandonment
- Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling
- FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation.

The draft Project Specific Plans (PSPs) for these programs have been completed and submitted to the EPAs. U.S. EPA and Ohio EPA comments have been received on the FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation. Additionally, DOE has received Ohio EPA comments on the Great Miami Riverbank Investigation and the Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling PSPs. The comments are being addressed and will be transmitted to the agencies in July.

**Status:**

FEMP Trap Shooting Range Investigation

The grids for the radiological and metal detector walkover surveys were established. Field work for this task is scheduled to be completed in July.

Great Miami River Bank Investigation

Survey to establish a grid for the radiological survey was completed. The radiological survey was also completed in the latter part of June. The landowner access agreement for the site lapsed, but was reinstated late in the month. This caused the field work for this program to be delayed for two to three weeks. Soil borings are scheduled to be completed in July.

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**5.1.2 Additional Operable Unit 5 Field Investigation Tasks (continued)**

Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation

Surface water and seep sampling associated with the drainage ditch for this task has been completed. Resampling of surface water at background locations W-1 and W-5 is also complete for this task. Flow measurements at two weirs and a drainage pipe in this area are being measured on a daily basis. The flow measurements will be completed in mid-July.

Surface and Subsurface Soil Sampling

Task specific field training and health and safety training was conducted for the personnel involved in this sampling effort. Over 100 soil sampling locations were staked. Radiation work permits and penetration permits continue to be obtained for sample locations where they are needed. Soil sampling was initiated at the shallow sampling locations outside the former production area. Sampling associated with this task is scheduled to be completed near the end of July.

Additional Monitoring Well Installation and Well Abandonment

Twenty groundwater monitoring wells were scheduled for completion under this task: 16 Type 1 wells, 3 Type 2 wells, and 1 Type 4 well. In June, eight wells were completed (11064, 21064, 11067, 11071, 11072, 11073, 11075, and 11077). Development of wells 11064 and 21064 was completed on June 27 and 21, respectively; a groundwater sample was collected from 11064 on June 27, 1993. Development of 11067 was initiated on June 22 and is expected to be completed and the well sampled in July 1993.

Installation of wells 21063, 21065, 41066, 11074, 11078, and 11079 was initiated in June; well installation, development, and sampling are expected to be completed in July.

Seven wells (1350, 1174, 1004, 1072, 1030, 1037, and 3084) are scheduled to be plugged and abandoned for this task. This work is expected to begin in July 1993.

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**5.1.2 Additional Operable Unit 5 Field Investigation Tasks (continued)**

Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling

A total of 117 wells are scheduled to be sampled by Site Characterization for this task. To date, 71 wells have been sampled. A total of approximately 275 wells have been sampled in support of the snapshot. The 275 includes wells that were sampled for other FEMP programs. Surface water and sediment sampling associated with this task is nearly complete. One surface water/sediment sample remains to be collected on the Great Miami River at Location GMR-2. Lack of a landowner access agreement and recent high water levels in the river have hampered efforts to collect samples from this location. It will be sampled in early July.

FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation

Training for this program was completed. Slug testing was initiated on June 30. Procurement of equipment and finalization of the drilling contract for this task have contributed to a significant delay in this program. It is expected that the procurement and drilling contract issues will be resolved and the bulk of the field work for this program will be completed in July.

**5.1.3 Abandonment and Plugging of KC-2 Warehouse Well No. 67**

In March 1993, a RSE for the KC-2 Warehouse/Well No. 67 was performed to assess the need for a removal action. The RSE was performed to assess the impact of sediment-like material present in Well No. 67 on groundwater quality in the lower portion of the Great Miami Aquifer, pursuant to Section 104 (a)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended.

DOE, as the lead agency, determined the need for a removal action pursuant to 40 CFR 300.415 Sections (b)(2)(ii) and (b)(2)(viii). The following removal action will be implemented as defined in 40 CFR 300.415. Since Well No. 67 was screened in the lower portion of the Great Miami Aquifer, and this aquifer is a sole source aquifer, the removal action will be performed as a Time Critical Removal Action.

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**5.1.3 Abandonment and Plugging of KC-2 Warehouse Well No. 67 (continued)**

The Work Plan requires that the sediments in the well casing be removed prior to abandonment of the well. This will provide relative assurance for eliminating the potential of introducing further contamination into the Great Miami Aquifer.

No attempts to remove the existing well casing will be made because of the confined work area and the possibility that the casing could break at depth leaving a potential vertical migration pathway through the glacial overburden. Sediments and groundwater removed from the well will be sampled and drummed.

The analytical results will be used to develop a vertical profile of the sediment column and to perform a hazardous waste characterization to determine disposal options for these materials. An attempt will be made to re-develop the well and collect a groundwater sample. The casing will then be filled with Volclay grout to 30 inches below grade. The remaining 30 inches of casing will be removed, and a concrete cap will be placed over the hole. Monitoring well 41066 is being installed downgradient of the former Well No. 67 location at an equivalent depth in the Great Miami Aquifer. This installation is described in the Additional Monitoring Well Installation and Well Abandonment Work Plan prepared by Operable Unit 5.

Field work associated with this removal action will begin July 1, 1993.

**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

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**5.2 Treatability Study (continued)**

initially involves the separation of a soil into different particle-size fractions. Reagent formulas in the washing solutions are used in the extraction of radionuclides and organic and inorganic compounds from these different-size fractions. The contaminants may be separated from the wash stream into a concentrated residue for further treatment. The study consists of two phases: (1) remedy screening Stages 1 and 2, involving laboratory and bench-scale tests; and (2) remedy selection using pilot-scale equipment. Soils from three different areas will be used in these investigations. These soils are from the following areas: incinerator area (ID-A), Plant 1 Pad Area (ID-B), and maintenance building area (OU5-A).

**Status:**

The skids containing the major portion of the soil washing pilot plant equipment were installed in April 1993. During May, modifications/additions were performed to ensure that safety issues were addressed and the last major piece of equipment, the centrifuge, was installed. Training of supervisors and technicians for the operation of the pilot plant was conducted. Documents completed in support of startup of the soil washing pilot plant included the health and safety plan, environmental compliance plan and the risk management plan.

The data from the remedy screening tests for the ID-A and ID-B soils was received from IT Corporation by FERMCO on April 12, 1993. The data from the OU5-A soil was received in the middle of May. Results from these bench-scale studies were used to provide the initial operating conditions for startup of the remedy selection soil washing pilot plant. Initial operating conditions include physical separation processes followed by chemical extraction with dilute inorganic acid at elevated temperatures. The test system is designed to include spent extractant treatment.

The soil washing pilot plant began processing radiologically contaminated ID-B soil on June 8. Results from the initial sample analysis performed at the FEMP laboratory will be available in early July. Treatment of the ID-A soil commenced on June 25. A soil treatability laboratory is currently being established at the FEMP to support ongoing pilot plant testing. Government owned laboratory and testing equipment from IT's ETDC facility in Oak Ridge is being shipped to the FEMP for installation in the on-site lab.

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**5.2 Treatability Study (continued)**

Design and programming of a database to accommodate Operable Unit 5 remedy screening and remedy selection data was initiated. The database is being designed to also accommodate soil washing treatability test data from Lockheed Environmental, Oak Ridge National Laboratory, and Westinghouse-Savannah River. These soil washing test programs have been conducted in parallel to the Operable Unit 5 study under the umbrella of the DOE Treatability Integrated Demonstration program.

**5.3 Operable Unit 2 Dispute Resolution Supplemental Project (Uranium Reduction in FEMP Discharge)**

**Scope:**

The supplemental project will provide for partial treatment of the South Plume discharge with the objective of reducing uranium discharges from the FEMP to the Great Miami River. The project consists of the following parts:

1. Procure and install one additional IAWWT trailer unit to treat 200 gpm South Plume flow. This new unit will be installed and operational by March 30, 1994.
2. Utilize off peak capacity in Phase I AWWT for South Plume Treatment when no stormwater is available for treatment. This provision will be available in January 1995 when Phase I of the AWWT becomes operational.
3. Eliminate low uranium streams, that is, less than 20 ppb (Sewage Treatment Plant and clean side general sump) from Phase II AWWT and utilize this capacity to treat a portion of the South Plume; estimated to be approximately 200 gpm. This provision will be available in January 1995 when Phase II of the AWWT becomes operational.
4. Extend the planned operational life of the existing IAWWT SWRB unit and convert from treating stormwater to treating South Plume flow. Also, the capacity would be increased from 300 gpm to approximately 400 gpm. This would be implemented by March 30, 1995.

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**5.3 Operable Unit 2 Dispute Resolution Supplemental Project (Uranium Reduction in FEMP Discharge) (continued)**

**Status:**

A request for proposal was issued and a proposal was subsequently received from the Architect/Engineer (A/E) for performing the engineering of Part 1. This proposal has been revised and the A/E is proceeding with the functional requirements and design basis document. Changes to the AWWT project scope have been completed to eliminate the treatment of the Sewage Treatment Plant and clean side General Sump flows to provide for Part 3. Evaluation of the best method for transferring South Plume water to Part 2 is being investigated.

Provisions have been made in the AWWT design to allow AWWT Phase I to accommodate South Plume flows when no stormwater is available for treatment to address Part 2.

**5.4 Remedial Investigation (RI)**

**Scope:**

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

**Status:**

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

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**5.4 Remedial Investigation (RI) (continued)**

A significant data validation effort was initiated in January and became fully operational in February. A backlog of nearly 8,000 RI/FS samples requiring validation has been identified and validated. Validation of the backlog samples was completed in June. Quality control of the validated data base is continuing. The validated data base will be transferred to Operable Unit 5 in early July. Operable Unit 5 staff will begin to split up the validated data base so that work can begin on Sections 4, 5 and 6 of the RI report. Additional validated data will continue to be added to the data base throughout this summer and fall as validation is completed on the new programs and on the laboratory data that has been received since the beginning of 1993.

FERMCO review of RI report Sections 1, 2, and 3 is continuing. Review comments on the glacial overburden portion of Section 3 were prepared. A TIE meeting was held with U.S. EPA, Ohio EPA, DOE-FN, and DOE-HQ on June 2. The focus of the TIE was contaminant fate and transport modeling, with particular emphasis on FEMP groundwater model development and improvement activities for both the regional aquifer and glacial overburden/perched water zone.

U.S. EPA comments were received on the Groundwater and Surface Water Background report. Ohio EPA comments were not received in June. The report was transmitted to the EPAs in early May. Responses to U.S. EPA comments will be completed and transmitted to the agency in July. Work on preparing an ecological risk screening study based on U.S. EPA Region V guidelines continues. Completion of the screening study is expected in July.

**Issues/Corrective Actions:**

Attenuation/release characteristics of uranium contamination at the FEMP have been determined to be an issue that has not been resolved in RI/FS studies to date. DOE is in the process of developing a site-wide strategy for addressing the attenuation/release characteristics of uranium. In addition to summarizing all the existing information from previous studies (that is, the On-Site Disposal Cell and soil washing treatability studies), this strategy will define the overall approach and necessary laboratory experiments to define the following data:

- Extractable portions of uranium in the waste materials;
- Kd values for the waste materials based on the total contaminant mass or the extractable mass only; and

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**5.4 Remedial Investigation (RI) (continued)**

- Aerial and vertical distributions of Kd values for contaminants in the media outside the contaminant source areas.

Preliminary experimental procedures have been developed and waste materials have been collected from the Operable Unit 2 waste units. The first batch of experiments were initiated in late June. After these results are available (by mid-July), the procedure and the overall plan will be re-evaluated and finalized. Before this information is available, conservative assumptions and literature values will be used for ongoing RI/FS activities (Operable Unit 4 and Operable Unit 1 RI/FS and CRARE).

**5.5 Planned Activities for July 1993**

- Complete field work for all of the RI characterization programs currently in progress with the exception of the Glacial Overburden/Vadose Zone Hydraulic Investigation.
- Resolve all U.S. EPA, Ohio EPA, and internal comments related to the present field programs.
- Finalize the site strategy on determining attenuation/release characteristics for uranium. Present this strategy to the EPAs.
- Complete all field work associated with the plugging and abandonment of Well No. 67 in the KC-2 Warehouse.
- Continue work on RI report Sections 1, 2, and 3. Continue compilation and evaluation of historic data in support of the RI report.
- Complete screening study for ecological risk assessment and transmit report to DOE.
- Continue validation of the laboratory data from the present field programs.
- Divide the validated data base by media so that work can begin on Sections 4, 5, and 6 of the RI report.
- Begin work on Sections 4, 5, and 6 of the RI report.
- Finalize responses to EPA comments on the following reports that were submitted to the agencies in May: "Characterization of Background Water Quality for Streams and Groundwater"; "Groundwater Modeling Evaluation Report and Improvement Plan"; and "Groundwater Modeling Report - Summary of Model Development."

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**5.5 Planned Activities for July 1993 (continued)**

- Complete sampling specified in the Operable Unit 5 Work Plan Addenda.
- Complete comment responses to Ohio EPA and U.S. EPA comments on the Operable Unit 5 Work Plan Addenda. Revise the Work Plan to reflect final comment resolutions.
- Complete comment responses to the Ohio EPA and U.S. EPA comments on the Work Plan Addendum for the Outfall Line. Revise the Work Plan to reflect final comment resolutions.

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**6.0 On-Site Disposal Cell**

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

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

**6.1 EWMF General Siting Report**

**Scope:**

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

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

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Period Ending June 30, 1993

**REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES**

**6.1 EWMF General Siting Report (continued)**

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

**Status:**

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

**Issues/Corrective Actions:**

None to report.

**6.2 Planned Activities for July 1993**

None to report.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY  
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Period Ending June 30, 1993

**REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES**

**7.0 Community Relations**

**Status**

On June 1, 1993 a DOE-FN public workshop was held to explain the alternatives for Operable Unit 5, taken from the Initial Screening of Alternatives document. Eight residents from the community attended. DOE-FN gave a presentation on the CERCLA process and illustrated where the ISA fits into that process and explained the remedial alternatives for both groundwater and soils/sediment screening.

Public Affairs staff is continuing to support Dr. Eula Bingham, the convener for the Fernald Advisory Committee. Preparations are underway for the public availability session that will be held on July 14, 1993. After Dr. Bingham has nominated a list of people willing to serve on the committee, the committee will meet to address issues such as future use of the site, cleanup levels, and waste disposal.

The *Fernald Project Cleanup Report* publication was sent to the DOE mailing list around.

On June 22, 1993, DOE-FN held a community meeting to discuss environmental cleanup activities at the Fernald Environmental Management Project. One hundred forty people registered for the session. The U.S. EPA, the Ohio EPA, and the Fernald Residents for Environmental Safety and Health (FRESH) gave prepared statements. The entire meeting was recorded and the transcript will be available at the Public Environmental Information Center the week of July 5.

On June 23, 1993, a Notice of Availability was issued announcing a 30-day public comment period on the Erosion Control at the Inactive Flyash Pile Removal Action.

DOE-FN representatives attended the monthly FRESH meeting, held June 24, 1993. Thirty members of the community attended the meeting. Topics included:

- Joint Response '93 emergency preparedness exercise with the State of Ohio and Hamilton and Butler counties is scheduled for June 26.
- Status on the progress of the new Fernald Advisory Committee selection and an invitation to a Public Availability Session on July 14 at Meadowbrook
- A representative of DOE-Oak Ridge attended the FRESH meeting to discuss Formerly Utilized Sites Remedial Action Program (FUSRAP). DOE's objective is to identify and clean up FUSRAP sites. There are currently six sites in Ohio; a site in Hamilton, Ohio, may become the seventh.
- Public Water Supply

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY  
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**REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES**

**7.0 Community Relations (continued)**

DOE-FN participated in a full-scale joint emergency response exercise on June 26, 1993. The purpose of the exercise is to test the emergency preparedness and emergency response capabilities of the Fernald with state and local agencies. More than 500 emergency management and response personnel representing approximately 20 organizations.

**Issues/Corrective Action**

None.

**Planned Activities for July 1993**

A 30-day public comment period begins on the Asbestos Abatement Removal Action and on the Contamination at the Fire Training Facility Removal Action on July 7, 1993.

DOE will conduct a meeting at the Plantation with interested stakeholders on the reduction in force on July 8, 1993.

The 30-day public comment period on Plant 7 Dismantling Removal Action will end on July 9, 1993. The 30-day public comment period on Erosion Control at the Inactive Flyash Pile Removal Action will end on July 23, 1993. Addenda to the Community Relations Plan will be prepared to meet the community relations requirements.

Dr. Bingham will hold a working session at the Meadowbrook for the public on the creation of the Fernald Advisory committee on July 14, 1993. Key stakeholders and other interested parties will meet with Dr. Bingham to discuss the committee's mission and charter.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY  
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**PERIOD ENDING JUNE 30, 1993**

**ENCLOSURE A**

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

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

## CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending June 30, 1993

### Wastewater Flows and Radionuclide Concentrations

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

Location: 11000004001 Month: June 1993  
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	0.388	194	604	0.39	0.57	132
2	0.394	131	239	0.27	0.40	91
3	0.336	104	144	0.26	0.33	88
4	0.819	225	77	0.38	1.18	128
5	0.802	302	158	0.48	1.46	162
6	0.443	203	243	0.39	0.65	132
7	0.331	203	225	0.26	0.33	88
8	0.377	144	248	0.24	0.34	81
9	0.341	176	234	0.22	0.28	74
10	0.391	153	189	0.24	0.35	81
11	0.437	90	261	0.24	0.40	81
12	0.291	189	194	0.36	0.40	122
13	0.162	212	90	0.40	0.25	135
14	0.409	248	81	0.30	0.46	101
15	0.717	230	72	0.40	1.08	135
16	1.278	198	90	0.29	1.40	98
17	1.187	234	90	0.34	1.53	115
18	1.061	239	59	0.27	1.08	91
19	0.281	41	144	0.03	0.03	10
20	0.228	63	176	0.07	0.06	24
21	0.644	144	216	0.23	0.56	78
22	0.930	153	180	0.21	0.74	71
23	0.903	140	122	0.25	0.85	84
24	0.405	144	140	0.20	0.31	68
25	0.286	117	302	0.20	0.22	68
26	0.267	131	189	0.19	0.19	64
27	0.223	81	113	0.10	0.08	34
28	0.705	149	45	0.20	0.53	68
29	0.420	72	59	0.04	0.06	14
30	<u>0.389</u>	176	329	0.20	<u>0.29</u>	68
TOTAL	15.845				16.43	

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**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY  
COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR  
CONTROL AND ABATEMENT OF RADON-222 EMISSIONS  
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Period Ending June 30, 1993

**Wastewater Flows and Radionuclide Concentrations**

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

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

Month: June 1993

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

Based on 5.54 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 15.74 kgs.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY  
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Period Ending June 30, 1993

INTRODUCTION

Enclosure B describes actions undertaken at the FEMP during the period June 1 through June 30, 1993, that are not covered by the reporting requirements of the Consent Agreement As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a).

**WORK ASSIGNMENTS AND PROGRESS**

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

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

1. Initial Remedial Measures

*Section C*

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

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

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

TABLE 1

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

JUNE 30, 1993

<u>ACTION</u>	<u>DESCRIPTION</u>	<u>COMPLETION TIME AFTER FFCA SIGNED</u>	<u>FY1992 STATUS</u>
CERCLA			
1.	INITIAL REMEDIAL MEASURES		
1.C	Implement radon control plan approved by the U.S. EPA.	-----	No longer applicable. Progress on actions to address radon emissions from the K-65 Silos are being reported separately under Section IX-Removal Actions of the Consent Agreement/FFCA Monthly Progress Report.
2.	REMEDIAL INVESTIGATION/FEASIBILITY STUDY		No action required.
2.A	RI/FS work is to be conducted in accordance with the U.S. EPA guidelines.	N/A	
2.B	--No Action Required--	-----	Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).
2.E	Amend and submit revised RI/FS Work Plan to U.S. EPA if deficiencies are found.		Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).
2.F	Implement tasks described in the approved RI/FS Work Plan		Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA sections 120 and 106(a).
3.	REPORTS AND RECORD KEEPING		
3.B	Submit monthly RI/FS progress reports.	monthly	The RI/FS Monthly Progress Report for May 1993 was transmitted to the U.S. EPA on June 21, 1993. (DOE-2267-93)
CLEAN AIR ACT			
B.4	Prepare annual progress report installation and replacement of emission control devices.	yearly	The Fifth Annual Progress Report on the installation and replacement of emission control devices was transmitted to the U.S. EPA on March 9, 1993 (DOE-1305-93).

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

**JUNE 30, 1993**

A.5	Update the facility closure plan to reflect the year the facility expects to begin closure.	30 days	The Facility closure date is dependent upon closure schedules for individual TSD units as presented most recently in Section I of the RCRA Part B Permit Application transmitted to the Ohio EPA and the U.S. EPA on March 26, 1993 (DOE-1471-93). Facility closure will be completed on a date the last TSD unit is closed.
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**RADIATION DISCHARGE INFORMATION**

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

**REPORTING REQUIREMENTS**

B.	Issue monthly progress report of actions taken to ensure compliance with FFCA requirements.	monthly	May's FFCA Monthly Progress Report was transmitted to the U.S. EPA on June 21, 1993. (DOE-2267-93).
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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 June 30, 1993**

**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 June 1 through June 30, 1993, to implement Part V, Radon-222 Control and Abatement Plan, paragraphs 19-33 of the FFA-CARE.

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

**Work Assignments and Progress**

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

<u>FFA Part, Paragraph(s)</u>	<u>Description of Commitment</u>	<u>FFA Due Date</u>	<u>Status of Commitment</u>
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 June 1993.
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 <sup>2</sup> -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.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY  
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Period Ending June 30, 1993

**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 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).

**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

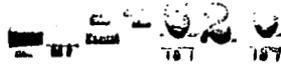
**K-65 SILO REPORT**

**LOCATION:** Silo # 1

**DATE:** June 1993

Day	Ambient		Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
	Temp Deg. F	Pres In. Hg.				
1	52.02	29.40	55.02	*	-0.0037	506,816
2	51.89	29.35	54.75	*	-0.0050	537,913
3	61.90	29.28	54.47	*	-0.0022	619,451
4	56.99	29.06	53.92	*	-0.0288	654,448
5	58.20	29.36	54.58	*	0.0140	430,400
6	59.18	29.56	54.38	*	-0.0025	665,305
7	66.89	29.43	54.99	*	-0.0011	699,140
8	79.99	29.32	56.05	*	0.0018	380,651
9	71.39	29.34	56.94	*	-0.0102	305,300
10	72.91	29.46	57.13	*	0.0186	391,044
11	72.02	29.53	57.69	*	0.0289	427,912
12	68.71	29.55	57.88	*	-0.0008	306,137
13	73.02	29.53	58.06	*	0.0011	385,021
14	72.65	29.49	58.72	*	0.0065	387,775
15	L	L	L	*	L	L
16	77.62	29.63	58.86	*	0.0029	420,798
17	74.27	29.62	59.28	*	0.0011	340,987
18	74.19	29.63	60.01	*	0.0013	320,831
19	77.16	29.58	60.36	*	0.0087	407,621
20	69.81	29.49	60.62	*	-0.0009	366,171
21	72.77	29.41	60.42	*	-0.0034	173,101
22	70.23	29.44	60.59	*	0.0005	338,987
23	60.32	29.44	60.95	*	-0.0031	305,029
24	84.68	29.56	61.62	*	0.0037	323,360
25	73.64	29.50	62.05	*	-0.0032	311,311
26	73.56	29.51	62.05	*	0.0192	329,588
27	73.34	29.47	62.12	*	0.0050	340,211
28	70.71	29.36	62.34	*	-0.0045	402,916
29	73.89	29.40	62.30	*	0.0041	301,474
30	74.99	29.37	62.61	*	0.0005	292,757
<b>ARITHMETIC MEAN</b>						
	69.62	29.45	58.65	*	0.0017	402,499
<b>MAXIMUM</b>						
	84.68	29.63	62.61	*	0.0289	699,140
<b>MINIMUM</b>						
	51.89	29.06	53.92	*	-0.0288	173,101
<b>MEDIAN</b>						
	72.65	29.46	58.86	*	0.0005	380,651

**Notes:** 1. "L" denotes system failure due to lightning strike.  
2. \* Data not available.



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

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

**SELECTED RADON DATA REPORT**

MONTH: JUNE, 1993

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	K-65, NW	K-65, SW	K-65, NE	K-65, SE
	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)
06/01/93	1.5	1.5	2.1	1.9
06/02/93	1.6	2.1	1.6	1.8
06/03/93	1.2	1.7	0.8	0.8
06/04/93	1.9	2.2	0.9	0.8
06/05/93	0.9	0.8	1.6	1.0
06/06/93	1.4	1.4	2.9	1.5
06/07/93	1.7	1.7	5.9	3.2
06/08/93	1.0	1.0	2.4	1.1
06/09/93	0.7	0.6	1.4	0.7
06/10/93	0.8	0.9	1.1 &	0.8
06/11/93	1.4	1.3	2.3	1.2
06/12/93	1.6	2.0	1.8	1.4
06/13/93	1.4	1.5	2.5	1.4
06/14/93	1.8	1.7	3.4	1.7
06/15/93	1.1	0.9	3.0	1.7
06/16/93	1.4	1.3	2.0	1.4
06/17/93	1.5	1.4	2.4	1.7
06/18/93	1.8	1.5	2.9	1.7
06/19/93	1.4	1.1	4.7	1.3
06/20/93	1.5	1.6	6.3	1.8
06/21/93	0.8	0.8	1.8	1.1
06/22/93	1.2	1.3	2.5	1.5
06/23/93	1.7	1.8	2.3	8.9
06/24/93	1.2	1.2	1.8	12.3
06/25/93	0.9	0.7	1.2	0.8
06/26/93	1.0	1.0	2.6	1.4
06/27/93	1.8	1.5	5.1	2.1
06/28/93	1.4	1.2	2.6	1.3
06/29/93	1.0	1.2	1.4	1.0
06/30/93	1.6	1.5	1.3	1.1

	K-65, NW	K-65, SW	K-65, NE	K-65, SE
	(pCi/L)	(pCi/L)	(pCi/L)	(pCi/L)
<b>AVERAGE</b>	1.3	1.3	2.5	2.0
<b>MAXIMUM</b>	1.9	2.2	6.3	12.3
<b>MINIMUM</b>	0.7	0.6	0.8	0.7
<b>MEDIAN</b>	1.4	1.3	2.3	1.4
<b>STD. DEV.</b>	0.3	0.4	1.4	2.4

NOTES: 1. "&" indicates partial data loss due to instrument malfunction.

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

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

K-65 SILO REPORT  
RADON CONCENTRATIONS

MONTH: JUNE, 1993

REPORT GENERATED: 07/02/93

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

Date	SILO 1				SILO 2			
	Average	Maximum	Minimum	Std. Dev.	Average	Maximum	Minimum	Std. Dev.
06/01/93	506816	996460	300140	195643	2364236	3254170	1915830	196649
06/02/93	537913	1020470	300140	182035	2361372	3070830	1824170	185713
06/03/93	619451	1092500	300140	221887	2569022	4005830	1970830	281545
06/04/93	654448	1188540	300140	263948	2356351	2887500	1219170	321601
06/05/93	430400	1212560	300140	215638	2321530	2997500	1585830	224485
06/06/93	665305	1068490	300140	258892	2368629	2869170	1879170	110364
06/07/93	699140 M	1068490	219803	186803	2440833 M	2557500	2245830	64557
06/08/93	380651	735109	104282	181008	M	N/A	N/A	N/A
06/09/93	305300	696432	24753	191046	M	N/A	N/A	N/A
06/10/93	391044	628241	101641	178247	2138135 M	2277113	1237783	180042
06/11/93	427912	609695	65597	176738	2235939	2315549	1917858	49654
06/12/93	306137	543484	35758	159805	2215754	2320255	1625669	95658
06/13/93	385021	553723	61061	152426	2312152	2425365	2037479	58478
06/14/93	387775	568373	23485	122137	2334244	2473213	208258	278032
06/15/93	L	N/A	N/A	N/A	L	N/A	N/A	N/A
06/16/93	420798	537626	83256	139948	2474320	2550020	2310580	32002
06/17/93	340987	541989	44829	158179	2466587	2573960	2071140	70594
06/18/93	320831	486844	92438	106547	2439361	2621850	1257050	171026
06/19/93	407621	571321	74096	124055	2567394	2693680	2214810	95330
06/20/93	366171	574210	65597	147395	2625093	2789460	2238750	119301
06/21/93	173101	545637	8040	130605	2509115	2789460	1640150	222947
06/22/93	338987	558821	32528	186708	2719039	2813400	2550020	45016
06/23/93	305029	544202	18945	187562	2687115	2789460	2406360	66107
06/24/93	323360	531776	68214	135146	2609712	2789460	1257050	269951
06/25/93	311311	521587	67573	121308	2576207	2813400	1807760	199664
06/26/93	329588	586028	35070	168561	2747888	2861290	2550020	58987
06/27/93	340211	632691	81969	155049	2718291	2909180	2023250	151958
06/28/93	402916	664821	74096	177907	2751961	2981010	1807760	175127
06/29/93	301474	632691	55839	158440	2796887	2957060	2406360	89081
06/30/93	292757	722907	28612	191163	2686199	2957060	2023250	169002

Grab Samples of Headspace

Date	SILO 1 Concentration	SILO 2 Concentration
06/03/93	1107000	2672000
06/10/93	767000	3109000
06/11/93	769000	2860000
06/14/93	816000	3276000
06/17/93	730000	3151000
06/22/93	738000	3276000
06/25/93	545000	2506000

- Notes:
1. All values reported in pCi/L.
  2. "L" denotes system failure due to lightning strike.
  3. "M" denotes incomplete data due maintenance on system.

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

**PERIOD ENDING JUNE 30, 1993**

**ENCLOSURE D**

**DRILLING/BORING LOGS**



# VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	0305	PROJECT NAME	OU 2 - IFP
BORING NUMBER	250	COORDINATES	
ELEVATION:		GWL: Depth	Date/Time
ENGINEER/GE	J. Keagan	Depth	Date/Time
DRILLING METHOD	ollow stem auger		DATE COMPLETED
			6/7/93
		PAGE	2 OF 6

DEPTH (F)	SAMPLE TYPE & NO	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (psi)	REMARKS
8	NA	6	Very stiff, 10XR 5/4, silty clay, low plasticity, moist	cl	2.0	
	NA	6	SAA	cl	2.5	B <sub>s</sub> = 80cpm
9	NA	0	NA			Mt = 1.5ppm
	NA	0	NA			
	NA	0	NA			
10	116450 1615 6/3/93	6	Very stiff, 10XR 4/4, silty fine sand, low plasticity, very moist	ml	2.0	B <sub>s</sub> = 60-80cpm
	116451 1615 6/3/93	6	SAA	ml	2.0	Mt = 1.5ppm
	116452 1615 6/3/93	6	SAA	ml	2.0	
	116453 1615 6/3/93	6	SAA	ml	2.0	
11	NA	6	SAA	ml	2.5	B <sub>s</sub> = 60cpm
	NA	6	SAA	ml	2.5	Mt = 1.5ppm
12	NA	6	Very stiff, 10XR 5/1, silty clay, medium plasticity, moist	cl	2.5	
	NA	6	SAA	cl	2.5	
13	NA	0	NO Recovery	NA	NA	B <sub>s</sub> = NA
	NA	0	NO Recovery	NA	NA	Mt = NA

PRIMARY

NOTES

Drilling: Pennsylvania Drilling  
 Drilling: Acker Soil Sentry  
 Driller: J. Raab  
 J. Davis

SAA - Same as above  
 NA - Not Applicable  
 Mt - microtip

Samples collected per ASTM standards  
 Colors identified using Munsell Color Chart

# VISUAL CLASSIFICATION OF SOILS

PROJECT NO.	2.03.05	PROJECT NAME.	OUZ-IFP
BORING NO.	050	COORDINATES.	
ELEVATION		GWL: Depth	Date/Time
ENGINEER/	J. Reagan	Depth	Date/Time
DRILLING M.	Hollow stem auger		
		PAGE	3 OF 6

DEPTH (F)	SAMPLE	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (SI)	REMARKS
5	N	0	No recovery			
6	N	0	No recovery			
6.75	1162	6	Very dense 10x25% poorly graded sand, low plast. cont. moist	SP	NA	B <sub>8</sub> - 60cpm Mt = 0.5ppm
7	1164	6	SAA	SP	NA	
7.5	1001	6	SAA	SP	NA	
8	1166	6	SAA	SP	NA	
18	101		End of Boring 18'			
19						
20						

PRELIMINARY

NOTES  
Drilling  
Drilling  
Driller

for Pennsylvania Drilling  
Acker soil sentry  
Laab  
W. Seibert

SAA - Same as above 74  
NA - Not Applicable  
Mt - Microtop

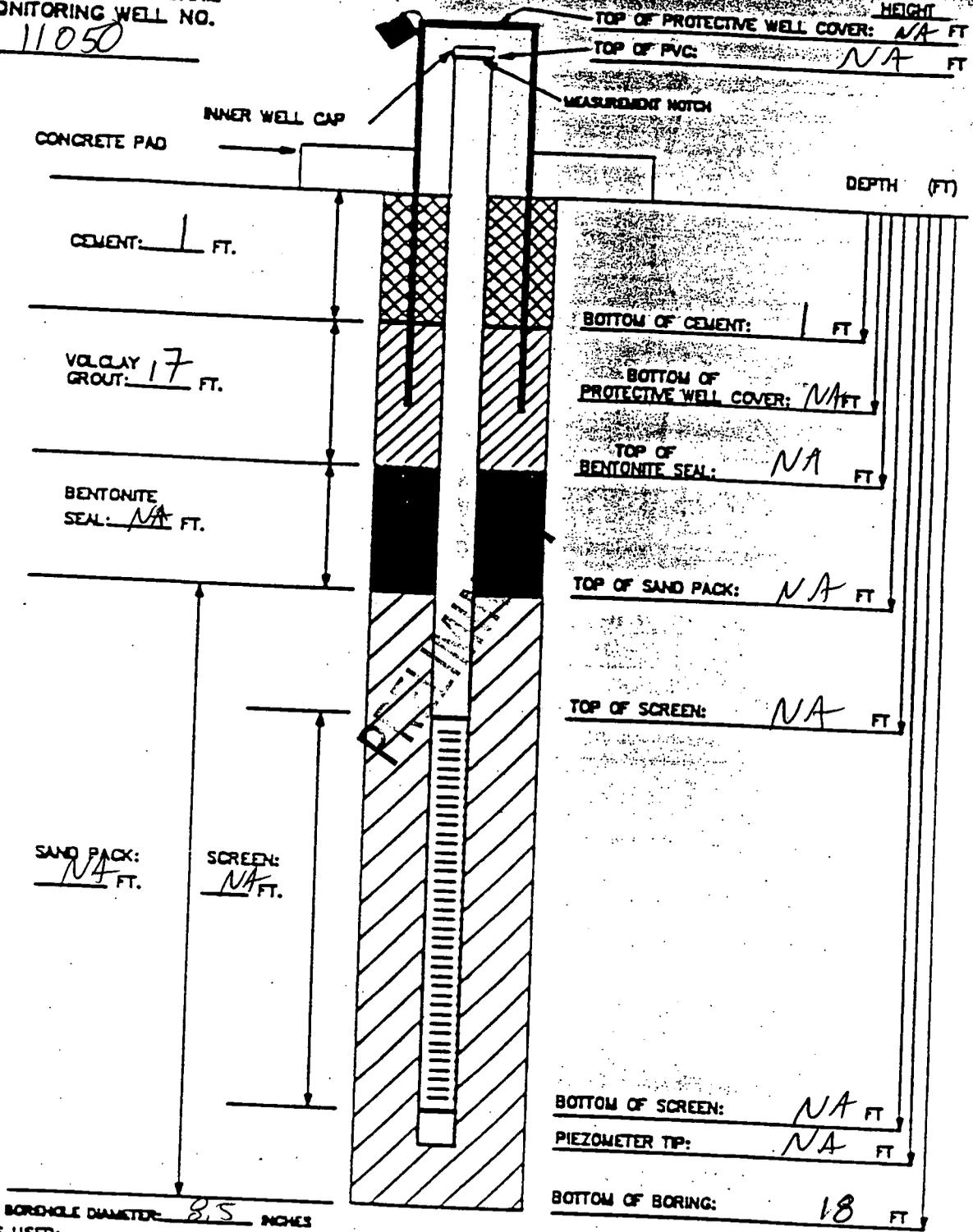
Samples collected per ASTM standard procedures  
Colors identified using Munsell Color Chart

# FERNALD RI/FS

INSTALLATION DIAGRAM  
MONITORING WELL NO.

11050

INSTALLATION DATE: 4-86  
4626-677  
6/13-6/15



MATERIALS USED:  
 PIPE TYPE AND QUANTITY: NA  
 BENTONITE PELLETS (5-GALLON BUCKETS): NA  
 BAGS OF VOLCLAY GROUT: 2  
 POUNDS OF CEMENT: 1/2  
 GALLONS OF WATER USED: 10 gal  
 OTHER: NA

- NOTES:
- 1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLASH-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 PLUG.
  - 4) WATER DEPTH/DATE:

TASK: 20.03.05

GEOLOGIST/ENGINEER: J. Regan

FER  
RI

46586

### PIEZOMETER INSTALLATION SHEET

PROJ  
PRCJ  
BORIN  
PIEZO  
BORE

OUZ-IFP

FIELD ENG./GEO. J. Reagan

DATE 6/4

20.03.05

CHECKED BY

DATE

11050

NO. NA

DATE OF INSTALLATION

6/3-6/7/93

DRILLING

DI  
D

METHOD Hollow stem auger

TYPE OF BIT auger

FLUID(S) USED:

CASING SIZE (S) USED:

NA FROM NA TO NA

SIZE NA FROM NA TO NA

NA FROM NA TO NA

SIZE NA FROM NA TO NA

PIEZO

DESCRIPTION

TO  
DI  
PE  
A  
TO

NA

RISER PIPE MATERIAL NA

PERFORATED SECTION NA

RISER PIPE DIAMETERS:

IN TYPE:

O.D. NA I.D. NA

HOLES

SCREEN

LENGTH OF PIPE SECTIONS NA

SIZE OF PERFORATIONS NA

JOINING METHOD NA

PERFORATED AREA NA

PROT

SYSTEM

R  
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EFFECTIVE PIPE LENGTH NA

OTHER PROTECTION NA

PIPE O.D. NA

DEPTH	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION	
TOP OF PIPE	NA		NA	
GROUND SURFACE	0.0		↓	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BORE HOLE MATERIALS:	TOP	BOTTOM	TCP	BOTTOM
	TOP 0	BOTTOM 1	NA	BOTTOM
	TOP NA	BOTTOM NA	↓	BOTTOM
	TOP NA	BOTTOM NA	↓	BOTTOM
	TOP NA	BOTTOM NA	↓	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZO	NA		NA	
BOTTOM OF HOLE	18.0		NA	
GWL AT INSTALLATION	NA		NA	

WAS THE  
WAS A SE  
REMARKS

REFLUSHED AFTER INSTALLATION?

YES

NO

TEST PERFORMED ON THE PIEZOMETER?

YES

NO

076

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2102264	COORDINATES:
ELEVATION: 3 87 5-1-93	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: B. Yehudlev	Depth Date/Time
DRILLING METHODS: Cable Tool	PAGE 1 OF

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 in	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (11%)	REMARKS
0.0	1600 118222 S-11-93	2 3 3	6	Stiff, 10YR (3/2) v. dk gray-sh brown, s. lty clay, low plasticity, dry	OL	1.5	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
	1600 118223 S-11-93	SAA	6	Stiff, 10YR (5/4) yellowish brown, s. lty clay, med. plast., moist	CL	1.5	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
	-	-	-	No Recovery	-	-	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
1.5	1607 118224 S-11-93	4 4 4	6	Stiff, 10YR (5/4) y. brown, 10YR (6/8), s. lty clay, med. plast., moist	CL	2.0	B <sub>γ</sub> : 30-50cpm H <sub>N</sub> U: 0 ppm
	1607 118225 S-11-93	SAA	6	SAA	CL	2.0	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
	1607 - S-11-93	SAA	0	No Recovery	-	-	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
	1609 118226 S-11-93	7 8 7	6	Stiff, 10YR (5/4) yellowish brown, silty clay, med. plast., wet	CL	2.0	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
3.0	1609 118227 S-11-93	SAA	6	Med. dense, 10YR (5H) yellowish brown, clayey s. lt, low plast., wet	ML	-	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
	1609 118228 S-11-93	SAA	1	SAA	ML	-	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm
	1617 118229 S-11-93	5 7 9	6	Med. dense, mottled 10YR (5/4 & 3/6) y. brown silt, low plast., moist	ML	-	B <sub>γ</sub> : 60-80cpm H <sub>N</sub> U: 0 ppm

PRELIMINARY

NOTES:  
 Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cable Tool  
 Driller: Jim Sullivan  
 Helper: Lois Chelton  
 SAA = Same As Above  
 N/A = Not Applicable  
 Background = 60-80cpm  
 \* Samples collected per ASTM Standard Penetration Test.  
 \* All colors identified by the Munsell Color Chart.

