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LETTER REPORT FOR AREA 1, PHASE II PERCHED WATER SAMPLING AT THE SEWAGE TREATMENT PLANT AREA

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

NOVEMBER 1997

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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55200-RP-0001
REVISION A

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TABLE OF CONTENTS

Executive Summary ES-1

1.0 Introduction 1-1
- 1.1 Purpose 1-1
- 1.2 Area Description 1-1
- 1.3 Scope 1-2

2.0 Field Activity 2-1
- 2.1 General 2-1
- 2.2 Numbering System 2-1
- 2.3 Surveying 2-2
- 2.4 Physical Sampling 2-2
  - 2.4.1 Exploratory Borings 2-2
  - 2.4.2 Perched Water Sampling 2-2
- 2.5 Equipment Decontamination 2-3
- 2.6 Field Quality Control Requirements 2-4
- 2.7 Borehole Abandonment 2-4

3.0 Quality Assurance/Quality Control Requirements 3-1
- 3.1 Procedures and Manuals 3-1
- 3.2 Project Requirements for Surveillances 3-1
- 3.3 Implementation of Field Changes 3-1

4.0 Health and Safety 4-1

5.0 Disposition of Wastes 5-1

6.0 Data Management 6-1

7.0 Results of Investigation 7-1
- 7.1 Boring Lithology 7-1
- 7.2 Perched Water Sampling 7-1

APPENDIX A Boring Locations, Sample Identification Numbers, Sample Intervals, and Analytical Results

APPENDIX B Lithologic Logs

APPENDIX C Variance/Field Change Notices

LIST OF TABLES

2-1 Sampling and Analytical Requirements

3-1 Summary of Variances/Field Changes

LIST OF FIGURES

1-1 Exploratory Boring Locations at the Sewage Treatment Plant

LIST OF ACRONYMS AND ABBREVIATIONS

CGM	coarse-grained material
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
FACTS	Fernald Analytical Customer Tracking System
FAL	Field Activity Log
FEMP	Fernald Environmental Management Project
GIS	Graphical Information System
LAN	Local Area Network
OSDF	On-site Disposal Facility
OU5	Operable Unit 5
ppb	parts per billion
ppm	parts per million
PSP	Project Specific Plan
PWID	Project Waste Identification Document
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SCQ	Sitewide CERCLA Quality Assurance Project Plan
STP	Sewage Treatment Plan
VR/FCN	Variance Request/Field Change Notice
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WDSS	Waste Disposition Support Services

EXECUTIVE SUMMARY

Remedial activities at the Fernald Environmental management Project (FEMP) are divided among five Operable Units. Operable Unit 5 includes soil, groundwater, and other environmental media within the FEMP boundaries and, in some cases, in small areas outside the boundaries. This document relates to volatile organic compound (VOC) and total uranium contamination in perched groundwater within clay till underlying the Sewage Treatment Plant. As shown in Figure 1-1, the sewage treatment plant lies along the FEMP's eastern boundary, in soil remediation Area 1.

A Remedial Investigation of Operable Unit 5 reported low concentrations of VOCs in perched groundwater within the STP. The OU5 Record of Decision required that perched groundwater collected during soil excavation must be pretreated to remove RCRA-listed perchloroethylene prior to treatment in the AWWT. Additionally, the presence and concentrations of other VOCs and total uranium is pertinent to planning the proper management, routing, and AWWT treatment needs. To determine the proper management of collected perched groundwater, samples were collected in more permeable zones within the clay till to determine the current conditions of perched water contamination.

This investigation included drilling of three exploratory boreholes to 25 feet depth within the STP, to identify the presence of more permeable material within the clay till. After review of the lithologic logs of these three borings, two additional borings were drilled to obtain samples within the two more permeable (silt) zones identified in the exploratory borings. Two water samples were collected within these borings and sampled for VOCs and total uranium. The two perched water samples did not contain detectable levels of VOCs or total uranium. This is presumably because: 1) the source, being the sludge in the sludge drying beds, has been removed since the first sampling of the RI, and 2) the residual VOC contamination has since been degraded.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this pre-design investigation was to obtain perched water quality data necessary to support the design of the excavation strategy for the Sewage Treatment Plant (STP) area. The data from this investigation, in conjunction with the existing data collected during the Remedial Investigation (RI), was used to assess the nature and extent of volatile organic compound (VOC) contamination in perched water underlying the STP. This information is necessary to evaluate and select the appropriate perched water handling and treatment systems to be utilized during soil excavation activities.

Previous studies conducted under the RI have identified the sludge drying beds, located in the northeastern corner of the STP area, as the source of perched water VOC contamination in the area. During the production years, sludges from STP processes and sludges that accumulated at various facility sumps were deposited on the sludge drying beds for dewatering. In particular, sludges from the laundry operation sump which contained VOC contaminants including a RCRA-listed waste (tetrachloroethylene) were periodically placed on the beds. As a result of this practice, the sludge drying beds have been designated Hazardous Waste Management Unit 41. Perched water samples collected in 1990 and 1993 from a series of six monitoring wells installed during the RI (which have since been plugged and abandoned) confirmed localized VOC contamination, including tetrachloroethylene, originating at the sludge drying beds and extending west within discontinuous sand lenses in the glacial overburden. This investigation focused on collecting perched water samples to develop a current snapshot of perched water conditions and further delineate the extent of VOC contamination (specifically RCRA-listed tetrachloroethylene) sufficient to support completion of the remedial design for the STP area.

1.2 AREA DESCRIPTION

The STP area is located along the eastern perimeter of the FEMP boundary within remediation Area 1, Phase II. The STP, associated facilities, and an abandoned solid waste incinerator are contained within an area on the FEMP property surrounded by a 6 feet high chain-link fence to restrict access. The STP became operational in 1952 for treatment of the FEMP sanitary wastewater. The system was later reconstructed to receive both sanitary and process-related wastewater. The use of the STP to treat process-

related wastewater was discontinued with the installation and start-up of the bio-denitrification effluent treatment system.

1.3 SCOPE

Continuous soil cores were collected to a depth of 25 feet using the Geoprobe at three locations (see Figure 1-1). The samples were described by the field geologist and lithologic logs were created for each exploratory boring. The soil cores were not archived or sent to the lab for analysis, but were disposed in accordance with Section 5.0.

The PSP for Perched Water Sampling at the STP included two boring/water sample locations. Because the coarse-grained material (CGM) kriging model was completed after the PSPs had been written, the boring locations in the PSP were re-evaluated against the new CGM model. As a result, one boring was moved to the southeast (Boring 12118), and an additional boring was added (Boring 12120).

Water samples were collected from silt zones identified in borings 12119 and 12120. Boring 12118 did not reveal any coarser grained layers that would yield water for sampling. The water sample from each boring was collected through the probe rods using a bailer and were analyzed for VOCs and total uranium. Groundwater samples from each water bearing zone was collected through the probe rods using a bailer. Field quality control samples includes a duplicate, a rinsate, and a trip blank. The duplicate water sample was collected from the silt zone in Location 12119 (the location of the highest historical VOC contamination). All water samples were analyzed for VOCs (SW-846, Method 8240) and for total uranium (ICP/MS or Bromopadap) at Analytical Support Level B. Sampling and analysis activities were consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ) and the Data Quality Objectives SL-036, Revision 3.

