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Soil Vapor Extraction System Design: A Case Study Comparing Vacuum and Pore Gas Velocity Cutoff Criteria

K. L. Dixon[1*] and R. L. Nichols[1]

[1] Savannah River National Laboratory, Savannah River Site, 773-42A, Aiken, SC 29808

* corresponding author: kenneth.dixon@srnl.doe.gov, 803-725-5205 voice, 803-725-7673 fax

Abstract

Soil vapor extraction (SVE) systems are typically designed based on the results of a vadose zone pumping test (transient or steady state) using a pressure criteria to establish the zone of influence (ZOI). A common problem associated with pressure based SVE design is overestimating the ZOI of the extraction well. The vacuum criteria commonly used to establish the boundary of the ZOI results in large areas with very low pore velocities and thus long cleanup times. As a result, design strategies based upon critical pore gas velocity (CPGV) have increased in popularity. The CPGV is used in an effort to loosely incorporate the effects of

mass transfer limitations into the design of SVE systems. Critical pore gas velocity designs use a minimum pore gas velocity rather than minimum vacuum to identify the extent of the treatment zone of an SVE system. The CPGV is typically much larger than the pore gas velocity at the perimeter of vacuum based (ZOI) designs resulting in shorter cleanup times.

In this paper, we report the results of testing performed at the Savannah River Site (SRS) to determine the influence of a vapor extraction well based upon both a pressure and pore gas velocity design criteria. Results from this testing show that a SVE system designed based upon a CPGV is more robust and will have shorter cleanup times due to increased flow throughout the treatment zone. Pressure based SVE design may be appropriate in applications where soil gas containment is the primary objective; however, in cases where the capture and removal of contaminated soil gas is the primary objective, CPGV is a better design criteria.

Introduction

In recent years, soil vapor extraction (SVE) has become one of the most widely deployed remediation technologies for the treatment

of volatile organic compounds (VOC) in the vadose zone. When properly applied, it is one of the most cost effective, energy efficient, remediation technologies available to the environmental engineer or scientist for the treatment of sediments with VOC contamination. Soil vapor extraction systems are relatively simple units with low operating costs. They strip contaminants from the unsaturated sediments by the advective removal of soil gas. A vacuum blower (commonly a rotary lobe blower) is generally used to apply vacuum to a network of SVE wells thereby resulting in the removal of soil gas from the vadose zone. As the contaminated soil gas is removed from the vadose zone it is ultimately replaced by clean air from above the ground surface. Remaining residual contamination then partitions and diffuses into the clean soil gas.

The most common approach for SVE well field design is to use vacuum as a criteria for well spacing. In this approach a critical or cut-off vacuum is established based on the natural variation in subsurface gas pressure that results from atmospheric waves that are transmitted through connected pores in the unsaturated zone (barometric pressure differential). Calculations are then performed using pilot test data and the appropriate analytical model to

determine the distance from the well where the critical vacuum is achieved. The volume contained within this radius is referred to as the Zone of Influence (ZOI).

A common problem associated with pressure based SVE design is overestimating the ZOI of the extraction well. This can produce dead zones where there is little or no meaningful air flow. Dead zones are areas between extraction wells where soil gas is stagnant and can occur when the well spacing is inadequate. Furthermore, SVE designs based solely on vadose zone pressure distributions neglect the important fact that a measured pressure differential may not correspond to meaningful vapor flow towards the extraction well. Therefore, SVE design based upon ZOI alone will ensure vapor containment but not necessarily vapor capture (EPA 2001, Johnson and Ettinger, 1994).

An alternative method to design an SVE well field is to determine the Zone of Capture (ZOC). The ZOC is based on pore-gas velocity calculations using permeability test data and includes the volume that has a pore-gas velocity greater than a previously established value. The critical pore-gas velocity is selected based

on mass transfer kinetics and the desired clean-up time. The critical pore-gas velocity can be defined as the minimum pore-gas velocity necessary to produce timely remediation (EPA 2001). Using this method, the ZOC is defined as the volume contained within the maximum radial distance from the well where the critical pore-gas velocity is maintained.

A ZOC based on pore-gas velocity helps to ensure that extraction well spacing will be sufficient to cause meaningful airflow towards the well. The ZOC for an individual extraction well based upon pore-gas velocity will typically be smaller than the ZOI based on pressure distribution depending on the cutoff values chosen for each method. Hence, it is important to establish clear objectives prior to the design of the SVE system. If vapor containment is the objective, a ZOI based approach may be sufficient; however, if vapor collection is the objective, a ZOC approach may be more appropriate.

The purpose of this paper is to present the results from testing at the U.S. Department of Energy's Savannah River Site (SRS) near Aiken, South Carolina to determine the influence of a vapor

extraction well based upon both a pressure and pore gas velocity design criteria. Data from the testing was analyzed to determine the ZOI based on pressure criteria and ZOC based on pore gas velocity for a small scale SVE system.

Discussion

The SVE system chosen for this analysis consisted of a single pumping well and three observation wells. These test wells are located at the A-Area Burning/Rubble Pit (ABRP) in the northwest portion of the SRS. The contaminated zone of interest is in a medium to fine grained sand overlain by a clayey layer. The clayey layer restricts air flow across the top boundary of the contaminated zone and can be simulated as a semi-confining layer. Figure 1 shows the conceptual model for the site. Several transient vadose zone pumping tests were conducted to establish the physical properties of the shallow, unconsolidated sediments.

Data from pumping tests were analyzed using a modified Hantush method for semi-confined aquifers (Hantush, 1964). Massman (1989) documented the assumptions and limitations associated with modeling vapor flow with conventional groundwater flow

equations. The most significant assumption is that vapor flow can be modeled using the equation for incompressible fluid flow when pressure variations within the model domain are on the order of one half atmosphere (~ 500 cm H_2O). The Hantush model provided a good fit to the field data validating the use of a semi-confined aquifer analog for the contaminated vadose zone at the ABRP, Figure 2. The results of these transient pumping tests and several others have been reported by Dixon and Nichols (2005). Dixon and Nichols (2005) gave a detailed description of the SRS site geology and the methods used to analyze the field data to determine the physical properties of the vadose zone sediments. The median physical properties based on testing conducted on well ASH-06 as reported by Dixon and Nichols (2005) were used in the ZOI/ZOC analyses presented in this paper. These properties are summarized in Table 1.

Zone of Influence

For a ZOI analysis, a minimum vacuum criteria must be established below which it is assumed the extraction well exerts limited influence. Several different minimum values have been

proposed ranging from 0.25 to 2.54 cm of water to 10% of the applied vacuum. In order to establish an appropriate cutoff vacuum for the ABRP test site, both atmospheric pressure and subsurface gas pressure were monitored during a pretest period, Figure 3. Fluctuations in barometric pressure at the ground surface are transmitted through the unsaturated subsurface in the form of pressure waves that are typically damped and delayed to degrees dependent on the effective permeability of the unsaturated media (Weeks, 1978). This dampened and delayed response is evident in the pretest data at the ABRP test site, Figure 3. When the subsurface pressure data were corrected for the delay, the magnitude of the difference between the subsurface and barometric pressure was found to average about 2.54 cm of water. In order to ensure a containment vacuum greater than the typical variation between barometric and subsurface gas pressure, a cutoff vacuum of 2.54 cm of water was selected to define the boundary of the ZOI.

The ZOI for the extraction well was estimated using the Hantush leaky aquifer method (Hantush, 1964) as outlined by Walton (1991). Steady state drawdown was calculated for several different pumping scenarios. The median physical properties from the

transient testing as reported by Dixon and Nichols (2005) were used to describe the vadose zone (Table 1). Walton (1991) gives the equation for drawdown in a leaky confined aquifer as:

$$s = \frac{Q}{4\pi T} W(u, \beta) \tag{1}$$

where Q is the extraction flow rate, T is the transmissivity. W(u, β) is the Hantush leaky well function defined by:

$$W(u, \beta) = \int_u^\infty \frac{1}{y} e^{\left\{-y - \frac{\beta^2}{4y}\right\}} dy \tag{2}$$

where:

$$u = \frac{r^2 S}{4Tt} \tag{3}$$

and

$$\beta = \frac{r}{\sqrt{\left(\frac{Tb'}{k'}\right)}} \tag{4}$$

where r is the radial distance from the extraction well, S is the storativity, t is time, b' is the confining layer thickness, and k' is the permeability of the confining layer.

A user defined excel function was created to calculate the pressure drawdown in the vadose zone at varying radial distances from the

extraction well using Equations 1 through 4. The output from the function was verified against tabulated values for W(u, β) in Walton (1991). Figure 4 shows the results of the pressure response calculations for several extraction flow rates as a function of radial distance. An extraction flow rate of 1.42 m^3/min (50 scfm) produced a ZOI of about 56.4 m (185 ft) using a cutoff criteria of 2.54 cm. Similarly, for an extraction flow rate of 0.71 m^3/min (25 scfm) produced a ZOI of about 18.3 m (60 ft). An extraction flow rate of 0.28 m^3/min (10 scfm) did not produce vadose pressures above the cutoff criteria of 2.54 cm.

Zone of Capture

The computer program AIR2D, which is a public domain Fortran code, was used to determine the pore-gas velocity distribution in the vadose zone (Joss and Baehr, 1997). AIR2D is a two-dimensional, steady-state, axisymmetric air flow model that simulates air movement either to or from extraction or injection wells in the vadose zone. The program has the capability to model systems open to the atmosphere or bounded by a leaky confining layer.

For this analysis, the leaky confining layer option was chosen and the analytical solution used is documented by Baehr and Joss (1995). Figure 5 shows the pore-gas velocity as a function of radial distance for various flow rates. EPA (2001) selected a critical pore-gas velocity of 0.01 cm/sec for a contaminated site located in the sandy sediments of the Atlantic Coast Plain. The ABRP is also underlain by coastal plain sediments and therefore a critical pore-gas velocity of 0.01 cm/sec was adopted for this study. Using a critical pore gas velocity of 0.01 cm/sec, the ZOC for an extraction flow rate of 1.42 m^3/min (50 scfm) was predicted to be about 15.2 m (50 ft) and for an extraction flow rate of 0.71 m^3/min (25 scfm) the predicted ZOC was about 7.6 m (25 ft). An extraction flow rate of 0.28 m^3/min (10 scfm) was also simulated to examine the ZOC of low flow soil vapor extraction. The ZOC was found to be on the order of about 3 m (10 ft) for this flow rate (Figure 5)

Table 2 shows a comparison of the ZOI based on the steady state pressure distribution and the ZOC based on critical pore gas velocity. The radius of the ZOC based on the attainment of a

critical pore-gas velocity is less than 1/3 the radius of the ZOI determined using the pressure response method for an extraction flow rate of 1.42 m^3/min.

Figure 6 shows the pressure profile for the model domain as simulated using the AIR2D model. This figure clearly shows the effect of the leaky confining layer on the pressure distribution around the extraction well. Darcy's law was used to calculate the pressure distribution for the confining layer. This distribution was then superimposed onto the pressure distribution generated by AIR2D to show the effect of the confining layer.

Figures 6 and 7 show the contrast in predicted ZOI based on pressure versus ZOC based on pore-gas velocity for an extraction flow rate of 1.42 m^3/min (50 scfm). Using the typical cutoff value of 2.54 cm H_2O vadose zone vacuum yields a ZOI of about 58 m (190 ft) which is consistent with the ZOI predicted using the Hantush method described earlier. Figure 7 shows that the ZOC is much smaller (15.2 m) based on pore-gas velocity using the cutoff velocity of 0.01 cm/sec. Similarly, for a flow rate of 0.71 m^3/min,

the predicted ZOC (7.6 m) was much less than the ZOI (18.3 m) based on the pressure criteria.

While the treated zone for each extraction well is smaller when ZOC is used for the well field design, the treatment time will be significantly reduced for ZOC based design due to the increased pore-gas velocities within the treatment zone. Additionally, more pore volumes of soil vapor will flush the treatment zone in ZOC designs for the same treatment period..

Multi-Well Analysis

EPA (2001) developed a three dimensional flow model for steady state simulations of soil vapor extraction wells. The model "MAIRFLOW" can be used for steady state simulations of multi-well extraction systems in homogeneous porous media. EPA (2001) used MAIRFLOW to evaluate the design of a fully operational SVE system with regard to ZOC based on a critical pore gas velocity of 0.01cm/sec. The original system used seven wells operating at a cumulative flow rate of 28.3 m^3/min (1000 scfm). They reported that after simulating several alternative well

field designs, a well field of sixteen properly located SVE wells pumping at a cumulative rate of only 11.3 m^3/min (400 scfm) could achieve a ZOC similar to the seven well system operating at 28.3 m^3/min.

MAIRFLOW was used to conduct multi-well simulations for the ABRP waste unit to determine if a series of SVE wells could be used in the place of a single well pumping at 1.14 m^3/min (40 scfm) to reduce the size of the soil vapor extraction and treatment system necessary to achieve remediation. Multi-well simulations were conducted using three and four wells (Figure 1) to study whether or not multiple wells could be used to reduce the pumping requirements of the SVE system similar to that reported by EPA (2001).

The Darcy velocity field generated by MAIRFLOW for each of the scenarios was converted to pore velocity by dividing the Darcy velocity by the effective porosity determined during analysis of pumping test data. Tecplot™ visualization software for numerical simulation, was used to plot and analyze the pore velocity field using three dimensional interpolation and reverse particle tracking.

Particle tracking was performed by releasing seeds an 30 degree arcs at a distance of 100 cm from each extraction well at the top, middle, and bottom of the permeable zone. Figure 8 shows a plan view of the flow field through the middle of the model domain for three different scenarios. Markers on the flow lines represent 0.5 day travel times. The low permeability of the overlying semi-confining layer coupled with a high anisotropy ratio ($k_r/k_v = 5$) in the pumped zone produced a flow field that is predominantly horizontal within both the ZOI and the ZOC. . Figure 9 shows the pore gas velocity profile through the middle of the model domain and through the center of the screen zone for the wells. The slight upward curvature of the flow lines in Figure 9 is due to leakage through the semi-confining layer. Steeper flow lines are originating out of the plane being viewed and actually have the same slope as those parallel to the plane coming from each side.

The ZOC (CPGV > 0.01 cm/sec) for the three scenarios had approximately the same areal extent (radius = 12.1 m); however, the three well scenario had a large zone between the wells with pore velocities less than the criteria as would be expected, Figure 8. The addition of the fourth well in the middle greatly reduced the

amount of area with pore velocities less than the criteria. Periodic variation in flow rates can be used to address these small zones within the ZOC where the pore gas velocity is less than CPGV.

Comparison of the particle tracking results show that all three scenarios produce similar average travel times for soil vapor originating on the periphery of the ZOC. In the example described above with an extraction rate of 1.14 m^3/min, the travel time from the perimeter of the ZOC is 0.7 days while the travel time from the perimeter of the ZOI is 10.4 days, Figure 10. The large increase in travel time is due to the lower pore gas velocities at greater distances from the pumping center and the longer travel distance from the perimeter of the ZOI. The pore gas velocity profiles in Figure 10 more clearly illustrate the difference between the scenarios within the ZOC. While the distance from the perimeter of the ZOC to a given extraction well is shorter in the three and four well scenarios, the average pore gas velocity along the flow path is smaller resulting in approximately the same travel times for each of the scenarios.

Conclusions

The criteria used for the design of soil vapor extraction systems varies significantly from site to site. The most common criteria, zone of influence (ZOI) and zone of capture (ZOC) produce different well spacings. Either criteria may be appropriate depending on the objective of the soil vapor extraction system.

ZOI criteria is most often set based on the minimum vacuum that can be measured using readily available field equipment and is commonly 2.54 cm H_2O vacuum. Natural diurnal fluctuations in atmospheric pressure produce subsurface pressure fluctuations of 1.27 to 2.54 cm H_2O. Therefore, to ensure containment, a ZOI criteria of 2.54 cm of H_2O vacuum is recommended.

Most ZOC designs use a critical pore-gas velocity to locate soil vapor extraction wells within a contaminated area. There are no generally accepted methods for determining the appropriate critical pore-gas velocity. The EPA (2001) conducted a comprehensive analysis of methods for determining critical pore-gas velocity based different theories related to mass transfer within the vadose

zone and ultimately used 0.01 cm/sec for a field site located in sandy Atlantic Coastal Plain sediments.

Pore-gas velocity decreases rapidly with distance from an extraction well and therefore the selection of critical pore-gas velocity has a significant impact on SVE systems designed by ZOC analysis. The use of the ZOC concept in the design of soil vapor extraction systems to remove contaminants produces a more robust system to achieve cleanup based on the current criteria commonly used for ZOI and ZOC analysis.