### VISUAL CLASSIFICATION OF SOILS

2.03.22	PROJECT NAME: CRU-5 Additional Wells	
U 21020	COORDINATES:	DATE: 5-11-93 5-2-93
64 <sup>09</sup> 6-3-93	GWL: Depth Date/Time	DATE STARTED: 5-11-93
3. Yeardeley	Depth Date/Time	DATE COMPLETED: 5-20-93
Cable Tool		PAGE 2 OF

SAMPLE TOTAL  
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DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISS)	REMARKS
Stiff, moist 10YR (5/4 & 6/4) y. brown and b. yellow, silty clay, med. plasticity, moist	CL	2.0	B <sub>8</sub> : 60-80cpm HNU: 0
SAA	CL	2.0	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
Stiff, 10YR (5/4 & 6/4) b. yellow to brown, silty clay, med. plasticity, moist	CL	1.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
v. Loose, 10YR (5/10) yellow to brown, clayey s.H., med. plasticity, moist	ML	-	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
Stiff, 10YR (5/4) yellow to brown, silty clay, med. plasticity, moist	CL	1.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
Stiff, 10YR (5/4 & 6/5) brown yellow silty clay, med. plasticity, moist ↑ yel. brown	CL	1.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
v. Stiff SAA	CL	3.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
Stiff SAA	CL	1.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
SAA	CL	1.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm
SAA, 5Y (5/1) gray	CL	1.5	B <sub>8</sub> : 60-80cpm HNU: 0 ppm

Contractor: Pennsylvania Drilling  
 Equipment: Cable Tool  
 Driller: Jim Sullivan  
 Helper: Jeff Cherkov  
 Tested per ASTM Standard Penetration Test.  
 Identified by the Munsell Color Chart.

SAA = Same As Above  
 N/A = Not Applicable  
 Background = 60-80cpm

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2102064	COORDINATES:
ELEVATION: By 6-3-93	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: B. Yearley	DATE: 5-12-93
DRILLING METHODS: Cable Tool	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 3 OF

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.6 in	RECOVERY in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (1st)	REMARKS
10.5	0950 119240 5-12-93	3 3 3	3	Stiff, 5Y(S11) Gray clay, med. plasticity, wet s.lty	CL	1.0	B <sub>8</sub> : 30-70cpm HNU: 0ppm
	0900 119241 5-12-93	2 2 3	6	m. Stiff, 5Y(S11) Gray clay, med. plast, wet s.lty	CL	<1.0	B <sub>8</sub> : 50-70cpm HNU: 0ppm
	0900 119242 5-12-93	2 2 3	6	Loose, 5Y(S11) Gray clayey s.lty, low plasticity, wet	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm
120	0900 119243 5-12-93	SAA	4	SAA	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm
	0955 119244 5-12-93	2 3 4	6	SAA	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm
	0955 119245 5-12-93	SAA	2	SAA	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm
135	0955 - 5-12-93	SAA	0	No Recovery			B <sub>8</sub> : 50-70cpm HNU: 0ppm
	1000 119246 5-12-93	8 10 10	6	Med. Dense, 5Y(S12) Olive gray, clayey s.lty, low plasticity, wet	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm
	1000 119247 5-12-93	SAA	6	SAA	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm
150	1000 119248 5-12-93	SAA	2	SAA Same, By, 5-14-93 SAA	ML	-	B <sub>8</sub> : 50-70cpm HNU: 0ppm

PRELIMINARY

NOTES:  
 Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cable Tool  
 Driller: Jim Sweeney  
 Helper: Jeff Sheehan  
 \* Samples collected per ASTM Standard Penetration Test.  
 \* All colors identified by the Munsell Color Chart.  
 SAA = Same As Above  
 N/A = Not Applicable  
 Background = 50-70cpm

**BERNARD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2102064	COORDINATES:
ELEVATION: 310.0-93	DATE: 5-12-93
ENGINEER/GEOLOGIST: B. Yeardeley	GWL: Depth Date/Time
DILLING METHODS: Cable Tool	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 4 OF

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (pcf)	REMARKS
1015	118249	4	6	V. Stiff, 54(S12) olive gray, silty clay, med. plasticity, moist	CL	225	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1015	119250	SAA	6	V. Stiff 54(S12) olive gray, clay, med. plasticity, moist	CL	225	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1015	119251	SAA	3	V. Stiff 54(S12) olive gray, clay, med. plasticity, moist	CL	225	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1030	119252	7	23	Dense, 54(S12) olive gray, silty clay, low plasticity, moist	ML	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1030	118253	SAA		Dense, 54(S13) olive gray, silty sand, poorly graded	SP	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1030	118254	SAA		SAA	SP	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1050	119255	15	6	SAA	SP	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1050	119256	SAA	6	SAA	SP	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1050	118257	SAA	5	SAA	SP	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm
1055	118258	28	6	SAA	SP	NA	B <sub>8</sub> : 50-70 cpm H <sub>NU</sub> : 0 ppm

Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cable Tool  
 Driller: Jim Saccani  
 Helper: Jeff Cherkhan  
 SAA = Same As Above  
 N/A = Not Applicable  
 Background = 50-70 cpm  
 Samples collected per ASTM Standard Penetration Test.  
 All colors identified by the Munsell Color Chart.

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: <b>50.0322</b>	PROJECT NAME: <b>CRU-5 Additional Wells</b>		
BORING NUMBER: <b>MW 2102064</b>	COORDINATES:	DATE: <b>5-14-93</b>	
ELEVATION: <b>146.83-93</b>	GWL: Depth	Date/Time	DATE STARTED: <b>5-11-93</b>
ENGINEER/GEOLOGIST: <b>B. Yearley</b>	Depth	Date/Time	DATE COMPLETED: <b>5-20-93</b>
DRILLING METHODS: <b>Cable Tool</b>	PAGE <b>5</b>		OF

Totals

DEPTH ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.6m	RECOVERY in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (%)	REMARKS
21.0	1055 118259 5-12-93	2 9 7	6	M. Dense, 2.5 YL(SH) H olive Brown, fine sand, poorly graded, wet last 2" clay silt.	SP MC	NA	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
	1055 5-12-93	2 8 7	0	No Recovery	-	-	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
22.5	1100 118260 5-12-93	3 5 18	6	M. Dense, 2.5 Y(SH) H. olive brown, fine to med. sand, well graded, wet	SW	NA	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
	1100 118261 5-12-93	SAA	6	M. Dense, 2.5 Y(SH) H. olive brown, clayey silt, low plasticity, wet	ML	NA	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
24.0	1100 118262 5-12-93	SAA	6	Stiff, 5Y(S11) Gray, silty clay w/ gravel, med. plastic, moist	CL	1.25	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
	1110 118263 5-12-93	27 28 42	6	Stiff, 5Y(S11) Gray, silty, gravelly clay, med. plastic, moist	CL	1.25	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
24.0	1110 118264 5-12-93	SAA	6	Hard, 5Y(S11) Gray, silty, gravelly clay, med. plasticity, moist	CL	74	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
	1110 118265 5-12-93	SAA	6	SAA	CL	74	$\beta \gamma$ : 50-70 cpm HNU: 0 ppm
24.0	0910 118266 5-13-93	35 65 70	5	V. Dense 10 YR (S13) brown, fine sand, poorly graded, dry	SP	NA	$\beta \gamma$ : 40-60 cpm HNU: 0 ppm
	0810 118267 5-13-93	SAA	4	V. Dense 10 YR (S13) brown, fine sand, poorly graded, dry	SP	NA	$\beta \gamma$ : 40-60 cpm HNU: 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cable Tool  
 Driller: Jim Sacca  
 Helper: Jeff Chechan

SAA = Same As Above  
 N/A = Not Applicable

Background = 50-70 5-12-93  
 40-60 5-13-93

- \* Samples collected per ASTM Standard Penetration Test.
- \* All colors identified by the Munsell Color Chart.

# VISUAL CLASSIFICATION OF SOILS

5.03.22 PROJECT NAME: CRU-5 Additional wells  
 W 2102064 COORDINATES: DATE: 5-13-93  
 6-5-93 84 GWL: Depth Date/Time DATE STARTED: 5-11-93  
 3 Yearcley Depth Date/Time DATE COMPLETED: 5-20-93  
 able Tool PAGE 6 OF

DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (18%)	REMARKS
V. Dense, 257 (S4) Brown, fine sand, poorly graded, dry	SP	NA	B <sub>8</sub> = 40-60 cpm H <sub>NU</sub> = 0 ppm
Go to five foot sampling			B <sub>8</sub> = H <sub>NU</sub> =
			B <sub>8</sub> = H <sub>NU</sub> =
			B <sub>8</sub> = H <sub>NU</sub> =
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			B <sub>8</sub> = H <sub>NU</sub> =

LIBRARY

Contractor: Pennsylvania Drilling  
 Equipment: Cable Tool  
 Driller: Jim Scaroni  
 Helper: Lefty Cherkov  
 Tested per ASTM Standard Penetration Test.  
 Certified by the Munsell Color Chart.

SAA = Same As Above  
 N/A = Not Applicable  
 Background = 40-60 cpm

082

**FERNALD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2102064 <small>By 6-2-93</small>	COORDINATES:
ELEVATION:	DATE: 5-13-93
ENGINEER/GEOLOGIST: B. Yeardley	GWL: Depth Date/Time
DRILLING METHODS: Cable Tool	DATE STARTED: 5-18-93
	DATE COMPLETED: 5-20-93
	PAGE 7 OF

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.6m	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (15F)	REMARKS
30.0	0930 118269	21 32	14	V. Dense, 10YR (5/3) Brown, fine to coarse sand, well graded, dry	SW		
31.5	5-13-93	40		V. Dense, 10YR (5/3) Brown, med. sand, well graded, dry	SW	NA	$\beta_8 = 40-60 \text{ cpm}$ Micro = 0 ppm
35.0	0910 119270	34 61	14	V. Dense, 10YR (5/3) Brown, fine to med sand w/ minor gravel, well graded, dry	SW		
36.5	5-13-93	73		sand, poorly graded, dry	SP	NA	$\beta_8 = 40-60 \text{ cpm}$ Micro = 0 ppm
40.0	0930 118271	9 23	14	V. Dense, 10YR (5/3) Brown, fine to coarse sand w/ gravel, well graded, dry	SW	NA	$\beta_8 = 60-80 \text{ cpm}$ Micro = 0 ppm
41.5	5-13-93	34					

PRIMARY

NOTES

Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment : Cable Tool  
 Driller : Jim Sacconi  
 Helper : Teff Checkan

SAA = Same As Above  
 N/A = Not Applicable  
 Background = 40-60cpm

\* Samples collected per ASTM Standard Penetration Test.  
 \* All colors identified by the Munsell Color Chart.

**FERNALD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2107064 BY 6-3-93	COORDINATES:
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: B. Yeardley	DATE: 5-13-93
DRILLING METHODS: Cable Tool	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 8 OF

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6" (bl)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISPT)	REMARKS
45.0	1010 114977	28 4	15	10 BAX 5-17-93 V. Dense, 2.54R S13 Brown, fine to coarse sand w/ gravel, well graded, dry	SW		B <sub>8</sub> = 40-60 cpm M <sub>u0</sub> = 0 ppm
46.5	5-13-93	32					
50							
51.5	1020 114978	27 33 34	17	SAA	SW	N/A	B <sub>8</sub> = 40-60 cpm M <sub>u0</sub> = 0 ppm
55.0	1100 114979	70 35/3	8	V. Dense, 10.4R (S13) Brown, fine to med sand well graded, dry	SW		B <sub>8</sub> = 40-60 cpm micro = 0 ppm
51.5	5-13-93			V. Dense, 10.4R (S13) Brown, fine to coarse sand w/ gravel (coarse), well graded	SW		

PRIMARY

water table

NOTES  
 Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cable Tool  
 Driller: Jim Saciani  
 Helper: Teff Cheekan  
 Samples collected per ASTM Standard Penetration Test.  
 All colors identified by the Munsell Color Chart.

SAA = Same As Above  
 N/A = Not Applicable  
 Background = 40-60 cpm

084

**FERNALD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2102064	COORDINATES:
ELEVATION: 83y 6-3-93	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: B. Yearley	DATE: 5-13-93
DRILLING METHODS: Cable Tool	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 9 OF

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
60.0	1115 118480	5	17	M. Dense, 2.5-7(5/4) 1/4 ol. brown-fine sand w/ minor gravel, poorly graded, wet	SP	NA	B <sub>g</sub> = 60-80 cpm micro = 0 ppm
61.5	5-13-93	5/12					
63.0							
66.5	1600 118991	12	14	SAA	SP	NA	B <sub>g</sub> = 60-80 cpm micro = 0 ppm
	5-13-93			Hydroponic @ 65.0 # 118483 1545			
70.0	1680 118982	12	14	Dense, 2.5-7(5/4) olive brown fine sand, poorly graded to fine gravel, well graded to fine sand w/ some gravel, wet	Sp Gw Sw	NA	B <sub>g</sub> = 60-80 cpm micro = 0 ppm
71.5	5-13-93	26					
				set Hydropond @ 74.0 Sample # 118985			

PRIMARY

NOTES:  
 Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment : Cable Tool  
 Driller : Jim Saccani  
 Helper : Jeff Cheekan  
 SAA = Same As Above  
 N/A = Not Applicable  
 Background = 60-80 cpm  
 \* Samples collected per ASTM Standard Penetration Test.  
 \* All colors identified by the Munsell Color Chart.

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NO. 25 03 22	PROJECT NAME: CRU-5 Additional Wells
BORING NO. U 2102064 By 6-3-93	COORDINATES:
ELEVATION	GWL: Depth Date/Time
ENGINEER B. Yerdley	DATE: 5-14-93
DRILLING Cable Tool	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 10 OF

DEPTH	SAMPLE
75.0	151
	1189
76.5	54
80	153
	1189
81.5	57
85.0	104
	1189
86.5	57

RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (list)	REMARKS
16	Dense, 2.57(SH) H. olive brown, fine to coarse sand w/ some gravel, well graded, wet	SW	MA	$\beta_8 = 30$ cpm Micro = 0 ppm
15	Dense, 2.54(SH) H. olive brown, fine sand w/ minor gravel, poorly graded, wet dense, fine to coarse sand w/ some gravel, well graded, wet Set Hydro punch @ 84.0, Sample # 18986	SP GW	MA	$\beta_8 = 40-60$ cpm Micro = 0 ppm
16	Dense, 2.54(SH) H. olive brown, coarse sand, poorly graded, wet to a fine-coarse sand w/ some gravel, well	SP SW	MA	$\beta_8 = 40-60$ cpm Micro = 0 ppm

MAY

**NOTES**

Dr  
Dri  
\* Sampl.  
\* All cc

Contractor: Pennsylvania Drilling  
 Equipment: Cable Tool Rig, 5-14-93  
 Driller: Tom Saccani, G. Coulter  
 Helper: Teff Checklan  
 Tested per ASTM Standard Penetration Test. 5-15-93, 40-60 cpm  
 Identified by the Munsell Color Chart.

SAA = Same As Above  
 N/A = Not Applicable  
 Background = 40-60 cpm

**FERNALD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 05.03.22	PROJECT NAME: CRU-5 Additional Wells
BORING NUMBER: MW 2102064	COORDINATES:
ELEVATION: 1875-1543	DATE: 5-15-93
ENGINEER/GEOLOGIST: B. Yeardeley	GWL: Depth Date/Time
DRILLING METHODS: Cable Tool	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 11 OF

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
90.0	1100 118989	7 12	16	Dense, 2.54(5/16) ft. olive brown, fine sand w/ gravel (minor), poorly graded, wet	SP	NA	BY = 60-80 cpm Micro = 0 ppm
91.5	57543	20		Hydropunch sample taken @ 94.0 Sample # 118990			
95.0	1440 118991	27 30	18	Vy Dense, 2.54(5/16) ft. olive brown fine sand, poorly graded	SP	NA	BY = 40-60 cpm Micro = 0 ppm
96.5	57543	36					
100.0	1500 118992	19 24	18	Vy Dense, 2.54(5/16) ft. olive brown, fine to coarse gravelly sand, well graded, wet - some oxidat. streaks	SW	NA	BY = 40-56 cpm Micro = 0 ppm
101.5	5-1543	17		Hydropunch taken @ 104.0 Sample # 118993			

PRELIMINARY

NOTES:  
 Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cable Tool  
 Driller #5: Jim Sarisani JOE BARILE  
 Helper #5: Jeff Christian MARK REIBOW  
 SAA = Same As Above  
 N/A = Not Applicable  
 Background = 40-60cpm  
 \* Samples collected per ASTM Standard Penetration Test.  
 \* All colors identified by the Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT #
BORING NO.
ELEVATION
ENGINEER
DRILLING

50322	PROJECT NAME: CRU-5 Additional Wells
12102064	COORDINATES:
210 SWEDER #8 3.0m 12.0 5-16-93	GWL: Depth Date/Time
Cable Tool	DATE: 5-16-93
	DATE STARTED: 5-11-93
	DATE COMPLETED: 5-20-93
	PAGE 12 OF

DEPTH	SAMPLE
105.5	1187
106.5	5-16
10.0	101
111.5	5-16
115.0	144E
HS 5-16-93	11899
116.5	11899
	5-16

DEPTH	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
2	DENSE, 2.5(4/2) DARK GRAYISH BROWN FINE SAND WITH GRAVEL, WELL GRADED, WET.	SW	NA	BS = 50-70 CPM micro = 0 PPM
1	DENSE, 5(3.2) DARK OLIVE GRAY FINE TO MEDIUM GRAVELY SAND, POORLY GRADED, WET.	SP	NA	BS = 50-70 CPM micro = 0 PPM
	MEDIUM DENSITY 5(2.5/2) BLACK MEDIUM GRAVELY SAND, POORLY GRADED, WET	SP	NA	BS = 50-70 CPM micro = 0

PRELIMINARY

NOTES:

Dr.  
Dri

Contractor: Pennsylvania Drilling

Equipment: Cable Tool

Driller: HS Jim Sargent, JOE BAKILE

Helper: HS Jeff Chretien, MARTY WATRAL

Tested per ASTM Standard Penetration Test.

Identified by the Munsell Color Chart.

SAA = Same As Above  
N/A = Not Applicable

Background = 40-70 CPM

- \* Sample
- \* All cc

N&E  
/F&E

### VISUAL CLASSIFICATION OF SOILS

NUM:	20322	PROJECT NAME:	CRU-5 Additional Wells
NUM:	21064	COORDINATES:	DATE: 5-16-93, 5-17-93
DN:		GWL: Depth	Date/Time
R/G/E:	Yearley	Depth	Date/Time
MET:	Cable Tool		DATE COMPLETED: 5-20-93
			PAGE 13 OF

TYPE & NO	DEPTH (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
00 998 643	6	Loose, 2.54 (3/16) in. olive brown, fine to medium sand, poorly graded, wet	SP	NA	β <sub>s</sub> = 40-60 cpm micro = 0 ppm
		Hydropunch @ 124 ft, 118699 Time 0900			
150 200 42		Drilled to 125.0 ft. Med. dense, 2.54 (3/16) in. olive brown, fine sand, poorly graded, wet	SP	NA	β <sub>s</sub> = 40-60 cpm micro = 0 ppm

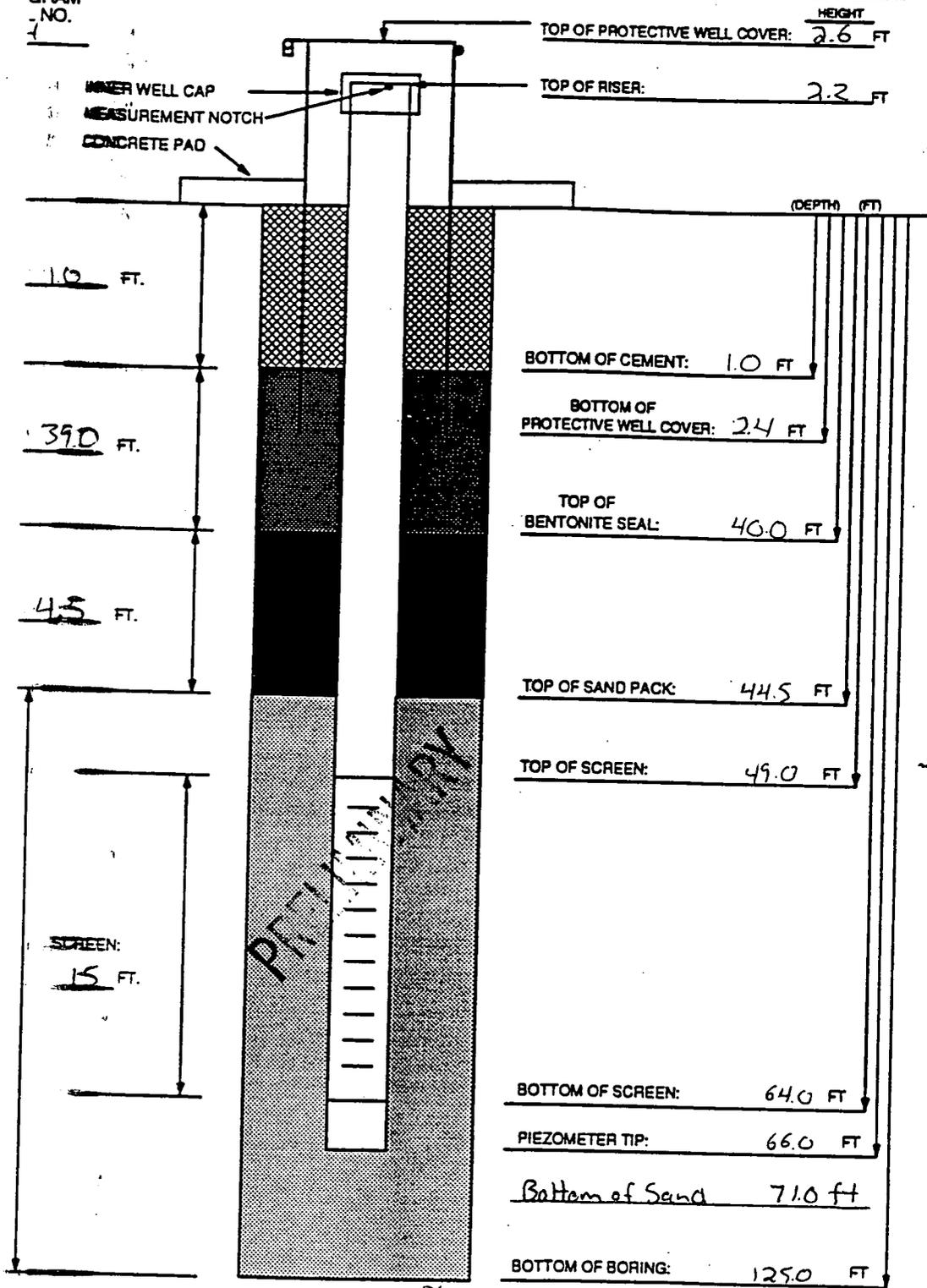
Contractor: Pennsylvania Drilling SAA = Same As Above  
 Equipment: Cable Tool N/A = Not Applicable  
 Driller: Jim Saccani  
 Helper: Jeff Chekan Background = 40-60 cpm  
 Tested per ASTM Standard Penetration Test.  
 Identified by the Munsell Color Chart.

089

FES  
INST.  
MON.

/FS  
GRAM  
-NO.

INSTALLATION DATE: 5-11-93 to 5-20-93



**MATERIALS USED**

SAND TYPE AND QUANTITY  
 BENTONITE PELLETS: \_\_\_\_\_  
 BAGS OF VOLCLAY CEMENT: \_\_\_\_\_  
 AMOUNT OF CEMENT: \_\_\_\_\_  
 AMOUNT OF WATER: \_\_\_\_\_  
 OTHER: 150  
 TASK: SC

**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 53.3 FT / 5/24
  - 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: B. Yeardley

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME CRV-5 Additional Wells FIELD ENG./GEO. B. Yearley DATE 5-24-93  
 PROJECT NO. 50.03.22 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 DRILLING NO. 21064  
 PIEZOMETER NO. 21064 DATE OF INSTALLATION 5-11-93 to 5-20-93

**BOREHOLE DRILLING**

DRILLING METHOD <u>Cable Tool</u>	TYPE OF BIT <u>Hammer Percussion Bit</u>
DRILLING FLUID(S) USED: FLUID <u>H<sub>2</sub>O</u> FROM <u>0.0</u> TO <u>54.0</u> FLUID <u>-</u> FROM <u>-</u> TO <u>-</u>	CASING SIZE (S) USED: SIZE <u>10 3/4 in</u> FROM <u>0.0</u> TO <u>125.0</u> SIZE <u>-</u> FROM <u>-</u> TO <u>-</u>

**PIEZOMETER DESCRIPTION**

TYPE <u>Monitoring Well</u>	RISER PIPE MATERIAL <u>316 Stainless Steel</u>
DIAMETER OF PERFORATED SECTION <u>40 in I.D.</u>	RISER PIPE DIAMETERS: O.D. <u>4 3/8 in</u> I.D. <u>40 in</u>
PERFORATION TYPE: SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>1-15 ft, 5-10 ft, 1-1 ft</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 in</u>	JOINING METHOD <u>Screw type - flush joint threaded</u>
TOTAL PERFORATED AREA <u>15.0 ft</u>	

**PROTECTION SYSTEM**

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.4			
BOREHOLE FILL MATERIALS: GROUT/SLURRY By 5-24-93 BENTONITE SAND GRAVEL - none used	TOP	0.0	BOTTOM	1.0
	TOP	1.0	BOTTOM	40.0
	TOP	40.0	BOTTOM	44.5
	TOP	44.5	BOTTOM	71.0
	TOP	NA	BOTTOM	NA
PERFORATED SECTION	TOP	49.0	BOTTOM	64.0
PIEZOMETER TIP	66.0 ft			
BOTTOM OF BOREHOLE	125.0			
WELL AFTER INSTALLATION	53.3			

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

REMARKS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# VISUAL CLASSIFICATION OF SOILS

PROJECT NUM	03-05	PROJECT NAME	042 Southfield
BORING NUM	030	COORDINATES	
ELEVATION:		GWL: Depth	Date/Time
ENGINEER/GE	Reagan/T. Lagne	Depth	Date/Time
DRILLING ME	ollow Stem Auger		
		PAGE	1 OF 24

DEPTH	SAMPLE TYPE & NO	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USC)	REMARKS
	n/a	Drilling to water Table	n/a	n/a	
10	n/a	Hard Drilling at 12' - 13.5' and 14' - 15'	n/a	n/a	
18.0		* Changed to Larger Drilling Rig Continued Drilling	n/a	n/a	
20			n/a	n/a	
30			n/a	n/a	
40			n/a	n/a	
50	1100	olive brown clay moist	CL	3.2	Some gravel & pebbles
52	16-1-93	(2.57 5/3) olive brown SAND, slightly moist	SP		Med-coarse brown, gravel & pebbles
	n/a		n/a	n/a	By = BG

PRELIMINARY

NOTES  
 Drilling C  
 Drilling E  
 Driller

Pennsylvania Drilling  
Golden Soil Sentry  
and  
Davis, Helgen

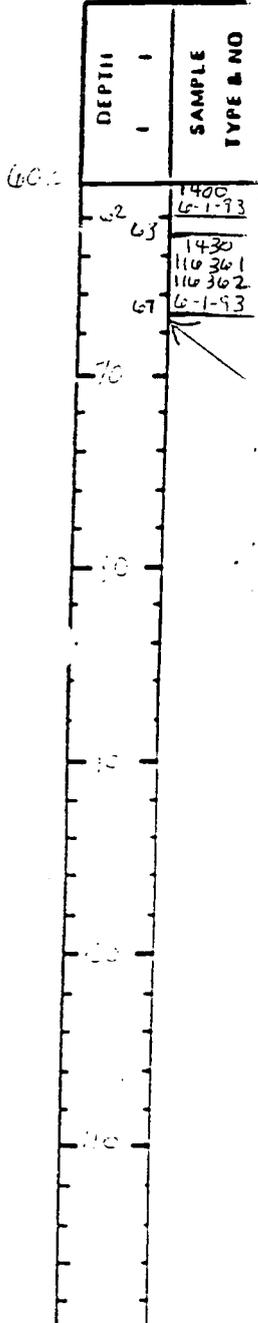
Background  $\rho_y = 40-80 \text{ cpm}$   
 SAA - Same as above  
 NA - Not Applicable

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

# VISUAL CLASSIFICATION OF SOILS

PROJECT NUM  
BORING NUM  
ELEVATION  
ENGINEER/GE  
DRILLING ME

03-05 PROJECT NAME. Old Southfield  
11030 COORDINATES.  
DATE 6-1-93  
GWL: Depth Date/Time DATE STARTED 5-28-93  
Depth Date/Time DATE COMPLETED 6-3-93  
PAGE 2 OF 24



DEPTH	SAMPLE TYPE & NO	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
63	1400 6-1-93	140	(4.5 Y 413) fine brown loose SAND med-coarse grain, well graded WET	SP	N/A	some gravel by = 20-30 cph
67	1430 110301 110302 6-1-93	N/A	Hydro-punch (Hydrocarbon Mode) Took Full Uranium Water Samples	U/A	N/A	
70			Bottom of casing 67'			

PRELIMINARY

NOTES  
Drilling Co  
Drilling E  
Driller

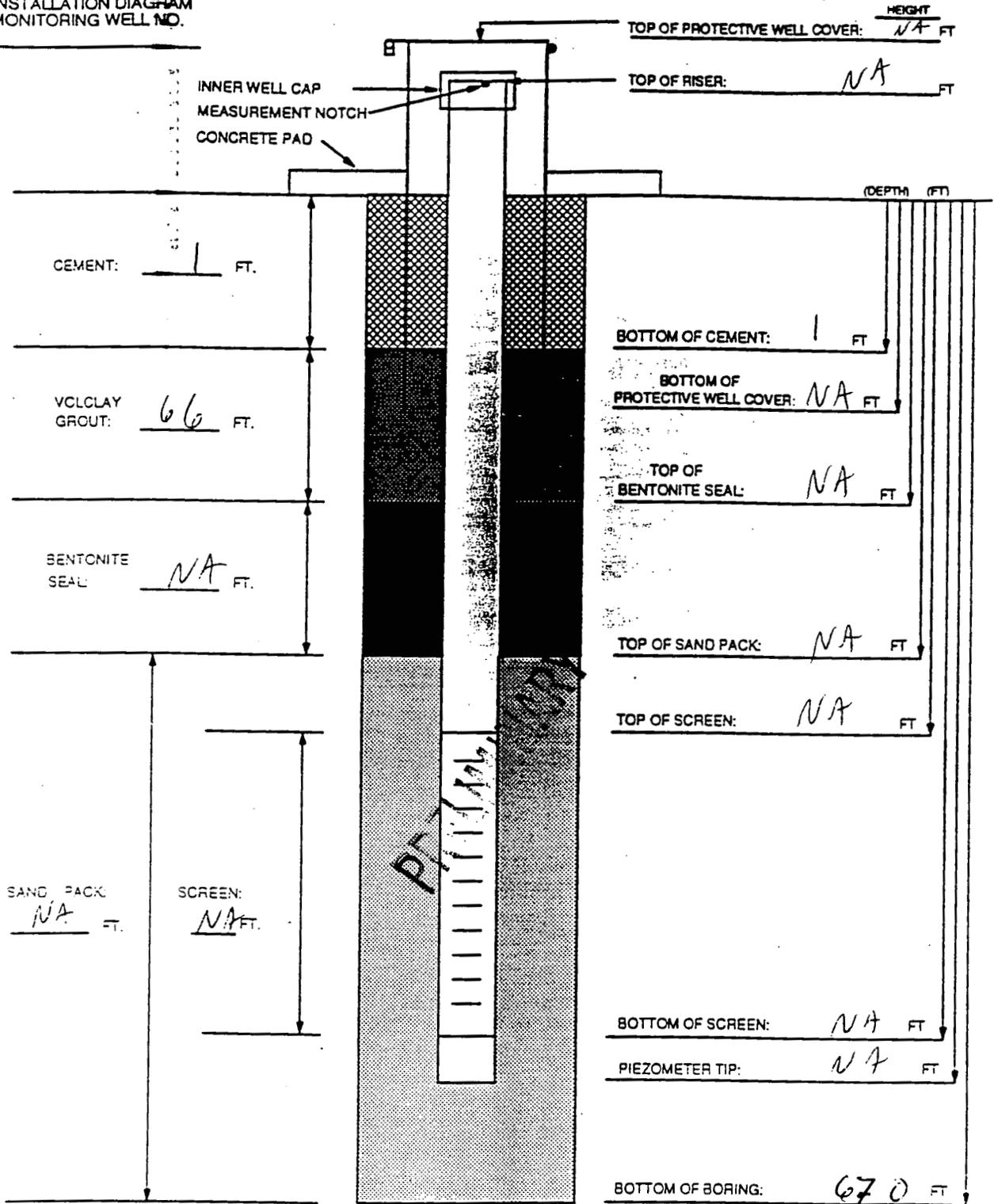
Pennsylvania Drilling  
Raab  
Stavis Helper

Background By = 40-80 cpm  
SAA - Same as above  
NA - Not Applicable

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

FERNALD RI/FS  
INSTALLATION DIAGRAM  
MONITORING WELL NO.

INSTALLATION DATE: 5/28-6/3/93



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA  
 BENTONITE PELLETS (5-GALLON BUCKETS): NA  
 BAGS OF VOLCLAY GROUT: 11  
 AMOUNT OF CEMENT: 1/2 bag  
 AMOUNT OF WATER USED: 5 gal  
 OTHER: NA  
 TASK: \_\_\_\_\_

NOTES:

- 1) RISER PIPE IS 1/4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 1/4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0. IN. SLOTS.
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
  - 4) WATER DEPTH AND DATE 52 FT. 6/15/93
  - 5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
  - 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
  - 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.
- GEOLGIST/ENGINEER: J. Ragan/T. Lopez

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME OUZ - Southfield FIELD ENG./GEO. J. Reagan DATE 6/3/94  
 PROJECT NO. 20.03.05 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 BORING NO. 1103D  
 PIEZOMETER NO. NA DATE OF INSTALLATION 5/28-6/3/93  
**BOREHOLE DRILLING**

DRILLING METHOD <u>Hollow stem auger</u>	TYPE OF BIT <u>auger</u>
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	SIZE <u>NA</u> FROM <u>NA</u> TC <u>NA</u>
FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	SIZE <u>NA</u> FROM <u>NA</u> TC <u>NA</u>

**PIEZOMETER DESCRIPTION**

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

**PROTECTION SYSTEM**

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	<u>NA</u>		<u>NA</u>	
GROUND SURFACE	<u>0.0</u>		<u>↓</u>	
BOTTOM OF PROTECTIVE PIPE	<u>NA</u>		<u>NA</u>	
BOREHOLE FILL MATERIALS: GROUT/SLURRY <del>CEMENT</del> <del>BENTONITE</del> SAND GRAVEL	TOP <u>1</u>	BOTTOM <u>67</u>	TCP <u>NA</u>	BOTTOM <u>NA</u>
	TOP <u>0</u>	BOTTOM <u>1</u>	TOP <u>↓</u>	BOTTOM <u>↓</u>
	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP <u>↓</u>	BOTTOM <u>↓</u>
	TOP <u>↓</u>	BOTTOM <u>↓</u>	TOP <u>↓</u>	BOTTOM <u>↓</u>
PERFORATED SECTION	TOP <u>NA</u>	BOTTOM <u>NA</u>	TOP <u>NA</u>	BOTTOM <u>NA</u>
PIEZOMETER TIP	<u>NA</u>		<u>NA</u>	
BOTTOM OF BOREHOLE	<u>67.0</u>		<u>NA</u>	
GWL AFTER INSTALLATION	<u>52.0</u>		<u>NA</u>	

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

REMARKS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# VISUAL CLASSIFICATION OF SOILS

NO. 067  
 IN: J. Reagan  
 VICE: Hollow stem auger  
 MET:

2.05 22	PROJECT NAME. CRUS Wells
067	COORDINATES. DATE 6/8/93
J. Reagan	GWL: Depth Date/Time DATE STARTED 6/8/93
Hollow stem auger	Depth Date/Time DATE COMPLETED 6/10/93
	PAGE 1 OF 5

TYPE & NO  
 90  
 300  
 902  
 300  
 902  
 300  
 30  
 31  
 903  
 310  
 1903  
 310  
 903  
 310  
 19  
 90  
 3  
 190  
 33  
 190  
 190  
 3  
 190  
 190  
 132  
 190  
 134  
 1904  
 134  
 1904  
 134

RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USC)	REMARKS
				B <sub>x</sub> - 80-100cpm MT - 0.5ppm
6	very st. 80, 10YR 7/3, silty fine sand, low plasticity moist	ml	2.5	B <sub>x</sub> - 80cpm
6	SAA	ml	2.5	MT - 0.5
6	SAA	ml	2.5	
0	NR	NA	NA	
6	very st. 80, 10YR 7/4, silty clay, some brick fragments present, low plasticity, very moist	cl	2.5	B <sub>x</sub> - 80-100cpm
6	SAA			
6	SAA			MT - 0.5
0	NA			
6	very st. 80, 10YR 7/4, silty clay low plasticity, very moist	cl	2.5	B <sub>x</sub> - 80-100cpm
6	SAA			
6	SAA			MT - 0.5ppm
6	SAA			
6	SAA			B <sub>x</sub> - 150cpm
6	SAA			MT - 0.5ppm
6	SAA			

by Pennsylvana Drilling  
 sent Acton Soil Survey  
 by Raab  
 for Davis

SAA - Same as above  
 NA - Not Applicable  
 MT - Microtip

Samples collected per ASTM standard procedure  
 Colors identified using Munsell Color Chart

# VISUAL CLASSIFICATION OF SOILS

FR  
BC  
EL  
EN  
DF

UMB	03.22	PROJECT NAME.	005 -
JMB	067	COORDINATES.	
I:		GWL: Depth	Date/Time
GE:	J. Reagan	Depth	Date/Time
AE			
		PAGE	2 OF 5

DEPTH	RECOVERY (R)	TYPE & NO	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (SI)	REMARKS
093	6		Very stiff, 10R 4/4, <sup>OR 6/8/93</sup> low silty clay, low plasticity very moist	CI	2.5	
40	6		SAA			B <sub>x</sub> = 80-120 cpm MT = 0.5 ppm
44	6		SAA			
55	6		SAA			
045	6		SAA			
55	6		SAA			B <sub>x</sub> = 40 cpm MT = 0.5 ppm
096	6		SAA			
55	6		SAA			
047	6		SAA			
55	6		Very stiff, 2.5Y 4/4, silty clay low plasticity, moist	CI	2.5	B <sub>x</sub> = 40-60 MT = 0.5 ppm
048	6		SAA			
049	6		SAA			
050	6		SAA			
051	6		SAA			B <sub>x</sub> = 40-60 MT = 0.5 ppm
052	6		SAA			
053	6		SAA			
054	6		SAA			
055	0		NR	NA	NA	MT = 0.5 ppm
056	0		NR	NA	NA	
057	0		NR	NA	NA	
058	6		Very stiff, 2.5Y 4/4, silty clay, low plasticity, moist	CI	2.5	
059	6		Very stiff, 10R 5/1, clay, low plasticity moist, some gravel	CI	3.0	

or Pennsylvania Drilling  
Arden Soil Sundry  
Lab  
Davis

NR - No Recovery  
SAA - Same as above  
NA - Not Applicable  
MT - M.