2.0 FIELD ACTIVITY

2.1 GENERAL

Three boring locations were selected for this investigation based on historical data on perched water quality and lithologic conditions in the study area. One location (12119) was chosen to coincide with the highest detected VOC contamination to determine the current concentration for VOCs. A kriging model for estimating the locations of coarse-grained material (e.g. sand and gravel) was used to determine the locations of 12118 and 12120. All changes from the PSP were documented on an approved Variance/Field Change Notice as described in Section 3.3.

2.2 NUMBERING SYSTEM

Perched water samples were assigned a unique sample identifier, as listed in Appendix A. Fernald Analytical Customer Tracking System (FACTS) identification numbers were used by the laboratory to track the sample through the analytical and data review process.

The unique sample identifier has 20 characters or less and is divided into five parts as follows:

A1P2STP-Sample Location-Depth-Suite-QC

Where:

A1P2STP = Sample collected for the Area 1, Phase II Swage Treatment Plant

Sample Location = Boring number

Sample Depth ID = Top of sample interval

Suite = Analytical Suite. "L" = volatile organic compounds

QC = Quality control sample, where applicable. "D" = duplicate, "X" = rinsate, "T" = trip blank

For example, sample identification number A1P2STP-12119-11.5-L-D is a duplicate sample collected in Area 1, Phase 2, at location 12119 collected from 11.5 feet, for VOC analysis. The sample identification number for a trip blank associated with the above sample will be A1P2STP-12119-L-T.

2.3 SURVEYING

The easting and northing coordinates and surface elevation of each location were surveyed using the Geodimeter Survey instruments or a global positioning unit. Locations that were moved up to three feet due to utility restrictions or Geoprobe accessibility did not necessitate completion of a Variance Request/Field Change Notice (VR/FCN). A VR/FCN was completed for boring locations that were moved more than three feet required. The final coordinates of the boring locations are listed in Appendix A.

2.4 PHYSICAL SAMPLING

2.4.1 Exploratory Boreholes

At each location, soil samples were collected from each exploratory borehole to identify zones of perched groundwater. The soil samples were collected using the Geoprobe® Model 5400 in accordance with procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance*. Continuous soil samples were collected in 36 inch intervals from 0 to 25 feet below the surface using the dual tube sampler equipped with a plastic liner insert. The soil cores were screened using photoionization detector in accordance with EQT-04, *Photoionization Detector–Calibration, Operation, and Maintenance*. All samples were described by a geologist. Descriptions were documented on a lithologic log and a strip log by the geologist. The soil samples collected for lithologic description were disposed as described in Section 5.0.

2.4.2 Perched Water Sampling

Following completion of the lithologic log by the geologist, the Area Project Manager determined the depth of perched water samples based on the lithology. The PSP required that groundwater samples be collected from saturated sand lenses greater than 1 foot thick as identified in the exploratory boring. Because no saturated sand lenses were found in the borehole, water samples were taken from silt layers instead. Silt layers were encountered only in Borings 12119 and 12120. The lithologic logs are provided in Appendix B.

For each waterbearing zones identified for groundwater sampling by the Area Project Manager, an additional borehole was installed to the top of each perched water zone. The Geoprobe borehole for the water samples were located adjacent to the exploratory borehole within a 5 foot radius. A temporary screen point (screen point 15) was deployed per procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance*. The screen point was located through the layer to be sampled. The perched groundwater

sample was then collected using either Teflon tubing fitted with a stainless steel check valve or a stainless steel mini bailer. The water sample was collected to minimize agitation and was carefully poured from the bailer directly into the sample container.

For VOC samples, the field technician ensured that no air bubbles were present in the sample container after placing the lid securely on the sample container. All sample lids were encircled with custody tape and the technician dated and initialed the taped lid. After collection, the technician affixed the Fernald Analytical Customer Tracking System (FACTS)-generated label to each sample liner/container. The sample was submitted to the Sample Processing Laboratory for shipment to an off-site contract laboratory for VOC and total uranium analysis. Table 2-1 provides the sampling and analysis requirements for these constituents.

TABLE 2-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte	Sample Matrix	Sample Type	Preser-vative	Lab	ASL	Holding Time	Container
Volatile Organic Compounds	Liquid	Grab	HCl, pH<2, cool 4° C	Off-site	B	14 days	3-40ml amber glass vials
Total Uranium	Liquid	Grab	None	On-site	B	6 months	500 ml glass or plastic

All field measurements, observations, and sample collection information were recorded as applicable on the Sample Collection Log, the Field Activity Log, the Lithologic Log, the Chain of Custody/Request for Analysis Form, and the Borehole Abandonment Record. Each unique sample identifier was listed on the Chain of Custody/Request for Analysis and was used to identify the sample during analysis, data entry, and data management.

2.5 EQUIPMENT DECONTAMINATION

Sampling equipment was decontaminated before transport to the sampling area, between sampling intervals, and after all sampling is completed. Because soil samples were collected for lithological descriptions only, the soil sampler and components were wiped down between sample intervals and locations to remove visible soil or material. Equipment that contacted the water sample (i.e., screen point) underwent a Level

II decontamination prior to installation as referenced in Section 6.11 of the procedure SMPL-01, *Solids Sampling*.

2.6 FIELD QUALITY CONTROL REQUIREMENTS

Field quality assurance consisted of the collection of one duplicate groundwater sample from location 12119 in the sampled silt lens, a trip blank, and a rinsate sample. The duplicate sample consisted of two times the required volume of sample collected using the bailer as specified in SMPL - 21, *Collection of Field Quality Control Samples*. The trip blank was also collected per SMPL-21, and accompanied the samples from the field to the laboratory.

2.7 BOREHOLE ABANDONMENT

Boreholes were abandoned using bentonite slurry tremied through the probe rods per procedure EQT-06, *Geoprobe® Model 5400-Operation and Maintenance*. Bentonite pellets (hydrated in two-foot intervals) were used to abandon the boreholes. All borehole abandonment activities were completed in accordance with Section 5 and Appendix J of the SCQ. Borehole abandonment was documented on the Borehole Abandonment Record.

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 PROCEDURES AND MANUALS

To assure consistency and data integrity, field activities in support of the PSP followed the requirements and responsibilities outlined in the following procedures and guidance documents:

ADM-02, *Field Project Prerequisites*
EQT-04, *Photoionization Detector--Calibration, Operation, and Maintenance*
EQT-05, *Geodimeter® 4000 Survey System - Operation, Maintenance, and Calibration.*
EQT-06, *Geoprobe® Model 5400 - Operation, Maintenance, and Calibration*
SC-GWM-FO-201, *Groundwater Sampling Activities*
SMPL-01, *Solids Sampling*
SMPL-21, *Collection of Field Quality Control Samples*
SDP 766-S-1000, *Shipping Samples to Offsite Laboratories*
Trimble Pathfinder Pro-XL GPS Operation Manual
Sitewide CERCLA Quality Assurance Plan (SCQ)

3.2 INDEPENDENT ASSESSMENT

Independent assessment was performed by the FEMP QA organization by conducting a surveillance. One surveillance was conducted which consisted of monitoring or observing on-going project activity and work areas to verify conformance to specified requirements. Surveillances were planned and documented in accordance with Section 12.3 of the SCQ.