ZOC was used to design an SVE system for use in coastal plain sediments on the SRS. Results from the analysis showed that the radius of the ZOC for a single well operating at a flow rate of 1.14 m^3/min would be 15 m. Similarly, four wells spaced such that that the radius of the ZOC of the four wells combined equaled that of the single well required pumping at a cumulative flow rate of 1.14 m^3/min. This result is not consistent with the previously mentioned EPA (2001) study where the cumulative flow rate from the SVE system could be reduced by incorporating additional extraction wells.

Finally, an SVE system for the ABRP waste unit designed using ZOC analysis will cleanup the site approximately 15 times faster than a ZOI design. Conversely, the ZOC design will require a network of four to six wells pumping at a combined flow rate of 6.0 to 7.0 m^3/min as compared to one well pumping at a flow rate of 1.42 m^3/min.

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Contact information

Kenneth L. Dixon

Savannah River National Laboratory

773-42A

Aiken, SC 29808

kenneth.dixon@srnl.doe.gov

Ralph L. Nichols

Savannah River National Laboratory

773-42A

Aiken, SC 29808

ralph.nichols@srnl.doe.gov

Biographical sketches

Kenneth Dixon is a Principal Engineer at the Savannah River National Laboratory (SRNL) where he has conducted research related to soil and groundwater characterization and remediation for 15 years. He received B.S. and M.S. degrees in Agricultural Engineering from the University of Georgia and a M.E. degree in Civil Engineering from the University of South Carolina. His primary research interests are in pilot scale testing of innovative remedial technologies and numerical modeling of contaminant fate and transport in the vadose zone.

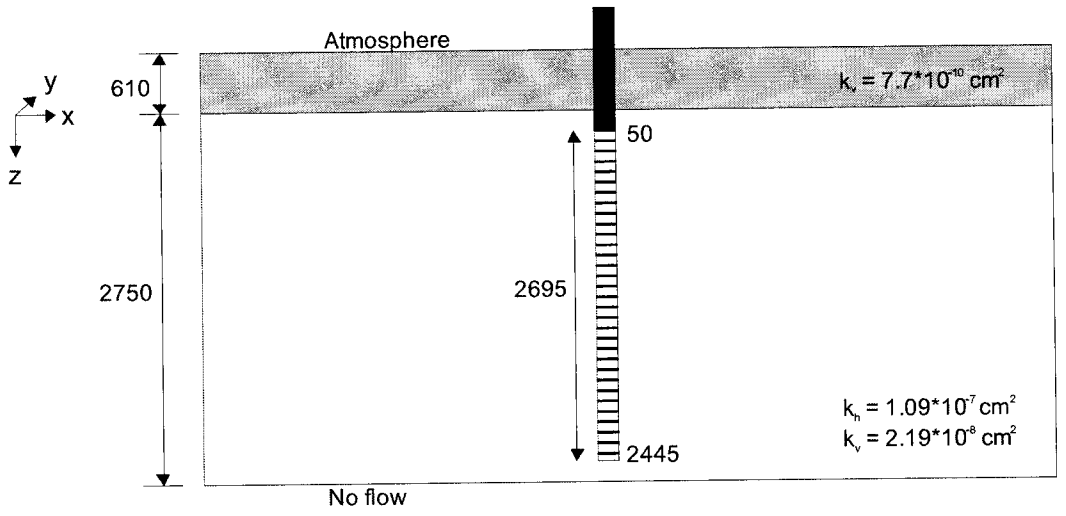
Ralph Nichols is a Fellow Engineer at the Savannah River National Laboratory (SRNL) where he has conducted research related to soil and groundwater characterization and remediation for 18 years. He received a B.S. degree in Geological Engineering from the University of Missouri-Rolla and an MS degree in Civil Engineering from the University of Oklahoma. His primary research interests are in the collection and synthesis of data from multiple scales into conceptual models that are used to develop sustainable environmental management strategies.

	T m^2/min	S	k_r (darcies)	k_z (darcies)
Minimum	0.0063	0.000023	5.2	1.0
Maximum	0.0138	0.001066	11.2	2.3
Median	0.0115	0.000289	9.4	1.9
Average	0.0112	0.000352	9.2	1.8

Dixon – Table 1

	Zone of Influence (Vacuum > 2.54 cm H_2O)		Zone of Capture (Critical Pore Gas Velocity > 0.01 cm/sec)	
Extraction Flow Rate m^3/min	Radius (m)	Pore Gas Velocity @ Edge (cm/sec)	Radius (m)	Vacuum @ Edge (cm H_2O)
1.42	56.4	0.0023	15.2	5.9
0.71	18.3	0.0041	7.6	3.9
0.28	0.0		3.0	2.0

Dixon – Table 2



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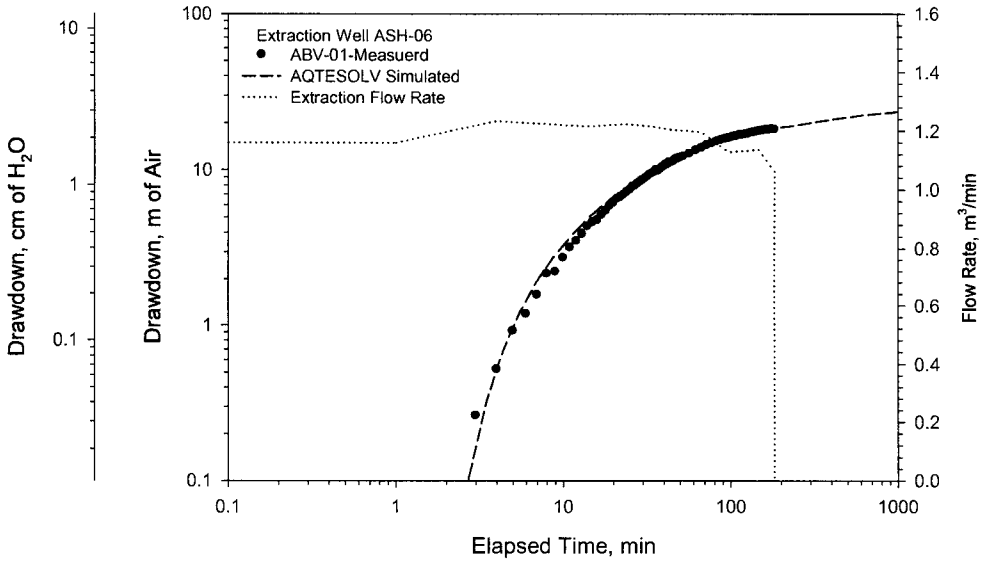

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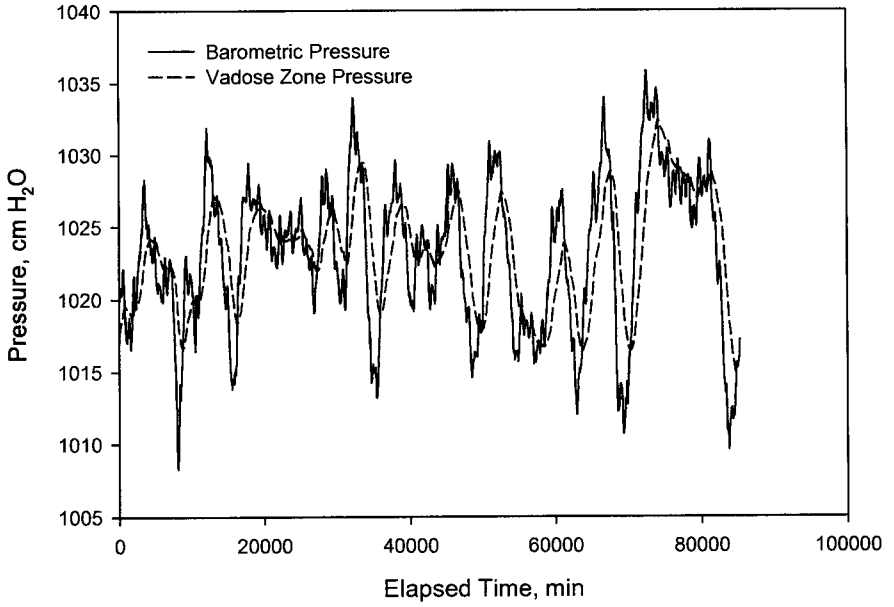

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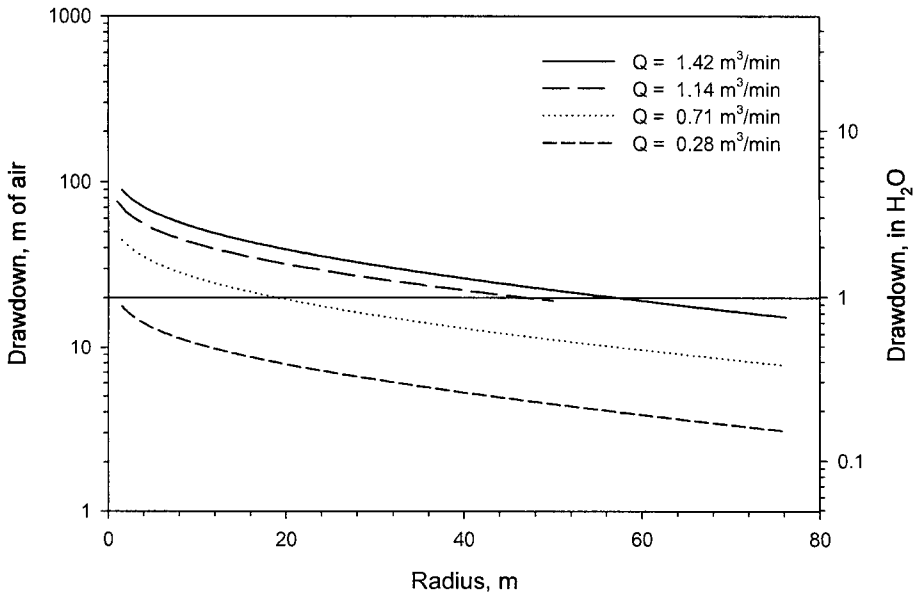

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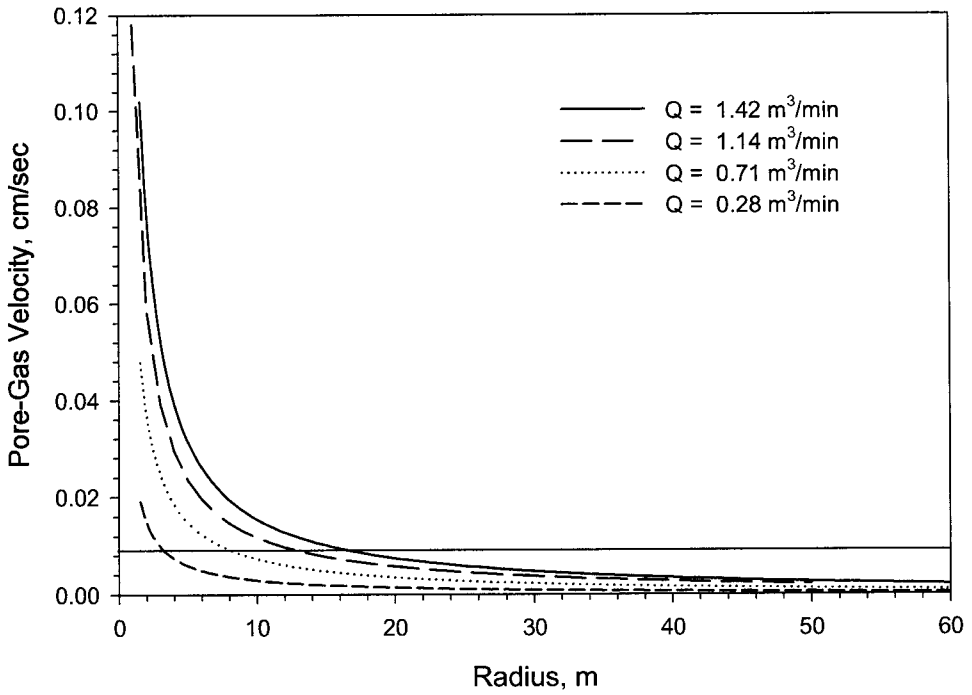

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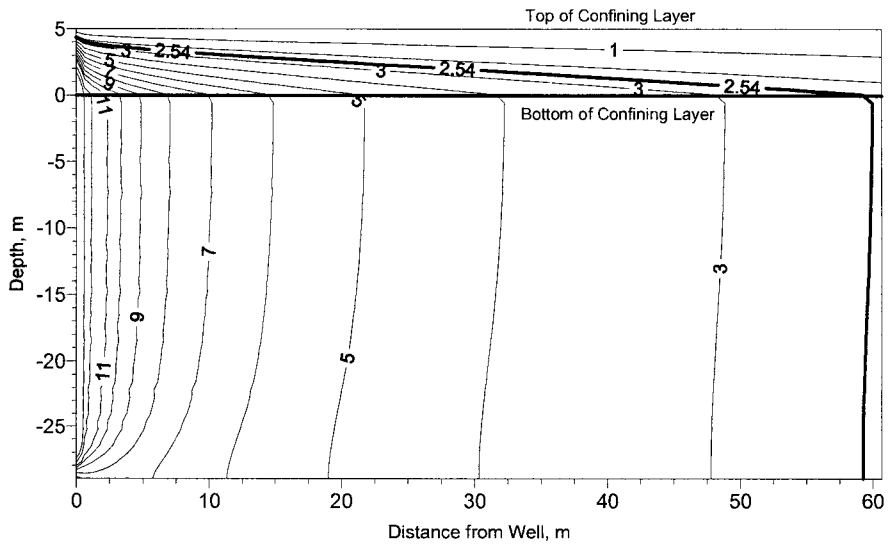

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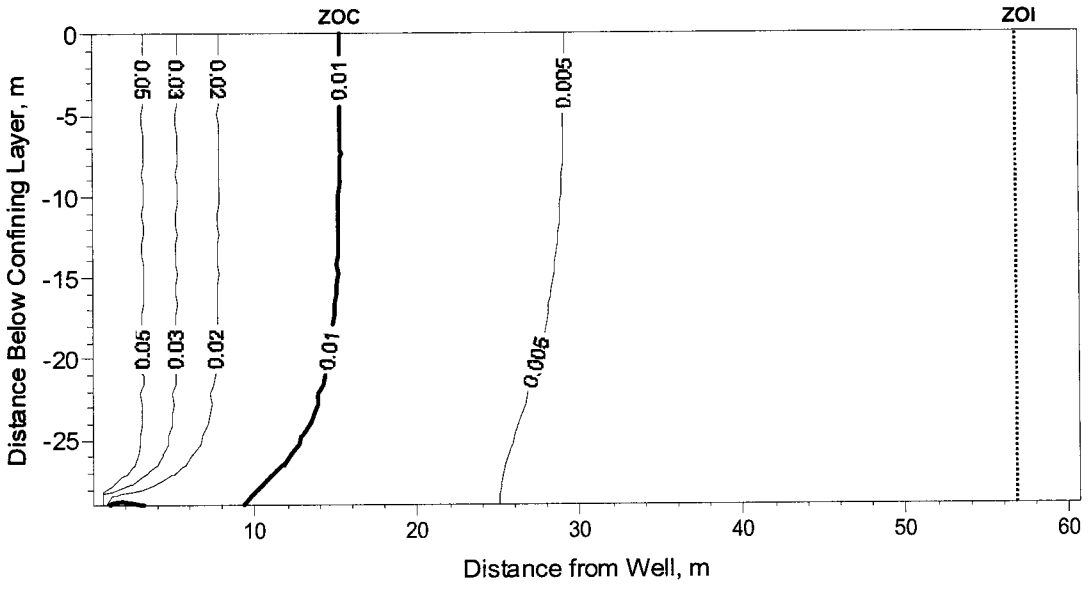

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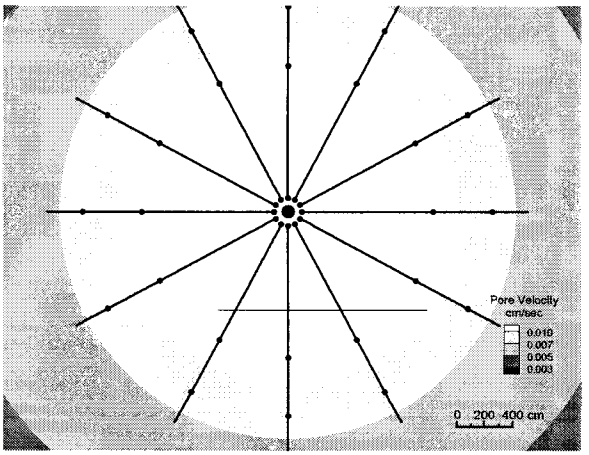