Samples collected per ASTM standard procedures  
Colors identified using Munsell Color Chart

097

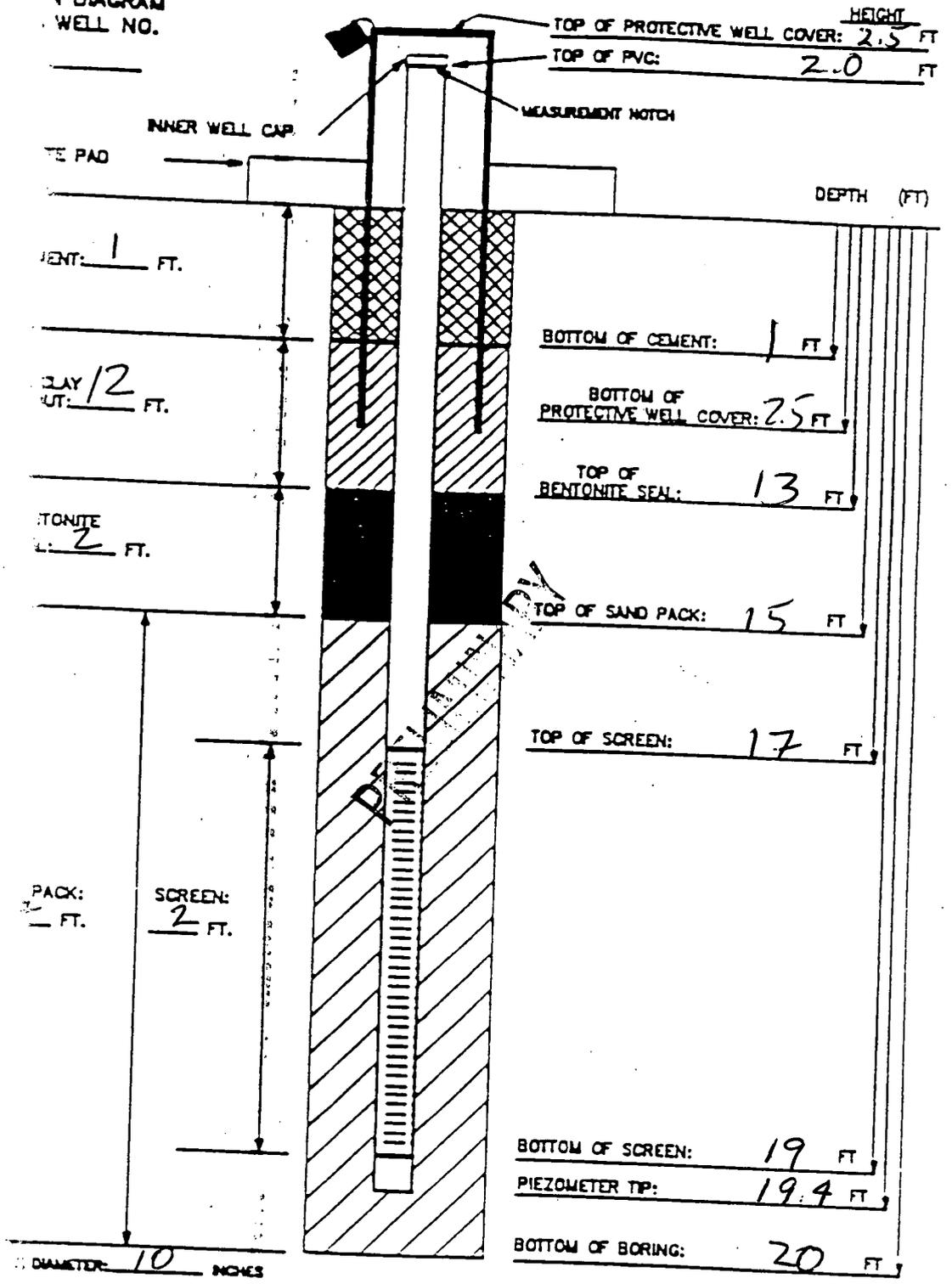


-4625

F  
IF  
ML

D RI/F/S  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 6/10/93



INTER  
DITY  
TONI  
S OF  
JUN  
XUN  
LER:

QUANTITY: 8-10x20  
S (5-GALLON BUCKETS): 1 1/2  
GROUT: 4  
USED: 30 gal

- NOTES:
- 1) RESER PIPE IS 4-inch stainless steel
  - 2) SCREEN IS 4-INCH I.D. SCHEDULE 40 4-inch stainless steel
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SLIP WITH .010 INCH ST.
  - 4) WATER DEPTH/DATE:

TASK: 50.03.22

GEOLOGIST/ENGINEER: J. Reagan

FERRI

585  
4626

# PIEZOMETER INSTALLATION SHEET

PROJ  
PRCJ  
BORIN  
PIEZC  
BORE

DU5 - Add'l Horizontal No. Well  
50.03.27  
11067

FIELD ENG./GEO. J. Reason DATE 6/1/93  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
DATE OF INSTALLATION 6/8-6/10/93

DRILLING

METHOD hollow stem auger TYPE OF BIT auger  
FLUID(S) USED: \_\_\_\_\_ CASING SIZE (S) USED: \_\_\_\_\_  
NA FROM NA TO NA SIZE NA FROM NA TO NA  
FROM TO SIZE FROM TO

PIEZC

## DESCRIPTION

TY  
DI  
PE  
AV  
TO

hollow stem RISER PIPE MATERIAL Stainless Steel  
OF PERFORATED SECTION 4 in RISER PIPE DIAMETERS:  
ON TYPE: HOLES  SCREEN  O.D. 4 in I.D. 4 in  
SIZE OF PERFORATIONS .010 LENGTH OF PIPE SECTIONS 2-10 ft  
PERFORATED AREA 2 ft JOINING METHOD flush threaded

PROT

## SYSTEM

RIS  
PR

EFFECTIVE PIPE LENGTH 5 ft OTHER PROTECTION Lock  
PIPE D.D. 100 in

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF PIPE	2.5		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	2.5		NA	
BOREHOLE MATERIALS:	TOP	0	BOTTOM	1
	TOP	1	BOTTOM	13
	TOP	13	BOTTOM	15
	TOP	15	BOTTOM	20
	TOP	NA	BOTTOM	NA
SECTION	TOP	17.0	BOTTOM	19.0
PIEZOMETER	19.4		NA	
BOTTOM OF BOREHOLE	20 ft		NA	
GWL AT INSTALLATION	To be checked at a later date		NA	

WAS THE P  
WAS A SEN  
REMARKS

PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
TEST PERFORMED ON THE PIEZOMETER? YES  NO

### VISUAL CLASSIFICATION OF SOILS

PRC	UMS
BO	ME
EL	1
EN	SEC
DR	NET
DEPTH	TYPE & NO
0	72
1	50
	193
	73
	5
	193
3	74
	0
	193
4	75
	5
	193
6	76
	73
	17
	5
	193
	75
	0
	193
10	199
	5
	193
12	200
	0
	193
13	201
	0
	193
14	

5 20.03.05	PROJECT NAME. RI/FS Southfield	
7954	COORDINATES.	DATE 5/21/93
	GWL: Depth 53.0' Date/Time 5/22/93 830	DATE STARTED 5/21/93
Ken Geiger	Depth 53.0' Date/Time 6/1/93, 1050	DATE COMPLETED: 6/4/93
able Tool		PAGE 1 OF 7

(IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ITS)	REMARKS
9	Stiff, Dark Yellowish Brown (10YR, 4/4) silty clay with some gravel, medium plasticity, slightly moist	CL	1.5	MT = 3ppm P <sub>y</sub> = 40-60cpm L = 0cpm
6	Very stiff, Dark Yellowish Brown (10YR, 3/6) silty clay with some gravel, medium plasticity, slightly moist	CL	3.0	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
7	Stiff, olive brown (2.5Y, 4/4) silty clay with some gravel, medium plasticity, slightly moist	CL	1.5	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
3	Very stiff, olive brown (2.5Y, 4/4) silty clay with some gravel, medium plasticity, slightly moist	CL	2.25	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
0	Stiff, olive brown (2.5Y, 4/4) silty clay with a trace of gravel, medium plasticity, slightly moist	CL	1.5	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
2	Very soft, olive brown (2.5Y, 4/3) silty clay with a trace of gravel, medium plasticity, moist	CL	.25	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
15	Stiff, olive brown (2.5Y, 4/4) silty clay with a trace of gravel, medium plasticity, slightly moist	CL	2.0	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
5	medium stiff, olive brown (2.5Y, 4/4) silty clay with a trace of gravel, medium plasticity, moist	CL	.75	MT = 1ppm P <sub>y</sub> = 60-80cpm L = 0cpm
18	Soft, olive brown (2.5Y, 4/3) sandy silty clay with some gravel, medium plasticity, slightly moist	CL	.5	MT = 1ppm P <sub>y</sub> = 40-60cpm L = 0cpm
12	Stiff, olive brown (2.5Y, 4/4) silty sandy clay with some gravel, medium plasticity, slightly moist	CL	2.0	MT = .7ppm P <sub>y</sub> = 60cpm L = 0cpm

Drilling by Pennsylvania Drilling

DAVE NEWMAN  
JOE BARILE

Background Levels  
5/21/93  
MT = .5ppm  
P<sub>y</sub> = 40-60cpm  
L = 0cpm

Background Levels  
5/24/93  
MT = .7ppm  
P<sub>y</sub> = 40-60cpm  
L = 0cpm

Samples collected per ASTM Standard Penetration Test. Colors identified using Munsell color chart.

### VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 20.03.05	PROJECT NAME: RI/FS South field	
BORING NUMBER: 2954	COORDINATES:	DATE: 5/24/93
ELEVATION:	GWL: Depth 53.0' Date/Time 5/28/93, 830	DATE STARTED: 5/21/93
ENGINEER: Ken Geiger	Depth 53.0' Date/Time 6/7/93, 1050	DATE COMPLETED: 6/7/93
DRIILL METHOD: Cable Tool	PAGE 2 OF 7	

DEPTH (ft)	BLOWS ON SAMPLER PER 1.0 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	8	7	Stiff Light olive Brown (2.5Y, 5/4) sandy silty clay with a trace of gravel, low plasticity slightly moist	CL	1.0	MT = 1.9 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
16.5	18	14	Hard Light olive Brown (2.5Y, 5/4) sandy silty clay with some gravel low plasticity, slightly moist	CL	4.0	MT = 1.9 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
18.0	14	13	VERY Stiff, Light olive Brown (2.5Y, 5/4) silty clay with a trace of gravel and sand, low plasticity, slightly moist	CL	3.5	MT = 1.9 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
19.5	20	12	VERY Stiff, olive Brown (2.5Y 4/4) silty clay with a trace of gravel, medium plasticity, slightly moist	CL	2.5	MT = 1.4 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
21.0	15	13	Hard, Dark Gray (2.5Y, 4/1) silty clay with some gravel, medium plasticity, slightly moist	CL	4.0	MT = 1.3 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
22.5	11	5	Soft, Dark Gray (2.5Y, 4/1) sandy silty clay with some gravel, medium plasticity, slightly moist	CL	0.25	MT = 1.2 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
24.0	18	7	Very Dense, Brown (10YR, 4/3) poorly graded sand with some gravel, slightly moist	SP	0.4	MT = 1.3 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
25.5	32		No samples taken. Samples to be taken every 5' starting at 30.0'			

NOTE: S. se 1

5/24/93 Background Levels MT = 0.7 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm	5/25/93 Background Levels MT = 0 ppm P <sub>y</sub> = 40-60 cpm L = 0 cpm
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**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUM. 20 03 05	PROJECT NAME: RI/F5 South field		
BORING NUM 54	COORDINATES:	DATE 5/25/93	
ELEVATION:	GWL: Depth 53.0' Date/Time 5/28/93, 830	DATE STARTED 5/21/93	
ENGINEER/GE Ken Griger	Depth 53.0' Date/Time 6/7/93, 1050	DATE COMPLETED: 6/7/93	
DRILLING ME 451R T601	PAGE 3 OF 7		

DEPTH (ft)	SAMPLE TYPE & NO
30.0	113209
	1535
31.5	572519
35.0	
	113210
	1010
36.5	572610
40.0	
	113211
	1030
41.5	572619
45.0	

(IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7	Dense, Brown (10YR, 4/3) Poorly Graded sand with some Gravel, DRY	SP	N/A	MT = 1.3 ppm P <sub>y</sub> = 40-60 cpm λ = 0 cpm
6	Very Dense, Brown (10YR, 4/3) Poorly Graded sand with some Gravel, DRY	SP	N/A	MT = 1.1 ppm P <sub>y</sub> = 40-60 cpm λ = 0 cpm
2	Very Dense, Brown (10YR, 4/3) Well Graded sand with some Gravel, DRY	SW	N/A	MT = 1.4 ppm P <sub>y</sub> = 40-60 cpm λ = 0 cpm

PRIMARY

NOTES  
See

Background Levels 5/25/93 MT = 0 ppm P <sub>y</sub> = 40-60 cpm λ = 0 cpm	Background Levels 5/26/93 MT = 1.0 ppm P <sub>y</sub> = 40-60 cpm λ = 0 cpm
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**VISUAL CLASSIFICATION OF SOILS** - 4626

PROJECT NUM	20 03 05	PROJECT NAME	RI/FS South Field
BORING NAME	54	COORDINATES	
ELEVATION:		DATE	5/26/93
ENGINEER/GE	En Grigor	GWL: Depth 53.0' Date/Time 5/28/93, 830	DATE STARTED 5/21/93
DRILLING ME	6/2 Tool	Depth 53.0' Date/Time 6/7/93, 1050	DATE COMPLETED: 6/7/93
		PAGE	4 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	(IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0	113212 1425 5/26/93	1	Very Dense, Brown (10YR, 4/3) Poorly Graded Gravelly Sand with some silt and Rock fragments, slightly moist	SP	N/A	MT = 1.0 ppm βγ = 40-60 cpm λ = 0 cpm
46.5	113213 1455 5/26/93	3	Very Dense, Brown (10YR, 4/3) Poorly Graded sand with some gravel, slightly moist	SP	N/A	MT = 1.4 ppm βγ = 40-60 cpm λ = 0 cpm
48.0	113214 0900 5/27/93	7	Very Dense, Dark Yellowish Brown (10YR, 4/6) Poorly Graded Gravelly Sand, slightly moist	SP	N/A	MT = .4 ppm βγ = 40-60 cpm λ = 0 cpm
49.5	113215 1015 5/27/93	1	Very Dense, Dark Yellowish Brown (10YR, 4/6) Poorly Graded Gravelly Sand, wet	SP	N/A	MT = .5 ppm βγ = 40-60 cpm λ = 0 cpm
51.0	113216 1045 5/27/93	8	Very Dense, Dark Yellowish Brown (10YR, 4/6) Poorly Graded Gravelly Sand, wet	SP	N/A	MT = .5 ppm βγ = 40-60 cpm λ = 0 cpm
52.5	113217 1430 5/27/93	8	Very Dense, Brown (10YR, 4/3) well Graded Sand with some Gravel, wet	SW	N/A	MT = .5 ppm βγ = 40-60 cpm λ = 0 cpm
54.0	113218 1440 5/27/93	12	Dense, Brown (10YR, 4/3) well Graded Sand with some Gravel, wet	SW	N/A	MT = .5 ppm βγ = 40-60 cpm λ = 0 cpm
55.5	11321 150- 5/27/93	13	Dense, Brown, (10YR, 4/3) well Graded sand with some Gravel, wet	SW	N/A	MT = .6 ppm βγ = 40-60 cpm λ = 0 cpm
57.0	1132 151C 5/27/93	18	Medium Dense, Brown (10YR, 4/3) well Graded Sand with a Trace of Gravel, wet	SW	N/A	MT = .6 ppm βγ = 40-60 cpm λ = 0 cpm
58.5	11322 1520 5/27/93	14	Medium Dense, Brown (10YR, 4/3) Poorly Graded Sand with a Trace of Gravel, wet	SP	N/A	MT = .6 ppm βγ = 40-60 cpm λ = 0 cpm

W.T. 53.0'

NOTES	5/26/93 Background Levels • MT = 1.0 ppm • βγ = 40-60 cpm • λ = 0 cpm	5/27/93 Background Levels • MT = .5 ppm • βγ = 40-60 cpm • λ = 0 cpm
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S22

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER. <i>W95 20, 03, 05</i>	PROJECT NAME. <i>RI/FS Southfield</i>		
BORING NUMBER. <i>2954</i>	COORDINATES:	DATE <i>5/28/93</i>	
ELEVATION:	GWL: Depth <i>53.0'</i> Date/Time <i>5/28/93, 930</i>	DATE STARTED: <i>5/21/93</i>	
ENGINEER: <i>Ken Geiger</i>	Depth <i>53.0'</i> Date/Time <i>6/7/93, 1050</i>	DATE COMPLETED: <i>6/7/93</i>	
DRILLING METHODS: <i>Cable Tool</i>		PAGE <i>5</i>	OF <i>7</i>

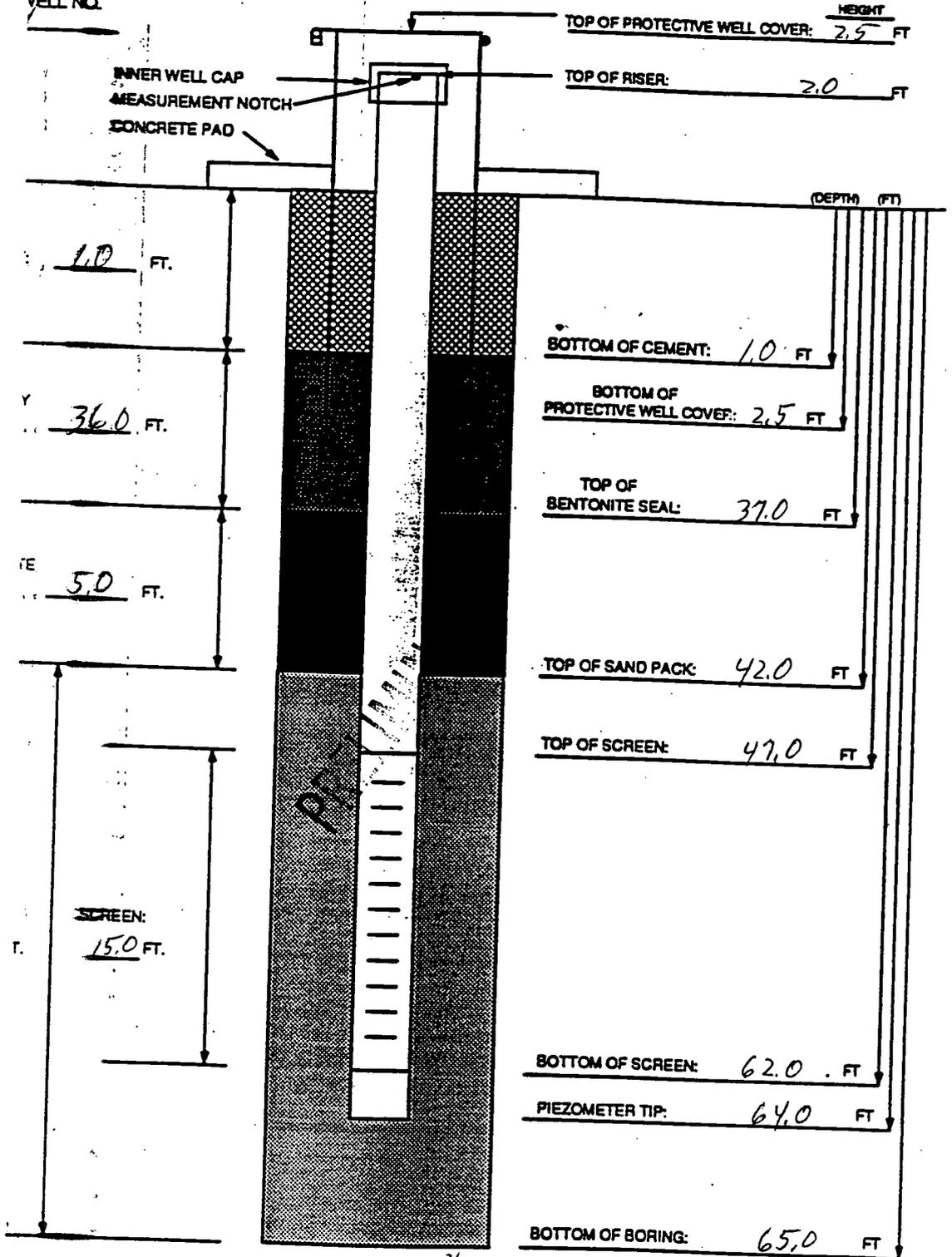
DEPTH	TYPE OF SAMPLER	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.				<p><i>split spoon sampled to 60'</i>  <i>Bottom of Boring at 65'</i></p> <p style="text-align: center; font-size: 2em; transform: rotate(-45deg); opacity: 0.5;">PRELIMINARY</p>			<p><i>Composite Silt  Sample #11322</i></p>

NOTE: *Page 1*

105

R/VFS  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 6/7/93



BOREHOLE DIAMETER: 10 3/4 IN.

**MATERIALS USE:**

SAND TYPE AND  
BENTONITE PEL:  
BAGS OF VOLCL  
AMOUNT OF CE:  
AMOUNT OF WA:  
OTHER: 1-15' Sec  
TASK: W.T.

20 20 Bags  
BUCKETS: 17 Buckets  
7 50lb Bags  
39lb  
480 gallon  
4-10' 1-9' Sections  
5 (doc-11)

**NOTES:**

- 1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
- GEOLOGIST/ENGINEER: Ken Geiper

- 4) WATER DEPTH AND DATE 530 FT / 5/2
- 5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
- 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RI/ES Southfield 04-2 FIELD ENG./GEO. Ken Geiger DATE 6/7/93  
 WELL NO. WB3 20.03105 (RDC-11) CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 WELL NO. 2954  
 WELL NO. 2954 DATE OF INSTALLATION 6/7/93  
 TYPE OF DRILLING \_\_\_\_\_

DRILLING METHOD <u>Cable Tool</u>	TYPE OF BIT <u>Hemmed Percussion Bit</u>
DRILLING FLUID(S) USED: FLUID <u>Water</u> FROM <u>0.0'</u> TO <u>53.0'</u>	CASING SIZE(S) USED: SIZE <u>10"</u> FROM <u>0.0'</u> TO <u>65.0'</u>
FLUID <u>N/A</u> FROM <u>N/A</u> TO <u>N/A</u>	SIZE <u>N/A</u> FROM <u>N/A</u> TO <u>N/A</u>

PIEZOMETER DESCRIPTION

WELL TYPE <u>Monitoring Well</u>	RISER PIPE MATERIAL <u>316 Stainless Steel</u>
DEPTH OF PERFORATED SECTION <u>4.0 I.D.</u>	RISER PIPE DIAMETERS: O.D. <u>4 7/8 in</u> I.D. <u>4.0 in</u>
PERFORATION TYPE: POINTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>1-15' Screen with 2' Sump</u> <u>4-10' 1-9' Sections</u>
MAXIMUM SIZE OF PERFORATIONS <u>.010"</u>	JOINING METHOD <u>Screw Type - Flush</u>
PERFORATED AREA <u>15.0'</u>	<del>Joint Threaded</del>

PROTECTION SYSTEM

PROTECTIVE PIPE LENGTH <u>5.0'</u>	OTHER PROTECTION <u>Hinged Well Cover</u>
PROTECTIVE PIPE O.D. <u>10 3/4 in</u>	<u>with Lock</u>

ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (ft)		ELEVATION ( )	
RISER PIPE	2.0			
GROUND SURFACE	0.0			
DEPTH OF PROTECTIVE PIPE	2.5			
BACKFILL MATERIALS: SILT/SLURRY CONCRETE SAND GRAVEL	TOP	0.0	BOTTOM	1.0
	TOP	1.0	BOTTOM	37.0
	TOP	37.0	BOTTOM	42.0
	TOP	42.0	BOTTOM	65.0
	TOP	N/A	BOTTOM	N/A
PERFORATED SECTION	TOP	47.0	BOTTOM	62.0
PIEZOMETER TIP	64.0			
DEPTH OF BOREHOLE	65.0			
DEPTH OF INSTALLATION	53.0			

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

# VISUAL CLASSIFICATION OF SOILS

0.05.05	PROJECT NAME: 002 Phase II	
1108Z	COORDINATES:	DATE: 06/03/93
	GWL: Depth Date/Time	DATE STARTED: 06/03/93
A. Como	Depth Date/Time	DATE COMPLETED: 06/03/93
5/4" Hollow Stem Auger		PAGE 1 OF 1

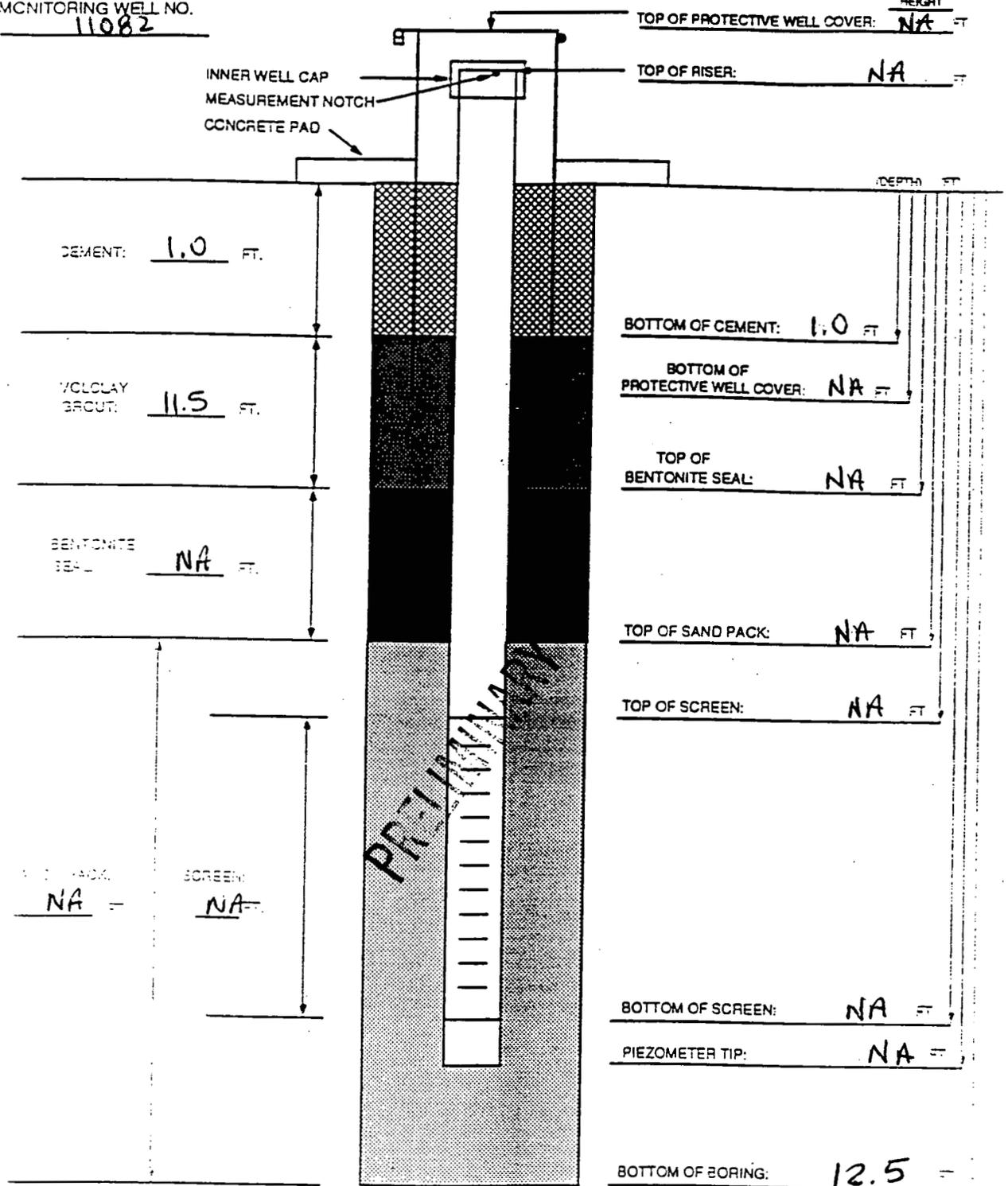
DEPTH (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
A	NA	NA	NA	Auger to 5.0' then begin sampling.
3	Very stiff (2.5YS/6) light olive brown silty clay, mottling, low plasticity, dry, some (5YS/1) gray silty clay	CL	3.0	MT= 1.1 ppm BT= 80cpm x last 3" inches moist
5	Medium dense (2.5YS/6) light olive brown clayey silt, moist	ML BT ac 06/03/93	NA	MT= 0.6 ppm BT= 20-60cpm
6	Medium dense (2.5YS/4) light olive brown clayey silt, few small pieces of gravel, iron staining, moist	ML	NA	MT= 0.6 ppm BT= 20-60cpm - few thin wet zones
7	Very stiff (2.5YS/4) light olive brown silty clay, low plasticity, few small pieces of gravel, iron staining, dry	CL	3.5	MT= 1.3 ppm BT= 20-60cpm
11.0'	SAH Medium dense (2.5YS/4) light olive brown silty well graded fine sand, moist	CL SM NA ac 06/03/93	3.5 NA	MT 0.6 ppm BT= 20-60cpm
11.5'	Very stiff (5YS/1) gray silty clay, medium plasticity, few small pieces of gravel, dry	CL	3.5	(12.0' - 12.5') No Recovery Push hydro punch from 12.5' Sample # 113695

PRELIMINARY

End of Boring  
 sinca Drilling Co.  
 Bentley owners  
 Background MT= 0.6 ppm  
 BT= 20-60cpm  
 NA- Not Applicable  
 2" Split Spoons driven by ASTM standards

FERNALD RI/FS  
 INSTALLATION DIAGRAM  
 MONITORING WELL NO.  
11082

INSTALLATION DATE: 06/03/93



HEIGHT  
 TOP OF PROTECTIVE WELL COVER: NA FT  
 TOP OF RISER: NA FT  
 DEPTH FT  
 BOTTOM OF CEMENT: 1.0 FT  
 BOTTOM OF PROTECTIVE WELL COVER: NA FT  
 TOP OF BENTONITE SEAL: NA FT  
 TOP OF SAND PACK: NA FT  
 TOP OF SCREEN: NA FT  
 BOTTOM OF SCREEN: NA FT  
 PIEZOMETER TIP: NA FT  
 BOTTOM OF BORING: 12.5 FT

BORING DIAMETER: 8 IN.

ITEMS USED  
 NET POUND QUANTITY: NA  
 VOLUME PELLETS (5 GALLON BUCKETS): NA  
 BAGS OF VCLAY BROUT: 2  
 BAGS OF CEMENT: 1 bag  
 GALLONS OF WATER USED: 5 gallons  
 TEST: Hydropinch pushed to 13.0'  
 METHOD: Soil Boring

NOTES:  
 1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.  
 2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.  
 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.  
 4) WATER DEPTH AND DATE: NA NA  
 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.  
 6) PARENTHESIS INDICATE DEPTH TO GROUND LEVEL.  
 7) WELL CASING HAS A PERFORATED COVER WITH FASCIAL.  
 GEOLOGIST/ENGINEER: A. Como



**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 20.03 05	PROJECT NAME: 0u2 Phase II	
BORING NUMBER: 11084	COORDINATES:	DATE: 06/01/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/01/93
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 06/01/93
DRILLING METHODS: 1/4 Hollow stem Auger	PAGE 1	OF 2

DEPTH - ft -	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1' GIN	RECOVERY IN %	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	NA	NA		NA	NA	Auger to 5.0' then begin collecting continuous samples.
5.0	1110	4	6	stiff at outside			
	113272	7	6	firm (2.5YS/6) light olive brown silty clay, low plasticity, dry	CL	1.0	MT = 0.0 ppm BT = 20-60 cpm
	113273	9	6	very stiff at outside			
	113274	9	6	hard (2.5YS/6) light olive brown silty clay some (SYB/1) gray silty clay, no plasticity, dry	CL	4.0	
6.5	1120	4	6	very stiff at outside			
	113275	5	6	hard (2.5YS/6) light olive brown silty clay with some (SYB/1) gray silty clay, some (SYB/2) white silty clay, slight plasticity, dry	CL	4.0	MT = 0.0 ppm BT = 20-60 cpm
	113276	7	6	stiff at outside			
8.0	1125	3	6	firm (2.5YS/4) light olive brown silty clay, (some thin wet very fine sand lenses), low plasticity, moist	CL	1.5	MT = 0.0 ppm BT = 20-60 cpm * at 9.0' BT = 140 cpm
	113277	5	6				
	113278	9	6				
	113279	9	6				
9.5	1300	5	6	medium dense (2.5YS/4) light olive brown silt, some clay, no plasticity, wet	ML	NA	MT = 0.0 ppm BT = 20-60 cpm
	113280	7	6				
	113281	7	6				
	113282	7	6				
11.0	1305	6	6	SAA			MT = 0.0 ppm BT = 20-60 cpm
	113283	7	6		ML	NA	
	113284	8	6	* AT T.P. of split spoon some (SYSL) gray clay, medium plasticity, moist			
12.5	113285	8	6				

NOTES:  
 Drilling Co. Pennsylvania Drilling Co.  
 Driller M. Ke Bentley  
 Assistant Ron Winters

Background MT = 0.0 ppm  
 BT = 20-60 cpm

NA - Not Applicable  
 SAA - Same as Above

2" split spoons driven by ASTM standards

# VISUAL CLASSIFICATION OF SOILS

20.03.05	PROJECT NAME: 042 Phase II	
11084	COORDINATES:	DATE: 06/01/93
	GWL: Depth      Date/Time	DATE STARTED: 06/01/93
A. Lomo	Depth      Date/Time	DATE COMPLETED: 06/01/93
4 1/4" Hollow stem Auger		PAGE 2 OF 2

#	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	vert stiff acoulular			
0	Hand (3Y5.1) gray silty clay with some (2.5Y5.14) light olive brown silt, high plasticity vert stiff acoulular 13.0 Hand (3Y5.1) gray silty clay some well graded sand, medium plasticity, dry	CL	2.25	MT = 0.0 ppm BT = 20-60 cpm
	End of Boring			@ 1340 drive hydroprobe to a depth of 14.5' sample # 113288. collected sample @ 1430

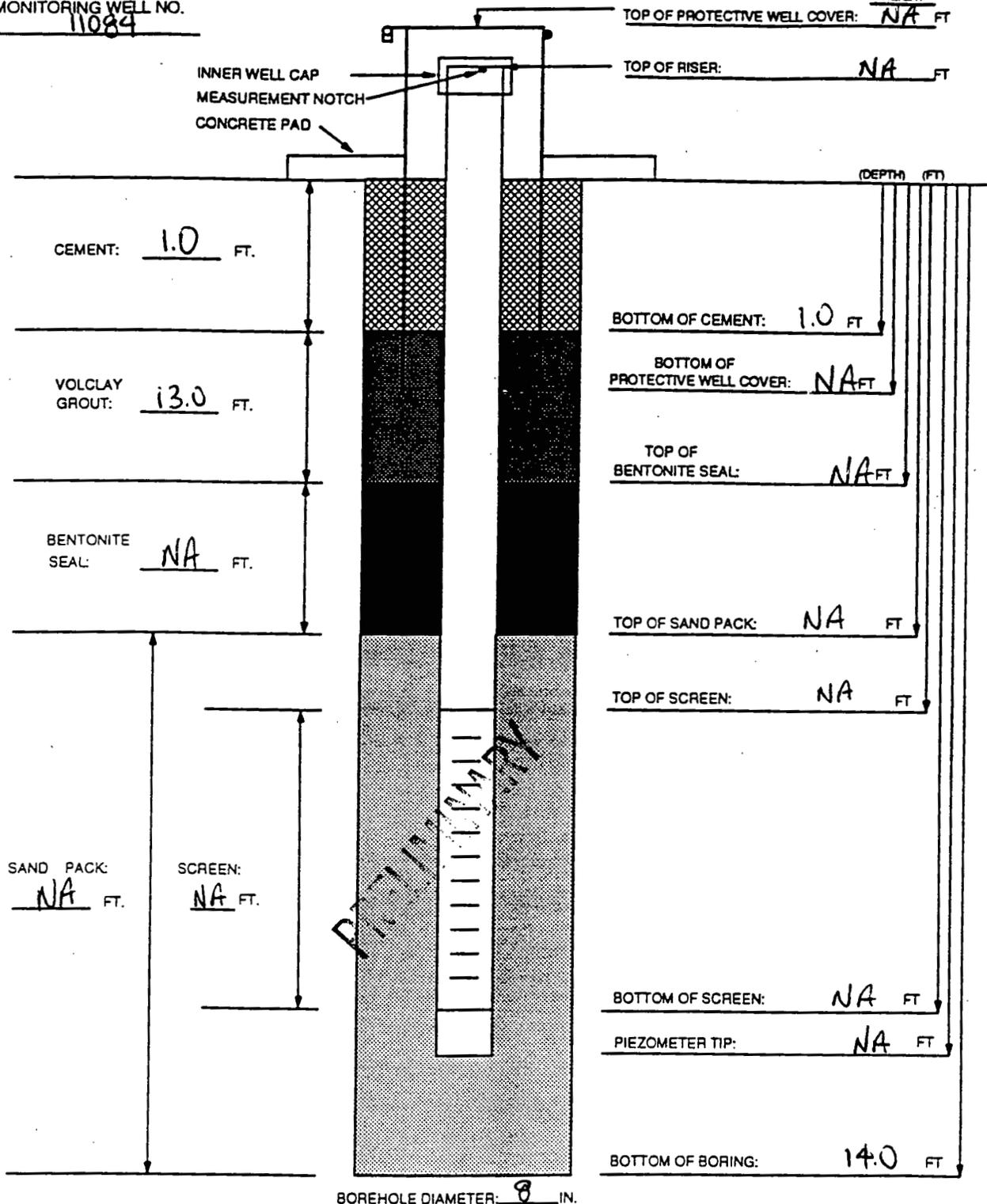
Ivania Drilling Co.  
 ntley  
 onors

Background MT = 0.0 ppm  
 BT = 20-60 cpm

2" Split Spans driven by ASTM standards

FERNALD R/FS  
 INSTALLATION DIAGRAM  
 MONITORING WELL NO.  
11084

INSTALLATION DATE: 06/01/93



BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA  
 BENTONITE PELLETS (5-GALLON BUCKETS): NA  
 BAGS OF VOLCLAY GROUT: 2  
 AMOUNT OF CEMENT: 1 bag  
 AMOUNT OF WATER USED: 5 gallons  
 OTHER: Used hydramach 10 14.5'  
 TASK: Hydramach boring

NOTES:

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

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-4626

# PIEZOMETER INSTALLATION SHEET

P  
P  
B  
P  
B

NAME OU2 Phase II FIELD ENG./GEO. A. Lamo DATE 06/0  
 NC. 20.03.05 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 J. 11084  
 SER NO. NA DATE OF INSTALLATION NA

## DRILLING

DRILLING METHOD 4 1/4" Hollow stem Auger TYPE OF BIT 4 1/4" Hollow stem Auger  
 DRILLING FLUID (S) USED: \_\_\_\_\_ CASING SIZE (S) USED:  
 ID NA FROM NA TO NA SIZE NA FROM NA TO NA  
 ID NA FROM NA TO NA SIZE NA FROM NA TO NA

P

## PIEZOMETER DESCRIPTION

PIEZOMETER TYPE NA RISER PIPE MATERIAL NA  
 PROTECTED SECTION NA RISER PIPE DIAMETERS:  
 O.D. NA I.D. NA  
 SIZES  SCREEN  LENGTH OF PIPE SECTIONS NA  
 PERFORATIONS NA JOINING METHOD NA  
 SEAL NA

P

PIEZOMETER LENGTH NA OTHER PROTECTION NA  
 TIME NA

	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
PIPE	NA			
	0.0			
MATERIALS:	TOP 0.0	BOTTOM 1.0	TCP	BOTTOM
	TOP 1.0	BOTTOM 14.0	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
PROTECTED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
PIEZOMETER HOLES	at 0.0/14.0 ft 14.0			
PIEZOMETER INSTALLATION	NA			

WAS  
WAS  
REM

PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 TIGHTNESS TEST PERFORMED ON THE PIEZOMETER? YES  NO

Soil being then pushed hydropanch.