3.3 IMPLEMENTATION OF CHANGES

Before the implementation of changes, the Characterization and Sampling Manager was informed of all proposed changes. Changes to the PSP were noted in the applicable field activity logs and on a Variance Request/Field Change Notice Form (VR/FCN). The VR/FCNs for this investigation are provided in Appendix C and are summarized in Table 3-1.

TABLE 3-1
SUMMARY OF VARIANCES/FIELD CHANGES

V/F NUMBER	VARIANCE OR CHANGE
50.03.50.03-1	Documented relocation of Boring 12118 and added Boring 12120, due to review of new kriging model.
50.03.50.03-2	Added total uranium to the analyte list for all water samples, as the concentration must be known for potential pretreatment purposes.

4.0 HEALTH AND SAFETY

All work was performed in accordance with applicable Environmental Monitoring Project Procedures, RM-0021, Safety Performance Requirements Manual, FDF Work Permit, Radiation Work Permit, Penetration Permit, and other applicable permits. Concurrence with applicable safety permits was indicated by the signature of each team member assigned to this project on the briefing record.

All FDF and subcontract personnel that worked on any portion of the project that used a subcontractor drilling company were briefed on and complied with the Project Specific Health and Safety Matrix.

The Field Safety Contact ensured that each team member performing sampling related to this project had been briefed on the applicable permits. Additionally, team members were trained to applicable procedures listed in Section 3.1. A copy of applicable safety permits/surveys issued for worker safety and health was posted at each sample location area.

5.0 DISPOSITION OF WASTE

During sampling activities, the field sampling team generated contact waste and decontamination waste. These wastes were managed in accordance with the Soils Characterization and Excavation Projects's Waste Disposition Support Services (WDSS) through the Project Waste Identification Document (PWID) process. Waste was managed in accordance with PWID No. 458. Excess soils that met the On-site Disposal Facility (OSDF) Waste Acceptance Criteria (WAC) based on historical data was consolidated and dispositioned in Removal Action 17 stockpile SP-3. Soils that exceeded the OSDF WAC were consolidated and dispositioned either to the Operable Unit 1 stockpile (non-RCRA) or transferred to Waste Programs Management for off-site shipment. Soils were placed in containers labeled with the boring number, date, media, and sample plan number. The containers were left in the area for pickup by Waste Materials Management. Water was dispositioned to the Plant 8 treatment system.

Generation of decontamination waters were minimized in the field; wherever possible, equipment was decontaminated at a facility that discharges to the AWWT, either directly or indirectly through the stormwater collection system. Contact waste generation was minimized by limiting contact with the sample media, and by using only necessary disposable materials. This waste stream was evaluated against dumpster criteria using the PWID process. If the materials did not meet the dumpster criteria, and alternative disposal option was identified. The Waste Disposition Contact was contacted by the Area Project Manager prior to the start of boring activities to initiate the PWID process.

6.0 DATA MANAGEMENT

A data management process was implemented to properly manage collected information upon completion of the field activities and to supplement existing information that will be used for remedial design and remedial action. As specified in Section 5.1 of the SCQ, sampling teams described daily activities on the Field Activity Log (FAL) in sufficient detail for the sampling team to reconstruct a particular situation without reliance on memory. Sample Collection Logs were completed according to the applicable procedures.

Electronically recorded data (e.g., Geodimeter, etc) was downloaded to disks as soon schedules permitted. Team members reviewed the data for completeness and accuracy and then downloaded the data onto the Local Area Network (LAN). Once the data was on the LAN, the Data Management Contact performed an evaluation of the data and produced an error file and a compressed archive file of the data. Once completed, the data was sent to the loader where it was loaded onto the Oracle system and an error log was generated. The data was made available to users through both the Graphical Information System (GIS) and Microsoft Access Software.

Field documentation, such as the FAL, underwent an internal QA/QC review by the field team members. Copies were delivered to the Data Management Contact who evaluated the data and created the appropriate links between the electronic and paper data. The paper data then was sent to data entry personnel for input into the Oracle System. Field packages were validated by the QA validation team.

Analytical data from on-site and off-site laboratories was reported in preliminary form to the Characterization Lead by the Laboratory Contact as soon as the data was available in the FACTS database. Following validation of the data for each sample release, the data for that release was reported to the Characterization Lead in the final data report format.

7.0 RESULTS OF INVESTIGATION

7.1 BORING LITHOLOGY

The lithologic boring logs are supplied in Appendix B. Boring 12119 revealed the presence of three thin (1.0 to 1.5 feet thick) silt layers within the clay till. The uppermost layer is very moist and is at a similar elevation (5.5 to 6.5 ft depth) as the uppermost silt layer in Boring 1442, which is located nearby. The middle layer is at 12.5 to 14 ft depth and was designated as very moist in the field lithologic logs. The lowermost layer was at 18 to 19.5 ft depth and was slightly moist.

Boring 12120 also revealed three silt or silt/sand layers. The uppermost silt/sand layer is at the ground surface, 4 feet thick, and dry, with the bottom foot being comprised of sand. The middle silt layer is 2.5 feet thick, wet, and at 9 to 11.5 ft depth. The lowermost silt layer was 2 feet thick, wet, and at 21 to 23 ft depth..

Boring 12118 revealed only a dry, shallow, 2 foot thick silt layer corresponding to the silt layer in adjacent boring 1448. The remainder of the boring was drilled through clay, therefore there was no zone in which to sample perched groundwater.

7.2 PERCHED WATER SAMPLING

Water samples were taken from middle silt layers encountered in Borings 12119 and 12120. In Boring 12119, the uppermost silt layer had been sampled via Boring 1442 during the OU5 RI and the lowermost layer was only slightly moist and therefore would not yield much water. In Boring 12120, the top silt/sand layer was dry and therefore would not yield water, and the lowermost silt layer is below the extent of excavation.

Two water samples, each related to the middle silt layer encountered in borings 12119 and 12120, were collected and analyzed for VOCs and total uranium. The boring locations, sample identification numbers, sample intervals, and analytical results are presented in Appendix A. No volatile organic compounds were detected, except for acetone at 6 ppb (below the detection limit of 10 ppb), in the perched water sample from Boring 12119. However, VOCs were not detected in the duplicate sample from this boring. No total

uranium was detected in the water samples, at detection limits of 9.8 and 7.3 ppm in Borings 12119 and 12120, respectively.