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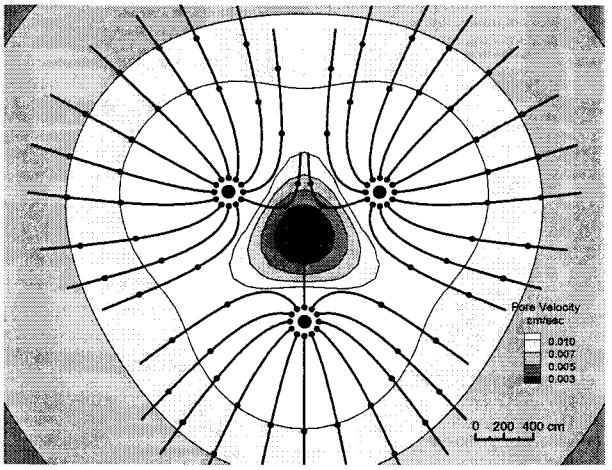

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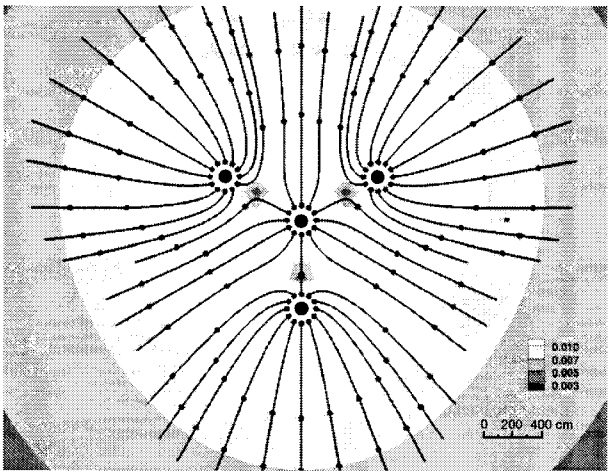

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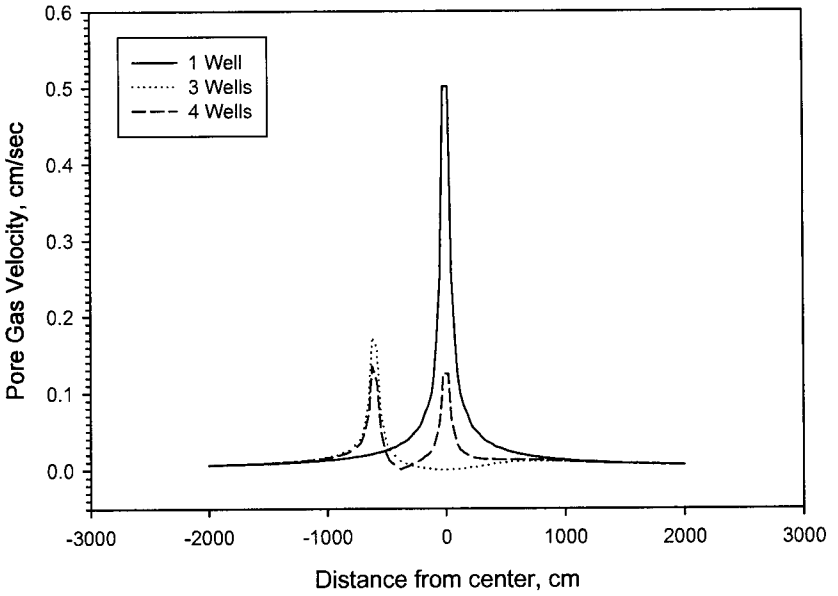
Dixon – Figure 8



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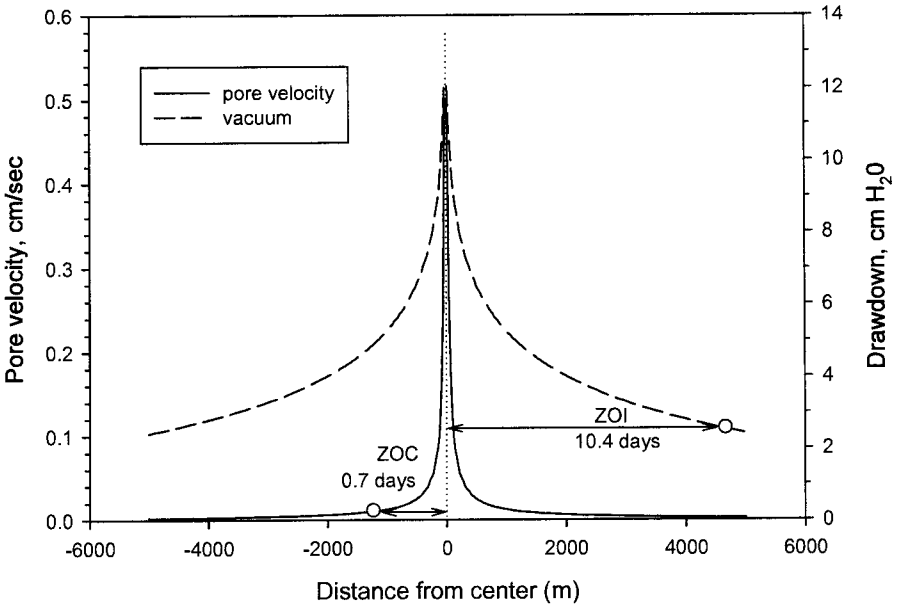
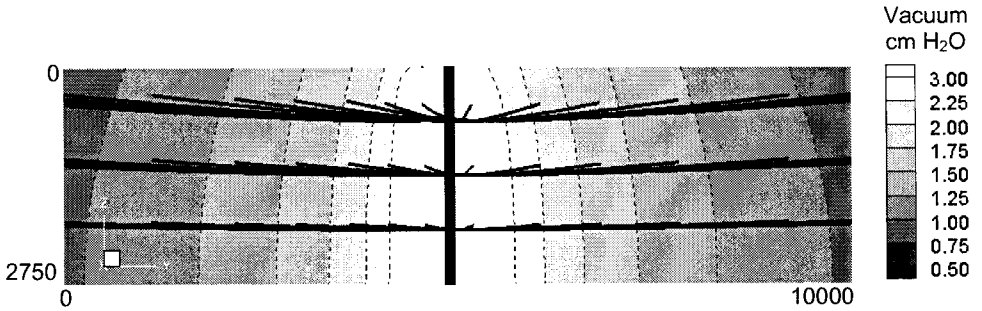


(b)

Dixon – Figure 9



Dixon – Figure 10

Table Captions

Table 1. Summary of Vadose Zone Physical Properties.

Table 2. Comparison of Vacuum Based ZOI and Pore Gas Velocity Based ZOC.

Figure Captions

Figure 1. Conceptual model and well locations for different pumping scenarios. Units = cm unless noted otherwise.

Figure 2. Transient response of vadose zone pressure to soil vapor extraction zone at the A-Area Burning Rubble Pit.

Figure 3. Response of vadose zone pressure due to fluctuations in atmospheric pressure at the A-Area Burning Rubble Pit.

Figure 4. Predicted vacuum drawdown as a function of radial distance for flow rates of 1.42, 0.71, and 0.28 m^3/min.

Figure 5. Pore-gas velocity as a function of radial distance for extraction flow rates of 1.42, 0.71, and 0.28 m^3/min.

Figure 6. Predicted steady state vacuum (cm of water) profile for extraction flow rates of 1.42 m^3/min (50 scfm).

Figure 7. Predicted pore-gas velocity (cm/sec) profile for an extraction flow rate of 1.42 m^3/min (50 scfm).

Figure 8 Pore-gas velocity (cm/sec) at the middle (z = 1350 cm) of the model domain for a single well pumping at a flow rate of 1.14 m^3/min. Markers on flow lines represent 0.5 day intervals starting 100 cm

from the well: . (a) one well scenario. (b) three well scenario, (c) four well scenario.

Figure 9. Velocity profile through the center (x = 5000) and the middle (z = 1350) of the contaminated zone: (a) for one, three, and four well cases and (b) comparison of ZOC and ZOI for a single well.

Figure 10. Vertical cross-section of model domain with four wells pumping at a total flow rate of 1.14 m^3/min (vertical exaggeration ~1).

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SECTION: 1

1.0 INTRODUCTION

A RFI Phase I investigation will be conducted at various potential release sites (PRSs) throughout Technical Areas (TAs) 16, 13 and 11 during the 1995 sampling season. The PRSs in this area are part of Field Unit #3 (FU #3) and are contained within operable unit (OU) 1082. Field activities at OU 1082 will include surface soil and sediment sampling, subsurface soil and sediment sampling, and subsurface bedrock sampling.

The objectives of this Phase I investigation are to determine what (if any) contaminants of concern (COC) are present and to identify if future investigative or corrective actions are necessary.

This field implementation plan will serve as a guide for planning and carrying out field activities. This plan consists of three fundamental parts:

- Identification, description, and schedule of samples to be taken
- Basic instructions for field workers
- Specific concerns associated with the field area and sampling in high explosive (HE) contaminated soil

2.0 FIELD ORGANIZATION AND ROLES

All field sampling operations at OU 1082 will be conducted at or near the PRSs being sampled. Most sample locations that are not within PRS boundaries will be located in an associated drainage. The site will be divided into three operational areas: the exclusion zone (EZ), (defined in Section 4.2) where samples are collected; the contamination reduction zone (CRZ), (also defined in Section 4.2) where removal of contamination from the exclusion zone is controlled; and the support zone (SZ) where site control and records are maintained. The field sampling trailer will be located in the SZ, and will contain site- specific, ER, and LANL plans and procedures as well as support equipment such as the computer, printer, and fax machine. The daily status board will be posted in the support zone and contain information on site activities for visitors and occasional workers. The bulletin board will also be located in the SZ and contain emergency and administrative infon-nation for site workers. The SZ will be stationed in a central location at the site from which all sampling activities will originate. Field team members and sampling equipment will then be transported to the EZ by a transportation cart. T'he details of the transportation cart are explained in Section 4.5.

Tailgate safety meetings for field team members entering the exclusion zone will be conducted each day by the Site Safety Officer (see Section 4.2). The Field Team Manager will report the weekly progress and status of sampling activities to the rest of the OU 1082 RFI team during field operations. The Field Team Leader will submitt a daily report (fax) of the progress and status of sampling activities to the Field Project Leader (FPL), Deputy FPL, Programmatic Project Leader (PPL), and ER Program Coordinator.

Personnel have been assigned the following roles and responsibilities but may be assigned alternate roles, provided the necessary training requirements and qualifications are met.

Filed Team Member	Role(s)	Organization
Brad Martin	Field Project Leader	LANL CST-18
Lynn Kidman	Field Team Manager	ICF KE
Peter Gram	Field Team Leader	ICF KE
Linda Fluk	Field Team Leader	ICF KE
Jim Roberts	Field Coordinator	LANL CST-18

Ken McFadden	Site Safety Officer	MK
	Health Physics Technician	
Russel Abel	Sampler	ICF KE
Kristi Beguin	Sampler	ICF KE
Ken Hansel	Sampler	ICF KE
Others		
Dave McInroy	Programmatic Project Leader	LANL EM/ER
Roy Bohn	ER Project Coordinator	LANL EM/ER

2.1 Field Team Manager

The field team manager (FTM) has overAll responsibility for the field operations, including assembling the field team and assigning responsibilities, assuring that training and health requirements are met, scheduling, and sampling according to the requirements in the RFI Work Plan. The field team manager interfaces with the Field Unit Project Leader, Project Safety Officer, Project Health Physicist, and other members of the Environmental Restoration Project Office, as may be necessary.

2.2 Field Team Leader

The field team leader (FTL) is responsible for implementing the RFI Work Plan in the field, and directs and oversees all field work operations and field personnel. Sampling locations, types, numbers, labels, and holding times are implemented by the FTL, according to the RFI Work Plan and other requirements. The FTL also ensures that all safety and health, sampling, decontamination, and disposal procedures are followed, and implements the emergency response procedures. In addition, the FTL is responsible for implementing the guidance and direction provided by the field team manager.

The FTL defines the exclusion and decontamination zone locations, and directs the setup and cleanup of the decontamination zone; arranges for All required equipment to be available on site; sets the daily schedule and optin-dzes the use of the field team members; oversees the sampling; and directs the preparation of labels and Chain-of-Custody forms.

After sampling, and the completion of appropriate paperwork, the FTL oversees the packaging of samples in coolers with packing material and ice. The Chain-of-Custody forms with the corresponding samples are placed in the coolers and transported to the mobile chen-dcal laboratory on site for HE analysis. All samples that are deemed to be suitable for transport will then be delivered to CST-3. All heterogenous contaminated HE samples will be handled by DX- 16 for HE chemical analysis and HE extraction before being sent to CST-3. Any samples that test positive for HE will not be sent to CST-3. For details of the FU #3 analytical process and decision criteria, please refer to Section 4.4. After the CST-3 representative accepts the samples, custody of the samples is transferred to the CST-3 representative, as directed by the FTL.

The FTL must ensure that all records are conipietecl for the Records Processing Facility. Necessary records include the Daily Activity Logs, Sample Collection Logs, Chain-of-custody forms, and any other records that are identified in the SOPs, and are used in the sampling activities. Discrepancies from documents and procedures are documented in the Daily Activity Log by the FTL. After the records are completed, the FTL ensures that the proper format for submitting the records to the Records Processing Facility is followed and that the records are fon-nally submitted to the Facility.

2.3 Health Physics Technician

The health physics technician (HPT) monitors the area, the equipment and personnel that come within radiation or a suspect radiation area. T'he monitoring ensures that personnel are not exposed to radiation levels that are above the limits set in the Site-Specific Health and Safety Plan (SSHASP), and also ensures that if contamination is present, the contamination is not spread outside the contaminated area.

The HPT conducts a field survey of the area before sample markers are set. During sampling the HPT monitors each sample location before samples are collected. All screening results are recorded, either in the Daily Activity Log or in the Sample Collection Log.

When the sample team returns to the SZ from a suspect radiation area, the HPT monitors each team member, each sample, and each piece of equipment used in the field. This monitoring is performed after decontamination. The monitoring results can assist the FTL to make decisions regarding the safety of the site, the health of the workers, the decontamination of equipment and personnel, and handling of the waste.

2.4 Site Safety Officer

The site safety officer (SSO) is responsible for the health and safety of field team members during sampling activities. He or she prepares the SSHASP, or otherwise becomes familiar with the contents. The SSHASP provides safety measures for handling the potential contaminants that could be a threat to personnel, and for the physical conditions and activities of fieldwork. Personal protective equipment (PPE) is established in the health and safety plan, and if the SSO has reason to change the established PPE, he or she initiates a Change Order Control.

On site, the SSO provides a health and safety oversight for the field team members, and ensures that all present are following safety procedures. The SSO inspects the area and all equipment. The SSO also maintains the list of telephone numbers to be used in emergencies, and provides safety requirements and briefing for visitors to the site.

The SSO presents a "Tailgate" safety meeting daily. The safety meeting familiarizes the team with conditions of the area, possible contaminants encountered, and weather conditions. The meeting serves as a reminder of inherent safety problems, and how to conduct activities safely.The meeting is documented and each field team member must sign the attendance sheet. The SSO also briefs visitors on health and safety issues and ensures their compliance with the SSHASP.

2.5 Sampler

Samplers are responsible for donning required personal protective clothing, entering the EZ, and collecting the samples as directed by the FFL and according to applicable procedures. Samplers are responsible for following directives given by the FTL and the SSO.

Activities conducted by the samplers include: collecting the samples, monitoring the area for non-radiological hazards, recording All the information required in the dedicated field notebook and/or the sample collection log forms. After returning to the SZ, the samplers must strictly follow decontamination procedures, including field monitoring before and after the decontamination process, if required.

3.0 IDENTIFICATION, DESCRIPTION, AND SCHEDULE OF SAMPLES

Sampling will be conducted at OU 1082 from April 17 through October 1, 1995, for the PRSs listed below. All screening, sample locations, techniques, and sample analysis will confrom to the 1082 RFI Work Plan, except where modifications prove necessary. Any pre-sampling modifications to RFI prescribed sample locations or sample decisions are explained in Section 3.1. The sampling activities initiate the Phase I sampling at OU 1082.