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 20.03.05	PROJECT NAME: 042 Phase II	
BORING NUMBER: 11083	COORDINATES:	DATE: 06/02/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/02/93
ENGINEER/GEOLOGIST: A. Lomo	Depth Date/Time	DATE COMPLETED: 06/02/93
DRILLING METHODS: 4 1/4" Hollow Stem Auger	PAGE 1	OF 1

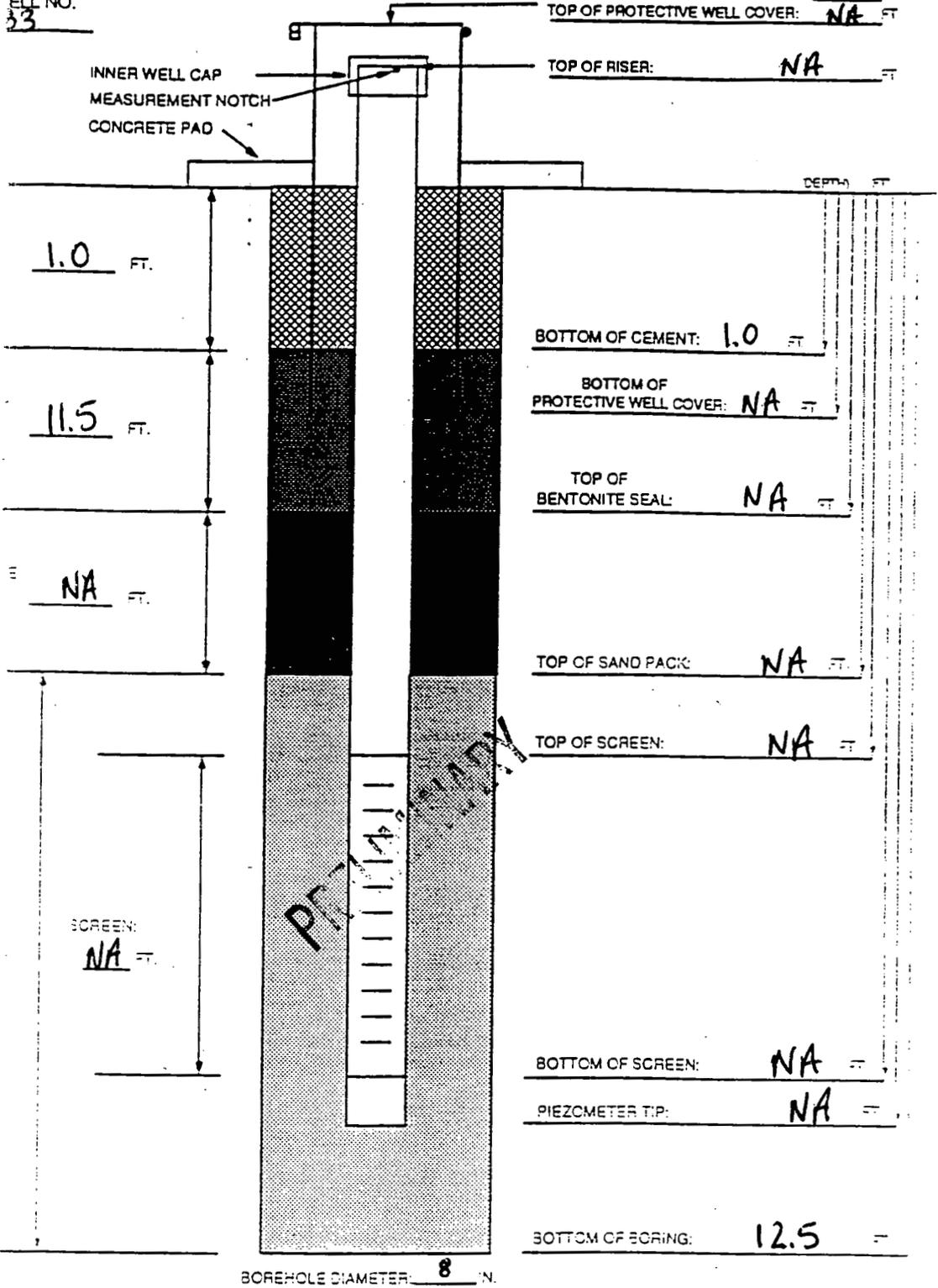
DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	NA	NA		NA	NA	Auger to 5.0' then begin driving split spoons
5.0	0855 113666	2 4 5	6 0 0	Very stiff accreted Hard (2.5Y 6/6) olive yellow silty clay, some (2.5Y 5/6) gray clay, low plasticity, few pieces of small gravel, dry	CL	2.5	MT = 0.3 ppm BT = 20-60 cpm
6.5	0905 113667 113668 113669	7 12 14	6 6 6	SAA, some thin well graded sand lenses, dry	CL	3.5	MT = 0.0 ppm BT = 20-60 cpm
8.0	0910 113670 113671 113672	8 7 8	6 6 6	Medium Dense (2.5Y 5/4) light olive brown clayey silt, slight plasticity, few small pieces of gravel, moist	ML	NA	7.5' MT = 0.0 ppm BT = 20-60 cpm
9.5	0915 113673 113674 113675	5 9 12	6 6 6	SAA Very stiff accreted Hard (5Y 5/1) olive with some (2.5Y 5/6) light olive brown silty clay, slight plasticity, dry, few pieces of small gravel	ML CL	NA 4.0	MT = 0.0 ppm BT = 20-60 cpm at 10.5' very thin net silty zone
11.0	0925 113676 113677 113678	9 10 13	6 6 6	Very stiff accreted Hard (5Y 5/1) gray silty clay, few pieces of gravel, low plasticity, dry	CL	4.0	MT = 0.0 ppm BT = 20-60 cpm @ 0930 set up and drive hydromech from 12.5' to 13'

12.5  
NOTES  
End of Borehole  
Drilling Co. Pennsylvania Drilling Co.  
Driller M. Bentley  
Assistant R. Lommors  
Background MT = 0.0 ppm  
BT = 20-60 cpm  
NA - Not Applicable  
2" split spoons driven by ASTM standards

REF  
INST  
ION

R/FS  
DIAGRAM  
ELL NO.  
33

INSTALLATION DATE: 06/02/93



NOTES:

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

GEOLOGIST/ENGINEER A. Como

ED  
DUP  
LEFT  
LAY  
MET  
STEP  
hed  
C

BUCKETS: NA  
2  
1 bag  
5 gallons  
inch to 13.0'

### PIEZOMETER INSTALLATION SHEET

PROJ  
NO.  
R  
ED  
OR

OU2 Phase II FIELD ENG./GEO. A. Como DATE 06/02  
20.03.05 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
11083  
 O. NA DATE OF INSTALLATION NA

**DRILLING**

METHOD Hollow Stem Auger TYPE OF BIT 1 1/4" Hollow Stem Auger  
 FLUID (S) USED: CASING SIZE (S) USED:  
NA FROM NA TO NA SIZE NA FROM NA TO NA  
NA FROM NA TO NA SIZE NA FROM NA TO NA

**DESCRIPTION**

RISER PIPE MATERIAL NA  
 PERFORATED SECTION NA RISER PIPE DIAMETERS:  
 TYPE: O.D. NA I.D. NA  
 HOLES  SCREEN  LENGTH OF PIPE SECTIONS NA  
 SIZE OF PERFORATIONS NA JOINING METHOD NA  
 PERFORATED AREA NA

**SYSTEM**

EFFECTIVE PIPE LENGTH NA OTHER PROTECTION NA  
 PIPE O.D. NA

DEPTH	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION			
PIPE	NA					
CE	0.0					
TECTIVE PIPE	NA					
L MATERIALS: RY	TOP	0.0	BOTTOM	1.0	TCP	BOTTL
	TOP	1.0	BOTTOM	12.5	TOP	BOTTL
	TOP	NA	BOTTOM	NA	TOP	BOTTL
	TOP	NA	BOTTOM	NA	TOP	BOTTL
SECTION	TOP	NA	BOTTOM	NA	TOP	BOTTL
IP	NA					
REHOLE	12.5					
STALLATION	NA					

WTER FLUSHED AFTER INSTALLATION? YES  NO   
 TEST PERFORMED ON THE PIEZOMETER? YES  NO   
Soil Boring, Samples collected from 3.0 to 12.5.  
Hydropinch 0 to 13.5. 117

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-4620

# VISUAL CLASSIFICATION OF SOILS

UN:	20.03.05	PROJECT NAME:	OU2 Phase II
UN:	11031	COORDINATES:	
N:		GWL: Depth	Date/Time
GE:	A. Cummings	Depth	Date/Time
METH:	4 1/4 Hollow Stem Auger		
		DATE:	06/07/93
		DATE STARTED:	06/07/93
		DATE COMPLETED:	06/07/93
		PAGE	1 OF 3

TYPE & NO	(in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 120 121	6 0	Very stiff (2.5Y 5/6) light olive brown silty clay, low plasticity, organic material, dry	CL	2.5	MT = 0.7 ppm BT = 40-80 cpm
5 22 23	6 0	Very stiff (2.5Y 5/6) light olive brown silty clay, low plasticity, dry	CL	3.5	MT = 0.7 ppm BT = 40-80 cpm
0 24 25 53	0 2	SAA Dense (2.5Y 6/6) olive yellow clayey silt, thin (SY 7/1) light gray silt lenses, no plasticity, dry	CL ML	3.5 NA	MT = 0.7 ppm BT = 40-80 cpm
0 26 27 28	6 6	SAA	ML	NA	MT = 0.7 ppm BT = 40-80 cpm
0 29 30 131	6 6	SAA	ML	NA	MT = 0.7 ppm BT = 40-80 cpm
0 132 133 134	6 6	SAA	ML	NA	MT = 0.7 ppm BT = 40-80 cpm

Winnac Drilling Co.  
Bentley  
Anderson

Background MT = 0.7 ppm  
BT = 40-80 cpm

SAA - Same As Above  
NA - Not Applicable

2" Split Spoons driven by ASTM standards

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: 20.03.05	PROJECT NAME: 042 Phase II	
BORING NUMBER: 11031	COORDINATES:	DATE: 06/07/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06/01/93
ENGINEER/GEOLOGIST: A. Wong	Depth Date/Time	DATE COMPLETED: 06/07/93
DRILLING METHODS: 4 1/4" Hollow Stem Auger	PAGE 2 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0	1305 116935 116936 116937	4 16 15	6 6 6	Dense (2.5/5/6) light olive brown clayey silt, dry, thin (3/4) light gray clayey silt lenses	ML	NA	MT = 0.7 ppm BT = 40-80 cpm
10.5	1315 116938 116939 116940	6 8 9	6 6 6	SAA Medium Dense (2.5/5/6) light olive brown and (10/23/2) very dark grayish clayey silt, dry	ML ML CL	NA NA 2-3 acc 1/193	MT = 0.7 ppm BT = 40-80 cpm
12.0	1325 116941 116942 116943	4 8 10	6 6 6	SAA Medium Dense (2.5/6/4) light yellowish brown clayey silt, dry	ML	NA	MT = 0.7 ppm BT = 40-80 cpm
13.5	1333 116944 116945 116946	4 9 11	6 6 6	Medium Dense (2.5/6/4) light yellowish brown clayey silt, dry Hard (3/5/1) gray and (2.5/5/3) light olive brown silty clay, low plasticity, few small gravel, iron staining, dry	ML CL	NA 4.5	MT = 0.7 ppm BT = 40-80 cpm
15.0	1345 116947 116948 116949	8 10 13	6 6 6	SAA Hard (3/5/1) gray silty clay with some (3/5/2) olive gray silty clay, low plasticity, small gravel, iron staining, dry	CL	4.0 4.5	MT = 0.7 ppm BT = 40-80 cpm
16.5	1355 116950 116951 116952	9 17 17	6 6 6	Very stiff (5/7/2) olive gray silty clay with some (2.5/5/6) light olive brown silty clay, low plasticity, few very small gravel, dry Hard (3/5/1) gray and (2.5/5/4) light olive brown silty clay, low plasticity, gravel, dry	CL	2.0 4.5	MT = 0.7 BT = 40-80 iron staining
18.0							Background MT = 0.7 ppm BT = 40-80 cpm

Drilling Co. Pennsylvania Drilling Co.  
Driller Mike Bentley  
Assistant Bill Anderson

SAA - Same As Above  
NA - Not Applicable

2" Split Spoons driven by ASTM standards

### VISUAL CLASSIFICATION OF SOILS

PROJECT NO:	20.03.05	PROJECT NAME:	012 phase II
BORING NO:	1103)	COORDINATES:	DATE: 06/07/93
ELEVATION:		GWL: Depth Date/Time	DATE STARTED: 06/07/93
ENGINEER:	LOGIST A. Lamo	Depth Date/Time	DATE COMPLETED: 06/07/93
DRAWN BY:	DDS. 4 1/4" Hollow Stem Auger		PAGE 3 OF 3

DEPTH	SAMPLER PER 6 in	RECOVERY in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18.0	4	6	Hard (5/5/1) gray and (5/5/4) light olive brown silty clay, low plasticity, small pieces of gravel, dry	CL	40	MT = 0.7 ppm BT = 40-80 ppm
19.5			End of Boring at 19.5'			

PROHIBITED

Driller  
Diller  
Assista

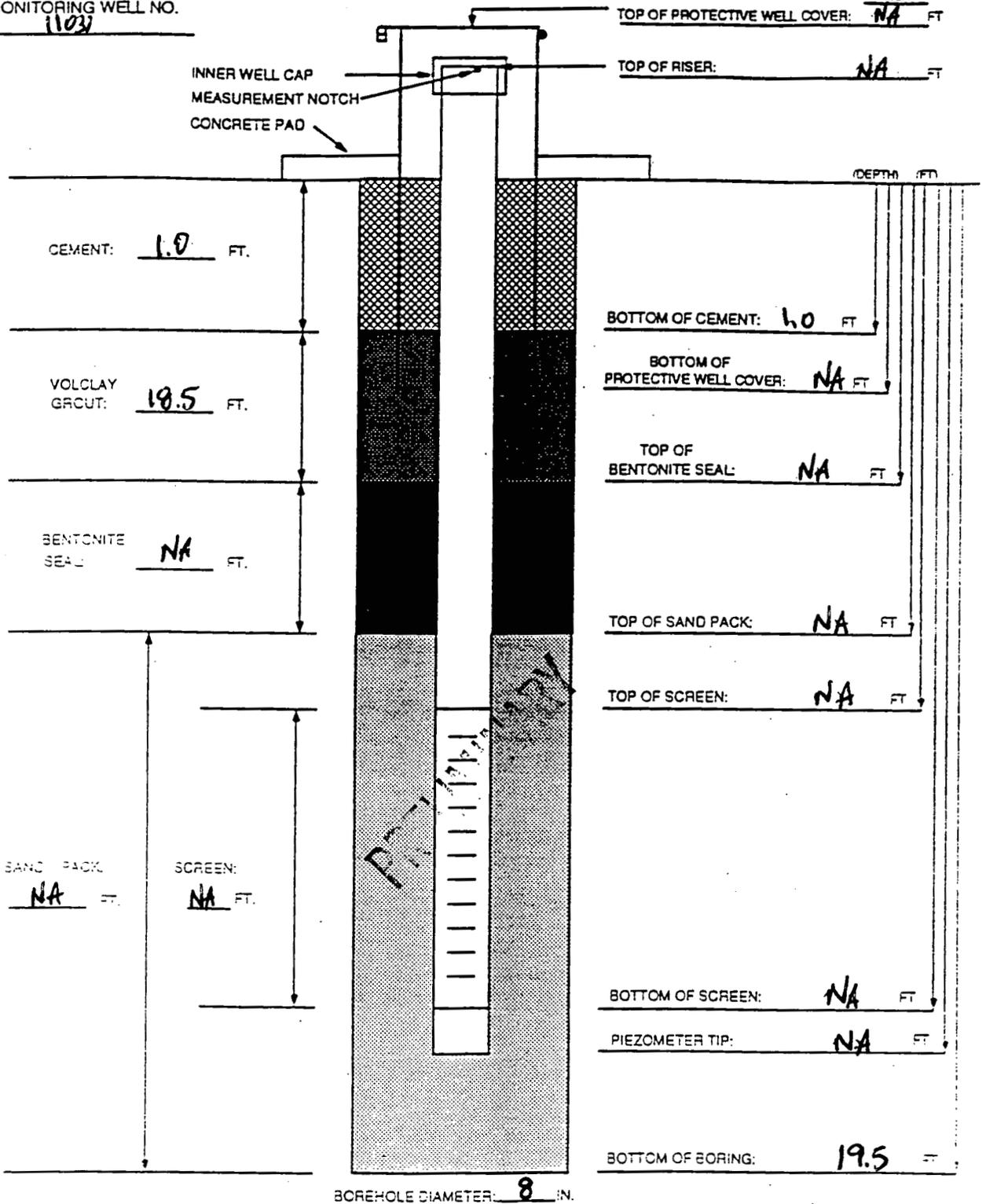
Pennsylvania Drilling Co.  
Mike Bentley  
Bill Anderson

Background MT = 0.7 ppm  
BT = 40-80 ppm

2" Split Spoons driven by ASTM standards

FERNALD RI/FS  
INSTALLATION DIAGRAM  
MONITORING WELL NO.  
1103

INSTALLATION DATE: 06/07/93



BOREHOLE DIAMETER: 8 IN.

**MATERIALS USED**

SAND TYPE AND QUANTITY:	<u>NA</u>
BENTONITE PELLETS (5-GALLON BUCKETS):	<u>NA</u>
BASE OF VOLCLAY GROUT:	<u>2</u>
AMOUNT OF CEMENT:	<u>1 bag</u>
AMOUNT OF WATER USED:	<u>5 gallons</u>
OTHER:	<u>Soil boring</u>
DATE:	<u>NA</u>

- NOTES:**
- 1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
  - 4) WATER DEPTH AND DATE NA FT NA
  - 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
  - 6) PARENTHESIS INDICATE DEPT. BE GROUND LEVEL
  - 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK
- GEOLOGIST/ENGINEER: A. Loms

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RI

-4626

# PIEZOMETER INSTALLATION SHEET

PROJ: ONL Phase II FIELD ENG./GEO. A. Lomo DATE 06/0  
 PREC: 20.03.05 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 BORI: 11031  
 PIEZ: NA DATE OF INSTALLATION NA  
 BORE DRILLING

METHOD Hollow Stem Auger TYPE OF BIT 1/4 Hollow Stem Auger  
 FLUID(S) USED: \_\_\_\_\_ CASING SIZE (S) USED:  
NA FROM NA TO NA SIZE NA FROM NA TO NA  
NA FROM NA TO NA SIZE NA FROM NA TO NA

DESCRIPTION

OF PERFORATED SECTION NA RISER PIPE MATERIAL NA  
 IN TYPE: \_\_\_\_\_ RISER PIPE DIAMETERS:  
 HOLES  SCREEN  O.D. NA I.D. NA  
 SIZE OF PERFORATIONS NA LENGTH OF PIPE SECTIONS NA  
 PERFORATED AREA NA JOINING METHOD NA

SYSTEM

EFFECTIVE PIPE LENGTH NA OTHER PROTECTION NA  
 PIPE D.O. NA

EM	DISTANCE ABOVE / BELOW GROUND SURFACE (ft)		ELEVATION						
TOP PIPE	<u>NA</u>								
GRC	<u>0.0</u>								
BOTT	<u>NA</u>								
BOTT	MATERIALS:								
	TOP	<u>0.0</u>	BOTTOM	<u>1.0</u>					
	TOP	<u>1.0</u>	BOTTOM	<u>19.5</u>					
	TOP	<u>NA</u>	BOTTOM	<u>NA</u>					
	TOP	<u>NA</u>	BOTTOM	<u>NA</u>					
PERF	SECTION	TOP	<u>NA</u>	BOTTOM	<u>NA</u>	TOP		BOTTOM	
PIEZ	TIP	<u>NA</u>							
BOTT	BREHOLE	<u>19.5</u>							
GWL	INSTALLATION	<u>NA</u>							

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 WAS A TEST PERFORMED ON THE PIEZOMETER? YES  NO   
Drilled/sampled to 19.5 Ft. No water was encountered.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.C5 RDC 11 PROJECT NAME CRU 2 Phase II  
 BORING NUMBER 2953 COORDINATES: DATE 5-17-93  
 ELEVATION: GWL: Depth 66.35 Date/Time 6-6-73/0920 DATE STARTED 5-17-93  
 ENGINEER/GEOLOGIST K. Payne Depth Date/Time DATE COMPLETED 6-6-73  
 DRILLING METHODS Cable Tool PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USCS)	REMARKS
1	115419 0920 5-17-93	3 4 18	7	Very stiff (2.5Y, 4/3) Olive Brown, Clay with trace gravel, Slight plasticity, moist	CL	3.0 m-tip = 60 B <sub>x</sub> = 80 α = 0	ppm cpm cpm
2	115419 0930 5-17-93	20 14 12	10	Hard (2.5Y, 4/3) Olive Brown, Clay with trace gravel, Slight plasticity, slightly moist	CL	4.5 m-tip = 0.0 B <sub>x</sub> = 80 α = 0	ppm cpm cpm
4	0932 5-17-93	13 12 13	N/A	No Recovery 2 Spans Driven	N/A	N/A m-tip = B <sub>x</sub> = N/A α =	ppm cpm cpm
5	0935 5-17-93	10 10 11	N/A	No Recovery 2 Spans Driven	N/A	N/A m-tip = B <sub>x</sub> = N/A α =	ppm cpm cpm
7	115420 0942 5-17-93	8 10 11	6	Soft (5Y, 3/2) Dark Olive Gray, Clay, Slight plasticity, Very moist	CL	.5 m-tip = 0.0 B <sub>x</sub> = 80 α = 0	ppm cpm cpm
8	115421 0944 5-17-93	14 14 15	13	Stiff (2.5Y, 6/6) Light Yellow, Sandy Clay, Slight plasticity, Slightly moist	CL	1.5 m-tip = 0.0 B <sub>x</sub> = 70 α = 0	ppm cpm cpm
10	1505 5-17-93	7 3	12	SAA	CL	1.5 m-tip = 0.0 B <sub>x</sub> = 100 α = 0	ppm cpm cpm
11	115423 1630 5-17-93	6 11 13	6	Stiff (2.5Y, 5/6) Low-olive brown, Clay, Low plasticity, moist	CL	1.5 m-tip = 0.0 B <sub>x</sub> = 100 α = 0	ppm cpm cpm
13	115424 1635 5-17-93	10 6 23	18	Very Stiff (2.5Y, 5/4) Low-olive brown, Clay, Slight plasticity, moist	CL	3.0 m-tip = 0.0 B <sub>x</sub> = 60 α = 0	ppm cpm cpm
14	115425 1647 5-17-93	13 20 25	13	Very Stiff (2.5Y, 5/4) Low-olive brown, Clay, Slight plasticity, moist	CL	2.5 m-tip = 0.0 B <sub>x</sub> = 70 α = 0	ppm cpm cpm

NOTES  
 Drilling Contractor Pennsylvania Drilling  
 Drilling Equipment Cyclone 42  
 Driller Bob Johnson  
John Vandine

SAA - Same as above.  
 NA - Not Applicable

Samples collected per ASTM standards per ASTM Test Colors identified using Munsell Color Chart

Background Readings  
 5-17-93 m-tip = 0.0 ppm  
 B<sub>x</sub> = 70 cpm

# VISUAL CLASSIFICATION OF SOILS

PROJECT NO. 20.03.05	RDC 11	PROJECT NAME CRU 2 Phase II	
ER. 2953	COORDINATES.		DATE 5-19-93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 5-17-93
ENGINEER	LOGIST K. Payne	Depth	Date/Time
DRILL	METHODS Cable Test		PAGE 2 OF 8

DEPTH (FT)	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISCI)	REMARKS
16	11 18 24	16	Hard (2.5Y, 5/2) Grayish Brown, Silty Clay, slight plasticity, moist	CL	4.5	m-tip = 0.0 ppm BX = 40 Cpm α = 0 Cpm
17	7 9	15	Very stiff (5Y, 4/1) Dark Gray, Silty clay with trace gravel, slight plasticity, moist	CL	2.5	m-tip = 0.0 ppm BX = 80 Cpm α = 0 Cpm
18	14					
19	3 8 9	12	Very stiff (5Y, 4/1) Dark Gray, Silty clay with trace sand, slight plasticity, moist	CL	2.5	m-tip = 0.0 ppm BX = 80 Cpm α = 0 Cpm
20	5 8	N/A	No Recovery	N/A	N/A	m-tip = 0.0 ppm BX = N/A Cpm α = 0 Cpm
21	6		2 Spoons Driven			
22	3 5 9	10	Medium Dense (5Y, 4/1) Dark Gray, Clayey silt, low plasticity, moist	ML	N/A	m-tip = 0.0 ppm BX = 80 Cpm α = 0 Cpm
23	3 9 16	18	Medium Dense (5Y, 4/1) Dark Gray, Clayey silt with trace gravel, low plasticity, moist	ML	N/A	m-tip = 0.0 ppm BX = 80 Cpm α = 0 Cpm
24	3 IN SPOON					
25	4 7 50	7	Very Dense (5Y, 5/1) Gray, Clayey silt, low plasticity, moist	ML	N/A	m-tip = 0.0 ppm BX = 40 Cpm α = 0 Cpm
26	8 20	16	Dense (5Y, 4/1) Dark Gray, Gravely silt, low plasticity, moist	ML	N/A	m-tip = 0.0 ppm BX = 40 Cpm α = 0 Cpm
27	14					
28	5 14 27	12	Very Dense (5Y, 4/1) Dark Gray, Gravely silt, slight plasticity, moist	ML	N/A	m-tip = 0.0 ppm BX = 40 Cpm α = 0 Cpm
29	7					
30	16	14	Medium Dense (5Y, 4/1) Dark Gray, Gravely silt, slight plasticity, moist	ML	N/A	m-tip = 0.0 ppm BX = 40 Cpm α = 0 Cpm

Contractor Pennsylvania Drilling  
 Equipment Cyclone 42  
 Job Johnson  
 Bill Sibert

SAA - Same as above  
 NA - Not Applicable

Samples collected per ASTM standards  
 Colors identified using Munsell Color Chart

Background Readings  
 5-19-93 m-tip = 0.0 ppm  
 BX = 50 Cpm

# VISUAL CLASSIFICATION OF SOILS

PROJECT NO.	20.03.05	PROJECT NAME	CRU 2 Phase II
DRILLING NO.	2953	COORDINATES	
DEPTH		GWL: Depth	Date/Time
ENGINEER	Geologist K. Payne	Depth	Date/Time
DILLING	DS Cable Tool		DATE COMPLETED: 6-6-93
		PAGE	3 OF 8

DEPTH (FT)	SAMPLE	SAMPLES PER 16 FT	RECOVERY (%)	TEST	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (SI)	REMARKS
1154 09 5-20		7	10		Medium Dense (5Y, 4/1) Dark Gray Clayey Silt with trace sand, slight plasticity, moist	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 90 cpm α = 0 cpm	
1154 10 5-20		7	9		SAA	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 90 cpm α = 0 cpm	
1154 10 5-20		7	6		SAA	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 60 cpm α = 0 cpm	
1154 10 5-20		7	12		Medium Dense (5Y, 5/1) Gray Clayey Silt with trace sand and gravel, low plasticity, moist	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 40 cpm α = 0 cpm	
1154 13 5-20		7	18		Medium Dense (5Y, 4/1) Dark Gray Sandy Silt, slight plasticity with organics, slight plasticity, moist	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 60 cpm α = 0 cpm	
1154 13 5-20		7	18		Medium Dense (5Y, 4/1) Dark Gray Clayey Silt with trace gravel, low plasticity, moist	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 60 cpm α = 0 cpm	
1154 14 5-20		7	14		Medium Dense (10YR, 5/4), Yellowish Brown Sandy Silt with trace gravel, slight plasticity, slightly moist	ML	N/A m-tip = 0.0 ppm p <sub>d</sub> = 60 cpm α = 0 cpm	
1154 15 5-20		7	10		Very Dense (10YR, 5/6), Yellowish Brown Silty Sand, dry	SM	N/A m-tip = 0.0 ppm p <sub>d</sub> = 50 cpm α = 0 cpm	
					Beyond 5.0 FT Sampling			

Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Cyclone 42  
 Driller: Bob Johnson  
 Recorder: Ron Conners

SAA - Same as above  
 NA - Not Applicable

Samples collected per ASTM standard procedures for  
 Colors identified using Munsell Color Chart

Background Readings  
 5-20-93 { m-tip = 0.0 ppm  
 p<sub>d</sub> = 50 cpm  
 α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUM:  
BORING NUMBER:  
ELEVATION:  
ENGINEER/GEOL:  
DRILLING METHOD:

3.05 RDC 11 PROJECT NAME: CRU 2 Phase II  
3 COORDINATES: DATE 5-20-93  
GWL: Depth Date/Time DATE STARTED 5-17-93  
Payne Depth Date/Time DATE COMPLETED 6-6-93  
ble Test PAGE 4 OF 8

DEPTH (FT)	SAMPLE TYPE & NO
46	115444 1550 5-20-93
47	
48	
49	
50	
51	115446 0915 5-24-93
52	
53	
54	
55	
56	115447 1030 5-24-93
57	
58	
59	
60	

DEPTH (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USC)	REMARKS
14	Very Dense (2.5 Y, 5/4) Light Olive Brown Poorly Graded Sand with trace Gravel, D-7 3 IN Spoon	SP	N/A	m-tip = 0.0 ppm β <sub>x</sub> = 50 cpm α = 0 cpm
2	Very Dense (10 YR, 5/6) Yellowish Brown, Well Graded Sand with Gravel, Dry	SW	N/A	m-tip = 0.0 ppm β <sub>x</sub> = 60 cpm α = 0 cpm
10	Dense (10 YR, 6/6) Brownish Yellow, Well Graded Sand with Gravel, Dry	SW	N/A	m-tip = 0.0 ppm β <sub>x</sub> = 60 cpm α = 0 cpm

PRIMARY

NOTES  
Drilling  
Drilling  
Driller

Pennsylvania Drilling  
Protocol 42

SAA - Same as above  
NA - Not Applicable

on \_\_\_\_\_  
ors \_\_\_\_\_  
ifer \_\_\_\_\_  
Samples collected per ASTM standards  
Colors identified using Munsell Color Chart

Findings:  
m-tip = 0.0 ppm  
β<sub>x</sub> = 50 cpm  
α = 0 cpm  
5-24-93 { m-tip = 0.0 ppm  
β<sub>x</sub> = 60 cpm  
α = 0 cpm



VISUAL CLASSIFICATION OF SOILS

TYPE AND NO. OF TESTS

3.05 RDC 11	PROJECT NAME. CRV 2 Phase II	
3	COORDINATES.	DATE 6-1-93
	GWL: Depth Date/Time	DATE STARTED 5-17-93
K. Payne	Depth Date/Time	DATE COMPLETED. 6-6-93
ble Tool		PAGE 6 OF 8

DEPTH IN FEET	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
	30.0 FT Bitten of Boring			

PRELIMINARY

Pennsylvania Drilling  
Cyclone 42  
Caulter  
bert

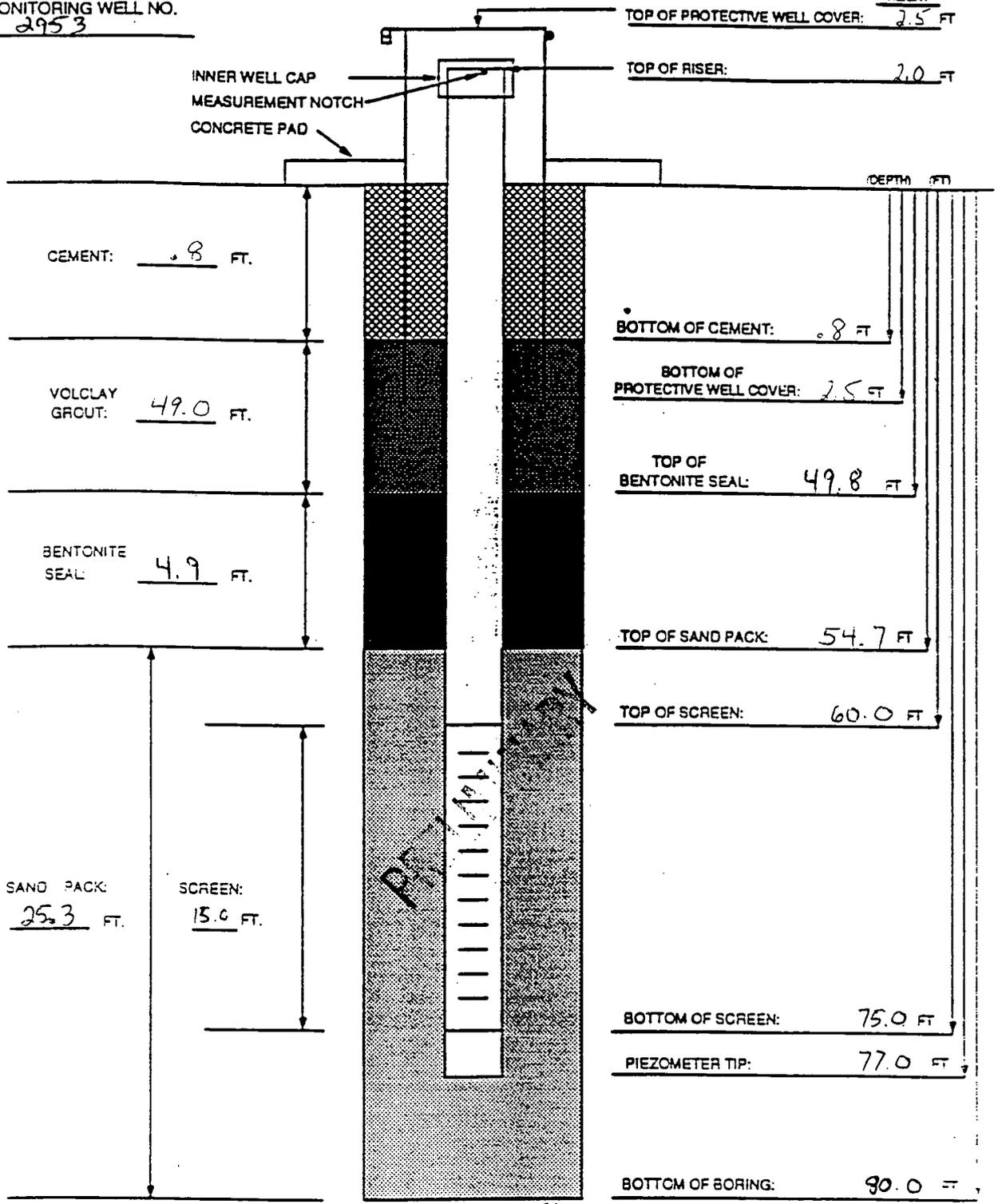
SAA - Same as above.  
 NA - Not Applicable

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

Readings  
 1.0 ft = 60 cpm  
 3.0 ft = 0 cpm

FERNALD RVFS  
INSTALLATION DIAGRAM  
MONITORING WELL NO.  
2953

INSTALLATION DATE: 6-6-93



BOREHOLE DIAMETER: 10 3/8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 24 bags @ 50 lb of #10/20  
 BENTONITE PELLETS (5-GALLON BUCKETS): 2 buckets  
 BAGS OF VOLCLAY GROUT: 13 @ 50 lb  
 AMOUNT OF CEMENT: 94 lbs  
 AMOUNT OF WATER USED: 750 gallons  
 OTHER: 14 Drums Sol. 1, 1 Drum Alconox / Water  
 TASK: 20 03.05 RDC II

NOTES:

- 1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
  - 4) WATER DEPTH AND DATE 66.35 FT
  - 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
  - 6) PARENTHESIS INDICATE DEPTH BE GROUND LEVEL.
  - 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.
- GEOLOGIST/ENGINEER: K. Payne

4626

# PIEZOMETER INSTALLATION SHEET

PROJ: CRU 2 Phase II FIELD ENG./GEO. Keith Payne DATE 6-6-93  
 PRC: 20.03.05 RDC 11 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 BORI: 953  
 PIEZ: 0.2953 DATE OF INSTALLATION 6-6-93  
 BORI: DRILLING

C D	METHOD <u>CABLE TOOL</u>	TYPE OF BIT <u>Hammer Percussion Bit</u>
	FLUID(S) USED: <u>water FROM 0.0 FT TO 63.0 FT</u> <u>N/A FROM N/A TO N/A</u>	CASING SIZE (S) USED: SIZE <u>10.0 IN I.D.</u> FROM <u>0.0 FT</u> TO <u>80.0 FT</u> SIZE <u>N/A</u> FROM <u>N/A</u> TO <u>N/A</u>

PIEZ: DESCRIPTION

T D F AV T	<u>Monitoring Well.</u>	RISER PIPE MATERIAL <u>316 Stainless Steel</u>
	DEPTH OF PERFORATED SECTION <u>4.0 I.D.</u>	RISER PIPE DIAMETERS: <u>O.D. 4 3/8 IN I.D. 4.0 IN</u>
	PERFORATION TYPE: <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>6-10 FT, 1-2 FT</u>
	SIZE OF PERFORATIONS <u>.010 IN</u>	JOINING METHOD <u>Screw type - flush joint threaded</u>
	PERFORATED AREA <u>15.0 FT</u>	

PROT: SYSTEM

R F	PROTECTIVE PIPE LENGTH <u>5.0 FT</u>	OTHER PROTECTION <u>Hinged Protective Cover with Lock</u>
	PROTECTIVE PIPE D.D. <u>10 3/4 IN</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF PIPE	<u>2.0 FT</u>			
GROUNDSURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	<u>2.5 FT</u>			
BOF OF CARRY	TOP	<u>.0 FT</u>	BOTTOM	<u>.8 FT</u>
	TOP	<u>.8 FT</u>	BOTTOM	<u>49.8 FT</u>
	TOP	<u>49.8 FT</u>	BOTTOM	<u>54.7 FT</u>
	TOP	<u>54.7 FT</u>	BOTTOM	<u>80.0 FT</u>
	TOP	<u>N/A</u>	BOTTOM	<u>N/A</u>
PERFORATED SECTION	TOP	<u>60.0 FT</u>	BOTTOM	<u>75.0 FT</u>
PIEZOMETER TIP	<u>77.0 FT</u>		TOP	BOTTOM
BOTTOM OF BOREHOLE	<u>80.0 FT</u>		TOP	BOTTOM
GWL AT INSTALLATION	<u>66.35 FT (Top Riser)</u>		TOP	BOTTOM

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO

WAS A PRESSURE TEST PERFORMED ON THE PIEZOMETER? YES  NO

REMARKS: Placed from 0.0 to 0.8 FT

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: <b>05.03.22</b>	PROJECT NAME: <b>CRU 5</b>	
BORING NUMBER: <b>MW-11064</b>	COORDINATES:	DATE: <b>06/10/93</b>
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: <b>06/10/93</b>
ENGINEER/GEOLOGIST: <b>A. Lamo</b>	Depth Date/Time	DATE COMPLETED: <b>06/10/93</b>
DRILLING METHODS: <b>Hollow Stem Auger</b>	PAGE <b>1</b>	OF <b>2</b>

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
1.5	0950 19633	4 4 6	6 6 0	Very stiff (SY 7/1) light gray and 10YR5/6 yellowish brown silty clay, low plasticity, dry	CL	3.5	MT = 0.3 ppm Bt = 60-80 cpm
3.0	0955 19634	4 8 8	6 6 0	Very stiff (10YR5/6) yellowish brown silty clay, mottling, medium plasticity, dry	CL	3.0	MT = 0.3 ppm Bt = 60-80 cpm small black stains
4.5	1000 NA	7 4 4	6 6 6	stiff (10YR5/6) yellowish brown with some (10YR5/1) gray silty clay, high plasticity, <del>dry</del>	CL	1.5	MT = 0.3 ppm Bt = 60-80 cpm to 4.5' * At 4.0 ASTM, moist
6.0	1010 19635	3 5 7	6 6 0	Medium Dense (10YR5/6) yellowish brown with some (10YR5/1) gray clayey silt, moist low plasticity	ML	NA	MT = 0.3 ppm Bt = 60-80 cpm several thin (10YR5/6) wet silt zones
7.5	1015 NA	7 7 11	6 6 6	Medium Dense (2.5Y 6/4) light yellowish brown clayey silt, <del>interbedded</del> <sup>accolated</sup> moist low plasticity	ML	NA	MT = 0.3 ppm Bt = 60-80 cpm (2.5Y 6/4) interbedded wet silt <del>zones</del> <sup>at 6.0'</sup> zones, iron staining
8.5	1025 NA	3 8 6	6 6 6	Medium dense (2.5Y 6/6) olive yellow clayey silt, wet low plasticity	ML	NA	MT = 0.3 ppm Bt = 60-80 cpm
9.0				Very stiff (2.5Y 6/6) olive yellow silty clay, some (2.5Y 6/6) gray silty clay, low plasticity, dry	CL	2.75	iron staining

NOTES: Drilling Co. Pennsylvania Drilling Co.  
 Driller Mike Bentley  
 Assistant Bill Anderson

Background MT = 0.3 ppm  
 Bt = 60-80 cpm

NA- Not Applicable

2" Split Spoons Driven by ASTM standards

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUM:	05-03-22	PROJECT NAME:	CRU 5
BORING NUM:	11064	COORDINATES:	
ELEVATION:		GWL: Depth	Date/Time
ENGINEER/GE:	A. Coma	Depth	Date/Time
DRILLING ME:	6 1/4 Hollow Stem Auger	DATE:	06/10/93
		DATE STARTED:	06/10/93
		DATE COMPLETED:	06/10/93
		PAGE	2 OF 2

DEPTH	SAMPLE TYPE & NO	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ITSE)	REMARKS
9.0	1030 119638	Very stiff (2.9766) olive yellow silty clay with some (2.5466) gray silty clay, low plasticity, moist	CL	2.0	MT = 0.3 ppm BT = 60-80 cpm
		medium stiff (5.9511) gray silty clay, medium plasticity, moist	CL	0.75	
10.5	1040 NA	Very Loose (5.9511) gray clayey silt, wet ac calciaz low plasticity, wet	ML	NA	MT = 0.3 ppm BT = 60-80 cpm
12.0	1050 NA	Loose (5.9511) gray clayey silt, low plasticity, wet	ML	NA	MT = 0.3 ppm BT = 60-80 cpm
		SAA with some (5.9511) olive gray clayey silt, moist			
13.5	1100 NA	Med. dense (5.9512) olive gray clayey silt, slight plasticity, wet	ML	NA	MT = 0.3 ppm BT = 60-80 cpm Drove last spoon 2.0' from 13.5' to 13.5'.
15.0	1100 119637	SAA with some well sorted fine sand, wet	ML	NA	MT = 0.3 ppm BT = 60-80 cpm
15.5		END OF BORING			From 11.0' to 15.5' sample was collected for sieve analysis. Sample No. 119638

NOTES  
Drilling Co  
Driller  
Assistant

Ivanna Drilling Co.  
Bentley  
Anderson

Background MT = 0.3 ppm  
BT = 60-80 cpm

SAA - same as above  
NA - Not Applicable

2" Split Spoons driven by ASTM standards

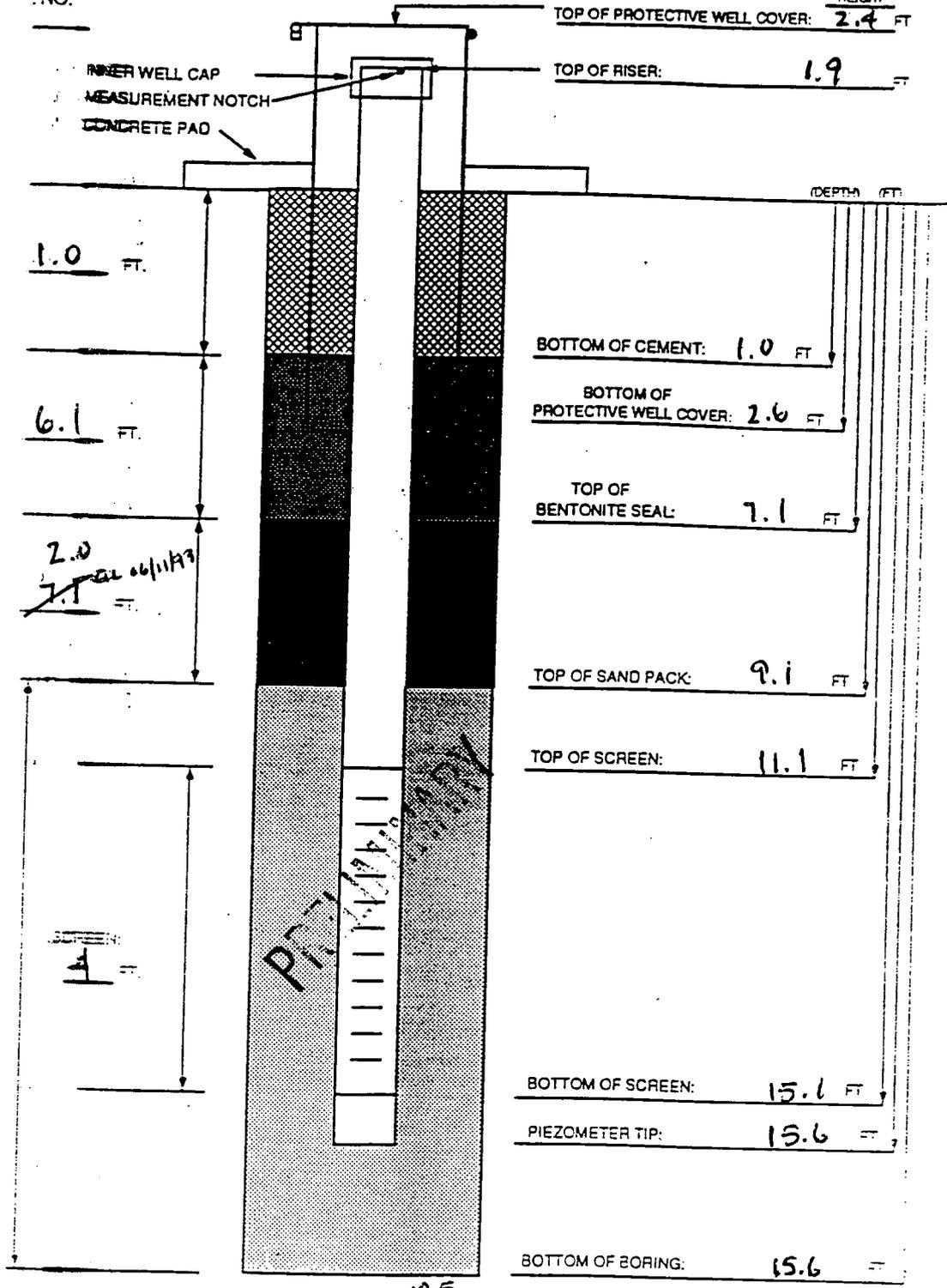
FER  
INSTA  
MONIT

FS  
GRAM  
NO.