In conclusion, it appears that the perched groundwater may no longer be contaminated with VOCs. There are two reasons for this: 1) the source, being the sludge in the sludge drying beds, has been removed since the sampling was conducted during the RI, and 2) the residual VOC contamination has since degraded to nondetectable levels. However, the detection limits under this investigation was 10 ppb; the detection limits under the RI investigation were lower and revealed low levels of contamination below 10 ppb. Regardless, any residual VOC contamination that was below 10 ppb during the RI has most likely been degraded to nondetectable levels by today.

APPENDIX A

Boring Locations, Sample Identification Numbers, Sample Intervals, and Analytical Results

TABLE A-1
SAMPLE IDENTIFIERS, LOCATIONS, DEPTHS, AND ANALYSES

Boring ID Number	Sample ID Number	Easting	Northing	Sample Interval (feet)	Total Uranium (ppm)	Volatile Organic Compounds (ppb)
12118	NA	1351670	480025	NA	NA	NA
12119	A1P2STP-12119-11.5	1351641	480106	11.5-15.5	ND (<9.8)	Acetone 6
	A1P2-12119-11.5-D				NA	ND (<10)
12120	A1P2STP-12120-8	1351725	480115	8.0-12.0	ND (<7.3)	ND (<10)
NA	A1P2STP-12119-T	NA	NA	NA	NA	2-Butanone 6
NA	A1P2STP-12119-X	NA	NA	NA	NA	2-Butanone 6
NA	A1P2STP-12120-T	NA	NA	NA	NA	ND (<10)

NA = not applicable/not analyzed

TABLE A-2
VOC ANALYTES

Analytes	
Chloromethane	Trichloroethene
Vinyl Choride	1,2-Dichloropropane
Bromomethane	Bromodichloromethane
Chloroethane	cis-1,3-Dichloropropene
1,1-Dichloroethene	4-Methyl-2-pentanone
Carbon Disulfide	Toluene
Acetone	trans-1,3-Dichloropropene
Methylene Chloride	1,1,2-Trichloroethane
1,1-Dichloroethane	Tetrachloroethene
1,2-Dichloroethene (total)	2-Hexanone
2-Butanone	Dibromochloromethane
Chloroform	Chlorobenzene
1,1,1-Trichloroethane	Ethylbenzene
Carbon Tetrachloride	Xylene (Total)
Benzene	Styrene
1,2-Dichloroethane	Bromoform
1,1,2,2-Tetrachloroethane	

APPENDIX B

Lithologic Logs

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FEMP

LITHOLOGIC LOG

CONTROL NO.: 3 PW 10-8-97 50035508-971001-014

PAGE 1 OF 6

PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NO.: 50.03.59.03

LOCATION/NUMBER:	COORDINATES:	DATE STARTED:	DATE COMPLETED:
12118	N 4800 E 1357641	10-1-97	10-1-97

SURFACE ELEVATION:	GROUNDWATER LEVEL:	DATE:	TIME:	GROUNDWATER LEVEL	DATE:	TIME:
N/A	NA	NA	NA	NA	NA	NA

GEOLOGIST:	DRILLING CONTRACTOR:	DRILLING EQUIPMENT	DRILLER
Keith Payne	Fluor Daniel	Geoprobe	Bill Neyer

WATER USED DURING DRILLING:	WATER RECOVERED DURING DRILLING:	WATER LOST DURING DRILLING
NA GAL.	NA GAL.	NA GAL.

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1312 10-1-97	–	6	(10YR, 5/3) Brown organic Silt with Roots and trace Sand, Dry, nonplastic	OL	–	PID = 0.4 ppm Bα = 0 ccpm
.5	1312 10-1-97	–	6	(10YR, 5/3) Brown Silt with trace sand, Dry, non-plastic	ML	–	PID = 0.4 ppm Bα = 0 ccpm
1.0	1312 10-1-97	–	6	SAA with large (35 mm piece of fractured gravel)	ML	–	PID = 0.4 ppm Bα = 0 ccpm
1.5	1312 10-1-97	–	6	(10YR, 5/3) Brown Silt with trace sand, Dry, non-plastic	ML	–	PID = 0.4 ppm Bα = 0 ccpm
2.0	1312 10-1-97	–	6	SAA	ML	–	PID = 0.4 ppm Bα = 0 ccpm
2.5	1312 10-1-97	–	6	(10YR, 4/2) Dark Brownish Gray, Silty Clay with sand size iron Nodules and iron staining, moist, slight plasticity	CL	–	PID = 0.4 ppm Bα = 0 ccpm
3.0	1312 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm Bα = 0 ccpm
3.5							

METER	BKGD	DATE	TIME
PID	0.0 ppm	10-1-97	1300
ALPHA	NA		
BETA / GAMMA	50 cpm	10-1-97	1301

SAMPLING EQUIPMENT:

TYPE OF SAMPLER: DTSS

DIAMETER OF SAMPLER: 2 1/8 inch O.D.

WEIGHTS OF HAMMER: NA

NOTES:

ppm = parts per million
cpm = counts per minute
ccpm = corrected counts per minute

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681

G: / WPSC / 95-0037.DRW (07-10-95)

CONTROL NUMBER: 5003590S-971001-015

FEMP
LITHOLOGIC LOG
(Continuation Page)

PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12118

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
	~~1316~~ 1312 10-1-97	—	6	(10YR, 4/2) Dark Brownish Gray, Silty Clay with sand size Iron Nodules and Iron staining, moist, slight plasticity	CL	—	PID=0.2 ppm βα=0 ccpm
4.0	1316 10-1-97	—	6	(2.5Y, 5/2) Grayish Brown, Silty Clay with trace sand and trace sand size Iron Nodules and Iron staining moist, slight plasticity	CL	—	PID=0.2 ppm βα=0 ccpm
4.5	1316 10-1-97	—	6	SAA	CL	—	PID=0.2 ppm βα=0 ccpm
5.0	1316 10-1-97	—	6	SAA	CL	—	PID=0.2 ppm βα=0 ccpm
5.5	1316 10-1-97	—	6	SAA with 35 mm fractured limestone gravel	CL	—	PID=0.2 ppm βα=0 ccpm
6.0	1316 10-1-97	—	6	(2.5Y, 5/2) Grayish Brown, Silty Clay with trace sand and sand size Iron Nodules, Iron staining, moist, slight plasticity	CL	—	PID=0.2 ppm βα=0 ccpm
6.5	1316 10-1-97	—	6	SAA	CL	—	PID=0.2 ppm βα=0 ccpm
7.0	1316 10-1-97	—	6	SAA	CL	—	PID=0.2 ppm βα=0 ccpm
7.5	1316 10-1-97	—	6	SAA with 30-35 mm fractured limestone gravel	CL	—	PID=0.2 ppm βα=0 ccpm
8.0							

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

G:\WPSC\95-0140.DRW

CONTROL NUMBER: PW 10-2-97
5C035903-97100-016

FEMP
LITHOLOGIC LOG
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PROJECT NAME: Area I Phase II Perched Water Sampling at the STP