FY 1995 sampling activities have been divided into eight sample groups (SG 1-8), based on RFI Work Plan priority and geographic proximity. These eight sample groups include PRSs from the RFI Work Plan Aggregates 5.2, 5.3, 5.4, 5.5, 5.6, 5.8, 5.12, and 5.16. The PRSs and their sample descriptions are outlined in this document on an aggregate basis for reasons of similarity between PRSs in each aggregate. The sample schedule is presented in terms of Sample Groups because the Sample Groups designate the sampling schedule.

Daily sample schedules presented in Appendix A include PRS numbers, sample numbers, site identification numbers, sample identification numbers (AAC #s), analyte suites, sample matrices, and container types for each sampling day and sampling technique. Appendix B contains a base map, which locates All PRSs to be sampled, the surveyed coordinates of fixed laboratory sample locations, and the heterogenous HE contaminated PRSS. Approximately 10-20 samples will be collected per day. Samples will be analyzed for various parameters and will be placed in specified containers. All necessary containers will be pre-arranged for the field samplers.

Each site will be discussed below in terms of a brief background, potential contaminants of concern (PCOC), and a description of the PRSs to be investigated. Detailed descriptions of each PRS are presented in the RFI Work Plan which will be available at the field site SZ if more information is needed. More detailed description of the sampling techniques is in Section 4.1.2 and a list of PRSs by sample group is in Appendix A.

3.1 Sample Collection Modifications

All of the samples outlined in these aggregates have been determined by sampling plans and DQOs from the RFI work plan. The sampling plan was then modified with estimates of the number of additional samples from positive results of screening that would be required for laboratory analysis.

EPA has approved sample modifications for the core holes at Aggregate 5.2 sumps, outfalls, and first down drainage sediment traps. Only two sumps and two troughs will be sampled at PRS 16-003(k) for FY 1995, and only one sump at TA- 16-302. The remainder of the sumps will be sampled in future fiscal years and would be contingent on FY 1995 results. At the 5.2 outfalls and sediment trap drill holes only two samples will be collected at 0-6 inches or the soil/ tuff interface and at the bottom of the hole. EPA has also approved modifications for sampling in PRSs 11-0 12(a) and 11-012(b). Four core holes will be hand augered in each PRS and field screened at 6 inch intervals. All positive hits will be submitted for analysis and if there are no positive hits one laboratory sample will be selected randomly.

The density of the screening grid in the 16-021 (c) drainage has also been modified for the field effort. Transects that do not include fixed laboratory samples will not be screened. Screening conducted on transacts with fixed laboratory analysis provide adequate information for future sampling or actions. Screening and laboratory samples are designed to bound the lateral and down drainage extent of contamination and identify any other PCOCS. The density of laboratory samples and screening locations associated with the fixed samples satisfies the goal of Phase I sampling. Eliminating transacts without fixed sample locations will not lin-dt knowledge of extent but will save time and expense.

3.2 Aggregate 5.2

Aggregate 5.2 consists of HE sumps, HE outfalls, and HE outfall drainages. There are both active and inactive sumps/ outfalls in this aggregate. The knowledge of amount and extent of contamination varies between the PRSs, but All PRSs in this aggregate have known HE contamination.

The primary goal of Phase I sampling is to determine extent of contamination by delineating the HE contamination in the drainages and associated sumps. If the outfall at PRS 16- 003(d) is found to be contaminated by HE screen results then one sump at PRS 16-003(e) will be sampled by two vertical drill holes: one near the sump/ trough joint and one down gradient from the sump. The sample locations are biased to these positions due to the potential for leaks and contaminant migration in these areas.

The outfalls and drainages will be sampled in the center of the drainage since it is unlikely that contaminants have migrated upslope out of the well defined drainages. HE screen locations will commence at the outfall at 10 foot intervals until the first negative test. At this location a 0-6 in. sample will be sent for laboratory analysis. Two more 0-6 in. laboratory samples will be taken at 20 foot intervals down drainage. From the third laboratory sample, screening will continue down drainage at 40 foot intervals until 500 feet from the outfafl. Two 0-6 in. samples will be selected from this region based on the geomorphic survey, HE screening, or the radiation survey.

All core holes will extend 2.5 feet into bedrock to evaluate contaminant movement into subsurface soil and tuff. The 0-6 in. interval and the deepest interval (or 6 in.bracketing soil/tuff interface) of each core will be sent for laboratory analysis.

The potential contaminants of concern (PCOCs) for Aggregate 5.2 include HE, rad, metals, sernivolatiles, VOA, and cyanide.

PRSs within Aggregate 5.2 include:

- 16-001(e): dry well; sample plan of 1 core hole
- 16-003(a): sump/outfall; sample plan of 2 core holes, 5 surface
- 16-003(b): sump/ outfall; sample plan of 2 core holes, 5 surface
- 16-003(d): sump/ outfall; sample plan of 2 core holes, 5 surface
- 16-003(e): sump; sample plan of 2 core holes
- 16-030(d): outfall; sample plan of 2 core holes, 5 surface
- 16-003(i): sump/ outfall; 6ani,,ole plan of 2 core holes, 5 surface
- 16-003(j): sump/ outfall: sample plan of 2 core fioles, 5 si.ifface
- 16-030(h): outfall; sample plan of 2 core holes, 5 surface
- 16-030(g): outfall; sample plan of 2 core holes, 5 surface
- 16-026(b): outfall; sample plan of 2 core holes, 5 surface
- 16-026(c): outfall; sample plan of 2 core holes, 5 surface
- 16-026(d): outfall; sample plan of 2 core holes, 5 surface
- 16-026(e): outfall; sample plan of 2 core holes, 5 surface
- 16-026(h2): outfall; sample plan of 2 core holes, 5 surface
- 16-02602): outfall; sample plan of 2 core holes, 5 surface
- 16-026(v): outfall; sample plan of 2 core holes, 5 surface
- 16-003(n): sump/ outfall; sample plan of 2 core holes, 5 surface
- 16-003(o): sump/ outfall; sample plan of 2 core holes, 5 surface
- 16-029(g): sump/ outfall; sample plan of 2 core holes, 5 surface

3.3 Aggregate 5.3

Active HE sumps, an active HE outfall, and an active HE outfall drainage associated with building 260 comprise aggregate 5.3. Historical and present HE contamination is well established for the sumps and

the outfall drainage in this aggregate, but extent of contamination is not as well known.

The primary goal of the RFI sampling plan is to determine the extent of HE contamination beneath the sumps and to identify other PCOCs present. This will be accomplished by four biased core holes adjacent to the primary sump/ trough joint and down gradient from the

two sumps being investigated. The intersection, where the trough leading to the outfall joins the sump, is suggested to be the most likely location for PCOCs. The cores will extend 3 feet into tuff to investigate potential subsurface contamination. The cores will be screened at 6 inch intervals with the deepest and shallowest HE positive intervals submitted for analysis or only the deepest interval if HE screens are negative. If the deepest interval is positive continue coring, screening, and sampling at 2 foot intervals until a clean zone is attained. The maximum depth of the cores will be 20 feet. Three cores will be drilled to investigate subsurface contamination beneath the main and secondary sump feeder troughs. If no preferential locations can be determined by field observations and tests for trough leaks then the cores will be biased to the following locations:

40 feet down the main feeder trough the joint between the main trough and the two secondary troughs

The cores will extend 3 feet into tuff with HE screening at 6 inch intervals. The shallowest and deepest positvie intervals will be sent for analysis. In the absence of positive screening send only the deepest interval and if the deepest interval is positive continue coring, screening, and sampling at 2 foot intervals until a clean zone is amained. The maximum depth of the cores will be 20 feet.

A grid sampling plan for 16-021(c) has been developed and will be screened for HE and organics (PID). The primary goals for Phase I sampling is determination of the extent of contamination in the upper part of the drainage and reconnaissance in the lower part of the drainage. A radiation survey will be conducted in the grid until 100 feet from the outfall (see Section 3.12). The grid will attempt to bound'the extent of contamination to within the drainage by sampling in the center and edges of the drainage. Sampling will extend to Canon de Valle because of the known contamanation present in the entire drainage. There are 11 0-6 in. surface sample locations in the center of the drainage at 20 foot intervals (including the outfall) for 200 feet, 14 samples bracketing the center at 100 foot intervals (including the outfall), and 6 center drainage samples at 60 foot intervals commencing at 200 feet from the outfall. Three soil/tuff samples will be selected from the above locations based on the three highest PID readings or at random in the absence of PID readings.

PCOCs for Aggregate 5.3 include HE, rad, metals, semivolatiles, and cyanide.

PRSs to be sampled in this aggregate are:

- 16-003(k): sumps; sample plan of 6 core holes
- 16-02 1 (c): outfafl; sample plan of 17 hand Auger holes, 14 surface samples

3.4 Aggregate 5.4

Aggregate 5.4 consists of the TA- 16 and TA- 13 septic system PRSs. All of the septic systems are still active except for PRS 13-003(b). The level and extent of contamination for these PRSs is unknown

Phase I sampling concentrates on determining levels of PCOCs in the septic systems. The RFI sampling plan is designed to sample the expected PCOC accumulation areas of the drain lines and outfalls. The outfalls and proximal/ distal ends of the drain lines win be sampled. These samples are biased to specified locations because contaminants should concentrate in these areas based on the design of the septic systems.

All core holes will extend 2.5 feet into bedrock to evaluate contaminant movement into subsurface soil and tuff. Screening at 6 inch intervals for HE, radiation, organics, and metals will determine the two intervals of each core that will be submitted for analysis. In the absence of positive screen results submit 6 inches bracketing the drain line interval and 6 inches bracketing the soil/tuff interface. The hand auger core at septic system outfalls will have two samples sent for analysis: 0-6 in. and the soil/tuff interface. There will also be two surface samples 2.5 feet and 5.0 feet down drainage from the outfall.

The PCOCs for Aggregate 5.4 include HE, rad, metals, semivolatiles, VOA, and cyanide,

The PRSs to be sampled in this group are:

- 16-006(c): sample plan of 2 core holes, 2 hand auger holes, 2 surface
- 16-006(d): sample plan of 3 core holes
- 16-006(e): sample plan of 2 core holes, 2 hand auger holes, 2 surface
- 13-003(b): sample plan of 3 core holes

3.5 Aggregate 5.5

This aggregate contains one PRS: 16-021 (a). This PRS is an outfall that served a materials testing laboratory and the level of contaminants is unknown. The outfall is considered to have no HE contamination and has no well-defined drainage, indicating low discharge. The sampling plan is designed for reconnaissance data.

The sampling is biased to the outfall mouth and 5 feet down gradient where low discharge should concentrate COCs. The two holes will be augered to bedrock to investigate potential subsurface soiul contamination with samples at 0-6 in. and soil/tuff interface if there is more than 6 inches of soil present.

Sample Group 4 PCOC include metals, semivolitales, VOA, and cyanide

- 16-021(a) laboratory outfall: sample plan of 2 hand auger holes

3.6 Aggregate 5.6

Aggregate 5.6 consists of PRS 16-020. It is the outfall and drainage for the photoprocessing facility. The level of surface contaminants is documented from previous studies for the upper part of the drainage. The goal of the reconnaissance sampling is to determine if contamination exceeds acceptable risk levels.

The placement of four 5 foot augered cores is based on the highest silver concentrations gathered in previous studies. The hand augered cores are at 25 foot intervals starting 25 feet from the outfall. auger cores will be bored up to 5 feet or the soil/ tuff interface at the outfall, 492 feet down drainage, and 738 feet down drainage to investigate potential saturation-induced subsurface flow. Surface samples at the drainage high water marks are biased to bound the migration of contamination in the lateral direction.

The 6 inch interval above the clay-rich interval and the soil/tuff interface in the cores at 492 and 738 feet from the outfall will be sent for analysis. The other five auger cores will send samples from the 6 inch, 3 foot, and 5 foot horizons. The six surface samples bracket the outfall, the 492 foot sample location, and the 738 foot sample location.

The primary PCOCs for this aggregate are metals and cyanide. Analysis will also include moisture content in selected samples.

- 16-020: photoprocessing facility; sample plan of seven hand Auger holes, six surface

3.7 Aggregate 5.8

Aggregate 5.8 contains the PRSs associated with the TA-16 burning ground and the fon-ner Ba-nitrate pile at Area P landfill. The PRSs to be sampled consist of surface and subsurface investigation of contamination from the basket wash facility troughs, a decommissioned flash pad, a filter vessel, the former Ba-nitrate pile, and off-site migration from the burning ground and the Ba-nitrate pile.

The sampling strategy for the Ba-nitrate contan-dnation at PRSs 16-0 1 0(a) and 16-016(C) is based on well-known levels of contaminants and is designed to ascertain the nature of extent of the contamination. 'Me drainage sampling for off-site migration accounts for possible contaminants from the adjacent landfill and only samples 10 feet from the drainage center because contaminants are unlikely to migrate upstope and out of the drainage. The burning ground PRSs sample locations are either randomized or biased to expected areas of contaniinant release or accumulation. The goal of Phase I sampling for the burning ground PRSs is to determine if contaniinant levels are above SALS.

The PCOCs for Area P and the burning ground are: HE, rad, metals (Ba), semivolatiles VOA, and cyanide.

The PRSs in this aggregate and sample selection conditions are listed below

- 16-010(a): Ba-aitrate location; minimum of 3 hand auger samples biased in grid by the highest Ba screen values and up to 10 additional samples that screen positive for HE or rad

- 16-010(h): basket wash facility; two 0-6 in. samples biased by Ba screens > SALs or positive HE screens, a third sample at cement pad run-off discharge point, and three soil/tuff interface (or 3 feet) samples one each at the three surface locations.

- 16-0 10(i): filter pad; two 0-6 in. samples biased by highest rad survey results and one 0-6 in. sample in the center of the pad, one soil/tuff interface (or 3 feet) sample at each filter pad location, one 0-6 in. sample at the pad outfall, one 14 in. sample at pad outfall, one 14-16 in. sample 12 inches up and down gradient from the outfall, and four 0-6 in. samples in the drainage at 50 foot intervals starting 2 feet from outfall.

- 16-010(k), 16-003(l), 16-003(m): steel trough; maximum of ten samples and minimum of three samples for analysis if positive for HE, if less than 3 samples are positive for HE select up to three positive Ba samples for analysis.

- 16-010(n): former steel trough; maximum of ten samples and minimum of three samples for analysis if positive for HE, if less than 3 samples are positive for HE select up to three positive Ba samples for analysis. Any samples that screen positive for radiation (above background) will also be submitted for analysis.

- 16-016(c): Ba-nitrate drainage; three surface samples will be selected for analysis biased to an observed stain and the two highest Ba readings, five surface locations positioned on the grid will be sent for analysis based on the five highest Ba screening values, if any of the five Ba values are >SALs then a 2 foot interval win be sampled for analysis, if the interval at 2 feet >SALs then a 5 foot interval will be sent, and up to ten additional samples will be sent where there is positive HE or radiation screens. Seven surface samples will be collected at 30 foot intervals and the three highest Ba values will have a sample from 2 feet sent for analysis.

- 16-S. drainage: offsite migration; Five surface samples of sediment traps will be selected at random, any sample that screens positive for HE, and three soil/tuff interface samples with the highest Ba levels will be subn-dtted for analysis.

- 16-010(i), 16-010(k), 16-010(l), 16-010(m), and 16-010(n): At seven HE positive surface

sample locations within these PRSS, an 18 in. (or soil/tuff interface) sample will be collected for laboratory analysis. If less than seven surface sample locations are HE positive, chose the remainder at random. If more than seven surface sample locations are He positive, select the locations farthest downstope from building 390.

3.8 Aggregate 5.12

PRS 16-007(a) is the only SWMU being sampled from this aggregate in FY 1995. This PRS consists of four former HE holding ponds that were decommissioned and backfilled in 1960. HE contamination is considered to be potentially high in this region.

The sampling strategy for PRS 16-007(a) specifies three 15-foot core holes per pond that are to be randomly selected. Random sampling for this PRS was selected because the nature of the originally contaminated medium of the four ponds precludes any preferential contaminated areas. The contamination should be evenly displaced across the area of the former ponds. Reconnaissance sampling is designed to determine if contaminants are present at levels exceeding SALS.