INSTALLATION DATE: 06/11/93

TOP OF PROTECTIVE WELL COVER: 2.4 FT

TOP OF RISER: 1.9 FT



BOTTOM OF CEMENT: 1.0 FT

BOTTOM OF PROTECTIVE WELL COVER: 2.6 FT

TOP OF BENTONITE SEAL: 7.1 FT

TOP OF SAND PACK: 9.1 FT

TOP OF SCREEN: 11.1 FT

BOTTOM OF SCREEN: 15.1 FT

PIEZOMETER TIP: 15.6 FT

BOTTOM OF BORING: 15.6 FT

6.5  
S  
OC  
09

WATERALS USED

SAND TYPE AND QUAN  
BENTONITE PELLETS  
BAGS OF MOLDY  
AMOUNT OF CEMENT  
AMOUNT OF WATER  
OTHER  
DATE: MA

10/20  
1 1/4  
2  
1 bag  
15 gallons  
Well

NOTES:

- 1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4 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.
- GEOLOGIST/ENGINEER: A. Lomo

- 4) WATER DEPTH AND DATE NA NA
- 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
- 6) PARENTHESIS INDICATE DEPTH OF GROUND LEVEL
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK



VISUAL CLASSIFICATION OF SOILS

01/19/93

PROJECT NUMBER: <b>SO 03.03.22</b>	PROJECT NAME: <b>CRU 5</b>
BORING NUMBER: <b>11077</b>	COORDINATES:
ELEVATION:	DATE: <b>06/14/93</b>
ENGINEER/GEOLOGIST: <b>A. Como</b>	DATE STARTED: <b>06/14/93</b>
DRILLING METHODS: <b>6 1/4" Hollow Stem Auger</b>	DATE COMPLETED: <b>06/15/93</b>
	PAGE <b>1</b> OF <b>3</b>

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.5	119639 119640	4 9 10	6 6 0	Hard (2.5744) olive brown silty clay, organic material, dry, no plasticity	OL	40	MT = 0.0 ppm BT = 40-80 cpm
3.0	119641 119642	13 13 13	6 6 0	Very stiff (2.5751) light olive brown silty clay, some (5751) gray silty clay, no plasticity, few pieces of small gravel, dry	CL	3.75	MT = 0.0 ppm BT = 40-80 cpm
4.5	119643 119644	13 14 15	6 6 0	Very stiff (2.5754) light olive brown silty clay, slight plasticity, few pieces of small gravel, some well graded sand, dry	CL	3.0	MT = 0.0 ppm BT = 40-80 cpm
6.0	119645 119646 119647 06119	5 7 9	6 6 6	Very stiff (2.5757) light olive brown silty clay, slight plasticity, few pieces of small gravel, iron staining, dry	CL	4.0	MT = 0.0 ppm BT = 40-80 cpm Completed drilling to 6.0' on 06/14/93
7.5	119648 119649 119650	14 25 24	6 6 6	SAA	CL	4.5	MT = 0.0 ppm BT = 40-80 cpm
9.0	119651 119652 119653	4 10 17	6 6 6	Hard (2.5753) light olive brown silty clay, slight plasticity, few pieces of small gravel, iron staining, dry	CL	4.5	MT = 0.0 ppm BT = 40-80 cpm

Drilling Co. **Pennsylvania Drilling Co.** Background MT = 0.0 ppm  
 Driller **Mike Bentley** BT = 40-80 cpm  
 Assistant **Bill Anderson** SAA Same As Above  
 NA - Not applicable  
 2" split Spoons driven by ASTM standards

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER: <b>SD 05.03.22</b>	PROJECT NAME: <b>CLU 5</b>	
BORING NUMBER: <b>11077</b>	COORDINATES:	DATE: <b>06/15/93</b>
ELEVATION:	GWL: Depth      Date/Time	DATE STARTED: <b>06/14/93</b>
ENGINEER/GEOLOGIST: <b>A. Lamo</b>	Depth      Date/Time	DATE COMPLETED: <b>06/15/93</b>
DRILLING METHODS: <b>6 1/4" Hollow Stem Auger</b>		PAGE <b>2</b> OF <b>3</b>

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0	0810 119654 119655 119656	4 8 10	6 6 6	SAA  very stiff (SYSI) gray silty clay, low plasticity, small gravel, dry	CL  CL	4.5  3.5	MT = 0.0 ppm BT = 40-80 cpm
10.5	0820 119657 119658 119659	3 5 8	6 6 6	SAA	CL	2.0	MT = 0.0 ppm BT = 40-80 cpm
12.0	0830 119660	7 8 11	4 0 0	SAA	CL	2.5	MT = 0.0 ppm BT = 40-80 cpm
13.5	0840 119661 119662 119663	4 4 6	6 6 6	SAA	CL	3.0	MT = 0.0 ppm BT = 40-80 cpm
15.0	0845 119664 119665 119666	4 10 16	6 6 3	SAA  SAA with abundant gravel, well graded sand, dry	CL	3.0	MT = 0.0 ppm BT = 40-80 cpm
16.5	0855 119667 119668	3 5 8	6 6 0	stiff (SYSI) gray silty clay, low plasticity, <sup>trace</sup> well graded sand, gravel, moist	CL	1.15	MT = 0.0 ppm BT = 40-80 cpm

PENNSYLVANIA

NOTES  
 Drilling Co. **Pennsylvania Drilling Co.**      Background MT = 0.0 ppm  
 Driller **Mike Bentley**      BT = 40-80 cpm  
 Assistant **Bill Anderson**  
 SAA - Same As Above  
 NA - Not Applicable  
 2" split Spoons driven by ASTM standards  
 136-65

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.0322	PROJECT NAME: CRM 5
BORING NUMBER: 11077	COORDINATES:
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: A. Lando	DATE: 06/15/93
DRILLING METHODS: 6 1/4 Hollow Stem Auger	DATE STARTED: 06/14/93
	DATE COMPLETED: 06/15/93
	PAGE 3 OF 3

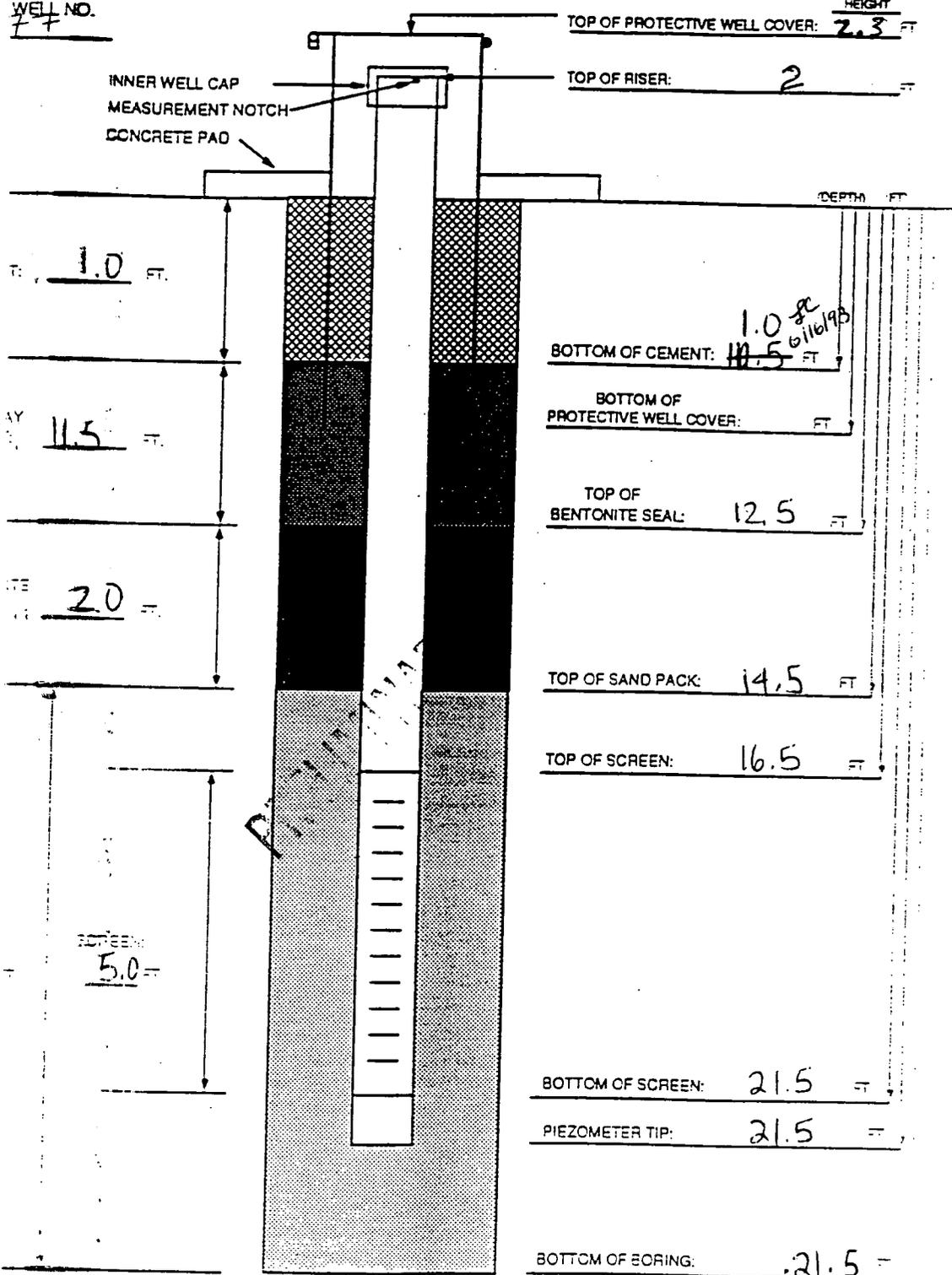
DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18.0	0905 119669 119670	6 7 7	6 4 0	stiff (95%) gray silty clay, low plasticity, gravel, trace well graded sand, moist	CL	175	MT = 0.0 ppm BT = 40-80 cpm
19.5	0920 119671 119672 119673	3 4 7	6 6 6	SAA, medium plasticity	CL	175	MT = 0.0 ppm BT = 40-80 cpm
21.0	119674	8	6				
21.5				END of BORING @ 21.5'			

PROHIBITED

NOTES  
 Drilling Co. Pennsylvania Drilling Co.  
 Driller Mike Bentley  
 Assistant Bill Anderson  
 Background MT = 0.0 ppm  
 BT = 40-80 cpm  
 SAA - Same As Above  
 NA - Not Applicable  
 2" split Spoons driven by ASTM standards

PIRIFS  
 WIDIAGRAM  
 WELL NO. 77

INSTALLATION DATE: 6/16/93



HEIGHT  
 TOP OF PROTECTIVE WELL COVER: 2.3 FT  
 TOP OF RISER: 2 FT

DEPTH FT

BOTTOM OF CEMENT: 1.0 ft  
 11.5 FT

BOTTOM OF PROTECTIVE WELL COVER: FT

TOP OF BENTONITE SEAL: 12.5 FT

TOP OF SAND PACK: 14.5 FT

TOP OF SCREEN: 16.5 FT

BOTTOM OF SCREEN: 21.5 FT

PIEZOMETER TIP: 21.5 FT

BOTTOM OF BORING: 21.5 FT

BOREHOLE DIAMETER: 10.5 IN.

MATERIALS USED

PIPE TYPE AND SIZE

BENTONITE PELLET

BASE OF CEMENT

AMOUNT OF CEMENT

AMOUNT OF WATER

OTHER

NA

10/20 - 7 bags

BUCKETER: 2 buckets

2 bags

3 bags

5 gallons

NA

Well

NOTES:

- 1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
  - 4) WATER DEPTH AND DATE NA NA
  - 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
  - 6) PARENTHESIS INDICATE TO GROUND LEVEL
  - 7) WELL CASING HAS A PERFORATED COVER WITH FACEDON.
- GEOLOGIST/ENGINEER: L. Cahill

### PIEZOMETER INSTALLATION SHEET

NAME CRUS FIELD ENG./GEO. L. Cahill DATE 6/1  
 NO. 50.03.22 CHECKED BY \_\_\_\_\_  
 NO. 11077 DATE OF INSTALLATION 6/16/93  
 NO. 11077  
 DRILLING

METHOD <u>Hollow Stem Auger</u> FLUID (S) USED: <u>NA</u> FROM <u>NA</u> TO <u>NA</u> <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	TYPE OF BIT <u>6 1/4 Hollow Stem Auger</u> CASING SIZE (S) USED: SIZE <u>NA</u> FROM <u>NA</u> TO <u>NA</u> SIZE <u>NA</u> FROM <u>NA</u> TO <u>NA</u>
--	---

WELL DESCRIPTION  
Monitoring Well  
 DEPTH OF PERFORATED SECTION 4"  
 PERFORATION TYPE:  
 HOLES  SCREEN   
 SIZE OF PERFORATIONS 0.010  
 PERFORATED AREA 5.0'  
 RISER PIPE MATERIAL 4" Stainless Steel  
 RISER PIPE DIAMETERS:  
 O.D. 4"  
 LENGTH OF PIPE SECTIONS 13.0'  
 JOINING METHOD Flush Threaded

PROTECTIVE SYSTEM  
 PROTECTIVE PIPE LENGTH 5.0' OTHER PROTECTION N/A  
 PROTECTIVE PIPE O.D. 10"

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION
TOP OF RISER PIPE	2.0		
FACE OF PROTECTIVE PIPE	0.0		
FILL MATERIALS:	0.0	1.0	
	TOP 1.0	BOTTOM 12.5	TOP BOTTOM
	TOP 12.5	BOTTOM 14.5	TOP BOTTOM
	TOP 14.5	BOTTOM 21.5	TOP BOTTOM
	TOP NA	BOTTOM NA	TOP BOTTOM
SECTION	TOP 16.5	BOTTOM 21.5	TOP BOTTOM
TIP	21.5		
DEPTH OF BOREHOLE	21.5		
DEPTH OF INSTALLATION	1		

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

### VISUAL CLASSIFICATION OF SOILS

PROJECT N
BORING N
ELEVATION
ENGINEER
DRILLING

UBS 50.03.22	PROJECT NAME	CRU S REPLACEMENT WELLS
# 11075	COORDINATES	DATE 6-21-93
	GWL: Depth	Date/Time
T RILEY	Depth	Date/Time
AUGER		DATE STARTED 6-21-93
		DATE COMPLETED
		PAGE 1 OF 5

DEPTH (FEET)	SAMPLE
0.5	11912 10 6-21-93 11912
1.0	1035 6-21-93
1.5	NA
2.0	11911 1105 6-21-93
2.5	11911 1105 6-21-93
3.0	11915 1105 6-21-93
3.5	1300 6-21-93
4.0	119132 1300 6-21-93
4.5	NA 6-21-93
5.0	119134 1320 6-21-93

RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	STIFF, GRAYISH BROWN (10YR 5/1), SANDY SILTY GRAVEL, FROM PARKING LOT, SLIGHT MOIST	GM	2.0	MT = 0 ppm BY = 50/240 cpm α = 0 cpm
4	HARD, GRAYISH BROWN (10YR 5/1), SAA, WITH VERT DARK BROWN ZONE (10YR 2/2) - MICROTIP ZEPHIRUS	GM	4.5	MT = 1.2 ppm BY = 120 cpm α = SAA
NA	NO RECOVERY	NA	NA	
6	VERY SOFT, BROWN (10YR 4/3), CLAYEY SILT WITH SOME GRAVEL, SLIGHTLY MOIST	ML	.5	MT = 0 ppm BY = 50/80 cpm α = 0 cpm
6	MEDIUM DENSE, VERY PALE BROWN (10YR 7/5) SANDY, SILTY GRAVELS FROM PARKING LOT (LIMESTONE GRAVEL W/FINES)	GP	NA	BY = 50/60
4	HARD, VERY DARK BROWN (10YR 2/2), SILTY CLAY, WITH A TRACE OF ORGANIC LOW PLASTICITY, SLIGHTLY MOIST	CL	4.5	BY = 50/80 cpm
6	VERY STIFF, DARK GRAY (10YR 4/1), SILTY CLAY, WITH SOME GRAVEL, MEDIUM PLASTICITY, SLIGHT MOIST	CL	2.5	MT = 0 ppm BY = 50-100 cpm α = 0 cpm
6	STIFF, YELLOWISH BROWN (10YR 5/6) SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.0	
NA	N/D RECOVERY	NA	NA	
6	STIFF DARK GRAY (10YR 4/1) SILTY CLAY WITH SOME GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	1.5	

NOTES

COMPANY: PENN. DRILL  
 DRILLER: JEFF BENTLEY  
 HELPER: MICE LEON  
 METHOD: AUGER

BACKGROUND LEVELS  
 MT = 0 ppm  
 BY = 50 cpm  
 α = 0 cpm

# VISUAL CLASSIFICATION OF SOILS

- 4620

JEC  
 RING  
 VAT  
 LINEE  
 CLING

WBS 50.03.22	PROJECT NAME: CRU 5 REPLACEMENT WELLS		
MW # 11075	COORDINATES:		DATE: 6-21-93
	GWL: Depth	Date/Time	DATE STARTED: 6-21-93
SIST. RILEY	Depth	Date/Time	DATE COMPLETED:
			PAGE 2 OF 5

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 6-21-93  
 11919  
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 6-21-93

RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ITSF)	REMARKS
6	VERY STIFF, LIGHT YELLOWISH BROWN (10% G/L) SILTY CLAY, WITH TRACE OF GRAVEL, MOD. PLASTICITY, MOIST	CL	3.5	MT = 0 ppm BY = 60-80 cpm α = 0 cpm
3 0	NO RECOVERY	NA	NA	
6	STIFF SAME AS 5.0 TO 5.5 FT	CL	1.5	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
6	STIFF, OLIVE YELLOW (2.5% G/L) SILTY CLAY, WITH TRACE OF SAND, LOW PLASTICITY, MOIST	CL	1.0	α = 0 cpm
3	STIFF SAA	CL	1.5	
6	STIFF, SAA	CL	1.5	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
6	VERY STIFF, OLIVE YELLOW (2.5% G/L) SILTY CLAY, WITH SAND & GRAVEL, MOD. PLASTICITY, MOIST	CL	2.5	α = 0 cpm
0	NO RECOVERY	NA	NA	
6	STIFF BROWNISH YELLOW (10% G/L) SILTY CLAY, WITH SOME GRAVEL, MOD. PLASTICITY, MOIST	CL	1.5	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
6	HARD SAA WITH LARGE GRANITE ERRATIC FRAGMENTS	CL	4.5	α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 50.03.22	PROJECT NAME: CRU 5 REPLACE MONT WELLS	
BORING NUMBER: MW # 11075	COORDINATES:	DATE: 6-21-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-21-
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 6-21-
DILLING METHODS: AUGER	PAGE 3 OF 3	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 G. INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
0.0	119143 1410 6-21-93	53	6	SAA SLIGHTLY MOIST	CL	4.5	
5	119143 119144 1415 6-21-93	4	5	VERY STIFF, GRAY (10 YR 5/1) SILTY CLAY WITH SOME GRAVEL, MEDIUM PLASTICITY, WET	CL	3.5	MT = 0 PPM BY = 60-80 c α = 0 cpm
10	NA 1415 6-21-93	4	0	No RECOVERY	NA	NA	
15	NA 1415 6-21-93	8	0	No RECOVERY	NA	NA	
20	119145 1515 6-21-93	12	6	VERY STIFF YELLOWISH BROWN (10YR 5/6) MOTTLED SILTY CLAY, WITH SOME GRAVEL, LOW TO MED. PLASTICITY, MOIST	CL	2.0	MT = 0 PPM BY = 60-80 c α = 0 cpm
25	119145 1515 6-21-93	17	6	VERY STIFF, GRAY (10YR 5/1) SILTY CLAY WITH SOME GRAVEL, MEDIUM PLASTICITY MOIST	CL	2.5	α = 0 cpm
30	119146 119147 1515 6-21-93	31	6	VERY STIFF, GRAY (10YR 5/1) SILTY CLAY WITH SOME GRAVEL, MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	2.5	
35	119148 1530 6-21-93	8	6	HARD, GRAY (10YR 5/1), SILTY CLAY WITH SOME GRAVEL, MED. PLASTICITY, MOIST	CL	4.5	MT = 0 PPM BY = 60-100 c α = 0 cpm
40	119149 1530 6-21-93	12	6	VERY STIFF OLIVE BROWN (2.5Y 4/3) SILTY CLAY, WITH SOME GRAVEL, MED. PLASTICITY, MOIST TO WET	CL	3.0	α = 0 cpm
45	119150 1530 6-21-93	14	4	VERY STIFF, GRAY (10 YR 5/1) SILTY CLAY, WITH SOME GRAVEL, MEDIUM PLASTICITY, WET	CL	2.0	

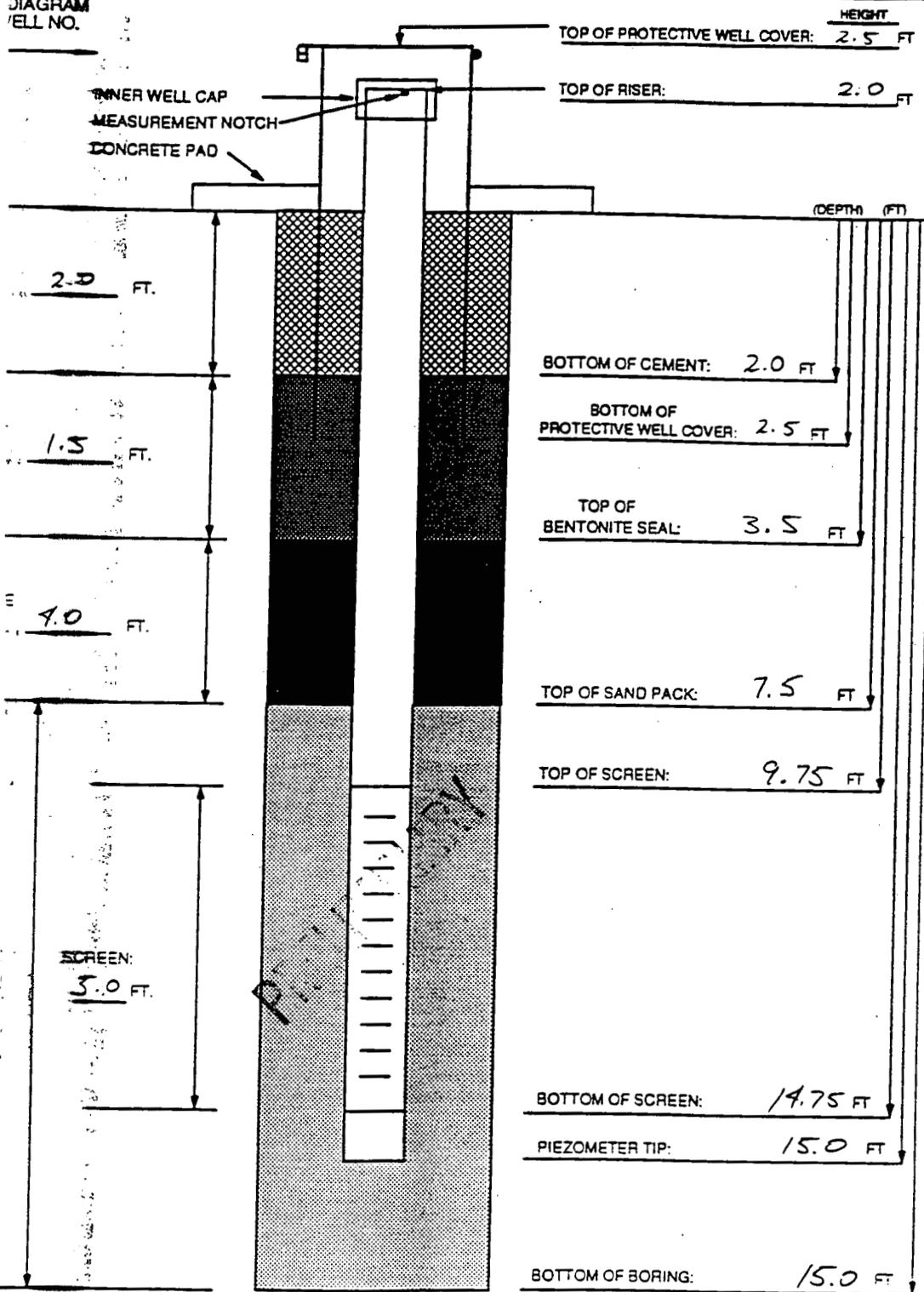
TBS

SEE PAGE 1

F  
IN  
M

R/FS  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 6-22-93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED:

SAND TYPE AND C  
BENTONITE PELLE  
BAGS OF VOLCLA  
AMOUNT OF CEM  
AMOUNT OF WAT.  
OTHER: 1-5 FT  
TASK: W

20 4 BAGS  
BUCKETS: 2  
1  
4 BAGS  
10 GALLONS  
1-10 FT 1-2 FT SECTION PIPE  
3.22

NOTES:

- 1) RISER PIPE IS 9.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
  - 3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
- GEOLOGIST/ENGINEER: PAT RILEY

- 4) WATER DEPTH AND DATE 0.0 FT 6-22-93
- 5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
- 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME CRU 5 REPLACEMENT & ADDITIONAL WELLS FIELD ENG./GEO. RILEY DATE 6-23-93  
 PROJECT NO. WBS 50.03.22 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 DRILLING NO. # 11075  
 PIEZOMETER NO. # 11075 DATE OF INSTALLATION 6-23-93

**BOREHOLE DRILLING**

DRILLING METHOD <u>AUGER</u>	TYPE OF BIT <u>AUGER</u>
DRILLING FLUID(S) USED: FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u> FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	CASING SIZE(S) USED: SIZE <u>NA</u> FROM <u>NA</u> TO <u>NA</u> SIZE <u>NA</u> FROM <u>NA</u> TO <u>NA</u>

**PIEZOMETER DESCRIPTION**

TYPE <u>MONITORING WELL</u>	RISER PIPE MATERIAL <u>3/16 STAINLESS STEEL</u>
DIAMETER OF PERFORATED SECTION <u>4.0 INCHES</u>	RISER PIPE DIAMETERS: O.D. <u>4 3/8 IN</u> I.D. <u>4.0 IN.</u>
PERFORATION TYPE: SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>1 10 FT, 1 2 FT SEC</u>
AVERAGE SIZE OF PERFORATIONS <u>.010</u>	JOINING METHOD <u>SCREW TYPE - FLUSH JOIN</u>
TOTAL PERFORATED AREA <u>5.0 FT</u>	<u>THREADED</u>

**PROTECTION SYSTEM**

RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u>	OTHER PROTECTION <u>HINGED WELL COVER</u>
PROTECTIVE PIPE O.D. <u>10 3/4 IN</u>	<u>WITH LOCK</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: <u>CONCRETE</u> GROUT/SLURRY BENTONITE SAND GRAVEL	TOP	0.0	BOTTOM	2.0
	TOP	2.0	BOTTOM	3.5
	TOP	3.5	BOTTOM	7.5
	TOP	7.5	BOTTOM	15.0
	TOP	NA	BOTTOM	NA
PERFORATED SECTION	TOP	9.75	BOTTOM	14.75
PIEZOMETER TIP	15.0			
BOTTOM OF BOREHOLE	15.0			
DEPTH AFTER INSTALLATION	0.0			

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

REMARKS \_\_\_\_\_

# VISUAL CLASSIFICATION OF SOILS

NO. NUMBER	288323	PROJECT NAME	CRU 5
BOR. NUMBER	11071	COORDINATES	
ELEV.		GWL: Depth	Date/Time
ENG. GEOLOGIST	Leacars	Depth	Date/Time
DRILL METHODS	Hollow Stem		PAGE 1 OF 10

DEPTH (ft)	NO. BLOWS ON SAMPLER PER 6 IN.	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (Liquidity Index)	REMARKS
						B <sub>x</sub> = 80-100cpm Mt = 0.0ppm
1	6	6	medium dense, 10PR 4/4 olive brown, clayey sand, low plasticity, moist, gravel	SC	NA	B <sub>x</sub> - 80-100cpm
	6	6	SAA	SC	NA	Mt - 0 ppm
	6	6	SAA	SC	NA	
2	8	6	very stiff, 10PR 4/4 olive brown, clay, medium plasticity, moist some gravel	CI	2.5	B <sub>x</sub> - 80-100cpm
	13	6	SAA	CI	2.5	Mt - 0ppm
3	17	6	very stiff, 10PR 4/4 olive brown, 10PR 8/6 brownish yellow mottled clay, slight low plasticity, moist	CI	3.0	
	23	6	very stiff, 2.5X 4/3 olive brown, clay, low plasticity, moist	CI	3.0	B <sub>x</sub> - 80-100cpm
4	25	6	SAA	CI	3.0	Mt - 0 ppm
	28	6	SAA	CI	3.0	
5	4	6	medium dense, 10PR 4/4 olive brown clayey sand, low plasticity, moist	SC	NA	B <sub>x</sub> - 80cpm
	6	6	SAA	SC	NA	Mt - 0ppm
6	10	4	SAA	SC	NA	
	30	6	SAA	SC	NA	B <sub>x</sub> - 40cpm
7	32	4	very stiff, 2.5X 5/4 light olive brown, clay, medium plasticity, moist	CI	3.0	Mt - 0ppm
	29	0	NA	NA	NA	

Contractor Pennsylvania Drilling  
 Equipment Acifer Soil System  
 Driller Joe Raab  
Lock Lewis

NR - No Recovery  
 SAA - Same as above  
 NA - Not Applicable  
 Mt - microtop  
 Samples collected per ASTM standard procedure  
 Colors identified using Munsell Color Chart

# VISUAL CLASSIFICATION OF SOILS

50.03.22 PROJECT NAME. CRU5  
 11071 COORDINATES. \_\_\_\_\_ DATE 6/21/63  
 GWL: Depth \_\_\_\_\_ Date/Time \_\_\_\_\_ DATE STARTED 6/21/63  
 ST J. Benson Depth \_\_\_\_\_ Date/Time \_\_\_\_\_ DATE COMPLETED 6/22/63  
Hollow Stem Auger PAGE 2 OF 6

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RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISI)	REMARKS
6	very st.obb, 2.5Y4/4 olive brown, clay, medium plasticity, moist	cl	30	Bx - 60cpm
6	SAA	cl	30	Mt - 0ppm
6	very st.obb; 2.5Y4/1 dark gray clay, medium plasticity, moist	cl	30	
6	SAA	cl	30	Bx. 60cpm
6	SAA	cl	30	Mt - 0ppm
2	SAA	cl	3.0	
6	very st.obb, 5Y4/1 dark gray clay, low plasticity, moist	cl	20	Bx - 80cpm
6	SAA	cl	2.0	Mt - 0ppm
6	SAA	cl	2.5	
6	very st.obb 5Y4/1 dark gray clay, low plasticity, moist	cl	25	Bx - 100cpm
6	SAA	cl	30	
6	very st.obb, N3/very dark gray clay, low plasticity, moist	cl	2.5	Mt - 0ppm
6	SAA	cl	2.5	Bx - 80cpm
6	SAA	cl	30	Mt - 0ppm
4	SAA	cl	2.5	

at Pennsylvania Drillers  
 at Acker Soil Service  
 at Back  
 at Davis

NA - No recovery  
 SAA - Same as above  
 NA - Not Applicable  
 Mt - Micro top

Samples collected per ASTM standard procedures  
 Colors identified using Munsell color chart



# VISUAL CLASSIFICATION OF SOILS

0.03.22	PROJECT NAME. <u>CRV 5</u>	
071	COORDINATES.	DATE <u>6/22/93</u>
	GWL: Depth      Date/Time	DATE STARTED <u>6/21/93</u>
J. Reagan	Depth      Date/Time	DATE COMPLETED <u>6/22/93</u>
<u>hollow stem auger</u>		PAGE <u>4</u> OF <u>6</u>

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RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USCS)	REMARKS
6	very stiff, 10YR 4/1 gray, clay some sand, low plasticity, moist	CL	2.5	B <sub>s</sub> -80-100cpm
6	medium dense, 10YR 4/1 gray, poorly graded sand, no plasticity, wet	SP	NA	Mt- 100ppm
6	medium dense, 10YR 4/1 gray, poorly graded sand, no plasticity, wet	SP	NA	
6	Loose, 10YR 4/1 gray, poorly graded sand, no plasticity, wet	SP	NA	B <sub>s</sub> -80-100cpm
6	Loose, 10YR 4/1, gray, clayey sand, low plasticity, wet	SC	NA	Mt - 0.3 ppm
0	NR	NA	NA	
6	medium dense, 10YR 4/1, gray clayey sand, low plasticity, moist	SC	NA	B <sub>s</sub> -80-100cpm
6	SAA	SC	NA	Mt - 0.3 ppm
6	medium dense, 10YR 4/1, gray, poorly graded sand, low plasticity, wet	SP	NA	
0	NR	NA	NA	B <sub>s</sub> -80-100cpm Mt - 0.3 ppm
	Bottom of boring at 25'			

Pennsylvania Drilling  
 Acken soil entry  
 Raab  
 Davis

M<sub>t</sub> - Microtip  
 SAA - Same as above  
 NA - Not Applicable  
 NR - No Recovery

Samples collected per ASTM standard procedure  
 Colors identified using Munsell color chart

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME CRUS FIELD ENG./GEO. J. Reagan DATE 6/22  
 PROJECT NO. 50.03.22 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 BORING NO. NA DATE \_\_\_\_\_  
 PIEZOMETER NO. 11071 DATE OF INSTALLATION 6/21 - 6/22/9  
**BOREHOLE DRILLING**

DRILLING METHOD Hollow stem auger TYPE OF BIT auger  
 DRILLING FLUID(S) USED: CASING SIZE(S) USED:  
 FLUID NA FROM NA TO NA SIZE NA FROM NA TO NA  
 FLUID NA FROM NA TO NA SIZE NA FROM NA TO NA

**PIEZOMETER DESCRIPTION**

TYPE Stainless RISER PIPE MATERIAL stainless steel  
 DIAMETER OF PERFORATED SECTION 4 IN RISER PIPE DIAMETERS:  
 PERFORATION TYPE: O.D. 4 1/4" I.D. 4"  
 SLOTS  HOLES  SCREEN  LENGTH OF PIPE SECTIONS 2-10', 1-1'8"  
 AVERAGE SIZE OF PERFORATIONS .010 IN JOINING METHOD flush threaded joints  
 TOTAL PERFORATED AREA 10'

**PROTECTION SYSTEM**

RISER PROTECTIVE PIPE LENGTH 5.0 OTHER PROTECTION locked  
 PROTECTIVE PIPE O.D. \_\_\_\_\_

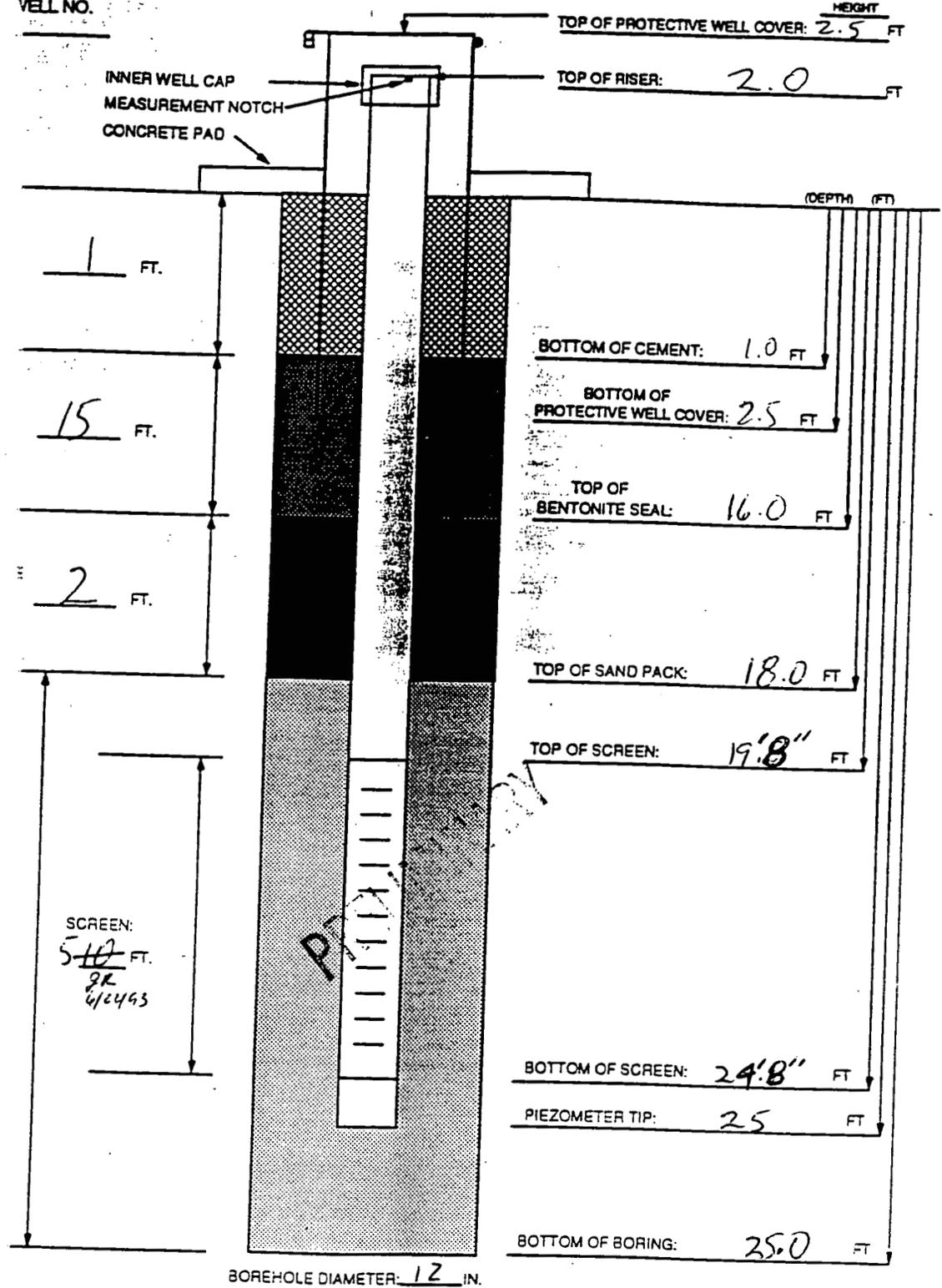
ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.5		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	2.5		NA	
BOREHOLE FILL MATERIALS:	TOP	BOTTOM	TCP	BOTTOM
	GROUT / SLURRY	1 16	NA	NA
	BENTONITE	16 18	TOP	BOTTOM
	SAND	18 25	TOP	BOTTOM
GRAVEL - CEMENT	0 1	TOP	BOTTOM	
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	19'8"	24'8"	NA	NA
BOTTOM OF BOREHOLE	25.0'		NA	
GWL AFTER INSTALLATION	25.0'		NA	

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

16086

R/VFS  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 6/21-6/22/93



BOREHOLE DIAMETER: 12 IN.