PROJECT NUMBER: 50.03 59.03

LOCATION NUMBER: 12118

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
8.5	1320 10-1-97	–	6	(10YR 5/6) Yellowish Brown, Silty Clay with 10-15% medium to coarse sand, moist slight plasticity	CL	–	PID=0.3 ppm BZ=0 ccpm
9.0	1320 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm BZ=0 ccpm
9.5	1320 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm BZ=0 ccpm
10.0	1320 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm BZ=0 ccpm
10.5	1320 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm BZ=0 ccpm
11.0	1320 10-1-97	–	6	SAA with increasing amount of fine sand	CL	–	PID=0.3 ppm BZ=0 ccpm
11.5	1330 10-1-97	–	6	(10YR, 5/2) Grayish Brown, Silty clay with trace sand and Iron staining moist, nonplastic	CL	–	PID=0.4 ppm BZ=0 ccpm
12.0	1330 10-1-97	–	6	SAA	CL	–	PID=0.4 ppm BZ=0 ccpm
12.5	1330 10-1-97	–	6	SAA	CL	–	PID=0.4 ppm BZ=0 ccpm

METER	BKGD	DATE	TIME
PID	See p.1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p.1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p.1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

CONTROL NUMBER: SPN 10-8-97
50035908-971001-017

FEMP LITHOLOGIC LOG (Continuation Page)

PROJECT NAME: Area I Phase II Perched Water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: ~~12112~~ 12115

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
13.0	1330 10-1-97	–	6	(5Y, 5/1) Gray, Silty Clay with trace sand and 15 mm fractured gravel, moist, slight plasticity	CL	–	PID = 0.3 ppm βα = 0 ccpm
13.5	1330 10-1-97	–	6	SAA	CL	–	PID = 0.3 ppm βα = 0 ccpm
14.0	1330 10-1-97	–	6	SAA with 30-40 mm fractured limestone	CL	–	PID = 0.3 ppm βα = 0 ccpm
14.5	1336 10-1-97	–	6	(5Y, 5/1) Gray, Silty Clay with trace sand and 15-25 mm fractured gravel, moist, slight plasticity	CL	–	PID = 0.4 ppm βα = 0 ccpm
15.0	1336 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm βα = 0 ccpm
15.5	1336 10-1-97	–	6	SAA with 30-35 mm fractured gravel	CL	–	PID = 0.4 ppm βα = 0 ccpm
16.0	1336 10-1-97	–	6	(5Y, 5/1) Gray, Silty Clay with trace sand and 15 mm fractured gravel, moist, slight plasticity	CL	–	PID = 0.4 ppm βα = 0 ccpm
16.5	1349 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm βα = 0 ccpm
17.0	1349 10-1-97	–	6	SAA	CL	–	PID = 0.5 ppm βα = 0 ccpm

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NUMBER: 3PW10-E-97 50035908-971001-018

FEMP LITHOLOGIC LOG (Continuation Page) 2046

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PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12118

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
	1349 10-1-97	–	6	(5Y, 5/1) Gray, silty clay with trace sand, moist, sligh plasticity	CL	–	PID = 0.5 ppm Bx = 0 ccpm
17.5	1349 10-1-97	–	6	SAA	CL	–	PID = 0.5 ppm Bx = 0 ccpm
18.0	1450 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm Bx = 0 ccpm
18.5	1450 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm Bx = 0 ccpm
19.0	1450 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm Bx = 0 ccpm
19.5	1450 10-1-97	–	6	SAA	CL	–	PID = 0.4 ppm Bx = 0 ccpm
20.0	1457 10-1-97	–	6	SAA	CL	–	PID = 0.2 ppm Bx = 0 ccpm
20.5	1457 10-1-97	–	6	SAA	CL	–	PID = 0.2 ppm Bx = 0 ccpm
21.0	1457 10-1-97	–	6	SAA with 30-35 mm fractured gravel	CL	–	PID = 0.2 ppm Bx = 0 ccpm
21.5							

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

* SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NUMBER: 3 PW 10-7-97
50035908-971001-019

FEMP
LITHOLOGIC LOG
(Continuation Page)

PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12118

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1457 10-1-97	—	6	(5Y, 5/1) Gray, Silty Clay with trace sand, moist, slight plasticity	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
22.0	1505 10-1-97	—	6	(5Y, 5/1) Gray, silty clay with trace sand, moist, slight plasticity with 1 inch clayey sand seam with medium sand, moist clay wet sand seam	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
22.5	1505 10-1-97	—	6	(5Y, 5/1) Gray, Silty Clay with trace sand, moist, slight plasticity	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
23.0	1505 10-1-97	—	6	SAA	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
23.5	1505 10-1-97	—	6	SAA	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
24.0	1511 10-1-97	—	6	SAA	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
24.5	1511 10-1-97	—	6	SAA	CL	—	PID = 0.2 ppm Bkd = 0 ccpm
25.0				Bottom of Boring 25.0 feet			

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

* SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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FEMP

LITHOLOGIC LOG

CONTROL NO.: 50035903.971002-003

PAGE 1 OF 6

PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NO.: 50.07.59.03

LOCATION/NUMBER:	COORDINATES:	DATE STARTED:	DATE COMPLETED:
12119	N 1351641 E 480106	10-2-97	10-2-97

SURFACE ELEVATION:	GROUNDWATER LEVEL:	DATE:	TIME:	GROUNDWATER LEVEL	DATE:	TIME:
NA	NA	NA	NA	NA	NA	NA

GEOLOGIST:	DRILLING CONTRACTOR:	DRILLING EQUIPMENT	DRILLER
Keith Payne	Fluor Daniel	Geoprobe	Bill Neyer

WATER USED DURING DRILLING:	WATER RECOVERED DURING DRILLING:	WATER LOST DURING DRILLING
NA GAL.	NA GAL.	NA GAL.

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 Inch)	RECOVERY (Inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0958 10-2-97	-	6	(10YR, 3/3) Dark Brown, organic Silty Clay with Roots, moist, slight plasticity	OL OH	—	PID = 0.9 ppm Bα = 0 ccpm
.5	1002 10-2-97	-	6	(10YR, 5/3) Brown, Silty Clay with trace Iron nodules and sand, moist slight plasticity Fill material	CL	-	PID = 0.9 ppm Bα = 0 ccpm
1.0	1002 10-2-97	-	6	SAA	CL	-	PID = 0.9 ppm Bα = 0 ccpm
1.5	1002 10-2-97	-	6	SAA	CL	-	PID = 0.9 ppm Bα = 0 ccpm
2.0	1002 10-2-97	-	6	SAA	CL	-	PID = 0.9 ppm Bα = 0 ccpm
2.5	1002 10-2-97	-	6	SAA	CL	-	PID = 0.9 ppm Bα = 0 ccpm
3.0	1002 10-2-97	-	6	SAA	CL	-	PID = 0.9 ppm Bα = 0 ccpm
3.5							

METER	BKGD	DATE	TIME
PID	0.8 ppm	10-2-97	0952
ALPHA	← NA →		
BETA / GAMMA	50 cpm	10-2-97	0950

SAMPLING EQUIPMENT:

TYPE OF SAMPLER: DTSS

DIAMETER OF SAMPLER: 2 1/8 in O.D.