A total of 12 intervals will be screened for HE and PID in each core hole. The following 6 inch intervals of each core hole will be screened: the surface, 3 feet, 5 feet, 7 feet, 13 feet, and at the bottom of the hole (15 feet). Also the segments bracketing the bottom of the ponds will be screened. Three samples from each pond will be submitted for laboratory analysis: the shallowest HE positive interval, the deepest HE positive interval, and the interval 2 feet deeper than the deep positive interval. If there are no positive intervals in a pond then one sample will be chosen from the interval bracketing the bottom of the pond in all three cores. If a single interval in a pond is postive, send the interval, the interval 2 feet deeper, and the same horizon from the nearest core. If the deepest interval in any core hole screens positive, then drilling and screening will continue at 2 foot segments until a clean zone is delineated. Maximum depth of the holes will be 20 feet.

T'he PCOCs for 16-007(a) are HE, rad, metals, seniivolatiles, and VOA,

- 16-007(a): former HE ponds; sample plan of 3 core holes/ pond

3.9 Aggregate 5.16

Only three PRSs from this aggregate are scheduled for sampling during the 1995 field season. They consist of the locations of two former HE magazines and a former firing pit. The levels of contaminants are unknown for all three PRSs. However, contaminant levels are predicted to be low for the former HE magazine sites since they were destroyed by burning and the ash debris was removed.

The sampling strategy for all three PRSs requires four sample locations in the center of each quadrant of each PRS and is for reconnaissance purposes. The sample locations will be bored to a depth of 18 inches for 11-012(a) and (b) because decontamination and destruction operations have redistributed surface contamination into the subsurface soil. The quadrant sampling plan was instituted due to the small area of each PRS (biasing by screening is less efficient) and the probability of detecting contamination with this strategy. The hand auger holes for 11-001(c) will be bored to 3 feet or bedrock. Samples win be collected at 0-6 inches and the soil/ tuff interface (or bottom of hole) for PRS 11 -001 (c). Screening for HE at 6 inch intervals will determine which intervals are sent for analysis at PRSs 11-012(a,b). All positive hits will be sent for analysis and in the absence of positive hits select one sample at random from the PRS for laboratory analysis.

The PCOCs for these three PRSs are: HE, rad, mews, and sernivolatiles.

The PRSs are described below:

- 11-001(c): former firing pit; 4 hand auger holes
- 11-0 12(a) and I I -0 12(b): fon-ner HE magazine; 4 hand auger holes

3.10 Aggregate 5.30

Aggregate 5.30 consists of PRS 16-005(g) and is located at the burning ground. Reconnaissance sampling is designed to detect subsurface soil contamination associated with the filter tank, TA- 16-406.

One 30' angled core hole passing three feet under the center of the filter tank will be screened for Ba and HE at 6 inch intervals. If there are multiple positive hits (HE present,, Ba twice background) then send the shallowest and deepest positive intervals for analysis, If the deepest HE-positive interval is not included then send the deepest HE-positive interval also. In the absence of positive sceening results send only the deepest interval.

The PCOCs for 16-005(g) are: HE, metals, sernivolatiles, and VOA

- 16-005(g): filter tank; sample plan of core hole.

3.11 VCAs and ECs

Voluntary clean-up of five PRSs will be preformed during the FY 1995 field season at OU 1082. Voluntary corrective action (VCA) will be conducted for PRSs 16-011, 16-016(b) 16-016(d), and 16-016(f). An expeditied clean-up (EC) will be performed for PRS 16- 034(p).

The VCAs will be conducted due to the nature of the contamination at the PRSs. The contamination is well known, clean-up options are evident and the clean-up can be easily and inexpensively implemented. Removal and proper disposal of the contaminated material is the primary goal of the VCAS. Confirmatory sampling will assure that the clean-up was successful and that the VCAs are a final solution for the these PRSs.

The EC preformed at PRS 16-034(p) is designed to remove and dispose of the incinerated debris associated with PRS 16-011. Clean-up can be easily and inexpensively implemented and removal of the immenent hazard Allows for soil sampling at the PRS. The objective of the subsurface sampling accompanying the clean-up is to determine the levels of polycyclic aromatic hydrocarbons (PAHs), HE, and metals in the debris and associated soil. Verifcation of clean-up is another goal of the subsurface sampling.

3.11.1 Implementation of the VCAs

This section describes the clean-up activities for the VCAs and the EC. The description includes verification sampling.

PRS 16-01 1: A VCA will be implemented for the incinerator cage. The focus of the action will be on removal and disposal of the cage itself. Nine locations on the cage will be swiped for HE: on each vertical surface, on each horizontal surface, and two swipes on the sloped side of the cage. A small section of the cage will be removed for analysis of PAHs by the immunoassay method. The cage will be screened for radiation and removed for disposal at TA-54. If the cage is HE contaminated it will be flashed at the TA-16 burning ground for removal of HE prior to disposal at TA-54. No hazardous or radioactive wastes are expected to be generated during this operation.

PRS 16-016(b): A VCA will be implemented for the disposal area outside the TA- 16 HE region. Excavation of the soil in this PRS will be conducted using a back hoe and hand held tools. (NOTE: Restrictions may apply to use of the back hoe and the hand held tools. Approval for use of this equipment will have to be obtained from safety personnel in the ESA-WMA group). The excavation will be based on HE screening of twenty field- randomized locations in and around the debris and will produce 20 cubic yards of material. Positive HE readings will also guide the placement of the three subsurface samples (0-6 inches) collected in the PRS for laboratory analysis of HE and metals. In the absence of positive readings the samples will be selected randomly. No hazardous or radioactive wastes are expected to be generated during this operation. However, if waste is suspected to be contaminated it will be stored in the <90 Day storage area associated with the FY 95 Phase I sampling effort pending analysis results. If hazardous TCLP sampling win be preformed on each drum. If not contaminated, the soil will be used for fill at PRS 16- 034(p).

PRS 16-016(d): A VCA will be implemented for the debris area within the TA- 16 HE region. Excavation will be preformed using non-sparking hand held tools and waste volumes will be less than one cubic yard. All removed material will be screened for HE and radiation. One randomly selected surface soil sample (0-6 inches) will be collected within the PRS and submitted for laboratory analysis of metals. No hazardous or radioactive wastes are expected to be generated during this operation.

PRS 16-016(f): A VCA will be implemented for the debris area near building TA- 16-360 in the HE region. The clean-up will focus on the friable asbestos component of the wastes. All other debris does not pose a human health risk. Trained personnel will remove the asbestos and disposal will follow the LANL Waste Management Plan (WMP). Air monitoring will be used during the clean-up to ensure the levels of airborne asbestos are below OSHA standards. All removed material will be screened for HE and radiation and the radiation results will be used to determine the appropriate disposal for the debris. The removal will be complete when the field team leader determines that the asbestos has been entirely removed. Four surface samples (0-6 inches) will be collected at even spaced intervals horizontally across the PRS area and used for verification.

3.11.2 Implementation of the EC

PRS 16-034(p) is the OU 1082 EC being conducted for the upcoming field season. It is the basement for TA-16-41 and housed the incinerator while the incinerator was active.

The implementation of this clean-up will occur in three phases. The first phase will be the removal of the incinerated debris, screening for HE, PAHS, and radiation. If the material is HE contaminated, the soil will be flashed at the burning ground prior to removal for TA-54. The second phase involves sampling of the soil in the incinerator pit. Nine screening locations for HE and PAHs will be randomly selected within the pit. Four subsurface samples (24 inches) will be collected in the four screening locations that are positive. In the absence of four positive hits choose the remainder of the samples randomly. If more than four locations screen positive than select samples for analysis randomly from the positive samples. The third phase involves removing the foundation for TA- 16-4 1. The concrete will be screened for HE and PAHs before removal. No hazardous or radioactive wastes are expected to be generated during this operation.

3.12 Geophysical Surveys

A Pilot Study will be performed at OU 1122 to test geophysical method(s) and their rate of success for locating subsurface features. The results of this study will be interpreted and the appropriate method(s) will be implemented at OU 1082 for the 1995 field season.

The objective of the pilot study at the Main Site (TA-33) drainfield in OU 1122 is to perform various types of shallow geophysical methodologies over the known drainfield and to determine which method(s) (if any) offer the most success for locating and delineating the drainfield and possibly the drainfield tiles. Although the study may yield positive results, there are still limitations to geophysical technologies used for this purpose such as interference from subsurface utilities.

It is estimated that the field survey will take approximately I to 2 days. Each data set will be reduced and coffelations with the known location of each drainfield pipeline will be made. A technical effectiveness evaluation and summary repom including cost-effective considerations, will be competed within two days of the field study. The results and recommendations will be used to begin geophysical survey work at OU 1082 immediately following the completion of the pilot study.

The following sections outline the goals of the study and the techniques that will be tested, T'he following sections also list and describe the PRSs in OU 1082 that will require a geophysical survey.

3.12.1 Geophysical Survey Plan

It is proposed that ICF Kaiser perform a number of geophysical test surveys over the Main Site drainfield. The methods proposed include: impulse ground penetrating radar (GPR) and continuous pulse GPR with various antenna frequencies; gradiometry (maximum sensitivity); self-potential; gradiometry; and shallow electromagnetics (horizontal and vertical dipole with various boom orientations). For each method, at least two traverses will be performed over the known drainfield. By conducting a limited test survey the proper geophysical method and field approach may be outlined for future use at many locations, including OU 1082.

Electromagnetic induction (EM-3 1) data will be obtained at 2.5 foot intervals along at least three traverses, perpendicular to the trend of the drain tiles, over the known drainfield. Terrain conductivity data will be obtained with two boom orientations and two dipole orientations at each measurement location. Both horizontal dipole and vertical dipole data will be obtained. Since terrain conductivity values are sensitive to the orientation of the boom with respect to the drainfield tiles, the difference between the data sets from two orientations will be computed. A map of the difference between the data sets from each orientation will be generated.

Continuous pulse GPR and impulse GPR techniques will be utilized along the same three traverses that were utilized for the EM survey. Both 50OMhz and 30OMhz antennas will be used. Stacidng procedures will be used for the impulse GPR method, which will greatly increase the signal to noise ratio, and possibly detect subtle objects ae the clay drain pipes. Measurement locations will be closely spaced (1-2 feet) so as to delineate objects in the clay pipe diameter range.

A magnetic gradiometer will be utilized along the same three traverses as described above, The magnetic sensors will be separated at a maximum distance so as to achieve the maximum sensitivity of the instrument Although this configuration is rarely used in gradiometry, the increased sensitivity may be successful at delineating subtle targets like clay drain tile pipes. Measurements will be obtained at 2.5 foot intervals.

Self-potential traverses will also be performed along the same three traverses. Measurements will be obtained at 2.5 foot intervals along the traverses. The base electrode will be located at the beginning of each traverse.

3.12.2 Geophysical Survey at OU 1082

Geophysical surveys at OU 1082 will be conducted using the method(s) selected ftom the OU 1122 Pilot Study outlined above. The selected method(s) will be outlined in the summary report that will be completed within two days of the completion of the Pilot Study.

The objective of the surveys is to locate subsurface features that defme the placement of Phase I sample locations. All of the surveys will attempt to locate septic system drain lines and buried outfall pipes. For these PRSs the expected areas of contamination are closely related to the drain lines and outfalls, therefore the reconaissance sampling is contingent on locating these buried features.

The PRSs that require a Geophysical Survey are presented below in the order they will be surveyed and sampled:

- PRS 16-030(d): outfall pipe; location of outfall pipe covered in overburden to determine two sample locations
- PRS 13-003(b): septic system; location of buried drain line beneath asphalt to determine all three sample locations
- PRS 16-02602): outfall pipe; location of outfall pipe covered in overburden to determine two sample locations
- PRS 16-006(d): septic system; location of buried drain line to determine all three sample locations
- PRS 16-006(e): septic system; location of buried drain line and outfall pipe covered by overburden to determine all five sample locations

3.13 Radiation Surveys

Radiation surveys will be conducted at a limited number of PRSs to determine any potential radiation contamination at PRSs with rad PCOCS. This section will outline All Radiation surveys by explaining each aggregate on a PRS-by-PRS basis.

The primary objective of the radiation surveys is to &de sample selection for laboratory analysis and to bias sample locations or core intervals for laboratory analysis. In addition to the radiation survey, All screening and sample locations will be radiation screened for field work Health and Safety requirements (see Section 4.8.4).

All Radiation surveys at OU 1082 will be performed by the members of the field team. All members of the team will be adequately trained as RSPs (Radiation screening personnel) and will use a 2 inch long, 2 inch tAll crystal, sodium iodide high energy ganu-na detector at I meter above the ground surface to detect exposure levels. All Radiation surveys and screening will conform to LANL ER-SOP XX.XX [tide for Rad Surveys in draft]. Radiation levels above background will be considered a positive hit unless stated otherwise in the RFI Work Plan. The following subsections detail the required action for a positive hit at the various Radiation survey locations.

3.13.1 Aggregate 5.2

The radiation survey for this aggregate will include outfall drainage screening locations at the following PRSS: 16-003(a), 16-003(b), 16-003(c), 16-003 (h), 16-003 (i), 16-0030), 16-003 (n), 16-003 (o), and 16-029(a). Any positive survey locations (above background) will be sent for laboratory analysis. The radiation survey results can also be used in the ouffAlls to bias the final two surface soil samples in each drainage if the geomorphic survey and HE screening results do not provide adequate sample locations.

3.13.2 Aggregate 5.3

T'he radiation survey consists of only PRS 16-021(c) and will coincide with the five lateral screening locations in the 260 until 100 feet from the outfall. Any survey point that is above background will be sent for laboratory analysis. In this region, radiation survey results will also be used to guide subsurface sample collection for laboratory analysis.

3.13.3 Aggregate 5.4

All sample locations and core intervals in this aggregate will be part of the radiation survey. Any samples that are positive (above background) will be sent for laboratory analysis. The PRSs that will part of the survey are 13-003(b), 16-006(c), 16-006(d), and 16-006(c).

3.13.4 Aggregate 5.8

The radiation survey for this aggregate includes the screening grid for PRSs 16-010(a) and all screening locations in 16-016(c). Any readings above background will be used to select additional samples from the three minimum laboratory samples biased by Ba screening. As many as 10 additional samples will be chosen from the radiation survey for laboratory analysis in both PRSs. If more than 10 samples screen positive for radiation pick ten samples randon-dy from the positive points.

In the filter pad (TA- 16-392) in PRS 16-010(i) All ten field randomized screening location: will be screened for radiation to bias two laboratory samples. The two highest above background readings will be selected. If there are no above background readings then the two samples will be chosen randomly.

The former trough line, PRS 16-0 10(n) will have all ten screening locations surveyed for radiation. Any screening location that is above background for radiation will be sent for laboratory analysis. The minimum three samples surface samples should be sent from locations screening positive for either HE or Ba. Positive radiation samples do not constitute part of the minimum but are additional samples only.

3.14 Field Scheduling Issues

Due to the nature of the operations at TA- 16 and TA- 11, certain areas cannot be entered while HE work is in progress. The work schedules for these areas are readily accessible for planning field activities around building operations. TA-16 Site Safety personnel are able to verify which areas are accessible on any given day.

For PRSs associated with buildings 260 and 430, access is limited to Friday due to current work operations. Sampling will take place in these PRSs on Fridays until the PRSs are completed. Other sampling areas may have limited access on a day-to-day basis.

Permission will be obtained from the TA- 16 Safety Officer, Bill McCormick, each week for sampling activities. Permission will include safety work permits (SWPS) for All equipment that could potentially pose a danger to the field team members or TA- 16 employees. SWPs will describe the type of equipment, detail the areas that the equipment is allowed, and state any restrictions. SWPs typicAlly cover equipment for one week of work. The following is a list of the equipment that may require a SWP:

- stainless steel hand auger; water-saturated conditions
- sparking houow-stem auger drill rig; water-saturated conditions
- use of golf cart on non-paved areas

- use of other non-government owned field vehicles (e.g. rental truck and drill rig truck) generator and gasoline containers
- excavation equipment
- trailer sample storage and special eating area
- cellular phones (restrictions will apply)
- private 2-way radios
- computer hard drives
- LIBS and XRF units
- cameras

T'he computer hard drives and camera wiU have to be approved by both FSS-14 and ESA WMA before these instruments can enter the secure area.

Permission will also be granted on a PRS-by-PRS basis for use of aluminum nails in the HE outfall drainages from Aggregate 5.2 for marking sample and screening locations. Bill N4cCormick will investigate each outfall to determine in what intervals of each drainage the use of aluminum nails will be allowed. ALL of these locations are to be determined during the sampling activities and therefore the field investigation and approvals will coincide with the sampling effort.