NOTES:

20 8 bags  
SACKETS): 1 bucket

- 1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4 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.
- GEOLOGIST/ENGINEER: J. Leagan

- 4) WATER DEPTH AND DATE 230 FT. 6/22/93
- 5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
- 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

MA  
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# VISUAL CLASSIFICATION OF SOILS

NUM:  
NUM:  
ION:  
ER/G:  
GM:

~~0.03~~ ~~05-300322~~ PROJECT NAME. 015  
073 COORDINATES. \_\_\_\_\_ DATE 6/14/93  
 \_\_\_\_\_ GWL: Depth \_\_\_\_\_ Date/Time \_\_\_\_\_ DATE STARTED 6/14/93  
J. Reagan/ Depth \_\_\_\_\_ Date/Time \_\_\_\_\_ DATE COMPLETED 6/17/93  
Hollow Stem auger PAGE 1 OF 5

SAMPLE  
TYPE & NO

- 19068
- 500
- 11913
- 19069
- 1500
- 11913
- 19070
- 1500
- 1191
- 1907
- 1515
- 1191
- 1907
- 1515
- 11919
- NR
- 1515
- 1191
- 1907
- 0810
- 11514
- 19074
- 0810
- 11514
- NR
- 0810
- 115
- 1907
- 082
- 1151
- 1907
- 0820
- 1151
- 19074
- 0820
- 11514
- 19074
- 0820
- 11514
- NR
- 0820
- 11514

RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISS)	REMARKS
				B <sub>x</sub> = 80-100 cpm MT = 0.8 ppm
6	Hard, light olive brown (2.5 Y, 5/3) clay with gravel, low plasticity, dry	CL	7.5	B <sub>x</sub> = 80-100 cpm
6	SAA	CL	7.5	MT = 1.5 ppm
6	SAA	CL	7.5	MT = 0.8 ppm
6	Hard, olive brown (2.5 Y, 4/3) clay with gravel, low plasticity, dry	CL	7.5	B <sub>x</sub> = 80-100 cpm
6	SAA	↓	↓	ML = 2.8 ppm
D	NR	↓	↓	1530 - Stopped Sampling
6	Stiff, light olive brown (2.5 Y, 5/4) silty clay with some gravel, low plasticity, moist	CL	2.0	B <sub>x</sub> = 80-100 cpm
6	SAA	CL	1.75	MT = 0.0 ppm
D	NR	N/A	N/A	(above readings are same as background for)
6	Very stiff, dark olive brown (2.5 Y, 3/3) silty clay with roots, <sup>medium</sup> plasticity, moist	CL	2.5	B <sub>x</sub> = 80-100 cpm
6	Stiff, light olive brown (2.5 Y, 5/6) silty clay with some gravel, slight plasticity, dry	CL	1.75	MT = 0.0 ppm
6	SAA	CL	1.75	
6	Stiff, olive brown (2.5 Y, 4/4) silty clay with some gravel, medium plasticity, moist	CL	1.75	B <sub>x</sub> = 80-100 cpm
6	Stiff, dark gray (2.5 Y, 4/1) silty clay with trace gravel, medium plasticity, moist	CL	2.0	MT = 0.0 ppm
6	SC-15-93 NR SAA	CL	2.0	SC-15-93

ing  
ing  
ler

or Pennsylvania Drilling  
 at Acker Soil Center  
 Raah  
 Davis

NR - No Recovery  
 SAA - Same as above  
 NA - Not Applicable  
 m+ - m.c.d. = p

Samples collected per ASTM standard procedure  
 Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT:  
BORING N:  
ELEVATION:  
ENGINEER:  
DRILLING:

50.03.22 PROJECT NAME: CRU 5  
11073 COORDINATES:  
L. Cahill GWL: Depth Date/Time DATE 6-15-93  
Hollow Stem Auger Depth Date/Time DATE STARTED 6-14-93  
DATE COMPLETED 6/17/93  
PAGE 2 OF 5

DEPTH	SAMPLE
8	1191 02 61
	1191 03 61
	1191 04 61
9	1191 05 61
	1191 06 61
	1191 07 61
10	1191 08 61
	1191 09 61
	1191 10 61
11	1191 11 61
	1191 12 61
	1191 13 61
12	1191 14 61
	1191 15 61
	1191 16 61
13	1191 17 61
	1191 18 61
	1191 19 61
14	1191 20 61
	1191 21 61
	1191 22 61

RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USCS)	REMARKS
6	Hard, dark gray (2.5 Y, 4/1), silty clay with brown mottling, slight plasticity, dry	CL	7.5	MT = 0.0 ppm BS = 80-100 c.p.
6	SAA	CL	4.0	
6	Very stiff, very dark gray (2.5 Y, 3/1) clay, slight plasticity, dry	CL	3.75	MT = 0.0 ppm BS = 80-100 c.p.
6	Very stiff, light olive brown (2.5 Y, 5/4) silty clay with trace gravel and silt, low plasticity, dry	CL	2.5	
6	Very stiff, dark gray (2.5 Y, 4/1) clay, with trace silt, high plasticity, moist	CL	2.75	SC 6-15-93
6	SAA	CL	2.75	
6	Stiff, dark grayish brown (2.5 Y, 4/2) clay with some roots, medium plasticity, moist	CL	1.0	SC 6-15-93 MT = 0.0 ppm BS = 80-100 c.p.
6	Stiff, dark grayish brown (2.5 Y, 4/2) clay with trace gravel, high plasticity, moist	CL	1.5	
6	SAA	CL	1.5	MT = 0.0 ppm BS = 80-100 c.p.
6	Stiff, grayish brown (2.5 Y, 5/2) clay with brown mottling, some silt and fine sands, slight plasticity, moist	ML	1.0	
6	SAA	ML	1.0	MT = 0.0 ppm BS = 80-100 c.p.
6	SAA	ML	1.0	
6	Stiff, light olive brown (2.5 Y, 5/3) clay with some silt and fine sands, low plasticity, moist	ML	1.75	MT = 0.0 ppm BS = 80-100 c.p.
6	SAA	ML	1.75	
6	SAA	ML	1.75	

NOTES

Drilling  
Drilling  
Driller

at Pennaculvane Drilling  
with Acker Soil Sensors  
by Bob  
for Davis

NR - No Recovery  
SAA - Same as above  
NA - Not Applicable  
MT - Micropip

Samples collected per ASTM standards  
Colors identified using Munsell Color Chart

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER	50.03.22	PROJECT NAME.	CRUS
BORING NUMBER	11073	COORDINATES.	
ELEVATION:		GWL: Depth	Date/Time
ENGINEER/GEOLOGIST	L Cahill	Depth	Date/Time
DRILLING METHODS	Hollow Stem Auger	DATE STARTED	6-14-93
		DATE COMPLETED.	6/17/93
		PAGE	3 OF 5

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 1/2 IN	RECOVERY (%)	DESCRIPTION	UNCS SYMBOL	MEASURED CONSISTENCY (US)	REMARKS
5	119015 1015 6/15/93	6	6	Stiff, grayish brown (2.5Y, 5/2) silty sand with some clay, low plasticity, wet	ML	1.5	MT = 0.0 ppm B <sub>x</sub> = 80-100 cpm
16	119016 1015 6/15/93	7	6	SAA	ML	1.5	
	119017 1015 6/15/93	12	6	SAA	ML	1.5	
17	119018 1020 6/15/93	10	6	Stiff, dark gray (2.5Y, 4/1) silty silt with clay, moist	ML	1.0	MT = 0.0 ppm B <sub>x</sub> = 80-100 cpm
	NR 1020 6/15/93	12	NR	NR	NA	NA	
18	NR 1020 6/15/93	11	NR	NR	NA	NA	
19	119019 1040 6/15/93	10	6	Stiff, olive brown (2.5Y, 4/3) silty clay, slight plasticity, moist	ML	1.0	MT = 0.0 ppm B <sub>x</sub> = 80-100 cpm
	119100 1040 6/15/93	12	6	Stiff, dark gray (2.5Y, 4/1) silty sand with trace gravel, moist	ML	1.75	
	119101 1040 6/15/93	15	6	Very stiff, dark gray (2.5Y, 4/1), clay with some silt, slight plasticity, moist	CL	3.0	
20	119102 1040 6/15/93	18	6	SAA	CL	3.0	MT = 0.0 ppm B <sub>x</sub> = 80-100 cpm
				Bottom of boring at 20'			

NOTES  
 Drilling Contractor Pennsylvania Drilling  
 Drilling Equipment Acker Soil Survey  
 Driller Joe Raab  
Roger Davis

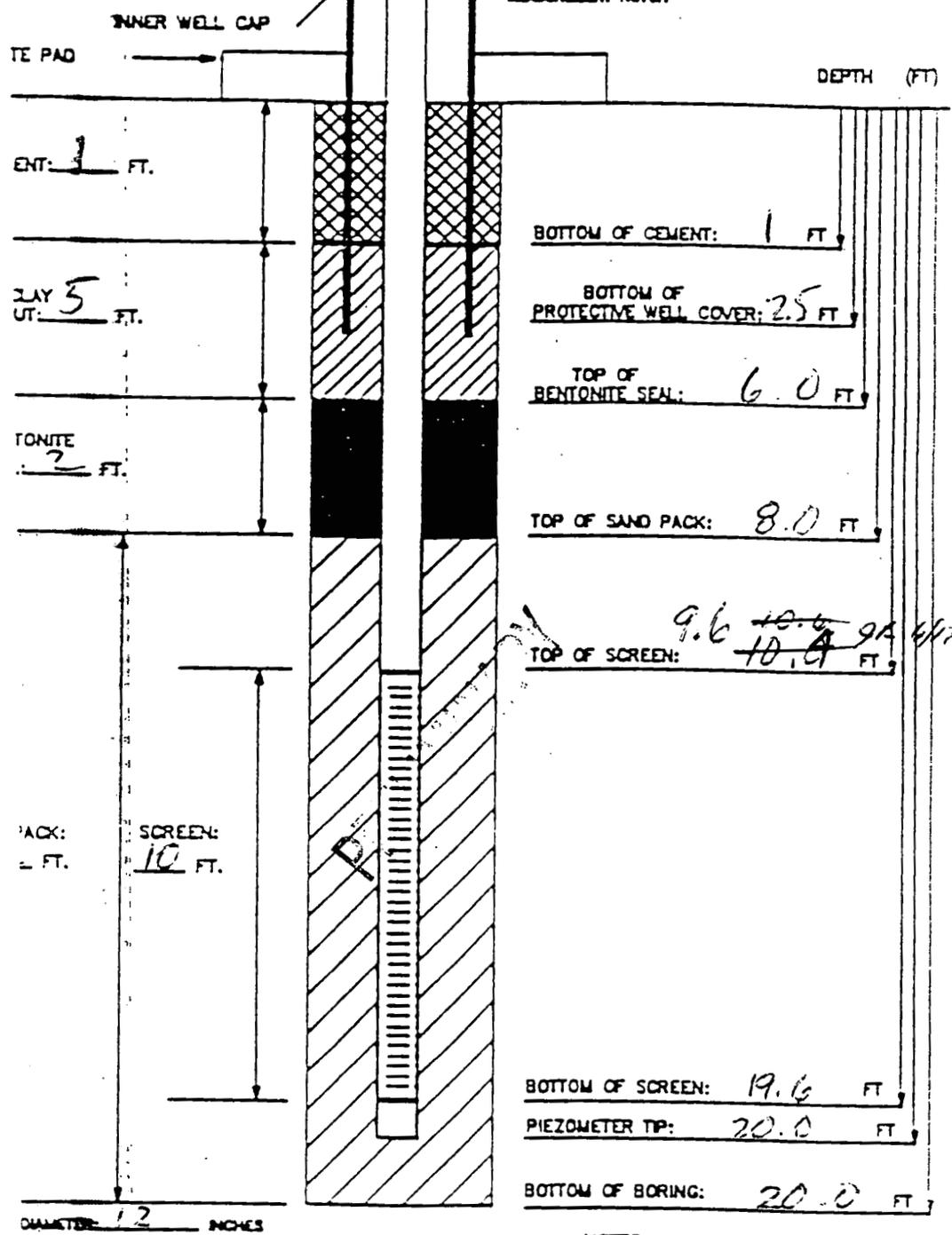
NR - No Recovery  
 SAA - Same as above  
 NA - Not Applicable  
 MT - Moisture  
 Colors identified using Munsell color chart

4626

INSTALLATION DATE: 6/15-6/17/93

# WELL DIAGRAM

WELL NO. \_\_\_\_\_



DIAMETER: 1.2 INCHES

UTILITY: 76  
 5-GALLON BUCKETS: 1  
 OUT: 3  
 SED: 20 gal

- NOTES:
- 1) RESOR-PIPE IS 2-INCH SCHEDULE 40 4-inch stainless steel PVC PIPE FLUOR-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 PLUG
  - 4) WATER DEPTH/DATE: 7.0 FT 6/17/93

WATER  
 SAND  
 BENTONITE  
 BAGS  
 AMOUNT  
 OTHER

TASK: 50.03.27

GEOLOGIST/ENGINEER: J. Reagan

FE.  
F

.D

405

# PIEZOMETER INSTALLATION SHEET

PRO  
PRO  
BOR  
PIE  
BOR

ME CLV5  
SD 03.22  
11073  
NO. NA  
DRILLING

FIELD ENG./GEO. J. Leagan DATE 6/17/93  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
DATE OF INSTALLATION 6/15-6/17/93

METHOD hollow stem auger  
FLUID (S) USED:  
NA FROM NA TO NA  
NA FROM NA TO NA

TYPE OF BIT auger  
CASING SIZE (S) USED:  
SIZE NA FROM NA TO NA  
SIZE NA FROM NA TO NA

PIE.

DESCRIPTION  
stainless steel  
OF PERFORATED SECTION 4 IN  
ION TYPE:  
 HOLES  SCREEN   
SIZE OF PERFORATIONS .010 IN  
FORATED AREA 2 ft

RISER PIPE MATERIAL stainless steel  
RISER PIPE DIAMETERS:  
O.D. 4 1/4 IN I.D. 4 IN  
LENGTH OF PIPE SECTIONS 1-10', 1-2' 8"  
JOINING METHOD Flush threaded join

PROT

F  
F

SYSTEM  
PIPE LENGTH 5.0  
PIPE O.D. 10 IN

OTHER PROTECTION lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP PIPE	2.5		NA	
GRO	0.0		NA	
BOT	2.5		NA	
BORH			NA	
L MATERIALS: REY	TOP	1	BOTTOM	6
	TOP	6	BOTTOM	8
	TOP	8	BOTTOM	20
	TOP	NA	BOTTOM	NA
PERF SECTION	TOP	9.6	BOTTOM	19.6
PIEZ TIP	20.0		NA	
BOT	20.0		NA	
GWL	7.0 ft		NA	

WAS THE  
WAS A S  
REMARKS

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

VISUAL CLASSIFICATION OF SOILS

NU  
JU  
OR  
R/  
IF

20.03.03	PROJECT NAME: OJ2 phase 2	DATE 11/8/93
2944	COORDINATES:	DATE STARTED 11/7/93
	GWL: Depth 4.6 ft Date/Time 11/2/93	DATE COMPLETED 11/2/93
D.O'Brien	Depth	Date/Time
Cable Tool		PAGE 1 OF 2

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RECOVERY (m)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12	V. STIFF 2.54 (1/4) Lt. olive brown granully clay, no plasticity, dry	CI	2.75	Mt = 0 ppm Bs = 60 cpm
8	Hard 2.54 (1/4) Lt. yellowish brown granully clay, no plasticity, dry	CI	4.0	Mt = 0 ppm Bs = 60 cpm
13	Hard 2.54 (1/2) Lt. brownish gray granully clay, no plasticity, dry	CI	4.5	Mt = 0 ppm Bs = 40 cpm
13	V. STIFF 54 (4 1/2) Olive gray silty clay w/ trace gravel, no plasticity, dry	CI	3.5	Mt = 0 ppm Bs = 60 cpm
13	V. STIFF 54 (5 1/2) Olive sandy granully clay, no plasticity, slightly moist	CI	3.5	Mt = 0 ppm Bs = 40 cpm
0	NO RECOVERY	NA	NA	Mt = NA Bs = NA
15	<del>NO RECOVERY</del> Hard 2.54 (1/2) grayish brown granully clay, no plasticity, dry	<del>NA</del> CI	<del>NA</del> 4.5	<del>Mt = NA 0 ppm Bs = NA 60 cpm</del>
8	V. STIFF, SAA	CI	3.5	Mt = 0 ppm Bs = 60 cpm
18	Hard 2.54 (1/4) Gray granully clay, no plasticity, dry	CI	4.5	Mt = 0 ppm Bs = 40 cpm
15	Hard 2.54 (1/4) Lt olive brown granully clay, no plasticity, dry	CI	4.5	Mt = 0 ppm Bs = 40 cpm

Illiana Drilling  
Cyrus Eyles  
Frankson  
Thomas

SAA - same as above  
NA - not applicable  
Samples collected per ASTM standard penetrometry test  
Colors identified using Munsell Color Chart

ppm Mt = 40-60 cpm

# VISUAL CLASSIFICATION OF SOILS

-4620

PROJECT NUMBER: <u>20.03.03</u>	PROJECT NAME: <u>OU2 phase 2</u>		
LOG NUMBER: <u>2944</u>	COORDINATES:		DATE: <u>6/9/93</u>
LOCATION:	GWL: Depth	Date/Time	DATE STARTED: <u>1/18/93</u>
ENGINEER/GEOLOGIST: <u>D.O. Brinn</u>	Depth	Date/Time	DATE COMPLETED: <u>1/23/93</u>
TESTING METHODS: <u>Cable Tool</u>			PAGE <u>2</u> OF <u>8</u>

SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (UN)	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1350 113750 16/9/93	13 18 26	18	Hard. 2.54(1/4) Lt. olive brown granular clay, no plasticity clay	CI	4.5	MH = 0 ppm BS = 40 cpm
1400 113751 16/6/93	32 36 47	18	SAA	CI	4.5	MH = 0 ppm BS = 60 cpm
1410 13752 11/11/93 9/25	30 6	12	V. Stiff 2.54(1/4) Lt. olive brown granular clay, no plasticity clay	CI	3.25	MH = 0 ppm BS = 60 cpm
13753 16/6/93 9/25	35 36 41	6	Hard. 2.54(1/4) Gray granular clay, no plasticity clay	CI	4.5	MH = 0 ppm BS = 60 cpm
13754 16/6/93 9/25	35 4	4	SAA V. Dense 2.54(1/4) Lt. olive brown med. to coarse sand, poorly granular clay	SP	NA	MH = 0 ppm BS = 60 cpm
			Begin sampling with SAA			MH = BS =
						MH = BS =
						MH = BS =
						MH = BS =
						MH = BS =

Contractor: Pennsylvania Drilling  
 Equipment: Reynolds Eries  
Bob Erickson  
Rich Thomas

SAA - same as above  
 NA - not applicable  
 Samples collected per ASTM standard penetrometer  
 Colors identified using Munsell Color Chart

sd: MH = 0 ppm BS = 40-60 cpm



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 PROJECT NAME: 012 phase 2  
 BORING NUMBER: 2944 COORDINATES:  
 ELEVATION:  
 ENGINEER/GEOLOGIST: D.O'Brien GWL: Depth          Date/Time          DATE STARTED: 11/18/02  
 DRILLING METHODS: Cable Tool Depth          Date/Time          DATE COMPLETED: 11/18/02  
 PAGE 24 OF 28

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 10" (10)	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.54	0840 1137 Miller	3 50%	10	1/2 in. 2.54 (5/16) Lt. olive brown sand with gravel, poorly graded, slightly moist	SP	NA	Mt = 0 ppm Rt = 400 ppm
1.66	0830 1137 Miller	60%	4	SAA	SP	NA	Mt = 0 ppm Rt = 400 ppm
1.78	0830 1137 Miller	0 31 46	A	SAA, moist	SP	NA	Mt = 0 ppm Rt = 400 ppm

PROHIBITED

NOTES:  
 Drilling Contractor: Pennsylvania Drilling  
 Drilling Equipment: Bucyrus Ellis  
 Driller: Bob Erickson  
Rich Thomas  
 Bkgd: Mt=0ppm Rt=40-100ppm

SAA- same as above  
 NA- not applicable  
 Samples collected per ASTM standard penetration test  
 Colors identified using Munsell Color Chart

# VISUAL CLASSIFICATION OF SOILS

-4626

NUMBER: 20.03.05	PROJECT NAME: OUG2 phase 2	DATE: 6/11/93
NUMBER: 2944	COORDINATES:	DATE STARTED: 1/18/93
GEOLOGIST: D.O. Brinn	GWL: Depth      Date/Time	DATE COMPLETED: 1/22/93
METHODS: Cable Tool	Depth      Date/Time	PAGE 5 OF 7

DEPTH

15

10

5

0

BLOWS ON SAMPLER PER 100mm	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16 15	6	11.0m to 2.54 (34) L of fine sand, poorly graded, wet	SP	NA	NA = 0 ppm NA = 0 ppm
		DESIGN CONTINUOUS SAMPLING			

PROHIBITED

Sylvania Drilling

SUCYPUS FCUS

Frickson

Thomas

1 = 0 ppm    Rf = 40-100 ppm

SAA - same as above  
 NA - not applicable  
 Samples collected per ASTM standard  
 penetration test  
 Colors identified using Munsell Color Chart

# VISUAL CLASSIFICATION OF SOILS - 401

OJEC  
 DRING  
 EVAT  
 GINE  
 ILLIP

R. 20.03.03	PROJECT NAME. OJ2 phase 2	
2944	COORDINATES:	DATE 6/11/93
	GWL: Depth      Date/Time	DATE STARTED: 6/1/93
OGIST. D.O. BRUN	Depth      Date/Time	DATE COMPLETED: 6/23/93
TESTS: Cable Tool		PAGE 10 OF 8

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SAMPLER PER 1.617.1	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
21	10	Drill. 2.5Y(BH) Lt. olive brown fine sand, poorly graded wet.	SP	NA	Mt = 0 ppm Bs = 60 cpm
23	11	Drill. 2.5Y(BH) Lt. olive brown fine sand & gravel, poorly graded, wet.	SP	NA	Mt = 0 ppm Bs = 60 cpm
20	13	SAA	SP	NA	Mt = 0 ppm Bs = 60 cpm
27	12	SAA	SP	NA	Mt = 0 ppm Bs = 60 cpm
16	12	SAA	SP	NA	Mt = 0 ppm Bs = 60 cpm
18	18	SAA	SP	NA	Mt = 0 ppm Bs = 60 cpm
14	14	SAA	SP	NA	Mt = 0 ppm Bs = 60 cpm
0	0	No Recovery	NA	NA	Mt = NA Bs = NA
		String terminated at 67.044			Mt = Bs =
					Mt = Bs =
					Mt = Bs =

S:  
 7 Contra: Pennsylvania Drilling  
 7 Equipment: Bucyrus Erie  
 Bob Erickson  
 Rich Thomas

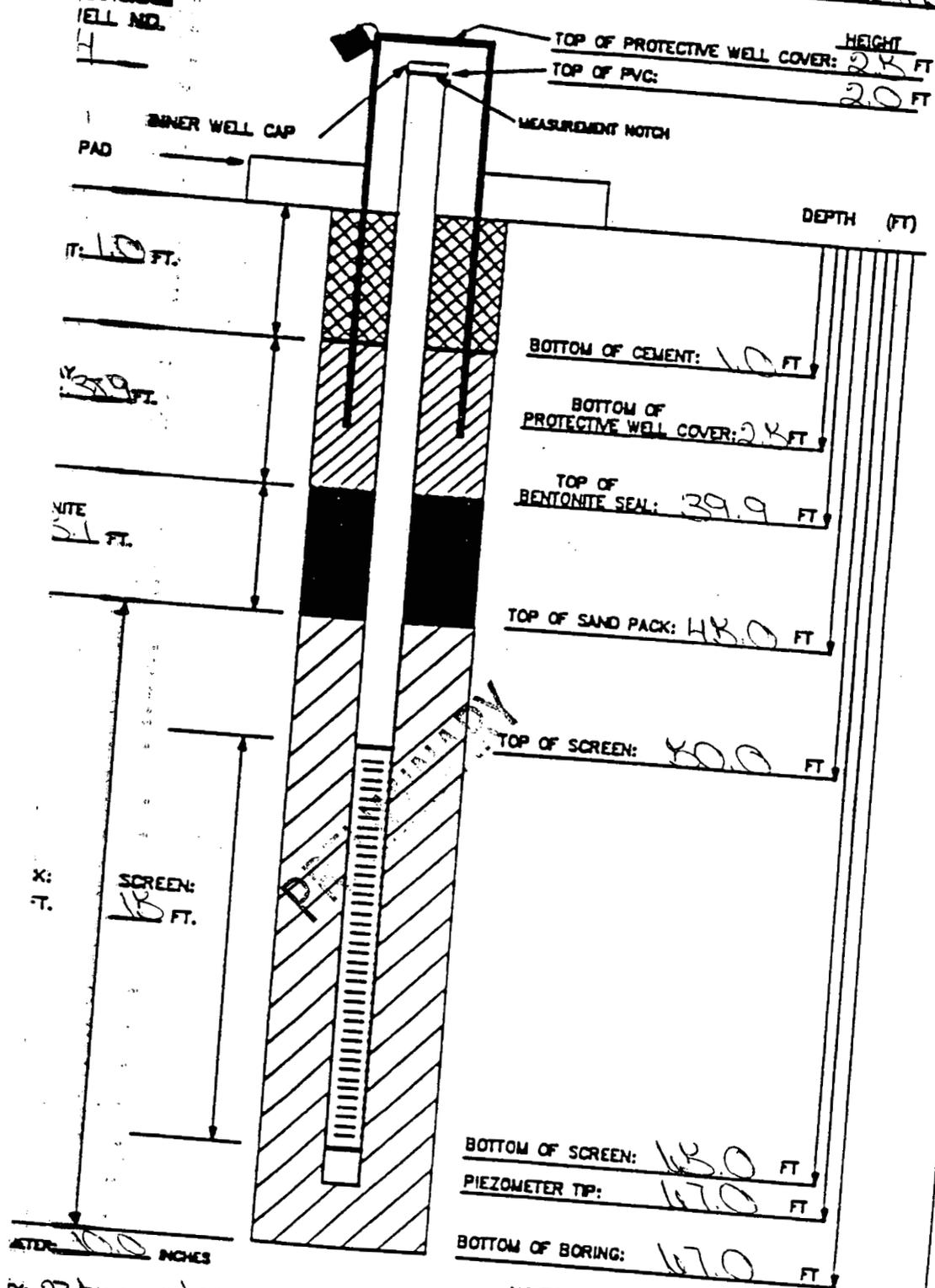
SAA - same as above  
 NA - not applicable  
 Samples collected per ASTM standard penetrometry test  
 Colors identified using Munsell Color Chart

3kgd: HNu = 0 ppm Bs = 40-60 cpm

F  
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C

DIAGRAM  
WELL NO.

INSTALLATION DATE: 10/23/93



WATER:  
SAND TYPE:  
BENTONITE:  
BAGS OF:  
AMOUNT:  
OTHER:

QTY: 23 bags 10/20  
GALLON (BUCKETS): 14/12  
T: 1/2 bag  
S: 500 gallon

- NOTES:
- 1) RISER PIPE IS 2-INCH SCHEDULE 40 316 stainless
  - 2) PVC PIPE, FLASH-THREADED JOINTS 316 stainless
  - 3) SCREEN IS 2-INCH I.D. SCHEDULE 40
  - 4) PVC PIPE WITH 0.020-INCH SLOTS
  - 5) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SLAMP
  - 6) WATER DEPTH/DATE: 51.6 FT 10/23/93

TASK: 20.03.01

GEOLOGIST/ENGINEER: D. O. Rain

11/20/93  
5/23/93

F

804  
-4626

# PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 phase 2 FIELD ENG./GEO. D. Brown DATE 1/23/93  
 PROJECT NO. 20.03.05 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 OFFICE NO. 2944 DATE OF INSTALLATION 1/23/93

DRILLING METHOD Cable Tool TYPE OF BIT Churn Bit  
 FLUID(S) USED: H<sub>2</sub>O FROM 0.0 TO 50.0 CASING SIZE(S) USED: 10.0 FROM 0.0 TO 45.0  
 FROM \_\_\_\_\_ TO \_\_\_\_\_ SIZE \_\_\_\_\_ FROM \_\_\_\_\_ TO \_\_\_\_\_

PIEZOMETER DESCRIPTION  
Monitoring Well  
 DEPTH OF PERFORATED SECTION 40.0 RISER PIPE MATERIAL 316 stainless steel  
 SECTION TYPE: HOLES  SCREEN  RISER PIPE DIAMETERS: O.D. 4 3/8 in I.D. 4.0 in  
 SIZE OF PERFORATIONS 0.010 in LENGTH OF PIPE SECTIONS 8-10ft 1-2ft  
 TO PERFORATED AREA 15.0 in JOINING METHOD scrim type - flush joint threaded

PROTECTION SYSTEM  
 PROTECTIVE PIPE LENGTH 50.0 OTHER PROTECTION buried backing cover with padlock  
 PIPE O.D. 10 3/4 in

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF PIPE	2.0			
GROUND SURFACE	0.0			
TOP OF PROTECTIVE PIPE	2.5			
ALL MATERIALS: CARRY	TOP	0.0	BOTTOM	39.9
	TOP	1.0	TCP	BOTTOM
	TOP	39.9	TOP	BOTTOM
	TOP	45.0	TOP	BOTTOM
SECTION	TOP	NA	TOP	BOTTOM
	TOP	50.0	TOP	BOTTOM
TIP	47.0			
DEPTH TO BOREHOLE	47.0			
DEPTH TO INSTALLATION	51.6			

THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 SECURITY TEST PERFORMED ON THE PIEZOMETER? YES  NO

REMARKS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <i>WBS-04-33</i>	PROJECT NAME: <i>OLS-12 Well</i>	
LOG NUMBER: <i>3898</i>	COORDINATES: <i>NA</i>	DATE: <i>5-11-93</i>
LOCATION: <i>NA</i>	GWL: Depth <i>11.30 FT</i> Date/Time <i>NA 6/29/93 1100</i>	DATE STARTED: <i>5-11-93</i>
ENGINEER/GEOLOGIST: <i>Musa M. Kasebir ET Corp</i>	Depth <i>NA</i> Date/Time <i>NA</i>	DATE COMPLETED: <i>6-18-93</i>
TESTING METHODS: <i>Cable Tool</i>		PAGE <i>1</i> OF <i>11</i>

SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.0 m	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ITSE)	REMARKS Actual Reading / Backgr.
<i>109449</i> 5-11 <i>1420</i>	<i>6</i> <i>5</i> <i>8</i>	<i>15</i>	<i>stiff (10 YR 3/2) very dark grayish brown silty clay to (10 YR 4/3) brown silty clay, moist, high plasticity</i>	<i>CL</i>	<i>1.5</i>	<i>MTIP = 0 ppm BS = 0 cpm</i>
<i>109451</i> 5-11 <i>1430</i>	<i>10</i> <i>9</i> <i>8</i>	<i>10</i>	<i>stiff (10 YR 4/3) brown to (2.5 Y 5/4) light olive brown, clay, high plasticity, moist</i>	<i>CH</i>	<i>1.25</i>	<i>MTIP = 0 ppm BS = 0 cpm</i>
<i>109452</i> 5-11 <i>1440</i>	<i>5</i> <i>3</i> <i>4</i>	<i>8</i>	<i>very soft (2.5 Y 5/4) light olive brown, clay, moist, high plasticity</i>	<i>CH</i>	<i>2.25</i>	<i>MTIP = 0 ppm BS = 0 cpm</i>
<i>109453</i> 5-11 <i>1700</i>	<i>3</i> <i>3</i> <i>6</i>	<i>8</i>	<i>SAA</i>	<i>CH</i>	<i>2.25</i>	<i>MTIP = 0 ppm BS = 0 cpm</i>
<i>109454</i> 5-12 <i>0830</i>	<i>10</i> <i>7 1/4</i>	<i>8</i>	<i>very stiff (2.5 Y 7/3) olive brown silty clay, with some coarse sand moist, high plasticity</i>	<i>CH</i>	<i>2.5</i>	<i>MTIP = 7.0/7.0 ppm BS = 60/60 cpm</i>
<i>109455</i> 5-12 <i>09:00</i>	<i>21</i> <i>27</i> <i>41</i>	<i>14</i>	<i>very stiff (2.5 Y 7/3) olive brown, silty clay w/ coarse sand. moist. High plasticity</i>	<i>CH</i>	<i>74.5</i>	<i>MTIP = 4.0/4.0 ppm BS = 70/70 cpm</i>
<i>109456</i> 5-12 <i>09:25</i>	<i>17</i> <i>15</i> <i>50</i>	<i>14</i>	<i>hard (10 YR 4/1) dark gray, silty clay. moist. high plasticity. Lenses of heavy silt 1-3mm thick. No sand.</i>	<i>CH</i>	<i>74.5</i>	<i>MTIP = NA BS = 60/60 cpm</i>
<i>109457</i> 5-12 <i>10:50</i>	<i>12</i> <i>19</i> <i>21</i>	<i>18</i>	<i>SAA</i>	<i>CH</i>	<i>74.5</i>	<i>MTIP = 0 ppm BS = 60/60 cpm</i>
<i>109458</i> 5-13 <i>0919</i>	<i>12</i> <i>18</i> <i>45</i>	<i>9</i>	<i>Hard (2.5 Y 5/1) gray, silty clay. moist. high plasticity. trace cobbles 5cm diam.</i>	<i>CH</i>	<i>74.0</i>	<i>MTIP = 0 ppm BS = 65/65 cpm</i>
<i>109459</i> 5-13 <i>0943</i>	<i>12</i> <i>18</i> <i>30</i>	<i>8</i>	<i>very stiff (5 Y 4/1) dark gray, silty clay. moist. med plasticity. few gravel</i>	<i>ch</i>	<i>4.0</i>	<i>MTIP = 0/0 ppm BS = 65/65 cpm</i>

Drilling Co. Pennsylvania Drilling  
 Drilling Equipment Bucyrus  
 Operator Kevin Myers  
 Assistant George Bullitt

Background: *MTIP = 0 ppm  
BS = 0 cpm*

*Samples taken by using 2" O.D. SSS, driven 18" using 140 lbs hammer falling freely through 30".*

# VISUAL CLASSIFICATION OF SOILS

NO	5-04-33	PROJECT NAME: 0V5-12 WELL
UM	98	COORDINATES: N/A
IN:		DATE: 5-13-93
VG		GWL: Depth NA Date/Time N/A
ME	MUSA M. KENNEDY (UT)	DATE STARTED: 5-11-93
	Depth see Page 1 Date/Time	DATE COMPLETED: 6-18-93
		PAGE 2 OF 11

RECOVERED (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSFI)	REMARKS	
	<del>STIFF (5Y 4/1) DARK GRAY SILTY CLAY WITH TRACE PEBS S&amp;G 5/13/93</del>			6-24-93H	
1400					
13	STIFF (5Y 4/1) DARK GRAY, SILTY CLAY, WITH TRACE PEBBLES, HIGH PLASTICITY MOIST	CH	1.5	MTIP = 0/0 PPM BS = 65/65 PPM	
05					
401					
13	STIFF (5Y 5/2) olive gray, silty clay, 6 in lens of clayey sand @ 7.5; moist, medium plasticity	CL	1.5	MTIP = 0/0 PPM BS = 65/65 PPM	
20					
400					
13	hard, (5Y 3/2) dark olive gray, low plasticity, top 6" clayey silt - change to 2 3/4" sand with some pebbles and cobbles, moist, well graded	ML SW	>4.5 NA	MTIP = 0/0 PPM BS = 65/65 PPM	
20					
400					
13	dense (5Y 3/2) dark olive gray, fine to medium sand, poorly graded, last 4" going to silty-sand, moist	SP SM	NA 39	MTIP = 0/0 PPM BS = 65/65 PPM	
35					
207					
14	NA	NA	NA	MTIP = NA BS = NA	
15					
164					
4	very soft (5Y 4/1) dark gray, fat clay, high plasticity, moist	CH	<0.25	MTIP = 0/0 PPM BS = 40/40 CPMM	
10					
2	NA	NA	NA	MTIP = NA BS = NA	
20					
14	NA	NA	NA	MTIP = NA BS = NA	
50					
165					
14	very soft (5Y 4/1) dark gray fat clay, high plasticity, moist	CH	<0.25	MTIP = 0/0 PPM BS = 60/60 CPMM	
10					
166					
14	6	SAA	CH	<0.25	MTIP = 0/0 PPM BS = 60/60 CPMM
257					

C  
E  
sylvania Drilling

Background: MTIP =  
BS =

please see page 1

# VISUAL CLASSIFICATION OF SOILS

PROJECT NO:	4.33	PROJECT NAME:	0U5-12 Wells Area
BORING NUMBER:	898	COORDINATES:	NA
ELEVATION:		DATE:	5-14-93
ENGINEER/CONSULTANT:	Musa M. Kasebir	GWL: Depth NA Date/Time NA	DATE STARTED: 5-11-93
DRILLING METHOD:	Cable Tool	DATE COMPLETED:	6-18-93
		PAGE	3 OF 4