WEIGHTS OF HAMMER: NA

NOTES:

ppm = parts per million

cpm = counts per minute

ccpm = corrected counts per minute

PID reading background drifted to 21 throughout the sampling event

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681

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CONTROL NUMBER: 50035403-97D02-004

FEMP LITHOLOGIC LOG (Continuation Page)

PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12119

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1002 10-2-97	–	6	(10YR, 5/3) Brown, Silty Clay with trace Iron Nodules and Sand, moist, slight plasticity. Fill material	CL	–	PID = 0.9 ppm Bα = 0 ccpm
4.0	1006 10-2-97	–	6	SAA	CL	–	PID = 0.9 ppm Bα = 0 ccpm
4.5	1006 10-2-97	–	6	SAA	CL	–	PID = 0.9 ppm Bα = 0 ccpm
5.0	1006 10-2-97	–	6	(10YR, 5/3) Brown, Silty Clay with trace sand size Iron Nodules and iron staing	CL	–	PID = 0.9 ppm Bα = 0 ccpm
5.5	1006 10-2-97	–	6	(10YR, 5/4) Yellowish Brown, Clayey Silt with trace Sand and Gravel Slight Plasticity, Very Moist	ML	–	PID = 1.1 ppm Bα = 0 ccpm
6.0	1006 10-2-97	–	6	SAA	ML	–	PID = 1.1 ppm Bα = 0 ccpm
6.5	1006 10-2-97	–	6	(10YR, 5/3) Brown, Silty Clay with trace sand, slight plasticity, moist	CL	–	PID = 1.1 ppm Bα = 0 ccpm
7.0	1006 10-2-97	–	6	SAA	CL	–	PID = 1.1 ppm Bα = 0 ccpm
7.5	1006 10-2-97	–	6	SAA	CL	–	PID = 1.1 ppm Bα = 0 ccpm
8.0							

METER	BKGD	DATE	TIME
PID	See		
ALPHA	P. 1		
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See
DIAMETER OF SAMPLER	P. 1
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

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FS-F-3681-1 7/11/95

CONTROL NUMBER: 5003590347 1002-00 5

FEMP
LITHOLOGIC LOG
(Continuation Page)

2046

PROJECT NAME: Area I Phase II Perched water Sampling at the STP

PROJECT NUMBER: 50.03 59.03

LOCATION NUMBER: 12119

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
	1012 10-2-97	–	6	(10YR 5/3) Brown, Silty Clay with trace sand and 15-25 mm (Pea) gravel with trace Iron nodules, moist, slight plasticity	CL	–	PID = 2.1 ppm Bα = 0 ccpm
8.5	1012 10-2-97	–	6	SAA	CL	–	PID = 2.1 ppm Bα = 0 ccpm
9.0	1012 10-2-97	–	6	SAA	CL	–	PID = 2.1 ppm Bα = 0 ccpm
9.5	1012 10-2-97	–	6	SAA	CL	–	PID = 2.1 ppm Bα = 0 ccpm
10.0	1012 10-2-97	–	6	SAA	CL	–	PID = 2.1 ppm Bα = 0 ccpm
10.5	1012 10-2-97	–	6	SAA	CL	–	PID = 2.1 ppm Bα = 0 ccpm
11.0	1012 10-2-97	–	6	SAA	CL	–	PID = 2.1 ppm Bα = 0 ccpm
11.5	1012 10-2-97	–	6	(10YR 4/1) Dark Gray, Silty Clay with trace sand and 20-30 mm gravel, moist slight plasticity	CL	–	PID = 1.2 ppm Bα = 0 ccpm
12.0	1017 10-2-97	–	6	SAA	CL	–	PID = 1.2 ppm Bα = 0 ccpm

METER	BKGD	DATE	TIME
PID	See		
ALPHA	p. 1		
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See
DIAMETER OF SAMPLER	p. 1
WEIGHTS OF HAMMER	

NOTES: see p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

CONTROL NUMBER: 50035903471002 006

FEMP LITHOLOGIC LOG (Continuation Page)

PROJECT NAME: Area I Phase II Perched Water Sampling at the STP

PROJECT NUMBER: 50.03 59.03

LOCATION NUMBER: 12119

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1017 10-2-97	–	6	(5Y, 5/1) Gray, clayey silt with 25% fine sand and trace gravel, very moist, slight plasticity	ML	–	PID=0.9 ppm Bα=0 ccpm
13.0	1017 10-2-97	–	6	SAA	ML	–	PID=1.2 ppm Bα=0 ccpm
13.5	1017 10-2-97	–	6	SAA	ML	–	PID=1.2 ppm Bα=0 ccpm
14.0	1017 10-2-97	–	6	(5Y, 5/1) Gray, silty clay with trace sand, moist low plasticity	CL	–	PID=1.2 ppm Bα=0 ccpm
14.5	1017 10-2-97	–	6	SAA	CL	–	PID=1.[illegible] ppm Bα=0 [illegible]
15.0	1017 10-2-97	–	6	SAA	CL	–	PID=1.2 ppm Bα=0 ccpm
15.5	1017 10-2-97	–	6	SAA	CL	–	PID=1.2 ppm Bα=0 ccpm
16.0	1025 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
16.5	1025 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
17.0							

METER	BKGD	DATE	TIME
PID	See p.1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p.1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p.1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NUMBER: 50035403 971002 00 1

FEMP LITHOLOGIC LOG (Continuation Page) 2046

PROJECT NAME: Area I Phase II Perched water

PROJECT NUMBER: 50.03.57.03

LOCATION NUMBER: #12119

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1025 10-2-97	6	–	(5Y, 5/1) Gray, Silty Clay with trace sand, moist, low plasticity	CL	–	PID=1.2 ppm Bα=0ccpm
17.5	1025 10-2-97	6	–	SAA with 10% fine sand and 40mm max fractured limestone	CL	–	PID=1.1 ppm Bα=0ccpm
18.0	1025 10-2-97	6	–	(5Y, 5/1) Gray, Clayey Silt with trace sand, slightly moist, non-plastic	ML	–	PID=1.3 ppm Bα=0ccpm
18.5	1025 10-2-97	6	–	SAA	ML	–	PID=1.3 ppm Bα=0ccpm
19.0	1025 10-2-97	6	–	SAA	ML	–	PID=1.3 ppm Bα=0ccpm
19.5	1025 10-2-97	6	–	(5Y, 5/1) Gray, Silty Clay with trace sand, moist, low plasticity	CL	–	PID=1.3 ppm Bα=0ccpm
20.0	1033 10-2-97	6	–	SAA	CL	–	PID=1.2 ppm Bα=0 ccpm
20.5	1033 10-2-97	6	–	SAA	CL	–	PID=1.2 ppm Bα=0ccpm
21.0	1033 10-2-97	6	–	SAA	CL	–	PID=1.2 ppm Bα=0ccpm
21.5							

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95 G:\WPSC\95-0140.D

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CONTROL NUMBER: 50035903-971002-008

FEMP LITHOLOGIC LOG (Continuation Page)

PROJECT NAME: Area I Phase II Perched Water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12119