4.0 BASIC INSTRUCTIONS FOR FIELD WORKERS

The following sections identify and summarize key instructions for field team members. Many of these instructions were extracted from the following documents:

- RFI Work Plan for Operable Unit 1082
- OU 1082 Site-Specific Health and Safety Plan
- OU 1082 Waste Management Plan
- OU 1082 Quality Assurance Plan
- Data Quality Objectives and Sampling and Analysis Plans for Additional and/or Modified Sampling at OU 1082
- LANL LP 116-1.0, Stop Work and Restart
- LANL ER-SOP-1.01, General Instructions for Field Investigations
- LANL ER-SOP-1.02, Sample Containers and Preservation
- LANL @R-SOP-1.03, Handling, Packaging, and Shipping Samples
- LANL ER-SOP-1.04, Sample Control and Field Documentation
- LANL ER-SOP-1.05, Field Quality Control Samples
- LANL ER-SOP- 1-06, Management of RFI-Generated Waste
- LANL ER-SOP- 1.07, Personnel Decontan-dnation
- LANL ER-SOP-4.01, Drilling Methods and Drill Site Management
- LANL ER-SOP-6.09, Spade and Scoop Method for Collection of Soil Samples
- LANL ER-SOP-6. 10, Hand Auger and Thin-WAll Tube Sampler
- LANL ER-SOP-6.13, Surface Water Sampling
- LANL ER-SOP-6.14, Sediment Material Collection
- LANL ER-SOP-6.15, Coliwasa Sampler for Liquids and Slurries
- LANL ER-SOP-6.19, Weighted Bottle Sampler for Liquids and Slurries in Tanks
- LANL ER-SOP-6.24, Sample Collection from Split-Spoon Samplers and Shelby Tube Samplers
- LANL ER-SOP-6.29, Single-Stage Sampling for Surface Water Run-Off
- LANL ER-SOP 10.06, High Explosives spot test
- LANL ER-SOP-10.08, Operation of the Spectrace 9000 field portable X-ray floresence instrument
- LANL Administrative Requirement 8-2, Hearing Conservation

- LANL Adn-dnistrative Requirement 12- 1, Personal Protective Equipment
- LANL Administrative Requirement 15- 1, Field Work
- LANL ER-QAPjP-06, Sampling Procedures
- LANL ER-QAPjP-07, Sample Custody
- LANL ER-QAPjP-08, Calibration Procedures and Frequency
- LANL ER-QAPJP-15, Corrective Action

These field instructions are not intended to supersede or replace instructions contained in the documents listed above. Field team members are expected to be familiar with and understand the instructions given in these documents. These documents will be placed in the field sampling trailer (located in the support zone at the field site) and will be available to all team members.

4.1 Sampling Procedures

All sample locations have been identified in the field with either aluminum nails or wooden stakes and orange surveyor's tape. Each aluminum nail has a brass tag with the Site ID number and each stake is also marked with the Site ID number. The Site ID numbers for OU 1082 are listed in Appendix A. Prior to field mobilization, field team members will check each sample location in the field to assure proper placement. At that time, the team will also verify that the proper analyte suite has been selected for each sample.

The sample containers corresponding to a sample location will be placed into plastic resealable bags prior to sampling at the location. The PRS and sample number will be clearly marked on each bag.

Before sampling begins, the HPT and a field team member will check the undisturbed sample location for the presence of above-background levels of radioactivity and VOCs. If elevated levels of radioactivity are detected, the site will be evacuated, and the sampling procedures for that site will be re-evaluated. If elevated levels of non-radiological constituents such as VOCs are detected, the SSHASP will be consulted, and recommendations will be followed before the site is sampled.

The following sections summarize sampling procedures specific to each of the sampling methods to be used at OU 1082.

4.1.1 Surface Samples

All surface sample collection activities will conform to LANL-ER-SOP-06.09, Spade and Scoop Method for Collection of Soil Samples. Surface soil samples are defined as samples taken from the surface to a depth of 6 inches. Surface soil samples will be taken using this depth criteria within a diameter of approximately 6-8 inches. Soil will be collected from each sample location using a aluminum spoon, homogenized in an aluminum bowl, and placed in the appropriate sample containers.

4.1.2 Subsurface Samples

All subsurface samples will be collected with a hand auger or a hollow-stem Auger, and sample collection activities will confortn to LANL-ER-S OP-06.10, Hand Auger and Thin- WAll Tube Sampler and LANL-ER-SOP-04.01, Drilling Methods and Drill Site Management. Subsurface soil samples can be recovered from depths to approximately 10 feet using a stainless steel hand-held auger manually driven into the soil. The hollow-stem auger can bore to depths of approximately 20 feet in soil and can bore into the underlying tuff. The soil or sediment is removed from the hand auger or hollow-stem auger, placed into an aluminum bowl, homogenized with an aluminum spoon, and placed in the appropriate sample containers.

All subsurface samples will be cored in water-saturated soil to eliminate risk of injury from undetonated HE soil component. I'he procedure consists of a gravity-driven drip irrigation system. A 500 gallon tank will be mounted on a truck for the water supply. The water will flow onto the soil at the desired location from the tank through a hoze and nozzle, 48 hours before the PRS is slated for sampling. If during sampling it is discovered that the soil is not saturated to the desired depth, then the procedure will be modified in the field. This procedure has been approved by ESA-WMA personnel. In areas where hand auger or hollow-stem auger locations are covered by pavement, the pavement win have to be excavated prior to the water saturation process.

Corehole management practices at OU 1082 applies to both drill holes and hand auger holes. As cuttings are produced during sampling they will be shoveled periodically on to high density polyethylene (HPDE) mats. The mats will help to minimize contact of potentially contaminated subsurface soils with the near-by ground surface. Care will be taken for the drill holes to separate the core hole cuttings into two distinct horizons: soil and tuff. The separation will allow for better filling of the core holes after the sampling is complete. The mats will be 3X3 feet for the drill rig and 2X2 feet for hand angers. After the hole and sampling is complete the cuttings will be returned to the hole. The mats and drill rig will then be decontaminated in place before moving to the next sampling area. Hand augers will be decontaminated in the CRZ.

4.2 Sampling Equipment

T'he following checklist will be used to ensure that equipment necessary to support sampling activities at TA-46 are available:

Support Zone	**Sampling**
first aid kit	sample
fire extinguisher	clip boards
phone	crates
tables	aluminum bowls
chairs	aluminum trowels
file boxes, folders	1 gallon resealable bags
clear paper cover	sample containers
waste forms	rad van resealable bags
health and safety plan	hand auger
material data safety sheets transportation forms	pipettes
tailgate meeting fon-ns	pipette bulb
controlled area access register forms equipment	preservatives
calibration log book sample collection forms	pH paper
daily sununary forms	gas containers
daily drilling forms	water spray jugs
notebook	PID/FID
training procedure book	02 meter
sample label book	LIBS
chain-of-custody tape	XRF
pens and sharpies	calibration gasses
duck tape	Miniram
cooler for drinks	personal air pumps
cups for drinks	generator

trash bin for clean trash heavy garbage bags caution tape health and safety - equal opp. forms scissors soap paper towels 5 gallon water container shade tent	extension cords tyvek cover alls inner gloves outer gloves booties safety glasses hard hats respirators weather station, anemometer sign-exclusion zone camera freezer
Decontamination Zone	**Waste Area**
3 heavy tubs 3 wash buckets 3 spray bottles kimwipes long stakes non-sparking hammer heavy ml clear or black plastic sign - decontamination zone tarps for storage drums pallets blocks or PVC for berm Alconox deionized water brushes waste water jug (5 gal) 2 large trash bins	55-gallon drums plastic liner waste labels pallets tarps rope

4.3 Sample Handling

Sample handling procedures will conform to LANL-ER-SOP- 1.01, General Instructions for Field Investigations, LANL-ER-SOP-1.02, Sample Containers and Preservation, LANL-ER-SOP 1.03, Handling, Packaging, and Shipping Samples, and LANL-ER-SOP 1.04, Sample Control and Field Documentation. General steps to be used in sample collection and handling include:

Support Zone

1. The sampler and documenter will refer to the daily schedule and choose appropriate sample containers with appropriate number of bowls and spoons and place them into crates in the SZ, adjacent to CRZ.
2. The FTL will review daily activities.
3. The FTL will log morning notes in the dedicated field notebook.
4. The SSO will give tailgate safety meeting, All field team members present must sign attendance sheet.
5. The samplers, HPT and SSO will don PPE. Cotton coverAlls, canvas gloves (sampler will wear inner and outer disposable gloves).

Contamination Reduction Zone

6. The sampling team will walk through CRZ to the EZ, sign the controlled area access register form before collecting samples.

Exclusion Zone

7. The SSO and HPT will monitor sampling activities and take notes of sample location.
8. The sampler will collect soil samples in aluminum bowl and homogenize well with aluminum trowels.
9. The sampler will hand Auger to the depth required by the RFI sampling plan, and screen the core at the documented intervals. The laboratory samples will be selected using the criteria from the RFI. The soil will be water-saturated for this operation.
10. Sampling from a hollow-stem Auger core will also follow the guidelines in the RFI for intervals of screening and position of the samples. All soil sampled by drilling will be water-saturated during the operation.
11. The HPT and SSO will monitor homogenizing and take notes of soil sample in the aluminum bowl.
12. The sampler will place soil samples in appropriate containers and place containers in plastic resealable bags, being careful to avoid contaminating exterior of containers and the resealable bag.
13. The documenter will take notes on sample collection log form: sample description, weather, type of containers used, rad and VOC readings, and other appropriate information. The documenter will take photograph of the sample location (camera stamps date and time on negative) and then logs the photo number.
14. When sample collection and documentation is completed the sampling team walks to CRZ.

Contamination Reduction Zone

15. Equipment will be deposited at the equipment drop in the CRZ. Samples will be placed in cooler next to CRZ drop.
16. The HPT will go to the dry wash tub and use a wire brush to remove dirt from boots or clothes and then frisks self.
17. The SSO, the documenter, and the sampler will proceed to the dry wash tub where a wire brush is available to remove dirt from boots or clothes.
18. The HPT will then frisk All personnel and swipe the bottom of boots. The swipe will be counted for one minute to determine whether there is radiation contamination.
19. If no radiation is detected, SSO will go through the wet potential hazardous decontamination tubs.
20. If radiation is detected, SSO must go through the wet potential mixed decontamination tubs.
21. The SSO will remove coverAlls, then gloves and place them on SZ side of table for re-use.
22. The SSO will then wait for HPT to give final frisk and HE swipe before leaving CRZ. Results of the frisk are recorded on the equipment and materials release form. The SSO will sign out on the area access register controlled form.
23. The documenter must complete steps 16-20.
24. The sampler must complete steps 16-18.
25. Samplers will remove outer gloves and dispose of them in potential mixed, potential hazardous, or clean waste containers.
26. The health physics technician will take rad and HE swipes of-

- sample bottles (I swipe per entire batch)
- bowls and spoons, approximately I swipe per 5 sets of spoons and bowls
- equipment (I swipe per pieces of equipment)
- outer gloves (if they are to be decontaminated)
- The insides of re-sealable bags which had contained the sample bottles and will be replaced with clean bags.
- Swiped material is placed on table and results of swipes are documented on the Equipment and Item Removal Log
- If swipes are clean, the sampler will decontaminate sample bottles in potential hazardous bucket (spray bottles with mister and then dry with kimwipe). The used kimwipes are placed in clean waste container.
- If swipes are rad, sampler decontaminates sample bottles in RAD bucket (spray bottles with n-dster and dry with kimwipe). The used ldmwipes are placed in clean waste container.
- If swipes are HE positive, sampler decontaminates sample bottles in potential hazardous

bucket (spray bottles with mister and then dry with kimwipe). The used kimwipes are placed in clean waste container.

27. Samplers will put sample bottles in NEW resealable plastic bags (and disposes of original bag in clean bag after decontan-fination). NOTE. Clean resealable plastic bags must be labeled with the appropriate sample number at this time.
28. The decontaminated sample bottles will be placed in a cooler in the support zone.
29. The samplers will decontaminate equipment (repeat step 24) and place clean equipment on the support zone side of the table.
30. The samplers will then decontaminate bowls and spoons (repeat step 24), in 2 tubs: Alconox water tub, spray water to rinse in same bucket, then rinse in 2nd bucket with deionized water). The sampler then places clean equipment on the SZ side oftable. (At end of day the spoons and bowls are bagged, labeled, and stored for re. use in the future).
31. The samplers will remove inner gloves and dispose of them in a clean waste container.
32. The HPT will frisk the samplers and himself then record results on controlled area access register form. The samplers and the HPT will sign out.

Support Zone

33. NOTE. Everyone entering the SZ from the CRZ must wash their hands and face.
34. The documenter will prepare the PE blank sample.
35. The FTL or another field team member will update and maintain the chain of custody data base. Chain of Custody forms and labels will be generated on the computer.
36. Sample bottles will be brought to the trailer in the SZ. Labels will then be placed on sample bottles. Chain of Custody forms will be completed. The samples will be placed in a cooler brought to the sample coordination facility.
37. At the end of each sampling day the FFL will generate the Daily Field Activity Summary on the computer and will fax copies to appropriate LANL personnel.
38. Infon-nation in the field data base is backed up on a hard drive at the end of each field day. The hard drive is stored each evening in a location (i.e. the storage truck) away from the original data base (located in the field trailer). During the field activities, infon-nation from the back-up hard drive is downloaded on the computer at the ICF Kaiser office. This backup system ensures there are a n-dnimum of two separate copies of the field data base at the end of each day.

4.3. Field Screening Methodology

X-ray fluorescence (XRF), Laser-induced breakdown spectroscopy (LIBS), and the High explosives (HE) spot test will be used to screen for metal contaminants and HE contamination. Both the LIBS and XRF machines will be used to analyze the metal content in the soil. The LIBS is a more accurate analytical machine for the principle PCOC in the OU, barium, but does have field limitations at the present time. LIBS win only be used in easily accessible areas of potential contamination and the XRF will be used in the less accessible areas due to its better mobility. Ile HE spot test will be used at All screening locations for HE and a positive result necessitates treatment of the sample as HE material until the Chem Van can determine the levels of HE in the soil sample (see Section 4.4. 1).

All of the following screening will be administered by the field team. The field team will have completed the required training for operation of the above instruments. ALL field screening will conform to LANL ER-SOP XX.XX [title for LIBS in progress], LANL ER-SOP- 10.08 Operation of the Spectrace 9000 field portable X-ray floresence instrument, and LANL ER-SOP 10.06 High Explosives spot test.

4.4 HE Sample Handling Issues

Due to the nature of the potential HE soil contaminants in TA- 16, there are issues related to the analytical process, transportation process, and release process from TA- 16. The following sections will discuss these issues and other related concerns.

4.4.1 HE Sample Analytical Process

Not all samples collected at OU 1082 will be sent directly to an outside laboratory for analysis. Heterogenous HE contaminated soil samples will have to be analyzed by the TA- 16 analytical group, DX-16, before they are released to an outside laboratory. The decision process for chemical analysis of samples is described below.

The driving mechanism for a particular analytical path is the distinction between the homogeneous HE contaminated areas and the heterogenous HE contaminated areas. This distinction has been determined on a PRS-by-PRS basis by ESA-WMA. All surface samples at the burning ground PRSs, all surface samples at PRS I 1-001(c), and any surface samples collected 300 feet or further from the outfall in the drainage of PRS 16- 003(o) are classified as heterogenous contamination. These samples will be treated as HE contaminated regardless of the spot test results. The PRSs that are in the burning ground and considered heterogenous are: 16-010(h), 16-010(i), 16-010(k), 16-010(l), 16-010(m), 16-010(n), 16-005(g), and the South drainage. Subsurface samples will only be considered as heterogenous contamination if the soil has been disturbed (e.g. by decontan-dnation and decommission operations). Only the outfall pipe subsurface samples at PRS 16-010(i) and all the subsurface samples at PRS 11-001 (c) may be classified as heterogenous contamination.