DEPTH (FT)	SAMPLE NO.	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	10946 5-1 142	10	very soft (5 Y 4/1) dark gray, fat clay, high plasticity, moist	CH	<0.25	MTIP = 0/0 ppm BS = 60/60 cpm
31.5	10946 5-11 152	10	SAA (w/ decomposed wood pieces)			MTIP = 0/0 ppm BS = 60/60 cpm
33	5-12 152	0	NA	NA	NA	MTIP = NA BS = NA
34.5	10946 5-14 152	12	very soft (5 Y 4/1) dark gray fat clay, high plasticity, moist	CH	<0.25	MTIP = 0/0 ppm BS = 40/40 cpm
36	1094 5-15 091	14	medium stiff (5 Y 4/1) dark gray fat clay, high plasticity, moist last 3" is very stiff (10 YR 4/3) brown	CH	1.0 2.5	MTIP = 0/0 ppm BS = 50/50 cpm
37.5	1094 5-11 092	8	stiff, (10 YR 4/3) brown, fat clay moist, a few pebbles/ bottom 1" gravelly medium coarse sand, moist well graded	CH SW	2 NA	MTIP = 0/0 ppm BS = 50/50 cpm
39	5-1 132	0	NA	NA	NA	MTIP = 0/0 ppm BS = 50/50 cpm
40.5	1094 5-1 132	18	use (5 Y 4/2) olive gray, gravelly ne. to coarse sand, well graded st, some pebbles	SW	NA	MTIP = BS =
42						MTIP = BS =
43.5						MTIP = BS =
45						MTIP = BS =

NOTES:  
 Drilling  
 Drilling  
 Driller  
 Assistant

Indiana Drilling  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Background: MTIP =  
 BS =

please see page 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: <i>015-12 Wells</i>	PROJECT NAME: <i>015-12 Wells</i>
LOG NUMBER: <i>3898</i>	COORDINATES: <i>NA</i>
LOCATION: <i>NA</i>	GWL: Depth <i>NA</i> Date/Time <i>NA</i>
ENGINEER/GEOLOGIST: <i>Mussa M. Kasebir</i>	Depth <i>See Page 1</i> Date/Time
LOGGING METHODS: <i>Cable Tool</i>	PAGE <i>4</i> OF <i>12</i>

SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
109473 5-15 16:15	31 50/4	8	very dense, (10 YR 5/3) brown, <sup>well graded</sup> gravel; changes to (10 YR 5/1) gray, poorly graded fine to medium sand with a few pebbles, moist	GW SP	NA	456-24-93 MTIP = 0/0 ppm BS = 50/50 cpm
						MTIP = BS =
						MTIP = BS =
109474 5-15 16:50	50 50	8	very dense, (10 YR 5/1) gray, poorly graded fine to medium sand, with a few pebbles, moist	SP	NA	MTIP = 0/0 ppm BS = 50/50 cpm
						MTIP = BS =
						MTIP = BS =
109475 5-16 13:00	30 75/4	7	very dense (10 YR 5/3) brown, poorly graded fine to medium sand, moist	SP	NA	MTIP = 0/0 ppm BS = 60/60 cpm
						MTIP = BS =
						MTIP = BS =

Drilling Co. Pennsylvania Drilling  
 Drilling Equipment \_\_\_\_\_  
 Driller \_\_\_\_\_  
 Assistant \_\_\_\_\_

SEE PAGE 1

Background: MTIP =  
BS =

please see page 1

# VISUAL CLASSIFICATION OF SOILS

24-33

DATE 4-16-93

PROJECT N: <i>5-12 Wells</i>	PROJECT NAME: <i>OUS-12 Well</i>
BORING NO: <i>898</i>	COORDINATES: <i>NA</i>
ELEVATION:	GWL: Depth      Date/Time
ENGINEER: <i>Musa M. Keshur</i>	Depth <i>5</i> Date/Time
DRILLING T: <i>Cable Tool</i>	PAGE <i>5</i> OF <i>41</i>

DEPTH (FT)	SAMPLE	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	1094 <i>5</i>		<i>very dense (10 YR 5/3) brown, gravelly fine to coarse sand, well graded, w/ a few pebbles, moist</i>	SW	NA	MTIP = 0/0 ppm BS = 60/60 cpm
61.5	<i>13</i>					MTIP = BS =
63						MTIP = BS =
65	1094 <i>5-1</i>		<i>SAA</i>	SW	NA	MTIP = 0/0 ppm BS = 60/60 cpm
66.5	<i>9-4</i>					MTIP = BS =
						MTIP = BS =
						MTIP = BS =
70	1094 <i>5-1</i>		<i>medium dense (10 YR 5/3) brown, gravelly, fine to coarse sand, well graded, wet</i>	SW	NA	MTIP = 0/0 ppm BS = 60/60 cpm
71.5	<i>105</i>					MTIP = BS =
						MTIP = BS =
75						MTIP = BS =

NOTES:  
Drilling  
Drilling  
Driller  
Assistant

*Sylvania Drilling SEE PAGE 1*

Background: MTIP =  
BS =

# VISUAL CLASSIFICATION OF SOILS

4028

PROJECT NO.	94-33	PROJECT NAME:	OUS- 12 Wells
BORING NUMBER	398	COORDINATES:	NA
ELEVATION:		GWL: Depth	Date/Time
ENGINEER/IC	Musa M. Kasebu	Depth	Date/Time
DRILLING METHOD	Cable Tool		
		PAGE	6
		OF	13

DEPTH (FT)	SAMPLE TYPE & NO.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	10947: 5-1 14:3	7	medium dense, (10 YR 5/2) grayish brown, fine to medium sand w/ a few pebbles, wet, poorly graded	SP	NA	MTIP = 0/0 ppm BS = 60/60 cpm
						MTIP = BS =
						MTIP = BS =
80	10948: 5-25 16:5	18	very dense, (5 Y 4/1) dark brown, medium to coarse sand, poorly graded, wet	SP	NA	MTIP = 0/0 ppm BS = 40/40 cpm
						MTIP = BS =
						MTIP = BS =
85	10949: 5-26 8:55	18	medium dense, (10 YR 5/2) grayish brown, well graded fine to coarse gravel, with less than 10% med-to coarse sand, wet	GW	NA	MTIP = 0/0 ppm BS = 50/50 cpm
						MTIP = BS =
						MTIP = BS =

P. 111

NOTES:  
Drilling ( )  
Drilling E  
Driller  
Assistant

Drilling SEE PAGE 1

Background: MTIP =  
BS =

# VISUAL CLASSIFICATION OF SOILS

PROJECT	04.33	PROJECT NAME	005 12 WELL
BORING	3878	COORDINATES	NA
ELEVATION		DATE	5-27-93
ENGINEER	GIST SCHNEIDER	GWL: Depth	Date/Time
DRILLING	S CABLE TOOL	DATE STARTED	5-11-93
		DATE COMPLETED	6-18-93
		PAGE	7 OF 7

DEPTH (FEET)	INCHES
91.5	11 5
95.0	10 5
96.0	10 5
96' 10 3/4"	10 5
98.0	10 5
98.5	10 5
100.0	10 5
101.5	10 5
103.0	10 5
104.5	10 5

16 INCHES RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
14	VERY DENSE (10 YR 5/2) GRAYISH BROWN, MEDIUM TO COARSE SAND WITH TRACE OF GRAVEL, WELL SORTED, WET.	SW	NA	MTIP = 0/0 PPM Bx = 10/10 CPM
12	DENSE (10 YR 4/2) DARK GRAYISH BROWN, GRAVELY MEDIUM TO COARSE SANDS, WELL GRADED, WET.	SW	NA	MTIP = 0/0 PPM Bx 20/20 CPM
10 3/4 IN	VERY DENSE (10 YR 4/2) DARK GRAYISH BROWN, COARSE SAND TO FINE GRAVEL, POORLY GRADED, WET.	GW	NA	MTIP = 0/0 PPM Bx 40/40 CPM
	NO RECOVERY - DRILLER ERROR.			
3	SAME AS 96.0 - 96' 10 3/4"	GW	NA	MTIP 0/0 PPM Bx 40/40 CPM
14	VERY DENSE (10 YR 4/2) DARK GRAYISH BROWN, COARSE SAND TO FINE GRAVEL WITH TRACE OF COARSE GRAVEL, WELL GRADED, WET.	GW	NA	MTIP 0/0 PPM Bx 40/40 CPM
7	VERY DENSE (10 YR 4/1) DARK GRAY MEDIUM SAND TO FINE GRAVEL WITH TRACE OF COARSE GRAVEL, WELL GRADED, WET.	GW	NA	MTIP 0/0 PPM Bx 60/60 CPM
2 PLUS 5 FROM SAND PUMP	SAME AS 100.0 - 101.5 FT	GW	NA	MTIP 0/0 PPM Bx 60/60 CPM
6	SAME AS 100.0 - 101.5 FT	GW	NA	MTIP 0/0 PPM Bx 40/40 CPM

NOTES

PAGE 1

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER	04.33	PROJECT NAME	0U5 12 WELL
BORING NUMBER	3898	COORDINATES	NA
ELEVATION:	NA	DATE	6-2-93
ENGINEER/GEOLOGIST	SCHNEIDER	GWL: Depth	Date/Time
DRILLING METHODS	CABLE TOOL	DATE STARTED	5-11-93
		DATE COMPLETED	6-18-93
		PAGE	8 OF 11

DEPTH FEET	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY INCH	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106.0	109549 6-2-93 1435	4 16 17	3	MEDIUM DENSE (10YR 4/1) DARK GRAY, MEDIUM SAND TO FINE GRAVEL WITH COARSE GRAVEL, POORLY GRADED, WET	GW GP HS 6-2-93	NA	MTIP 2.0/3.5 PPM Bx 60/60 CPM
107.5	109550 6-2-93 1455	16 23 26	8	VERY DENSE (10YR 3/1) VERY DARK GRAY, MEDIUM TO COARSE SAND WITH SMALL TRACE OF COARSE GRAVEL, WET	GP GW HS 6-2-93	NA	MTIP 2.5-3.0/4.0 PPM Bx 60/60 CPM
109.0	109551 6-3-93 1530	50	11	VERY DENSE (10YR 3/1) VERY DARK GRAY, COARSE SAND WITH COARSE GRAVEL, WET, WELL GRADED.	GP	NA	MTIP 0/0 PPM Bx 40/40 CPM
110.5	109552 6-3-93 1600	12 38 32	5	VERY DENSE (2.5Y 4/1) DARK GRAY, COARSE SAND WITH COARSE GRAVEL, WET, WELL GRADED.	GP	NA	MTIP 0/0 PPM Bx 60/60 CPM
112.0	109553 6-3-93 1425	8 6 13		NO RECOVERY		NA	MTIP 0/0 PPM Bx /
113.5	109553 6/7/93 0915	12 75/5	5 in. + 5 in. FROM SP. P.	VERY DENSE (10YR 4/1) DARK GRAY, MEDIUM SAND, WITH TRACE OF COARSE TO VERY COARSE GRAVEL	SW GP GW PR 4/1/93	NA	MTIP 0/0 PPM Bx 40/60 CPM
115.0	109554 6/7/93 0945	50 15 50/5	6 in. + 5 in. FROM PUMP	VERY DENSE SAME AS ABOVE (112.0 - 113.5)	SW GP PR 6/7/93	NA	MTIP 0/0 PPM Bx 60/60 CPM
116.5	109555 6/7/93 1015	18 35 37	12 in	SAME AS 113.5 TO 115.0	SW GP PR 4/7/93	NA	MTIP 0/0 PPM Bx 60/60 CPM
118.0	109556 6/7/93 1045	21 37 50	8 in	SAME AS 116.5 TO 118.0	PR 4/7/93 GW SW	NA	MTIP 0/0 PPM Bx 70/50 CPM
119.5	109557 6/7/93 1115	7 11 13	10 in	MEDIUM DENSE same as 116.5 TO 118.0	PR 6/1/93 GW SW	NA	MTIP 0/0 PPM Bx 40/40 CPM

NOTES

SEE PAGE 1

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-4620

# VISUAL CLASSIFICATION OF SOILS

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	CABLE TOOL	
	PAGE	9 OF 41

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RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
4.5	VERY DENSE (10 YR 5/1) GRAY, MEDIUM TO COARSE WELL GRADED SAND, WITH TRACE OF COARSE GRAVEL, WET	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 60/70 CPM
4 + 500 ml SAND PUMP	SAME AS 119.5 TO 121.0	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 70/70 CPM
4 + 500 ml SAND PUMP	VERY DENSE (10 YR 3/1), VERY DARK GRAY, COARSE SAND TO FINE WELL GRADED GRAVEL, WITH TRACE OF COARSE GRAVEL, WET	GW	NA	MTIP 0/0 PPM B <sub>α</sub> 50/50 CPM
3	SAME AS 122.5 TO 129.0	GW	NA	MTIP 0/0 PPM B <sub>α</sub> 50/50 CPM
6.5	VERY DENSE (10 YR 5/1) GRAY, FINE TO MED. WELL GRADED SAND, WITH TRACE OF COARSE GRAVEL, WET.	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 40/60 CPM
NA	NO RECOVERY. DRILLER DRILLED TO 127.5 BY MISTAKE, BUT NO CLAY ON EQUIP	NA	NA	NA
10	SAME AS 125.5 TO 126.5	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 40/40 CPM
5	SAME AS 129 127.5 TO 129.0 PR. 8/8/93	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 40/40 CPM
6	SAME AS 129.0 TO 130.5	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 50/50 CPM
11	SAME AS 130.5 TO 132.0	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 50/60 CPM
4	SAME AS 132.0 TO 138.5	SW	NA	MTIP 0/0 PPM B <sub>α</sub> 50/60 CPM

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# VISUAL CLASSIFICATION OF SOILS

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# VISUAL CLASSIFICATION OF SOILS

04.33	PROJECT NAME	005 12 WELL
3898	COORDINATES	NA
	GWL: Depth	Date/Time
SCHNEIDER	Depth	Date/Time
CABLE TOOL		
	PAGE 11	OF 11

RECOVERY INCH	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ITSF)	REMARKS
13	VERY DENSE (10YR 3/1) VERY DARK GRAY, VERY FINE TO FINE WELL GRADED SAND, WITH TRACE OF COARSE GRAVEL, WET.	SW	NA	MTIP 0/0 PPM Bx 40-50/40-50 CPA
5 IN WITH SPURT STICK 12 IN FROM SAND DUMP	VERY DENSE (10YR 3/1) VERY DARK GRAY, VERY FINE TO FINE WELL GRADED SAND, WITH COARSE GRAVEL, WET.	SW	NA	MTIP FAULTY Bx HS 670 50 30/50-60 CPA
13 IN WITH SPURT STICK	VERY DENSE (10YR 4/1) DARK GRAY, VERY FINE TO MEDIUM WELL GRADED SAND, WITH TRACE OF COARSE GRAVEL, WET. NO RECOVERY	SW		MTIP FAULTY PPM Bx 30/40 CPA

JECT  
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 NE  
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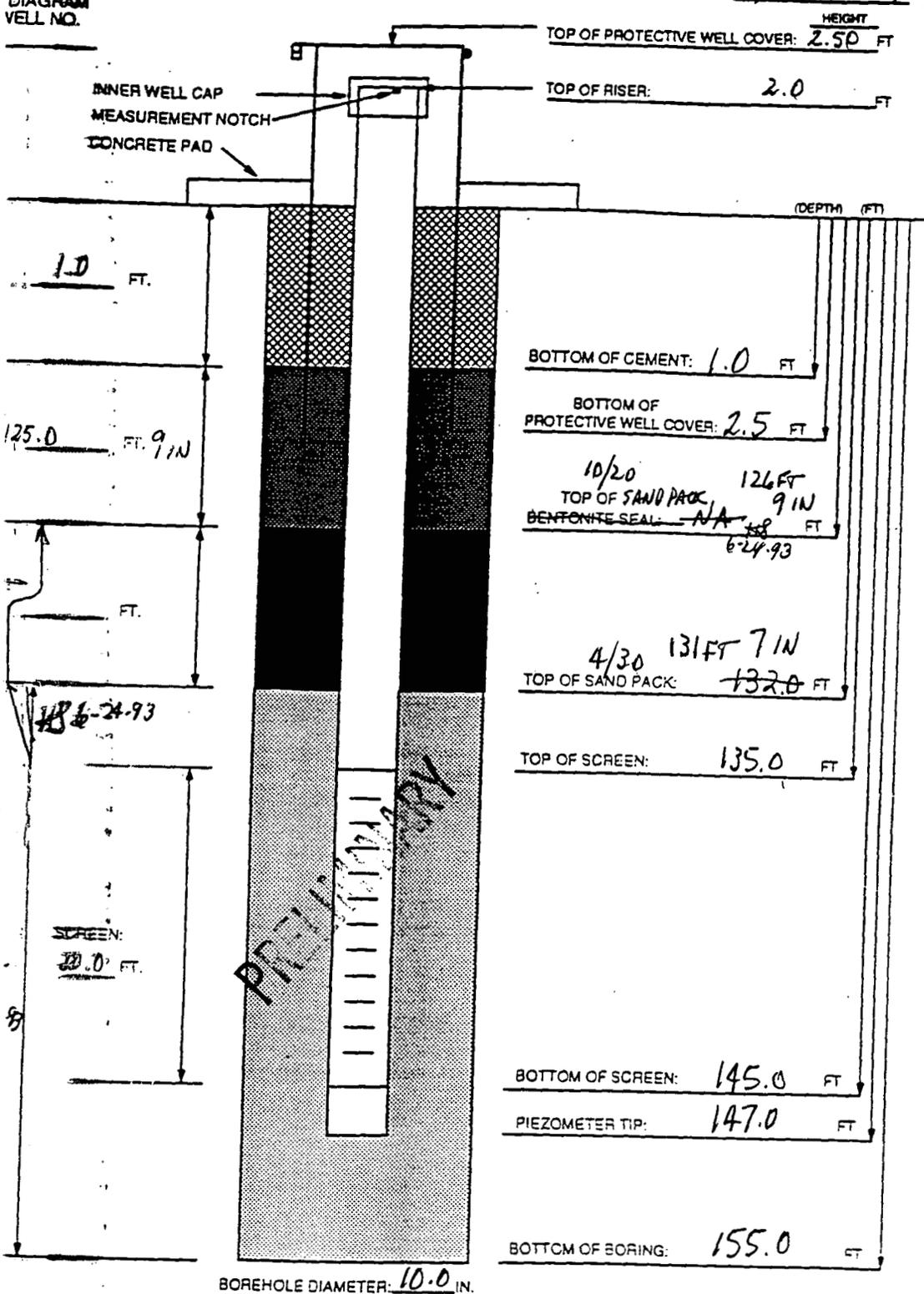
SCPT

1

F  
IN  
M

R/VFS  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 6/11/93 - 6/18/93



MATERIALS USED

SAND TYPE AND QUA  
 BENTONITE PELLETS.  
 BAGS OF VOLCLAY G  
 AMOUNT OF CEMEN  
 AMOUNT OF WATER  
 2 FEET 1-10.0 FT J  
 OTHER: 13-14.0 FT  
 TASK: 04.33

SOLBS 10/20 - 6 50 LB  
 CKETS: NA  
 65 - 50 LB  
 10 GALLONS  
 120 FT SUMP

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 71.30 FT. 6/24/93
- 5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
- 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: HELMUTH SCHWEIDER

**PIEZOMETER INSTALLATION SHEET**

PROJ  
PRCJ  
BORING  
PIEZOM  
BOREH

121WELL FIELD ENG./GEO. HELMUTH SCHNEIDER DATE 6-24-  
04.33 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
3898  
3898 DATE OF INSTALLATION 6-18-93

DR  
DR

METHOD CABLE TOOL TYPE OF BIT HAMMER PERCUSSION BIT  
 EQUIPMENT USED: \_\_\_\_\_ CASING SIZE (S) USED:  
 RL FROM 0.0 FT TO 70.9 FT SIZE 10.0 IN ID FROM 0.0 FT TO 155.0 FT  
 TA FROM NA TO NA SIZE NA FROM NA TO NA

PIEZOM

**DESCRIPTION**

TYPE  
DIAM  
PERF  
AVG  
TOT

INSTALLING WELL RISER PIPE MATERIAL 3/16 STAINLESS STEEL  
 PERFORATED SECTION \_\_\_\_\_ RISER PIPE DIAMETERS:  
 TYPE: \_\_\_\_\_ O.D. 4 3/8 IN I.D. 4.0 IN  
 HOLES  SCREEN  LENGTH OF PIPE SECTIONS 1-10.0 FT SCREEN WITH 2 FT SL  
 NO OF PERFORATIONS 0.020 JOINING METHOD SCREW TYPE - FLUSH JOINT  
 PERFORATED AREA 10.0 FT THREADED

PROTE

**SYSTEM**

RISE  
PRO

RISE PIPE LENGTH 5.0 FT OTHER PROTECTION HINGED WELL GAUGE  
 PIPE O.D. 10 3/4 IN WITH LOCK

	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF ACTIVE PIPE	2.5			
BOREHOLE MATERIALS:	TOP 0.0	BOTTOM 1.0		
	TOP 1.0	BOTTOM 126 FT 9 IN	TCP	BOTTOM
	TOP 126 FT 9 IN	BOTTOM 132.0	TOP	BOTTOM
	TOP 132.0	BOTTOM 147.0	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATION SECTION	TOP 135.0	BOTTOM 145.0	TOP	BOTTOM
PIEZOMETER	147.0			
BOTTOM OF HOLE	155.0			
GWL AT INSTALLATION	71.30 FT			

WAS THE PI  
WAS A SEN  
REMARKS

WER FLUSHED AFTER INSTALLATION? YES  NO   
 TEST PERFORMED ON THE PIEZOMETER? YES  NO

**VISUAL CLASSIFICATION OF SOILS**

PROJECT NUMBER	20.02.05	PROJECT NAME	CRU2/PHASE II
LOG NUMBER	11032	COORDINATES	
LOCATION		GWL. Depth	Date/Time
ENGINEER/GEOLOGIST	B. F. MULLER	Depth	Date/Time
TESTING METHODS	4.25 IN HOLLOW STEM AUGER		
		DATE	23 JUN 93
		DATE STARTED	23 JUN 93
		DATE COMPLETED	25 JUN 93
		PAGE	1 OF 2

SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN.	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
23 JUN 113818	4	6	VERY STIFF (2.54, 4/2) DARK GRAYISH BROWN, SILTY CLAY, LOW PLASTICITY, MOIST	CL	3.0	MT: 0 BY: 40
113819 1420	4	6	VERY STIFF (2.54, 5/3) LIGHT OLIVE BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.75	ARCHIVE
	5	0	NR	-	-	
23 JUN 113820	4	6	STIFF (2.54, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE GRAY AND BLACK MOTTLES, MEDIUM PLASTICITY, MOIST	CL	1.5	TIME: 1420 MT: 0 BY: 60
13821 1432	5	6	STIFF (2.54, 5/6) LIGHT OLIVE BROWN SAA	CL	1.75	ARCHIVE
	8	0	NR	-	-	
3 JUN 13822	5	6	SAA	CL	2.5	TIME: 1432 MT: 0 BY: 50
3823	7	6	SAA	CL	1.5	ARCHIVE
3824 1443	9	3	SOFT (2.54, 5/6) LIGHT OLIVE BROWN, SANDY SILTY CLAY, MEDIUM PLASTICITY, VERY MOIST	CL	0.25	TIME: 1443
3 JUN 3825	4	6	SAA MEDIUM STIFF - TRACE YELLOW MOTTLES, MOIST	CL	0.75	MT: 0 BY: 70
3826	6	6	STIFF SAA	CL	1.50	ARCHIVE
3827 150	4	3	MEDIUM STIFF SAA	CL	0.75	TIME: 1450
3 JUN 3828	5	6	SAA	CL	0.75	MT: 0 BY: 70
3829	10	6	SAA VERY STIFF - INCREASE SILT	CL	3.00	ARCHIVE
3830 1504	12	6	SAA STIFF LAST 2 INCHES. (2.54, 6/4) OLIVE YELLOW, SILTY SAND, WET	CL	1.75	TIME: 1504

EQUIP: PENN DRILL  
 THE RON CONNERS, TED BIAS  
 ACKER SOIL SENTRY

UNITS MEASURED: MICROPH: PPM  
 MICROPH: 0  
 BY: 50  
 NO RECORD KEPT IN THIS  
 SAME AS ABOVE

# VISUAL CLASSIFICATION OF SOILS

PROJ  
BORIN  
ELEV.  
ENGIN  
DRILL

20-02-05 PROJECT NAME CRU2/PHASE II  
 11032 COORDINATES  
 DATE 23-25 JUN 93  
 G.WL. Depth Date/Time DATE STARTED 23 JUN 93  
 DIST B.E. MULLER Depth Date/Time DATE COMPLETED 25 JUN 93  
 4.25 IN HOLLOW STEM AUGER  
 PAGE 2 OF 2

DEPTH  
8  
9  
10  
11  
12  
13  
14

DEPTH (ft)	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
8	6	STIFF (2.54, 5/16) LIGHT OLIVE BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST - 2 IN FINE WET SAND	CL	1.25	MT: 0 BY: 60
	6	SAA	CL	2.00	ARCHIVE
9	6	MEDIUM DENSE (2.54, 5/16) LIGHT OLIVE BROWN, SILTY SAND, WET	SM	NA	TIME: 1513
	6	0-3 IN SAA / 3-6 IN SOFT (2.54, 5/16) LIGHT OLIVE BROWN, SANDY SILTY CLAY, LOW PLASTICITY, MOIST	SM		MT: 0
10	6	STIFF SAA	CL	0.25	BY: 50
	6	STIFF SAA - LOW MOIST	CL	1.25	ARCHIVE
11	6	MEDIUM DENSE (2.54, 5/16) LIGHT OLIVE BROWN, CLAYEY SAND, SILT, WET	CL	1.50	TIME: 0845
	6	STIFF (2.54, 5/16) LIGHT OLIVE BROWN, SANDY, SILTY CLAY, MEDIUM PLASTICITY, MOIST	ML	NA	MT: 0
12	6	MEDIUM DENSE (2.54, 5/16) GRAYISH BROWN, CLAYEY SILTY SAND, LOW PLASTICITY, VERY MOIST	CL	1.0	BY: 80
	6	SAA	SM	1.25	ARCHIVE
13	6	STIFF (2.54, 5/16) GRAYISH BROWN CLAY, TRACE FINE SAND, MEDIUM PLASTICITY, MOIST - 1 IN WET SAND AT BOTTOM	SM	NA	TIME: 0859
	6	SAA	CL	1.5	MT: 0
14	0	NR	-	-	BY: 120
	6	VERY SOFT (5/16, 1/8) OLIVE, SILTY CLAY, TRACE FINE SAND, LOW PLASTICITY, VERY MOIST	CL	10.25	TIME: 0910
	6	SAA	CL	10.25	MT: 0.5
	6	SAA 0.5 IN COARSE SAND SEAM AT 5 IN	CL	10.25	BY: 50
	6	SAA	CL	10.25	ARCHIVE

PENN DRILL  
 COMPUTERS TEST BIAS  
 R SOIL SENSARY  
 UNITS MEASURED  
 MICROTIPI = ppm  
 BY = CPM  
 a = CPM  
 BACK GROUND READINGS  
 MICROTIPI 0 ppm  
 BY 50 CPM  
 a - CPM  
 NO RECORD FOR  
 SAME AS ABOVE

# PIEZOMETER INSTALLATION SHEET

PRO  
PRC  
BOR  
PIEZ  
BOR.

CRUZ/PHASE II  
20.03.05  
11032  
FIELD ENG./GEO. B.F. MULLER DATE 25 JUN 03  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
DATE OF INSTALLATION 25 JUN 03

PIEZ

METHOD HOLLOW STEM AUGER TYPE OF BIT HOLLOW STEM AUGER  
FLUID(S) USED: \_\_\_\_\_ CASING SIZE(S) USED:  
NA FROM NA TO NA SIZE NA FROM NA TO NA  
NA FROM NA TO NA SIZE NA FROM NA TO NA

PROT

DESCRIPTION  
6 STAINLESS STEEL  
PERFORATED SECTION 2 IN  
TYPE: \_\_\_\_\_  
HOLES  SCREEN   
SIZE OF PERFORATIONS 0.01 IN  
PERFORATED AREA 10 FT  
RISER PIPE MATERIAL 316 STAINLESS STEEL  
RISER PIPE DIAMETERS:  
O.D. \_\_\_\_\_ I.D. 2 IN  
LENGTH OF PIPE SECTIONS 7 FT  
JOINING METHOD FLUSH - THREADED JOINTS

RIS  
PR

SYSTEM  
ACTIVE PIPE LENGTH 5 FT OTHER PROTECTION NONE  
PIPE O.D. 4 3/8 IN

TOP OF
GROUND
BOTTOM
BOREHOLE
GRC
BEN
SAN
GRA
PERFOR
PIEZOM
BOTTOM
GWL AF

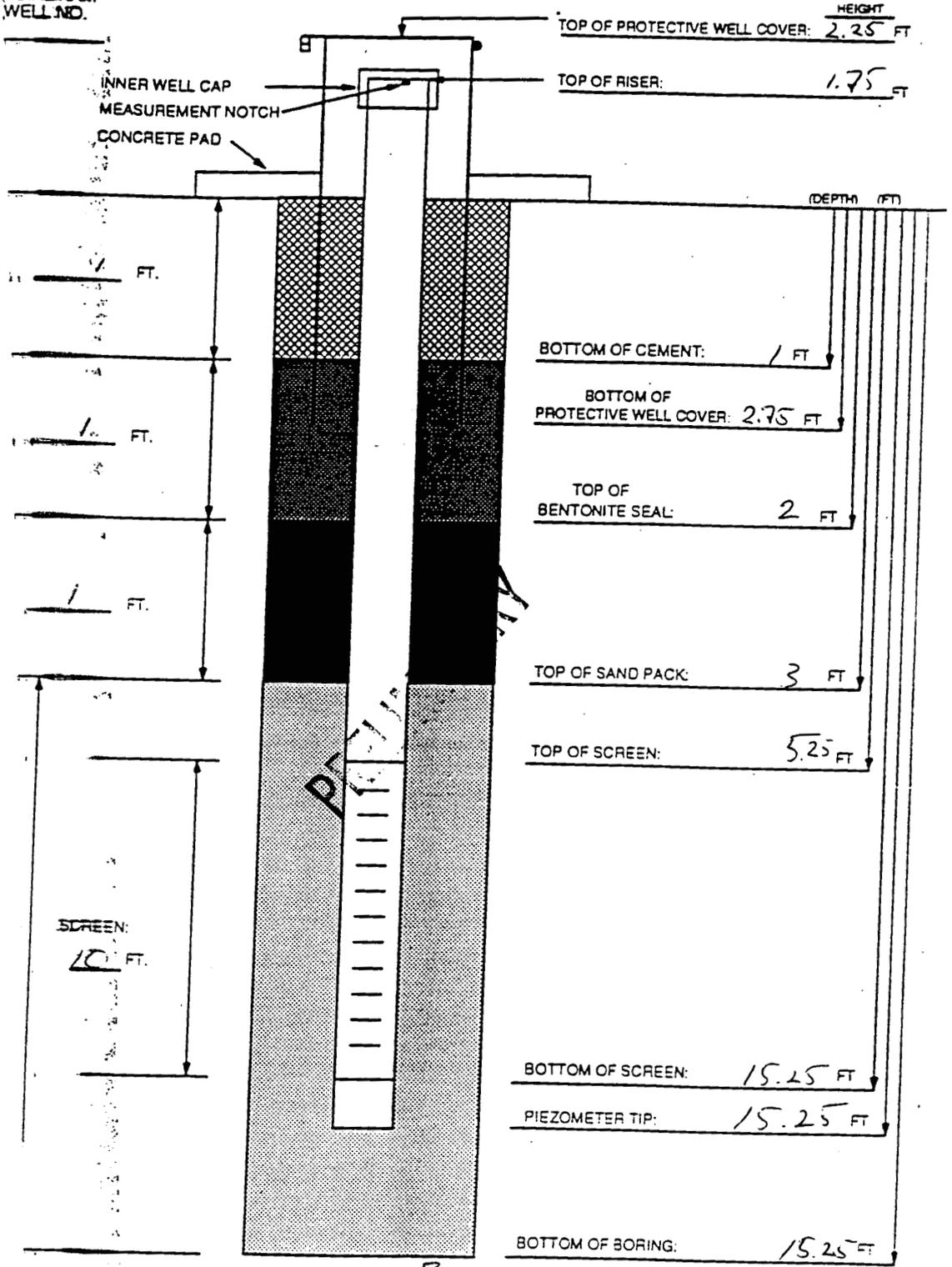
	DISTANCE ABOVE / BELOW GROUND SURFACE (FT)		ELEVATION ( )	
PE	2.25			
E	0.0			
EFFECTIVE PIPE	2.75			
MATERIALS:				
Y	TOP 0	BOTTOM 2	TCP	BOTTOM
	TOP 2	BOTTOM 3	TOP	BOTTOM
	TOP 3	BOTTOM 15	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
ATION	TOP 5.25	BOTTOM 10.25	TOP	BOTTOM
	15.25			
HOLE	15.25			
ELLATION	NA			

REMARKS

REFLUSHED AFTER INSTALLATION? YES  NO   
TEST PERFORMED ON THE PIEZOMETER? YES  NO

RIFS  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 25 Jun 53



BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY  
BENTONITE PELLETS  
BAGS OF VOLCLAY  
AMOUNT OF CEMENT  
AMOUNT OF WATER  
OTHER  
TASK

# 10/20  
ETS: 1  
326  
346  
ALS

NOTES:

- 1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
- 2) SCREEN IS 2 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 5.25 FT, 28 Jun 53
- 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: B.F. MULLER

# VISUAL CLASSIFICATION OF SOILS

NO  
JUL  
IN  
1/6  
1/2

22/CRV 5	PROJECT NAME. CRV 5	
11079	COORDINATES.	
A. Como	GWL: Depth	Date/Time
6 1/4 Hollow Stem Auger	Depth	Date/Time
	DATE	06/24/93
	DATE STARTED	06/24/93
	DATE COMPLETED	06/25/93
	PAGE	1 OF 3

DEPTH

0  
0.5  
1  
1.5  
2  
2.5  
3  
3.5  
4  
4.5  
5  
5.5  
6

DEPTH (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
6 6 0	Very stiff (2.5Y5/4) light olive brown, small gravel, no plasticity, organic material, dry	CL	4.0	MT = 0.0 ppm BT = 60-80 cpm
6 0	SAA	CL	4.0	MT = 0.0 ppm BT = 60-80 cpm
6 3	Stiff (2.5Y5/4) light olive brown silty clay, low plasticity, dry	CL	1.75	MT = 0.0 ppm BT = 60-80 cpm
6 4	Stiff (2.5Y6/6) olive yellow silty clay, medium plasticity, small dark spots, moist <i>some well graded sand</i>	CL	1.75	MT = 0.0 ppm BT = 60-80 cpm
6 6	Very stiff (2.5Y5/4) light olive brown silty clay, very small gravel, well graded sand, low plasticity, moist	CL	2.75	MT = 0.0 ppm BT = 60-80 cpm
6 0	Stiff (2.5Y5/4) light olive brown silty clay, very small gravel, low plasticity, moist	CL	1.5	MT = 0.0 ppm BT = 60-80 cpm

PRIMARY

Pennsylvania Drilling Co.

Bentley  
Anderson

Background MT = 0.0 ppm  
BT = 60-80 cpm

SAA - Same As Above  
NA - Not Applicable

2" split spurs driven by ASTM standards

# VISUAL CLASSIFICATION OF SOILS

326

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50.03.22	PROJECT NAME. <b>CRV S</b>	DATE <b>06/24/93</b>
11079	COORDINATES.	DATE STARTED: <b>06/24/93</b>
	GWL: Depth      Date/Time	DATE COMPLETED: <b>06/25/93</b>
A. Como	Depth      Date/Time	PAGE <b>2</b> OF <b>3</b>
<b>6 1/4 Hollow Stem Auger</b>		

RECOVERY	(IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISCI)	REMARKS
	6 6 6	Hard (2.5/5/3) light olive brown silty clay, some well graded sand, slight plasticity, iron staining, <del>rel</del> moist some gravel ac colzaks	CL	45	MT = 0.0 ppm BT = 60-80 cpm
	6 6 6	<del>Hard</del> SAA, moist	CL	4.5	MT = 0.0 ppm BT = 60-80 cpm
	6 6 6	Very stiff (5/5/1) gray silty clay, small gravel, slight plasticity, iron staining, <del>dry</del> moist ac colzaks	CL	2.5	MT = 0.0 ppm BT = 60-80 cpm # 19732 Sieve Analysis
	6 6 2	Stiff (5/5/1) gray silty clay, <sup>some</sup> well graded sand, small gravel, low plasticity, moist	CL	1.5	MT = 0.0 ppm BT = 60-80 cpm
	6 6 6	SAA, moist	CL	2.0	MT = 0.0 ppm BT = 60-80 cpm
	6 6 6	SAA, moist	CL	2.0	MT = 0.0 ppm BT = 60-80 cpm

Co. Inania Drilling Co.  
Bentley  
Anderson

Background MT = 0.0 ppm  
BT = 60-80 cpm

SAA - Same as Above  
NA - Not Applicable

2" split spoons driven by ASTM standards

114

# VISUAL CLASSIFICATION OF SOILS

-4626

PROJECT NO.	50.03.22	PROJECT NAME.	CRV 5
BORING NO.	11079	COORDINATES:	
ELEVATION		GWL: Depth	Date/Time
ENGINEER/	A. Como	Depth	Date/Time
DRILLING M.	6/4 Hollow Stem Auger		DATE COMPLETED: 06/25/93
			PAGE 3 OF 3

DEPTH (ft)	SAMPLE NO.	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
18.0	0825	6	Medium dense (S/S/1) gray clayey silt, some well graded sand, small gravel, low plasticity, moist	ML	NA	MT=0.0 ppm Bt=60-80 cpm
19.5	0830	6	+, very moist	ML	NA	MT=0.0 ppm Bt=60-80 cpm
21.0	0855	6	+, moist	ML	NA	MT=0.0 ppm Bt=60-80 cpm
22.5	0855	6	moist	ML	NA	MT=0.0 ppm Bt=60-80 cpm
23.0			End of Boring @ 23.0			Auger to 23.5 to set well.

P. 11079

NOTES  
 Drilling Co.  
 Driller  
 Assistant

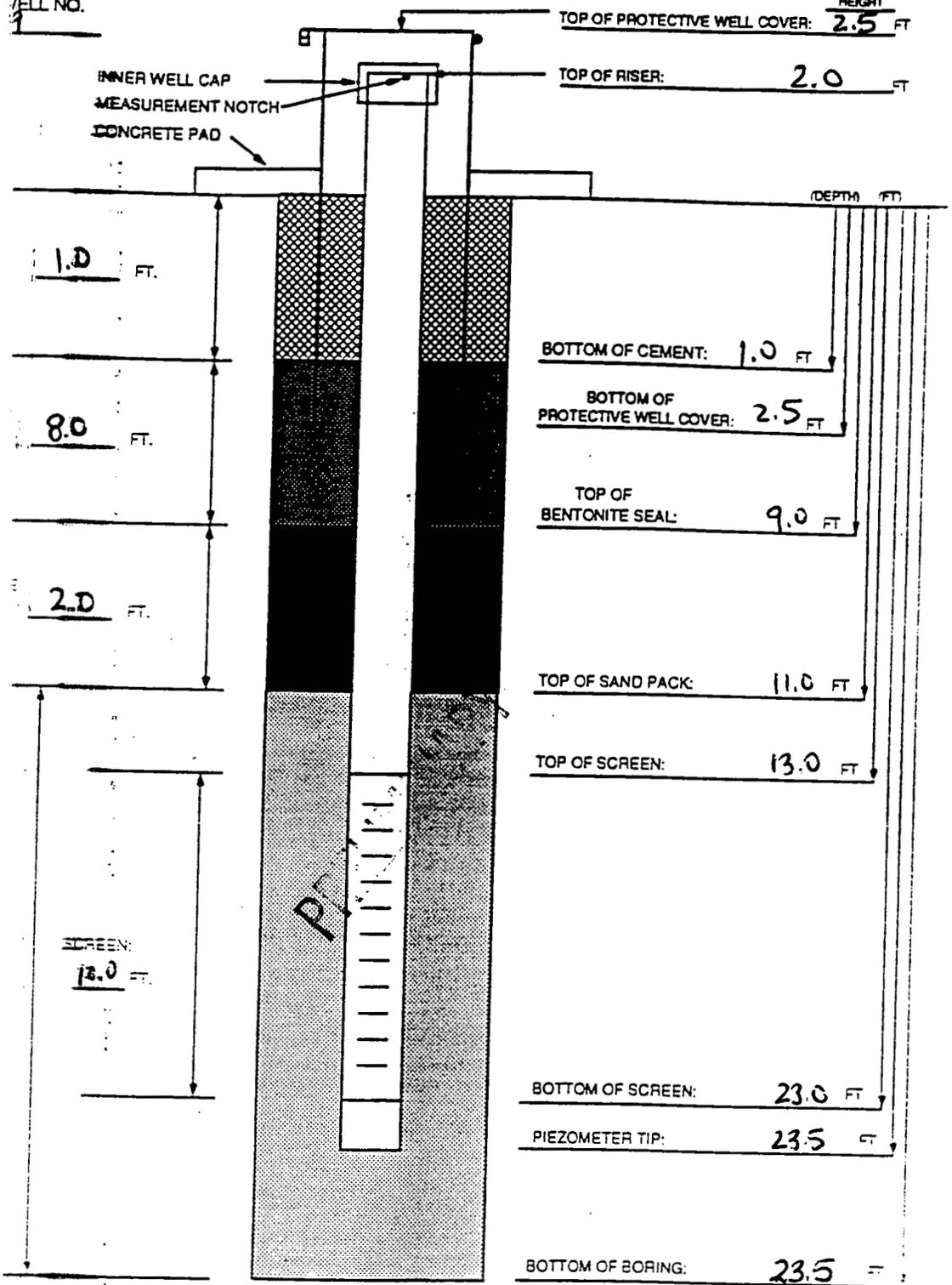
Virginia Drilling Co.  
 Bentley  
 Anderson

Background MT=0.0 ppm  
 Bt=60-80 cpm  
 NA - Not Applicable  
 SAA - Same as Above

2<sup>nd</sup> split spoons driven by ASTM standards

R/VFS  
DIAGRAM  
WELL NO. 1

INSTALLATION DATE: 06/29/93



BOREHOLE DIAMETER: 10.5 IN.