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.0	1033 10-2-97	–	6	(5Y, 5/1) Gray, Silty Clay with trace sand, moist, low plasticity	CL	–	PID=0.9 ppm Bα=0 ccpm
22.5	1033 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
23.0	1033 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
23.5	1033 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
24.0	1033 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
24.5	1325 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
25.0	1325 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
25.5	1325 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm
26.0	1325 10-2-97	–	6	SAA	CL	–	PID=0.9 ppm Bα=0 ccpm

Bottom of Boring 26.0 ft

METER	BKGD	DATE	TIME
PID			
ALPHA	See		
BETA / GAMMA		P. 1	

SAMPLING EQUIPMENT:

TYPE OF SAMPLER: See

DIAMETER OF SAMPLER: P. 1

WEIGHTS OF HAMMER

NOTES: See p. 1

* SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NUMBER: 50035908-971001-0016 10-8-97

FEMP
LITHOLOGIC LOG
(Continuation Page)

PROJECT NAME: Area 1 Phase II Perched water Sampling at The STP

PROJECT NUMBER: 50.03 59.03

LOCATION NUMBER: 12120

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
	0952 10-1-97	–	6	(10YR, 5/3) Brown, Well Graded Gravelly Sand, Dry, non-plastic	SW	–	PID=.7 ppm Bα=0 ccpm
4.0	0955 10-1-97	–	6	(10 YR, 6/4) Light Yellowish Brown Clay with trace Iron nodules and Iron staining, high plasticity, moist	CL	–	PID=1.5 ppm Bα=0 ccpm
4.5	0955 10-1-97	–	6	SAA	CL	–	PID=1.5 ppm Bα=0 ccpm
5.0	0955 10-1-97	–	6	SAA	CL	–	PID=1.5 ppm Bα=0 ccpm
5.5	0955 10-1-97	–	6	SAA	CL	–	PID=1.5 ppm Bα=0 ccpm
6.0	0955 10-1-97	–	6	(5YR, 3/1) Very Dark Gray, Clay with trace sand and 20 mm gravel	CL	–	PID=1.5 ppm Bα=0 ccpm
6.5	0955 10-1-97	–	6	SAA	CL	–	PID=1.5 ppm Bα=0 ccpm
7.0	0955 10-1-97	–	6	SAA	CL	–	PID=1.5 ppm Bα=0 ccpm
7.5	0955 10-1-97	–	6	SAA	CL	–	PID=1.5 ppm Bα=0 ccpm
8.0							

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NO.: 3PNV10-8-97
500359 08-971001-005

FEMP

LITHOLOGIC LOG

PAGE 1 OF 6

PROJECT NAME: Area 1 Phase II Perched water Sampling at the STP	PROJECT NO.: 50.03.59.03

LOCATION/NUMBER:	COORDINATES:	DATE STARTED:	DATE COMPLETED:
12120	E 1351725 N 4905115	10/1/97	~~50.03.59.03~~ [illegible]

SURFACE ELEVATION:	GROUNDWATER LEVEL:	DATE:	TIME:	GROUNDWATER LEVEL	DATE:	TIME:
NA	NA	NA	NA	NA	NA	NA

GEOLOGIST:	DRILLING CONTRACTOR:	DRILLING EQUIPMENT	DRILLER
Keith Payne	Fluor Daniel	Geoprobe	Bill Neyer

WATER USED DURING DRILLING:	WATER RECOVERED DURING DRILLING:	WATER LOST DURING DRILLING
NA GAL.	NA GAL.	NA GAL.

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0952 10-1-97	–	6	(10YR, 5/3) Brown, Organic Silt with Roots, Dry, non-plastic	OL	–	PID = 2.1 ppm βα = 0 ccpm
.5	0952 10-1-97	–	6	(10YR, 4/2) Dark Grayish Brown, Organic Silt with trace Sand and Gravel to 30 mm, Dry, non-plastic	OH	–	PID = 1.8 ppm βα = 0 ccpm
1.0	0952 10-1-97	–	6	SAA	OH	–	PID = 1.8 ppm βα = 0 ccp[illegible]
1.5	0952 10-1-97	–	6	SAA	OH	–	PID = 1.8 ppm βα = 0 ccpm
2.0	0952 10-1-97	–	6	SAA	OH	–	PID = 1.4 ppm βα = 0 ccpm
2.5	0952 10-1-97	–	6	SAA	OH	–	PID = 1.4 ppm βα = 0 ccpm
3.0	0952 10-1-97	–	6	(10YR, 5/3) Brown, well Graded Gravelly Sand, Dry, non-plastic	SW	–	PID = 1.0 ppm βα = 0 ccpm
3.5							

METER	BKGD	DATE	TIME
PID	0.0 ppm	10/1/97	0941
ALPHA	← NA →		
BETA / GAMMA	50 cpm	10/1/97	0942

SAMPLING EQUIPMENT:

TYPE OF SAMPLER: DTSS

DIAMETER OF SAMPLER: 2 1/8 inch O.D.

WEIGHTS OF HAMMER: NA

NOTES:

ppm = parts per million
cpm = counts per minute
ccpm = corrected counts per minute

Background Drifted between 00-10 ppm [illegible]

* SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681

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~~000481~~

CONTROL NUMBER: 10-2-97
50035908-971001-007

FEMP
LITHOLOGIC LOG
(Continuation Page)

2046

~~1092~~

PROJECT NAME: Area 1 Phase II Perched water Sampling at The STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12120

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
8.5	1002 10-1-97	–	6	(10YR, 5/3) Brown, Clay with trace sand, moist, medium plasticity	CL	–	PID=0.5 ppm Bα=0 ccpm
9.0	1002 10-1-97	–	6	SAA	CL	–	PID=0.5 ppm Bα=0 ccpm
9.5	1002 10-1-97	–	6	(10YR, 5/4) Yellowish Brown, Clayey silt, wet, slight plasticity	ML	–	PID=0.5 ppm Bα=0 ccpm
10.0	1002 10-1-97	–	6	SAA	ML	–	PID=0.5 ppm Bα=0 ccpm
10.5	1002 10-1-97	–	6	SAA	ML	–	PID=0.5 ppm Bα=0 ccpm
11.0	1002 10-1-97	–	6	SAA	ML	–	PID=0.5 ppm Bα=0 ccpm
11.5	1002 10-1-97	–	6	SAA	ML	–	PID=0.5 ppm Bα=0 ccpm
12.0	1002 10-1-97	–	6	(10YR, 5/3) Brown, Clay with trace sand Iron staining, moist, slight plasticity	CL	–	PID=0.5 ppm Bα=0 ccpm
12.5	1011 10-1-97	–	6	(10YR, 5/3) Brown, Clay with trace sand and Gravel, moist slight plasticity	CL	–	PID=0.3 Bα=0 ccpm

METER	BKGD	DATE	TIME
PID	See p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NUMBER: 10-8-97
5003590 -971001 - 008

FEMP LITHOLOGIC LOG (Continuation Page)

PROJECT NAME: Area 1 Phase II Perched Water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12120