The remainder of the PRSs are classified as homogeneous contamination. If the HE spot test results are positive, all samples collected will first be brought to the mobile chemical analysis unit (Chem Van) after decontan-dnation and documentation at the EZ and CRZ. The Chem Van analysis will determine the level of HE contamination. The Chem Van analysis will follow accepted quality assurance procedures and controls. The results that are produced in the Chem Van "I be used for decisions at the PRSs and an off-site lab will not be requested to analyze samples for HE concentrations. A homogenous HE contaminated area sample that is detem-iined to have less than 5 wt% HE in the Chem Van will be processed as a non-HE sample and sent to CST-3. Also, any homogenous HE contaminated area sample that tests negative for the HE spot test in the field will be processed as a non HE sample and sent to CST-3. Any sample that has greater than 5 wt% HE contamination will be packaged by TA- 16 personnel and sent to the off-site laboratory directly from TA- 16. The packaging will include a 25 gram limit of HE per package. The package consists of a thick metal pipe tested for safety in transport at levels of 25 grams or less of HE. The pipes will then be packed in blue ice for travel to the off-site analytical laboratory.

All heterogenous HE conmn-iinated samples collected will be analyzed for HE quality data in the Chem Van and then shipped as HE samples for laboratory analysis for other hazardous constituents. The shipping requirements for these samples is the same as for greater than 5 wtto homogeneous contan-dnated HE samples explained above.

4.5 Movement of Personnel and Equipment between the Exclusion Zone and the Contamination Reduction Zone

A transportation cart will be used to move personnel and equipment between the EZs and the CRZs while sampling. Because it is both timely and costly to set up multiple CRZS, there will be CRZs only adjacent to the SZ and support trailer. The support trailer, SZ, and CRZ will be set up at building TA-16-300 due to its central location. The area may be relocated for the second part of the 1995 field saeson. The cart is crucial for transporting personnel and equipment because the CRZs will be located significant distances from the sampling locations (the EZs). In addition, the use of the cart will eliminate the spread of contaminants from the EZs to clean areas as the sampling team members (dressed in PPE) will step directly from the EZ to the cart and from the cart to the CRZ (or ftom one EZ to another EZ).

The cart will transport personnel and equipment from the SZ and support trailer to the various Sample Group areas for sampling. The cart will house a secured cooler that will hold samples from a single sampling shift. Thus the sampling team can couect a large number of samples in one shift without having to walk a long distance from the EZ to the CRZ with a heavy cooler(s).

Use of the transportation cart between the CRZ and the EZ will include the following procedures:

1. the sampling team will don their PPE, enter the transportation cart, and drive from the CRZ to the EZ (which will have been set up by a field team member in advance);
2. the cart will be parked adjacent to the barricaded area around the EZ, and the sampling team will step directly from the cart into the EZ;
3. the sampling team will couect samples;
4. at the completion of sampling, the samples will be placed in a cooler (which is secured in the transportation cart), and sampling equipment will be secured in the cam
5. the sampling team will take down the barrier tape and place it in the back of the cam
6. the sampling team will drive directly to the CRZ or wfll set up a new EZ (and steps 2 through 5 will be followed);
7. refer to Section 4.7 of this plan for decontamination procedures which will be followed when the team enters the CRZ.

The cart will need to be properly labelled for on-site HE transport for samples that test positive for HE. The HE placards and labels will comply with DOT shipping requirements.

4.6 Quality Assurance and Quality Control (QA/QC) Samples

Field team members will couect three types of field QC samples at OU 1082: performance evaluation samples, field duplicates, and rinsate blanks. The performance evaluation samples will be collected using the techniques previously described for field samples, using material that has been supplied for this purpose. Field duplicate samples will be splits of homogenized soil taken from one sample location. There will be two rinsate blanks for the campaign to test decontamination procedures. One each will be taken from manual equipment and machinery near the start of the sampling effort.

Audits will be performed to verify that ER field activities comply with all aspects of the ER 4.6 Quality Assurance Program. Qualified audit staff will conduct audits in accordance with written plans and checklists. Field team members will be expected to cooperate with auditors and be in compliance with All ER requirements.

4.7 Documentation

All pertinent information regarding field activities win be documented according to forms specified in LANL-ER-SOPs.

Documentation	Person Responsible
Sample Colllecrtion Log	Sampler
Chain of Custody	FTL,Sampler
Dedicated Notebook	FTL
Instrument Calibration Logs	FTL, Sampler, HPT,SSO
Daily Field Activity Logs	FTL
Tailgate Safety Meeting Forms	SSO
Controlled Area Access Register	HPT,SSO
Vistor log-in Form	SSO,FTL
Waste Container Label	FTL, Sampler

Waste Profile Form	FTL, Sampler
Equipment And Item Removal log	HPT

The Sample Collection Logs are completed by the sampler for each sample. Some parts of this form may be completed prior to sampling (such as OU, TA, type of sample, weather). However, the sample location, type, depth, time of collection, and general description of the sample material must be recorded as the sample is taken. The sampler will sign each Sample Collection Log when they are completed.

The Chain-of-Custody forms will be prepared for All samples. The Chain-of-Custody forms will be fffled out in advance of the sampling except for the date and time of sample collection, which is entered after the sample is collected.

The FTL will maintain a dedicated field notebook to document site activities. The dedicated notebook must be completed in dark ink and have the Operable Unit and Technical Areas as one-time entries. Mistakes must have one line through them with an initial and date. Erasure, obliteration, or white-out is not Allowed. The FTL must date each day's entry and sign the notebook at the end of the day. Others are Allowed to make entries, but they must sign the first page and then initial and date the rest of their entries. The FTL must ensure that the following infon-nation is in the notebook:

- Date,
- On-site field team personnel and their responsibilities
- Weather
- Occurrence of the tailgate safety meeting
- Daily sampling events
- Location of exclusion and support zones (sketches and drawings can be used)
- Deviations from plans or SOPs and supporting reasons
- Photograph descriptions
- H&S monitoring
- A summary table including the SWN4U identifier and the sample numbers, types, and locations

Instrument Calibration Logs will be completed by the team member performing calibration of the H&S equipment or the health physics equipment. The Daily Field Activity Summary will be completed each day by the FTL and submitted to the OUPL and the PPL. The Tailgate Safety Meeting Form will be signed by All team members acknowledging attendance at the meeting. The Controlled Area Access Register Form will be filled in by team members but controlled by the SSO.

4.8 Health and Safety

The SSO is responsible for enforcing All health and safety requirements as stated in the SSHASP. The SSHASP contains detailed discussions of hazards associated with sampling activities and should be used for additional information. Health and safety measures of particular importance to field workers are discussed below. All on-site personnel will be trained in emergency procedures. In an emergency situation that necessitates evacuation of the site, a hom will be sounded, and All personnel will evacuate to the nearest muster area. The muster areas will be identified in the daily tailgate safety meeting. Emergency contacts, depending upon the type of emergency, are listed below.

Emergency Contact	Phone Numbers	
Los Alamos Hospital	662-4201	911 for Emergencies
ES&H Hotline	665-5010	911 for Emergencies
Los Alamos Police	662-8222	911 for Emergencies
Los Alamos Fire Dept.	677-4055,672-9191	911 for Emergencies
LANL Protective Force	667-4437	911 for Emergencies

LANL Spill Coordinator	667-6211	911 for Emergencies

For any emergency, contact Lynn Kidman (Field Team Manager) at 661-5227 and Brad Martin (Field Unit Project Leader) at 667-6080. Other emergency information is posted on the bulletin board located at the sampling site.

4.8.1 Site Coordination and Control

Site control procedures are listed in detail in the SSHASP. The SSO and FTL have the Allthority to Allow or deny access to the field site during sampling activities. ALL field team members must follow the directions of the SSO or FIL when working at the site.

The site will be divided into an exclusion zone, a contan-dnation reduction zone, and a support zone. When working in the EZ, team members will practice contan-dnation avoidance. Stand upwind during intrusive activities, if possible and n-dnimize dust generation. All solid and liquid samples should be collected in such a manner as to n-dnimize contact with the material. Workers should be alert for dangerous situations, strong or irritating odors, airborne dusts or vapors, and broken containers. Report All potentiAlly dangerous situations to the SSO or FTL. ALL personnel entering the EZ shAll log in before each entry and log out after each exit. The SSO or designee shAll ensure that All individuals are accounted for before leaving the site each day.

The CRZ includes the area(s) where decontamination of personnel and equipment occurs and will be set up next to the EZ. Team members will only be Allowed to exit the EZ through the CRZ except in the case of an emergency. The SZ will only be located in uncontaminated areas. Emergency supplies and All records and documents necessary for site work will be kept in the SZ.

4.8.2 Safe Work Practices and Sanitation

On-site workers will follow the safe work practices listed below:

- No food. beverages, or tobacco products shall be present or consumed in the EZ and areas where Dotential contamination exists.
- No cosmetics or creams shAll be applied in the EZ, or in a contan-dnated area.
- Prescription drugs should not be taken by personnel where the potential for contact with toxic substances exist, unless specifically approved by a qualified physician.
- Alcoholic beverage intake is prohibited before or during the work day.
- Horseplay, practical joining, or any other actions that jeopardize safety will not be tolerated.
- Running is not permitted.
- All activities will be performed to minin-dze or prevent the disbursement or release of contaminants.
- All personnel will avoid contact with potentiAlly contaminated substances except as necessary for sampling.
- Monitoring equipment will not be placed on potentiAlly contan-dnated surfaces. Personnel conducting ER field activities will work in groups of at least two, so that someone is always available to render assistance if there is an unplanned occurrence. They will be instructed to watch for signs and symptoms of illness or injury in their assigned buddy.

There will be water, soap, and towels available in the SZ. Personnel leaving the CRZ will wash their hands and faces. Potable and non-potable water in the SZ will be clearly marked.

4.8.3 Personal Protective Equipment

Field team members entering the EZ will be required to wear the following protective equipment:

- steel-toed/cheniical-resistant boots with smooth soles
- cotton coveralls, or tyvek
- chernical-resistant gloves (for the samplers)
- leather gloves (for the non-samplers)
- safety glasses
- hard hat (when working around heavy equipment)

4.8.4 Health and Safety Equipment and Sample Screening

Direct-reading insmiments and an explosives test kit will be used to monitor the work environment of on-site workers. Instruments will be calibrated at the beginning of each work day. The following instruments will be used by field team members in the EZ when the corresponding criteria are met:

Instrument	Monitor For	Monitoring Criteria
FID Or PID	Organic vapors	Breathing zone of the sampler and downwind of sampling activites where VOCs are potential contaminations of concerns
Oxygen/combustible gas monitor	Oxygen/combustible gas	Continuously during the excavation activites
Mini ram aeresol dust monitor	Particulate release during excavation.	Downwind of the excavation activites
Explosive field spot test kit	explosives	All samples sites where explosives are ssuspected

4.9 Decontamination Procedures

Decontamination of personal and non-expendable equipment will be conducted to protect the health and safety of field team members, to protect data quality, and to prevent the spread of contamination.

Specific procedures used for the decontan-dnation of personnel, manual sampling equipment, and the drilling equipment are described in detail in ER-SOP- 1.07 and ER- SOP-1.08.

4.9.1 Decontamination of Personnel

Decontamination of personnel will be conducted in the CRZ each time personnel exit the EZ. These steps are described in more detail in the SSHASP.

Personnel decontamination will include the following steps:

1. Dry decontamination.
2. Personnel radiation screening (including PPE). Personnel boots are swiped and swipes are counted for one niinute for radioactive contan-dnation. Personnel are screened for radioactive contamination using hand-held radiation monitors.
3. Outer boot Alconox wash.
4. Outer boot clean water rinse.
5. Outer glove removal (gloves will be disposed of or washed).
6. Inner glove removal and disposal and field coverAll removal.

7. Hand, foot, and mouth radiation screening.
8. HE swipes of boots.
9. Exit exclusion zone.
10. Hand wash

Note: If radiation is detected in Step 2, a separate decontan-dnation line will be used for steps 4 and 5, and an additional radiation screening will be conducted to verify decontamination. If coveralls cannot be decontaminated, they will be disposed of as rad- contaminated pending chemical analysis. Refer to Section 4.3 for more detail.

4.9.2 Decontamination of Manual Sampling Equipment

Sampling equipment such as hand augers, chisels, and non-dedicated, aluminum spoons and bowls will be decontaminated before each reuse according to appropriate ER SOPS. Dedicated aluminum spoons and bowls will be decontaminated after use and stored for subsequent sampling activities. Decontamination of manual sampling equipment will be conducted in the CRZ and will include the following steps:

1. Equipment Drop--used equipment is placed at entrance in CRZ.
2. Equipment Radiation Screening-equipment is screened for contamination using appropriate alpha, beta, and gamma detectors.
3. Equipment Wash---equipment will be washed in a solution of Alconox"" and water. 4. Equipment Rinse.-equipment will be rinsed in potable water.
4. Equipment Rinse-equipment will be rinsed again with deionized or distilled water.

The decontamination water will be left outside to evaporate. If, by the end of activities, the water has not completely evaporated, the remaining water will be drummed. All equipment will be certified clean of HE before it can be transported from the TA- 16 HE area.

4.9.3 Decontamination of Samples

Decontamination of samples will take place in the CRZ, as specified in the SSHASP. Decontamination of samples will require the following steps:

1. Radiation Screening-sample containers will be screened for radioactive contamination.
2. HE screening-sample containers will be screened for HE contamination.
3. Sample Container Wash-sample containers will be rinsed with water in a decontamination line for either radioactive or non radioactive contaminated equipment.

4.9.4 Equipment Release Procedures

Due to the extremely low probability of encountering radiation contamination at OU 1082 removal of equipment, samples, and supplies from the exclusion zone will fall under the requirements of a free release. A greater concern is migration of HE contamination from the HE area to public areas. The release of equipment, samples, and personnel is described in Section 4.9.5.

For unrestricted release to the public (free release), smear surveys shall be required. Qualified field team members will be equipped to evaluate these smears in the field using a laboratory-quality alpha counter. Smear surveys shall be conducted in accordance with the ESH- I procedure ESH- 1-02-02 "Surveying for Alpha and/or BewGamma Contamination." Also, equipment will have to be certified clean of HE before leaving the HE area (see Section 4.9.5).

4.9.5 Release of Sample Equipment and Personnel from HE Area

ESA-WMA has granted approval to ICF KE to train an individuals to be qualified in releasing material from the HE area. The trained individuals will be responsible for certifying clean, by use of the HE spot test kit, All personnel, sample containers, off-road use vehicles, and other equipment each day. ESA-WMA will conduct random checks for clean certification of HE to monitor the performance of the designated ICF KE individual(s).

This procedure will expediate the process of leaving the HE area each day. An average day of sampling will typically only require release of personnel and sample containers. The sampling equipment and off-road vehicles will be stored at the SZ for the sampling season. Tle drill rig is the only equipment that may leave the site occasionally during the sampling season to be used at other ER OUs.

4.10 Waste Management

All wastes generated during sampling activities will be managed in accordance with the approved Site-Specific Waste Management Plan. Site workers are required to minimize the amount of waste generated at the site. Wastes that have come in contact with potentially contaminated materials will be managed separately from other wastes. All solid and liquid wastes will be stored in approved 55-gallon drums labeled with information about the sampling activities (e.g., dates and sample identification numbers) associated with the activities that generated the waste. Team members will comply with the following procedures to characterize and segregate wastes:

1. Before decontamination when exiting the EZ, wastes and PPE will be screened for gross alpha, beta, and gamma activity.
2. If radioactive contamination is detected, rad-dedicated tub and liquid will be used for decontamination and will be segregated and classified as rad-suspect material.
3. If radioactive contamination is detected on PPE and other wastes from the EZ after decontamination, they will be segregated and classified as radioactive waste.
4. If radioactive contamination is not detected after decontamination, PPE will be segregated and classified as non-radioactive PPE waste. Other wastes from the EZ will be segregated and classified as non-radioactive waste.
5. If staining or contamination is evident upon visual inspection of the PPE or other waste, the FTL will be notified, and the waste may be segregated as potentially hazardous.
6. All solid wastes removed from the EZ or CRZ will be placed in plastic bags (corresponding to the waste classification) and identified with associated sample identification numbers.
7. Personal protective clothing and sampling equipment intended for reuse win be placed in heavy-duty bags. A label describing the materials will be affixed to each bag. These are not considered to be wastes.

The RCRA hazardous or mixed wastes will be stored at a satellite accumulation area until the total accumulated volume reaches 55 gAllons. At this time the wastes will be placed in the less-than-90-day storage area.

SECTION: 2

5.0 Field Activities by PRS

The following section describe the field activities conducted at each PRS during the 1995 field campaign at OU1082. Included in the discussions are types of samples, number of samples, location of samples, depth of samples, screening results, depth to tuff, deviations from the OU 1082 RFI Work Plan, and other important comments.

5.1 PRS 11-001(c)

Four surface analytical samples and four subsurface analytical samples were collected at PRS 11-001 (c).