MATERIALS USED

- SAND TYPE AND QTY
- BENTONITE PELLET
- BAGS OF WOLCLAY
- AMOUNT OF CEMENT
- AMOUNT OF WATER
- OTHER

- #7, 13 bags
- JACKETS: 2 buckets
- 2 bags
- 1 bag
- 12 gallons
- Well

NOTES:

- 1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4 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.
- GEOLOGIST/ENGINEER: A. Lomo

- 4) WATER DEPTH AND DATE NA FT NA
- 5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
- 6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
- 7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME CRU 5 FIELD ENG./GEO. A. Lomo DATE 06/29/93  
 PROJECT NO. 50.03.22 CHECKED BY \_\_\_\_\_  
 BORING NO. 11079  
 PIEZOMETER NO. NA DATE OF INSTALLATION 06/29/93

**BORING DRILLING**

DRILLING METHOD <u>Hollow Stem Auger</u>	TYPE OF BIT <u>6 1/4" Hollow stem Auger</u>
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	SIZE <u>NA</u> FROM <u>NA</u> <u>NA</u>
FLUID <u>NA</u> FROM <u>NA</u> TO <u>NA</u>	SIZE <u>NA</u> FROM <u>NA</u> <u>NA</u>

**PIEZOMETER DESCRIPTION**

TYPE <u>4" stainless steel</u>	RISER PIPE MATERIAL <u>4" stainless steel</u>
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. <u>4"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>13.0'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.01</u>	JOINING METHOD <u>Screw flush joint</u>
TOTAL PERFORATED AREA <u>10.0'</u>	

**PROTECTION SYSTEM**

RISER PROTECTIVE PIPE LENGTH <u>5.0'</u>	OTHER PROTECTION <u>NA</u>
PROTECTIVE PIPE O.D. <u>10"</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	25'			
BOREHOLE FILL MATERIALS:				
	CEMENT GROUT SLURRY	TOP 0.0 BOTTOM 1.0	BOTTOM 1.0 TOP 9.0	TCP BOTTOM
	BENTONITE	TOP 9.0 BOTTOM 11.0	BOTTOM 11.0 TOP 23.5	TCP BOTTOM
	SAND	TOP 11.0 BOTTOM NA	BOTTOM NA TOP 23.5	TCP BOTTOM
GRAVEL	TOP NA BOTTOM NA	BOTTOM NA TOP 23.5	TCP BOTTOM	
PERFORATED SECTION	TOP 13.0	BOTTOM 23.0	TOP	BOTTOM
PIEZOMETER TIP	23.5			
BOTTOM OF BOREHOLE	23.5			
DIV AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 WERE ANY TESTS PERFORMED ON THE PIEZOMETER? YES  NO

# VISUAL CLASSIFICATION OF SOILS

21 ac 2/21/93

PROJECT N  
BORING N  
ELEVATIO.  
ENGINEER  
DRILLING

03.22 PROJECT NAME: CRUS Drilling  
W 710.72 COORDINATES: DATE: 6-18-93  
A. LOMO GWL: Depth Date/Time DATE STARTED: 06/21/93  
Hollow Stem Auger Depth Date/Time DATE COMPLETED: 06/22/93  
PAGE 1 OF 3

DEPTH (ft)	SAMPLE
1.5	093 1196
3.0	093 1196 1196
4.5	094 1196 1196 1196
6.0	095 1196 1196 1196
7.5	1025 1196 1196
4.0	

RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	Medium stiff (2.5YS/14) light olive brown silty clay, medium plasticity, few small gravel, moist	CL	0.75	MT = 0.0 ppm B <sub>x</sub> = 60-80 cpm
20	stiff (2.5YS/14) light olive brown silty clay, medium plasticity, some (5Y 6/1) gray silty clay, medium plasticity, some small gravel, moist	CL	2.0	MT = 0.0 ppm B <sub>x</sub> = 60-80 cpm
	SAA	CL	2.75	MT = 0.0 ppm B <sub>x</sub> = 60-80 cpm
60	Very stiff (2.5Y 5/6) light olive brown and (5Y 5/1) gray silty clay, low plasticity, dry	CL	4.0	
60	Very stiff (2.5YS/14) light olive brown with some (5YS/1) gray silty clay, low plasticity, dry	CL	3.0	MT = 0.0 ppm B <sub>x</sub> = 60-80 cpm
60	Stiff (2.5YS/6) light olive brown and (5YS/1) gray silty clay, low plasticity, dry	CL	1.5	MT = 0.0 ppm B <sub>x</sub> = 60-80 cpm
60	SAA	CL	1.5	MT = 0.0 ppm B <sub>x</sub> = 60-80 cpm
30	Loose (5YS/1) gray clayey silt with (2.5Y 5/6) light olive brown clayey silt, slight plasticity, moist	ML	NA	

NOTES:

Drilling  
Driller  
Assistant

Sylvania Drilling Co.  
Pentley  
Anderson

Background:

MT = 0.0 ppm  
B<sub>x</sub> = 60-80 cpm

SAA - Same As Above  
NA - Not Applicable

2" Split spoons driven by ASTM standards

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	50.03.22	PROJECT NAME.	CRU 5 Drilling
BORING NUMBER.	11072	COORDINATES.	
ELEVATION:		GWL: Depth	Date/Time
ENGINEER/GEOLOGIST	A. Comw	Depth	Date/Time
DRILLING METHODS:	6 1/4 Hollow Stem Auger		PAGE 2 OF 3

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6" (1 1/2')	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
9.0	1030 119683 119684 119685	6 7 8	6 6 4	SAA, dry 9.5' stiff (SY 412) olive gray and (SY 311) very dark gray silty clay, slight plasticity, dry	AL CL X CL 1.75	NA 1.75	MT = 0.0 ppm BT = 60-80 cpm
10.5	1035 119686	2 2 3	6 0 0	stiff (SY 311) very dark gray silty clay, slight plasticity, wet	CL	1.75	MT = 0.0 ppm BT = 60-80 cpm piece of red clay tile, pipe in top of sampler
12.0	1050 119687 119688 119689	1 2 1	6 6 4	stiff (SY 511) gray with some (2SY 510) light olive brown, silty clay, medium plasticity, wet	CL	1.75	MT = 0.0 ppm BT = 60-80 cpm
13.5	1100 119690 119691 119692	2 4 4	6 6 6	soft, SAA, some well sorted sand, wet 14.5' stiff (SY 511) gray silty clay with (SY 610) olive yellow silty clay, medium plasticity, moist	CL CL	0.5 1.75	MT = 0.0 ppm BT = 60-80 cpm
15.0	1325 119693 119694 119695	3 4 6	6 6 6	very stiff (2SY 5/2) olive gray silty clay, low plasticity, iron staining, moist	CZ	2.5	MT = 0.0 ppm BT = 60-80 cpm note (15.0'-15.5') partially wet
16.5	1335 119696 119697 119698	5 5 6	6 6 6	SAA medium dense (SY 5/1) gray and (SY 4R 5/6) yellowish brown clayey silt, slight plasticity, moist iron staining	CL ML	2.5 NA	MT = 0.0 ppm BT = 60-80 cpm

Drilling Co. Pennsylvania Drilling Co.  
Driller Mike Bentley  
Assistant Bill Anderson

Background MT = 0.0 ppm  
BT = 60-80 cpm

NA - Not Applicable  
SAA - Same as Above

2" split spoons driven by ASTM standards

# VISUAL CLASSIFICATION OF SOILS

50.03.02	PROJECT NAME. CRV 5	
11072	COORDINATES:	DATE 06/21/95
A. Lomo	GWL: Depth Date/Time	DATE STARTED 06/21/95
6" Hollow Stem Auger	Depth Date/Time	DATE COMPLETED 06/21/95
		PAGE 3 OF 3

RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISCI)	REMARKS
6 6 6	Loose (5/5/1) gray clayey silt, some (5/5/2) olive gray clayey silt, slight plasticity, iron staining, moist.	ML	NA	MT = 0.0 ppm BT = 60-80 cpm - last spoon driven 2.0' - some thin wet zones interspersed
6	SAA	ML	NA	MT = 0.0 ppm BT = 60-80 cpm
0 0	<del>End of Boring @ 10' @ 06/22</del> Soft (5/5/1) silty clay, high plasticity, wet	OL CL	0.5	MT = 0.0 ppm BT = 60-80 cpm
0 0	Soft (5/5/1) gray silty clay, high plasticity, wet	CL	0.5	MT = 0.0 ppm BT = 60-80 cpm
6 6 0	Loose (5/5/1) gray clayey silt, small gravel, low plasticity, wet well graded sand	ML	NA	MT = 0.0 ppm BT = 60-80 cpm
	End of Boring @ 25.0'			

and Drilling Co.  
Bentley  
Anderson

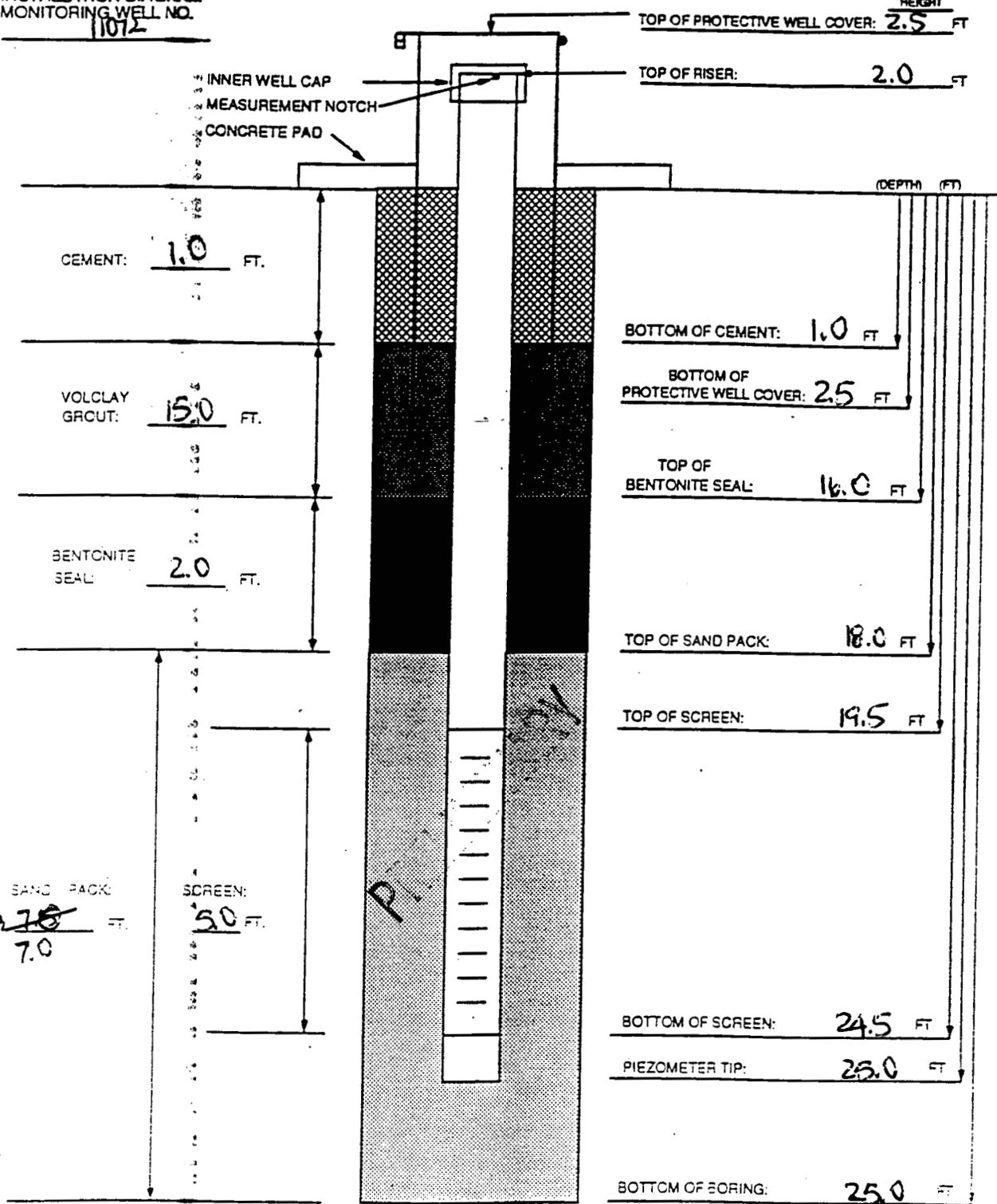
Background MT = 0.0 ppm  
BT = 60-80 cpm  
NA - Not Applicable  
SAA - Same as Above

2" split spoons driven by ASTM standards

FERNALD RI/FS  
INSTALLATION DIAGRAM  
MONITORING WELL NO.

11012

INSTALLATION DATE: 06/22/93



BOREHOLE DIAMETER: 10.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY:	<u>10/20</u> - <u>6.5 bags</u>
BENTONITE PELLETS (5 GALLON BUCKETS):	<u>1 1/4</u>
BAGS OF VOLCLAY GROUT:	<u>3</u>
AMOUNT OF CEMENT:	<u>1 bag</u>
AMOUNT OF WATER USED:	<u>15 gallons</u>
OTHER:	<u>Top/bottom caps</u>
USE:	<u>Monitoring Wells</u>

- NOTES:
- 1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 4 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 NA AT NA
  - 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: A. Jans

# PIEZOMETER INSTALLATION SHEET

ME CRU 5 FIELD ENG./GEO. A. Como DATE 06/22/93  
50.03.22 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
11072  
 NO. NA DATE OF INSTALLATION 06/22/93

## DRILLING

METHOD Hollow Stem Auger TYPE OF BIT 64 Hollow Stem Auger  
 FLUID (S) USED: \_\_\_\_\_ CASING SIZE (S) USED: \_\_\_\_\_  
NA FROM NA TO NA SIZE NA FROM NA TO NA  
NA FROM NA TO NA SIZE NA FROM NA TO NA

## PIEZOMETER DESCRIPTION

stainless steel RISER PIPE MATERIAL 4" stainless steel  
 TYPE OF PERFORATED SECTION NA RISER PIPE DIAMETERS: \_\_\_\_\_  
 SECTION TYPE: \_\_\_\_\_ O.D. \_\_\_\_\_ I.D. 4"  
 HOLES  SCREEN  LENGTH OF PIPE SECTIONS 22.0'  
 SIZE OF PERFORATIONS 0.01 JOINING METHOD flush joint  
 PERFORATED AREA 4.7 ft

## PROTECTION SYSTEM

PROTECTIVE PIPE LENGTH 5.0 OTHER PROTECTION NA  
 PROTECTIVE PIPE O.D. 10"

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION	
RISER PIPE	2.0			
FACE	0.0			
PROTECTIVE PIPE	2.5			
ALL MATERIALS:	TOP	0.0	BOTTOM	1.0
	TOP	1.0	BOTTOM	16.0
	TOP	16.0	BOTTOM	18.0
	TOP	18.0	BOTTOM	23.0
SECTION	TOP	NA	BOTTOM	NA
	TOP	19.5	BOTTOM	24.5
TIP	25.0			
PIEZO HOLE	25.0			
INSTALLATION	NA			

PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 TEST PERFORMED ON THE PIEZOMETER? YES  NO

**VISUAL CLASSIFICATION OF SOILS**

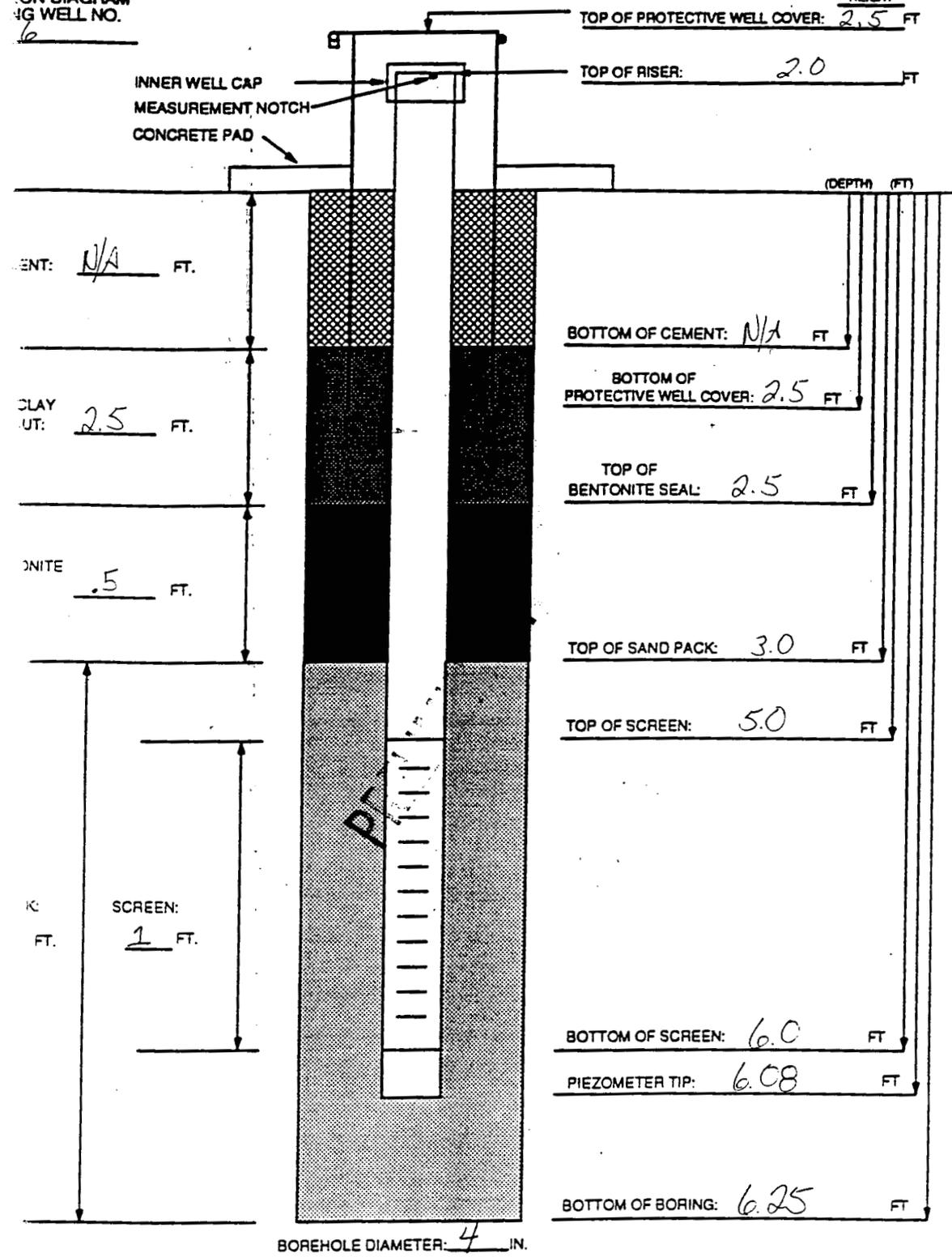
PROJECT NUMBER <b>40.03.05</b>	PROJECT NAME <b>CRU 4</b>
BORING NUMBER <b>1206</b>	COORDINATES.
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST <b>J. Reggan</b>	DATE STARTED <b>6/22/93</b>
DRILLING METHODS <b>4 inch bucket <del>and</del> hand auger</b>	DATE COMPLETED <b>6/22/93</b>
PAGE <b>1</b>	OF <b>1</b>

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISE)	REMARKS
							Mt-0ppm B <sub>x</sub> -100cpm
1	109055 0945 6/22/93	NA	6	stibb 10XR3/2, very dark grayish brown, silty fine sand, low plasticity, dry	ml	NA	Mt-0ppm B <sub>x</sub> -100cpm
	109056 0950 6/22/93	NA	6	stibb 10XR4/4, dark yellowish brown, clayey fine sand, low plasticity, dry	ml	NA	Mt-0ppm B <sub>x</sub> -100cpm
	109057 0955 6/22/93	NA	6	SAA	ml	NA	Mt-0ppm B <sub>x</sub> -100cpm
2	109058 1000 6/22/93	NA	6	medium dense 10XR4/4, dark yellowish brown, sandy clay, low plasticity, dry	SC	NA	Mt-0ppm B <sub>x</sub> -100cpm
	109059 1010 6/22/93	NA	6	medium dense 10XR3/4, dark yellowish brown, sandy clay, low plasticity, dry	SC	NA	Mt-0ppm B <sub>x</sub> -100cpm
3	109060 1025 6/22/93	NA	6	medium dense 10XR3/4, dark yellowish brown, sand-silt mixture, low plasticity, dry	SM	NA	Mt-0ppm B <sub>x</sub> -100cpm
	109061 1030 6/22/93	NA	6	SAA	SM	NA	Mt-0ppm B <sub>x</sub> -100cpm
4	109062 1035 6/22/93	NA	6	SAA	SM	NA	Mt-0ppm B <sub>x</sub> -100cpm
	109063 1045 6/22/93	NA	6	Loose, 10XR3/2 very dark grayish brown, sand-silt mixture, low plasticity, dry	SM	NA	Mt-0ppm B <sub>x</sub> -100cpm
5	109064 1050 6/22/93	NA	6	SAA	SM	NA	Mt-0ppm B <sub>x</sub> -100cpm
	109065 1055 6/22/93	NA	6	SAA	SM	NA	Mt-0ppm B <sub>x</sub> -100cpm
6	109066 1100 6/22/93	NA	6	stibb 10XR3/3, dark brown, clayey fine sand, low plasticity, moist	ml	NA	Mt-0ppm B <sub>x</sub> -100cpm
				Bottom of boring 6.0ft			
7							

NOTES  
 Drilling Contractor Peninsula Drilling VIA RT 6-22-93  
 Drilling Equipment Hand Auger 4" Bucket SAA - Same as above  
 Driller \_\_\_\_\_ NA - Not Applicable  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Samples collected per ASTM standard penetration  
 Colors identified using Munsell Color Chart

LD R/WFS  
 LOCATION DIAGRAM  
 WELLS NO. 6

INSTALLATION DATE: 6-22-93



BOREHOLE DIAMETER: 4 IN.

USE  
 NO C  
 ELLE  
 CLAY  
 CEME  
 WATE  
1/4  
3.05

10/20 3/8 Bag  
 IN BUCKETS: 1/2 Bucket  
1/4 Bag  
1/2  
4 gallons  
Arched Water in R/W Area

- NOTES:
- 1) RISER PIPE IS 1 IN. ID. Schedule 40 PVC 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
  - 2) SCREEN IS 1 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 0 File
  - 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: R. Thomas

### VISUAL CLASSIFICATION OF SOILS

PROJECT NO	10.03.05	PROJECT NAME	Undose + Perched Water in K65 Area
SUN	1205	COORDINATES	
FO		GWL: Depth N/A Date/Time N/A	DATE 23 Jun 93
ER	T.B.E. Muller	Depth N/A Date/Time N/A	DATE STARTED 23 Jun 93
IGM	4 in Bucket Hand Auger		DATE COMPLETED 23 Jun 93
			PAGE 1 OF 1

SAMPLE TYPE

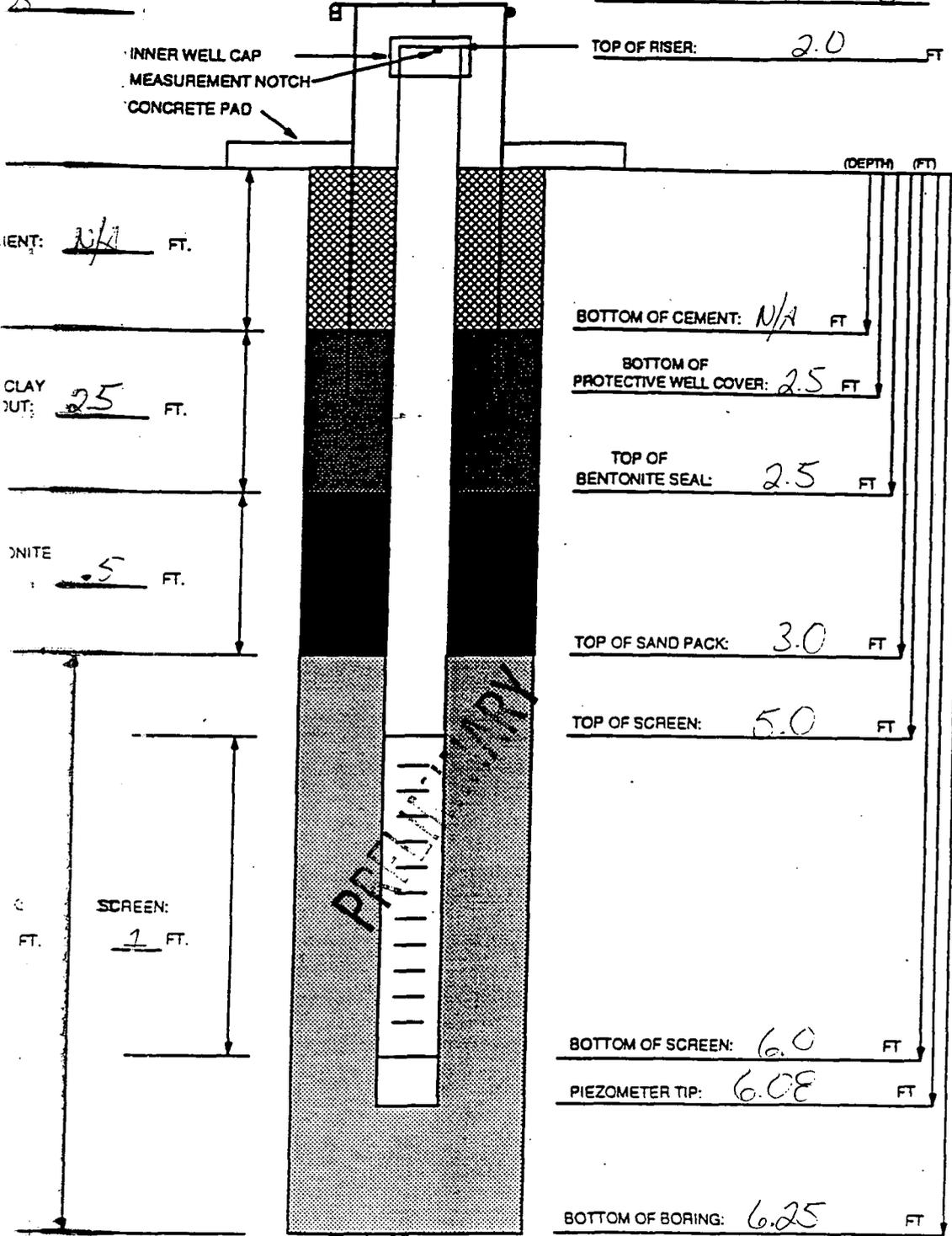
- June 2 109068 135
- June 2 10907 140
- June 2 10907 141
- June 23 19073 1420
- June 23 19074 1430
- June 23 19075 1435
- June 23 19076 1440
- June 23 19077 1445
- June 2 19079 1450
- June 23 1908 500

RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISCI)	REMARKS
-				M-Tip = Oppm (Background) Be = 800 cpm
6	109R, 3/2 Very Dark Grayish Slightly Brown, sand, silty clay trace organic, gravel, low plasticity moist	CL	Q/A	M-Tip = Oppm Be = 2000 cpm
6	109R, 5/4 yellowish Brown, silty clay, Trace gravel, low plasticity slightly moist			M-Tip = Oppm Be = 1400 cpm
6	109R, 5/7 Brown SAA			M-Tip = Oppm Be = 1100 cpm
6	109R, 5/4 yellowish Brown SAA			M-Tip = Oppm Be = 900 cpm
6	SAA			M-Tip = Oppm Be = 800 cpm
6	109R, 4/2 Brown SAA			M-Tip = Oppm Be = 800 cpm
6	SAA			M-Tip = Oppm Be = 800 cpm
6	109R, 3/3 Dark Brown SAA			M-Tip = Oppm Be = 800 cpm
6	SAA			M-Tip = Oppm Be = 800 cpm
6	109R, 4/4 Dark yellowish Brown silty clay, Medium Plasticity, Moist			M-Tip = Oppm Be = 800 cpm
6	109R, 4/2 Dark Brown SAA			M-Tip = Oppm Be = 800 cpm
6	SAA	CL	NA	M-Tip = Oppm Be = 800 cpm
	Boring Depth 6.25 ft.			

No.

LD RWFS  
ION DIAGRAM  
IG WELL NO.

INSTALLATION DATE: 6-24-93



MENT: N/A FT.

CLAY  
OUT: 2.5 FT.

BENTONITE  
SEAL: 2.5 FT.

SCREEN:  
1 FT.

BOTTOM OF CEMENT: N/A FT

BOTTOM OF  
PROTECTIVE WELL COVER: 2.5 FT

TOP OF  
BENTONITE SEAL: 2.5 FT

TOP OF SAND PACK: 3.0 FT

TOP OF SCREEN: 5.0 FT

BOTTOM OF SCREEN: 6.0 FT

PIEZOMETER TIP: 6.08 FT

BOTTOM OF BORING: 6.25 FT

BOREHOLE DIAMETER: 4 IN.

MATERIALS USE

SAND TYPE AND  
BENTONITE PELLE  
BAGS OF VOLCLAY  
AMOUNT OF CEM  
AMOUNT OF WA  
OTHER: NA  
TASK: 46130

10/20 3/2 Bag  
1 Bucket  
1 Bag  
7 gallons  
worked in water in K65 Area

NOTES:

- 1) RISER PIPE IS 2 IN. ID. Schedule 40 A16 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
- 2) SCREEN IS 2 IN. ID. Schedule 40 A16 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 0 FT/6/2
- 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: R. Thomas

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	40.03.05	PROJECT NAME	Vadose + Perched Water In K65 Area	
BORING NUMBER	11204	COORDINATES		
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED 6-17-93
ENGINEER/GEOLOGIST	RILEY	Depth	Date/Time	DATE COMPLETED 6-17-93
DRILLING METHODS	HAND AUGER w/ 4" bucket			PAGE 1 OF 2

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0920	NA	6	SOFT, VERY DARK GRAYISH BROWN (10YR 3/2), SILTY CLAY, WITH <sup>SOME GRAVEL</sup> ABUNDANT ORGANIC MATTER, MEDIUM PLASTICITY, MOIST	OL	0.5	MICRO TIP = 0 PPM BY = 100 CPM
0.5	0925	NA	6	MEDIUM STIFF, DARK GRAYISH BROWN, (10YR 4/2) SILTY CLAY WITH SOME GRAVEL & ORGANICS, MEDIUM TO LOW PLASTICITY, SLIGHTLY MOIST	CL	1.0	MICRO TIP = 0 PPM BY = 100 CPM
1.0	0930	NA	6	SOFT SAA	CL	0.5	MICRO TIP = 0 PPM BY = 100 CPM
1.5	0935	NA	6	SOFT, BROWN (10YR 4/3) SILTY CLAY WITH TRACE OF ORGANICS, MEDIUM PLASTICITY, MOIST	CL	0.5	MICRO TIP = 0 PPM BY = 100 CPM
2.0	0945	NA	6	SOFT, VERY DARK GRAYISH BROWN (10YR 3/2) SILTY CLAY, WITH TRACE OF GRAVEL, MEDIUM PLASTICITY, MOIST	CL	0.5	MICRO TIP = 0 PPM BY = 100 CPM
2.5	0950	NA	6	MEDIUM STIFF, DARK GRAYISH BROWN (10YR 4/2) SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	1.0	MICRO TIP = 0 PPM BY = 100 CPM
3.0	1000	NA	6	SAA WITH TRACE OF ORGANICS	CL	1.0	MICRO TIP = 0 PPM BY = 100 CPM
3.5	1005	NA	6	STIFF, DARK GRAYISH BROWN (10YR 4/2) SILTY CLAY, MEDIUM TO LOW PLASTICITY, SLIGHTLY MOIST	CL	1.5	MICRO TIP = 0 PPM BY = 100 CPM
4.0	1015	NA	6	MEDIUM STIFF, DARK GRAYISH BROWN (10YR 4/2), SILTY CLAY, TRACE OF ORGANICS, MEDIUM TO LOW PLASTICITY, SLIGHTLY MOIST	CL	1.0	MICRO TIP = 0 PPM BY = 100 CPM
4.5	1020	NA	6	MEDIUM STIFF, BROWN (10YR 4/3) SILTY SANDY CLAY WITH TRACE OF ORGANICS, MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	1.0	MICRO TIP = 0 PPM BY = 100 CPM
5.0							

NOTES

BACKGROUND LEVELS 6-17-93

MICRO TIP = Cppm

BY = 100 cpm

\* SAA = SAME AS ABOVE

\* NA = NOT APPLICABLE

\* TD = TOTAL DEPTH

# VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	40.03.05	PROJECT NAME	Vadose + Perched Water in K165 Area	
BORING NUMBER	11204	COORDINATES		
ELEVATION:		DATE	6-17-93	
ENGINEER/GEOLOGIST	RILEY	GWL: Depth	Date/Time	DATE STARTED 6-17-93
DRILLING METHODS	HAND AUGER w/ 4" bucket		Depth	Date/Time
				DATE COMPLETED 6-17-93
				PAGE 2 OF 2

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1.6 INCH	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
5.0	5.0 PR 1030 6-17-93	6-17-93 NA	6	MEDIUM STIFF, DARK YELLOWISH BROWN (10YR 9/4), SILTY SANDY CLAY, WITH SOME GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	1.0	MICRO TIP = 0 PA BY = 100 CPM
5.5	1095 6-17-93	NA	6	NA, BROWN (DARK YELLOWISH) (10YR 9/4), SILTY SANDY GRAVEL,	GM	NA	MICRO TIP = 0 PA BY = 100 CPM
6.0				Bottom of Sampling at 6.0 Ft Bottom of Boring at 6.2 Ft			

TD

PI

NOTES  
SEE PAGE 1

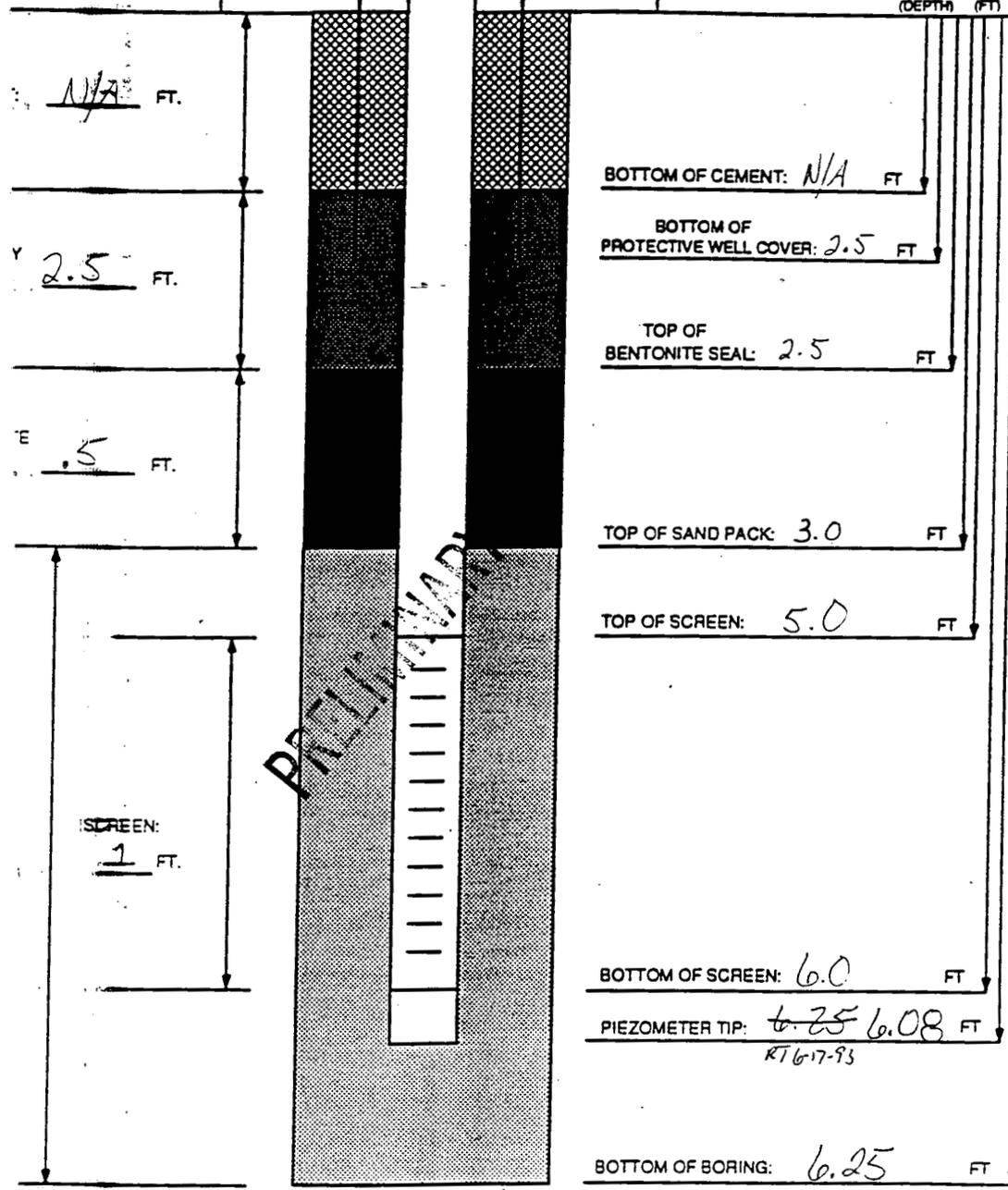
RV/FS  
DIAGRAM  
WELL NO.

INSTALLATION DATE: 6-17-93

INNER WELL CAP  
MEASUREMENT NOTCH  
CONCRETE PAD

HEIGHT  
TOP OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF RISER: 2.0 FT



BOREHOLE DIAMETER: 4 IN.

MATERIALS USED:

SAND TYPE AND AMOUNT: \_\_\_\_\_

BENTONITE PELLETS: \_\_\_\_\_

BAGS OF VOLCLAM: \_\_\_\_\_

AMOUNT OF CEMENT: \_\_\_\_\_

AMOUNT OF WATER: \_\_\_\_\_

OTHER: N/A

TASK: 40.0

NOTES:

1) RISER PIPE IS 1 IN. ID. <sup>Schedule 40 PVC</sup> 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS. RT 6-17-93

2) SCREEN IS 1 IN. ID. <sup>Schedule 40 PVC</sup> 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: N/A

5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.

6) PARENTHESIS INDICATE DEPTH TO GROUND LEVEL.

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

Geologist/Engineer: B. Thomas

20 3/4 Bag

JACKETS: 1/10 Bucket

Bag

allows

overhead water in KLS