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY(TSF)	REMARKS
	1011 10-1-97	–	6	(10YR, 5/3) Brown, Clay with trace sand and Gravel, moist slight plasticity	CL	–	PID=0.3 ppm Bα=0 ccpm
13.0	1011 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm Bα=0 ccpm
13.5	1011 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm Bα=0 ccpm
14.0	1011 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm Bα=0 ccpm
14.5	1011 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm Bα=0 c[illegible]
15.0	1011 10-1-97	–	6	(10YR, 5/1) Gray, Clay with trace sand and Iron staining moist, non-plastic	CL	–	PID=0.3 ppm Bα=0 ccpm
15.5	1011 10-1-97	–	6	SAA	CL	–	PID=0.3 ppm Bα=0 ccpm
16.0	1021 10-1-97	–	6	(5Y, 5/1) Gray, Clay with trace sand and 20-25 mm gravel, moist, slightly plastic	CL	–	PID=0.2 ppm Bα=0 ccpm
16.5	1021 10-1-97	–	6	SAA	CL	–	PID=0.2 ppm Bα=0 ccpm
17.0							

METER	BKGD	DATE	TIME
PID			
ALPHA	See p. 1		
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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CONTROL NUMBER: 3PW 10-8-97
50035908-971001-009

FEMP
LITHOLOGIC LOG
(Continuation Page)

PROJECT NAME: Area 1 Phase II PSP for Sampling for Perched water at The STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12120

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1021 10-1-97	-	6	(5Y, 5/1) Gray, clay with trace sand and 20-25 mm gravel, moist, slight plasticity	CL	-	PID=0.0 ppm Bx=0 ccpm
17.5	1021 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
18.0	1031 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
18.5	1031 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
19.0	1031 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
19.5	1031 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
20.0	1041 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
20.5	1041 10-1-97	-	6	SAA	CL	-	PID=0.0 ppm Bx=0 ccpm
21.0	1041 10-1-97	-	6	(5Y, 5/1) Gray, Clayey Silt with trace sand, moist non-plastic	ML	-	PID=0.0 ppm Bx=0 ccpm
21.5							

METER	BKGD	DATE	TIME
PID	see p. 1		
ALPHA			
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	see p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES:
See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

CONTROL NUMBER: 10-8-97
SD035908-97001-010

FEMP LITHOLOGIC LOG (Continuation Page)

PROJECT NAME: Area 1 Phase II PSP for Perched water Sampling at the STP

PROJECT NUMBER: 50.03.59.03

LOCATION NUMBER: 12120

DEPTH (FEET)	SAMPLE TIME, DATE, AND NUMBER	BLOWS (per 6 inch)	RECOVERY (inches)	DESCRIPTION (Colors identified per Munsell Color Chart)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1041 10-1-97	–	6	(5Y, 5/1) Gray, Clayey silt with trace sand, moist, non-plastic	ML	–	PID=0.0 ppm Bα=0 ccpm
22.0	1050 10-1-97	–	6	(5Y, 5/1) Gray, Clayey Silt with trace sand, wet, non-plastic	ML ~~CL~~ 10-1-97 RP	–	PID=0.0 ppm Bα=0 ccpm
22.5	1050 10-1-97	–	6	SAA	ML ~~CL~~ RP 10-1-97	–	PID=0.0 ppm Bα=0 ccpm
23.0	1050 10-1-97	–	6	(5Y, 5/1) Gray, Silty Clay with trace sand, moist, slight plasticity	CL	–	PID=0.0 ppm Bα=0 ccpm
23.5	1050 10-1-97	–	6	SAA	CL	–	PID=0.0 ppm Bα=0 [illegible]m
24.0	1100 10-1-97	–	0	Rock in Sampler No Recovery	–	–	
24.5	1100 10-1-97	–	0	SAA	–	–	
25.0				Bottom of Boring 25.0 ft			

METER	BKGD	DATE	TIME
PID			
ALPHA	See p. 1		
BETA / GAMMA			

SAMPLING EQUIPMENT:	
TYPE OF SAMPLER	See p. 1
DIAMETER OF SAMPLER	
WEIGHTS OF HAMMER	

NOTES: See p. 1

• SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST.

FS-F-3681-1 7/11/95

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[redacted]

APPENDIX C

Variance/Field Change Notices

VARIANCE / FIELD CHANGE NOTICE

2046

V/F-50.03.59.03-1

NO.: 50.03.59.03

Page 1 of 1

PROJECT TITLE: Perched Water Sampling at the Sewage Treatment Plant 55200-PSP-003

Date: 9/24/97

ANCE / FIELD CHANGE NOTICE (Include justification):

Field Change Notice:

This variance documents a change in the location of the Boring 12118, and the addition of a new boring, Number12120. The following table summarizes the changes to the proposed locations as stated in Section 2.0, Table 2.1 of the PSP.

	Original		Revised		
Boring ID	Easting	Northing	Easting	Northing	Comments
12118	1351508	480425	1351670	480025	Changed Location
12119	1351641	480106	1351641	480106	No Change
12120	N/A	N/A	1351725	480115	New Boring

Justification:

The revised locations were determined by reviewing a new kriging model based on recent borings placed in the Sewage Treatment Plant area under PSP A1P2 PreDesign Investigation For Total Uranium in the Sewage Treatment Plant Area, Rev. 0, Dated 8/97, WBS# 50.03.59.05, EDC# 55200-PSP-0001.

EDC CONTROLLED COPY NO: ORIGINAL 8544

REQUESTED BY: Joan White Date: ~~3/3/97~~ 9/24/97

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	9-25-97	X	PROJECT MANAGER	9/25/97
	DATA QUALITY MANAGEMENT		X	Characterization Lead	9/25/97
	ANALYTICAL CUSTOMER SUPPORT		X	Characterization and Sampling Mgr	9/24/97
	OTHER			OTHER	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Esther Dittmer	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

VARIANCE / FIELD CHANGE NOTICE

V/F No. 50.03.59.03-1

Page 1 of 1

Date: 10/1/97

TAS NO.: 50.03.59.03

PROJECT TITLE: Perched Water Sampling at the Sewage Treatment Plant 2046

VARIANCE / FIELD CHANGE NOTICE (Include justification):

1) This variance is to have the water collected to be analyzed for total uranium in addition to VOAs. The TAL will be TAL 50.03.59.03-B for Total Uranium by ICP/MS or Bromopadap with at Highest Allowable Minimum Detectable Concentration of 10 ppm. AT ASL B.

Justification
If the water needs to be pretreated the total uranium concentration needs to be known.

EDG
CONTROLLED
COPY
NO. 8544

REQUESTED BY: Alex Duarte Date: October 1, 1997

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	10-2-97	X	PROJECT MANAGER ARD FR STG	10/2/97
	DATA QUALITY MANAGER		X	SCEP SAMPLING & CHARACTERIZ.	10/2/97
	ANALYTICAL CONTROL			OTHER ARD	10/2/97
	OTHER			OTHER	10/2/97

VARIANCE/FCN APPROVED [X] YES [ ] NO

REVISION REQUIRED: [ ] YES [x] NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Michelle Tucker	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ORIGINAL