5.1.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.1.1. Sample locations are also illustrated in Figure 5.1.1.

TABLE 5.1.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0311-95-0001	11-0001	NE edge of pit, on lip	0 to 6 inches
0311-95-0002	11-0001	NE edge of pit, on lip	6 to 11 inches*
soil/tuff interface	11-0001	8 inches	
0311-95-0003	11-0002	NW comer of pit, on lip	0 to 4 inches
0311-95-0004	11-0002	NW comer of pit, on lip	5 to 8 inches*
soil/tuff interface	11-0002	7 inches	
0311-95-0005	11-0003	SW comer of pit, on lip	0 to 6 inches
0311-95-0006	11-0003	SW comer of pit, on lip	6 to 11 inches*
soil/tuff interface	11-0003	9 inches	
0311-95-0007	11-0004	SE comer of pit, on lip	6 to 12 inches*
0311-95-0008	11-0001	SE comer of pit, on lip	12 to 16 inches*
soil/tuff interface	11-0004	13inches	

*= Sampled using a hand auger

5.1.2 Screening Results

Significant screening results and any values above background are listed in Table 5.1.2. The other screening results were non-detects or were at or below background.

TABLE 5.1.2
Screening Results

Sample ID	Location ID	Screening Method/ Result
0311-95-0002	11-0001	PID/ 5.0 ppm
0311-95-0003	11-0002	PID/ 1.2 ppm
0311-95-0005	11-0003	PID/ 0.8 ppm
0311-95-0006	11-0003	PID/ 3.0 ppm
0311-95-0007	11-0004	PID/ 1.5 ppm
0311-95-0008	11-0004	PID/ 6.0 ppm

5.1.3 Deviations from OU 1082 RFI Work Plan

Samples 0311-95-0001 and 0311-95-0002 were collected at a different location than specified in the RFI Work Plan for OU1082. Details are discussed in Section 5.1.4.

5.1.4 Comments

FU3 Team Members selected a new sample location for 11-0001 during a field review of the 1995 OU 1082 sampling locations. The sample location was moved 20 feet along the canyon rim, southeast of the original location in the OU 1082 RFI Work Plan. The team chose the new sample location in order to sample beneath a detonator that is lying on the ground surface. There is also additional debris on the ground surface surrounding the sampled location indicating that the area is part of the PRS. Samples 0311-95-0001 and 0311-95-0002 were collected at location 11-0001.

5.2 PRS 11-012(a)

One subsurface analytical sarnple and three subsurface screening sarnples were conected at PRS 11-012(a).

5.2.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.2 in Figure 5.2. 1.Sample locations are also illustrated in Figure 5.2.1

TABLE 5.2.1
Sample Depths And Locations

Sample ID	Location	Location Description	Location Depth
0311-95-0009	11-0005	SW corner of mag.ft.print	0-18 inches*
0311-95-0010	11-0006	SE corner of mag.ft.print	0-18 inches*
0311-95-0011	11-0007	NE corner of mag.ft.print	0-18 inches*
0311-95-0012	11-0008	NW corner of mag.ft.print	12-18 inches*

5.2.2 Screening Results

Significant screening results and any values above background are listed in Table 5.2.2, All other screening results were non-detects or were at or below background.

TABLE 5.2.2
Screening Results

Sample ID	Location ID	Screening Method/ Result
0311-95-0009	11-0005	PID: 8.0 ppm
0311-95-0011	11-0007	PID: 1.5 ppm
0311-95-0012	11-0008	PID: 15.0 ppm

5.2.3 Deviations from the OU 1082 RFI Work Plan

The results of the HE screening in All locations were non-detects; therefore, the analytical sample collected at PRS I I -0 I 2(a) was biased to the location with the highest PID reading The field team felt that biasing the sample would possibly generate more relevant information than simply choosing the location randomly.

5.2.4 Comments

The depth to tuff is greater than 18 inches at this PRS; the field team did not Auger to the soil/tuff interface at any of the sample locations.

Sample 0311-95-0012 was submitted for off-site analysis.

5.3 PRS11-012(b)

One subsurface analytical sarnple and three subsurface screening sarnples were collected at PRS 11-012(b).

5.3.1 Sample Depths and Locations

S5mple depths and locations are listed in Table 5.3.1. Sample locations are also illustrated in Figure 5.3.1.

TABLE 5.3.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0311-95-0013	11-0009	NE comer of mag. ft.print	0 to 18 in
0311-95-0014	11-0010	NW comer of mag. ft.print	6 to 12 incnes*
soil/tuff interface	11-0010	12inches	(see Section 4.3.4)
0311-95-0015	11-0011	SW comer mag ft. print	0 to T8- inches*
0311-95-0016	11-0012	SE come-r-of mag. ft.print	0 to 10 inches*
soil/tuff interface	11-0012	10inches	(see Section 4.3-4)

*= sample collected using a hand auger

5.3.2 Screening Results

An organic vapor concentration of 5 ppm was detected using the PID in sample 0311-95- 0014. The other screening results were non-detects or were at or below background.

5.3.3 Deviations from the OU 1082 RFI Work Plan

Two locations were not sampled at the depth specified in the RFI Work Plan. Sample 0311-95-0014 was hand Allgured to a total depth of 12 inches where the sampler met refusal. Sample 0311-96-0016 was hand Allgured to a total depth of 10 inches where the sampler also met refusal. Details are discussed in Section 5.3.4.

5.3.4 Comments

This PRS contains numerous tuff and dacite cobbles and boulders which made sampling extremely difficult and ultimately prevented the collection of two samples at the targeted depth.

At location 11-0010 the sampler met refusal at 12 inches. The sampler had to hand auger three holes to reach this depth. In the first two holes, the sampler met refusal at even shallower depths. Field personnel felt that the sample (0311-95-0014) was collected from an interval that included the soil/tuff interface because tuff was recovered in the hand auger. However, because of the numerous tuff cobbles at depth in this area, the sampler may have met refusal on a large tuff cobble that overlies the true top of tuff. The depth to tuff may be 12 inches at location 11-0010 but is possibly deeper.

At location 11-0012 the sampler met refusal at 10 inches. Field personnel felt that the sample (0311-95-0016) was collected from an interval that included the soil/ tuff interface because tuff was recovered in the hand auger. However, because of the numerous tuff cobbles at depth in this area, the sampler may have met refusal on a large tuff cobble that overlies the true top of tuff. The depth to tuff may be 10 inches at location 11-0012 but is possibly deeper.

5.4 PRS 13-003(a,b)

Two subsurface analytical samples and five subsurface screening samples were collected at PRS 13-003(a,b).

5.4.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.4.1. Sample locations are also illustrated in Figure 5.4.1.

TABLE 5.4.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0313-95-0001	13-0001	distal borehole near 340	1.5 to 2.5 feet[a]
0313-95-0002	13-0001	distal borehole near 340	3 to 4 feet[a]
0313-95-1000	13-0001	distal borehole near 340	6 to 18 inches[a]
0313-95-1001	13-0001	distal borehole near 340	1.5 to 2.0 feet[a]
0313-95-1002	13-0001	distal borehole near 340	3 to 4 feet[a]
soil/tuff interface	13-0001	3.5 feet	
0313-95-1004	13-0001	distal borehole near 340	4 to 5 feet[a]
0313-95-1005	13-0001	distal borehole near 340	5 to 6.5 feet

[a] = sampled using Split Spoon

5.4.2 Screening Results

The screening results for the samples were non-detects or were below or at background,

5.4.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch inner diameter (ID) split spoon is insufficient material for full suite analysis.

Only one distal borehole was dffiled. No samples were collected in the proximal borehole. Details are discussed in Section 5.4.4.

5.4.4 Comments

Two GPR Geophysical Surveys were conducted at PRS 13-003(a,b) in an effort to locate the subsurface drainlines. Both the proximal and the disw boreholes were originally sighted based on the survey results. The GPR survey also indicated that the drainlines should be at a depth of 2.5 to 3.5 feet.

The distal borehole was drilled to a total depth of 6.5 feet; the soil/tuff interface was intersected at a depth of 4.5 feet. No positive indicators that the drainline was intersected during drilling were observed. A second borehole was drilled 1.5 feet to the north of the first borehole; the soilltuff interface was intersected at a depth of 3.5 feet and the borehole was completed to a total depth

of 4.5 feet. Again no evidence of the drainfine was observed. Additional potholing could not be conducted due to the numerous underground utilities in the area.

The proximal borehole was drilled to a total depth of 4.5 feet. The soivtuff interface was observed at a depth of 1.0 feet. There were no indications that the borehole intersected the drainline. Additional potholing could not be conducted due to the numerous underground utilities in the area.

Most likely, the drain line pipe was removed during the placement of the underground utilities for Building 340. The distal borehole may have intersected the remaining drainline trench as indicated by the significantly greater depth to tuff observed in the distal borehole relative to the proximal borehole. Analytical samples were collected from two intervals in the distal borehole. The first sample was collected from the depth where the drain line pipe was expected (based on geophysics and knowledge of engineering practices). The second sample was collected from the interval that brackets the fill/ tuff interface. Samples were not collected in the proximal borehole.

5.5 PRS 16-005(g)

Two subsurface analytical samples and four subsurface screening samples were collected at PRS 16-005(g).

5.5.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.5. 1. Sample locations are also illustrated in Figure 5.5. 1.

TABLE 5.5.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0468	16-1341	borehole near 406 filter tank	2-3 feet[a]
0316-95-0469	16-1341	borehole near 406 filter tank	5-7 feet[a]
0316-95-1631	16-1341	borehole near 406 filter tank	0-1 feet[a] No Recov.
0316-95-1632	16-1341	borehole near 406 filter tank	1-2 feet[a] No Recov.
0316-95-1633	16-1341	borehole-near 406 filter tank	2-3 feet[a]
soil/tuff interface	16-1341		2.5 Feet[a]
0316-95-1634	16-1341	borehole near 406 filter tank	3-4 feet[a]
0316-95-1635	16-1341	borehole near 406 filter tank	4-3 feet[a]
0316-95-1636	16-1341	borehole near 406 filter tank	5-7 feet[a]

[a] = sampled using Split Spoon

5.5.2 Screening Results

Significant screening results and any values above background are listed in Table 5.5.2. The other screening results were non-detects or were at or below background.

TABLE 5.5.2
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Sample ID	Location ID	Screening method/results
0316-95-1633	16-1341	XRF(Ba) 432.2 ppm
0316-95-1634	16-1341	XRF(Ba) 347.3 ppm
0316-95-1635	16-1341	XRF(Ba) 301.8 ppm
0316-95-1636	16-1341	XRF(Ba) 134.9 ppm

5.5.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is insufficient material for full suite analysis.

The borehole was drilled vertically, not at an angle as specified in the RFI Work Plan. Angled drilling was not allowed by TA- 16 personnel because the potential for creating an HE confining hazard is believed to be greater with this type of drilling.

5.6 PRS 16-006(e)

Four subsurface analytical samples and eleven subsurface screening samples were collected at PRS 16-006(e).

5.6.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.6.1. Sample locations are also illustrated in Figure 5.6.1.

TABLE 5.6.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0460	16-1335	prox. borehole 389 dr. line	1-2 feet[a]
0316-95-0461	16-1335	prox. borehole 389 dr. line	8-9 feet[a]
0316-95-0462	16-1339	prox. borehole 389 dr. line	0-1 feet[a]
0316-95-0463	16-1339	prox. borehole 389 dr. line	1-2 feet[a]
0316-95-1716	16-1335	prox. borehole 389 dr. line	0-I feet[a] No Recov.
0316-95-1717	16-1335	prox. borehole 389 dr. line	1-2-feet[a]
0316-95-1718	16-1335	prox. borehole 389 dr. line	2-3 feet[a]
0316-95-1719	16-1335	prox. borehole 389 dr. ine	3-4 feet[a]
0316-95-1720	16-1335	prox. borehole 389 dr..	4-5feet[a]-No Recov.
0316-95-1721	16-1335	prox. borehole 389 dr. line	15-6 feet[a]
soivtuff interface	16-1335	6 feet	
0316-95-1722	16-1335	prox. borehole 389 dr. line	6-7 feet[a]
0316-95-1723	16-1335	prox. borehole 389 dr. line	7-8 feet[a]
0316-95-1724	16-1335	prox. borehole 389 dr. line	8-9 feet[a]
0316-95-iT25	16-1339	distal borehole 389	0-1 feet[a]
0316-95-1726	16-1339	prox. borehole 389 dr. line	1.0-2.5 feet[a]
soiltuff interface	16-1335	1'2"	
0316-95-1727	16-1339	distal borehole 389 dr. line	3.5 feet[a]
0316-95-1728	16-1339	distal borehole 389 dr. line	3.5-4.5 feet[a]

[a] = sample using Split Spoon

5.6.2 Screening Results

Samples 0316-96-1717, 0316-95-1725, and 0316-95-1726 tested positive for high explosives with the HE Spot Test Kit. The other screening results were non-detects or were at or below background.

5.6.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is not enough material for full-suite analysis.

The deep sample in the proximal borehole, 0316-95-0461, was not collected from the interval

bracketing the soil/ tuff interface. This sample was taken from the bottom of the borehole at a depth of 8-9 feet.

Four analytical samples associated with the 16-006(c) outfall and drainage channel were not collected.

5.6.4 Comments

The drain line VC pipe was not located at either borehole during drilling. The proximal borehole, 16-1335, was biased to its location based on a field inspection of the septic tank, A Geophysical Survey using GPR confirmed that the selected location was directly over a subsurface anomaly (possibly the VCP drainline). The HE positive screening results observed in subsurface samples collected in borehole 16-1335 further confirm that the borehole was sighted appropriately to intersect an environmental release from the septic tank.

A Geophysical Survey (GPR) was used to bias the distal borehole, 16-1339, to its location. VCP was not recovered in the sampler or cuttings during the drilling of the borehole. Field personnel potholed in the area of borehole 16-1339 in an attempt to positively locate the drainline. The potholing effort consisted of four boreholes drilled in an east-west transect across borehole 16-1339, perpendicular to the presumed orientation of the drainline. Each pothole was drilled at least 1.5 feet into tuff. The three test holes furthest from borehole 16-1339 intersected tuff at approximately 6-8 inches of depth. Tuff was encountered between 1.5 feet and 2.0 feet in 16-1339 and in the pothole I foot west of 16-1339. The disparity in the depths to tuff suggest that borehole 16-1339 intersected the remnant drainline trench. This is ftuther substantiated by the fact that a small volume of engineering fill gravels was recovered from borehole 16-1339. Engineering gravels were not observed in the other potholes.

The four 16-006(e) outfall and drainage channel samples were not collected because the outfall and drainage channel could not be located. The field team excavated down to tuff the entire area where the outfall was suspected to be. Engineering fill gravels, VCP, a greater depth to tuff or any other indication that the drainhne had been found were not observed. The PRS location maps indicate that the outfall was located near a modem asphalt drainage channel constructed to divert run-off away from the Area P landfill. The field team suspects that the 16-006(e) outfafl and drainage channel were obliterated during the construction of the asphalt drainage.

5.7 Burning Ground South Drainage

Five surface analytical samples and ten surface screening samples were collected at the Burning Ground South Drainage.

5.7.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.7.1. Sample locations are also illustrated in Figure 5.7.1.

Table 5.7.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0363	16-1329	South Drainage 1st location	0-6 inches
0316-95-0364	16-1330	South Drainage 3st location	0-6 inches

0316-95-0365	16-1331	South Drainage 5st location	0-6 inches
0316-95-0366	16-1332	South Drainage 7st location	0-6 inches
0316-95-0367	16-1333	South Drainage 8st location	0-6 inches
0316-95-1601	16-1329	South Drainage 1st location	0-6 inches
0316-95-1602	16-2125	South Drainage 2st location	0-6 inches
0316-95-1603	16-1330	South Drainage 3st location	0-6 inches
0316-95-1604	16-2126	South Drainage 4st location	0-6 inches
0316-95-1605	16-1331	South Drainage 5st location	0-6 inches
0316-95-1606	16-2127	South Drainage 6st location	0-6 inches
0316-95-1607	16-1332	South Drainage 7st location	0-6 inches
0316-95-1608	16-1333	South Drainage 8st location	0-6 inches
0316-95-1609	16-2128	South Drainage 9st location	0-6 inches
0316-95-1610	16-2129	South Drainage 10th location	0-6 inches

5.7.2 Screening Results

Significant screening results and any values above background are listed in Table 5.7.2. The other screening results were non-detects or were at or below background.

Table 5.7.2
Screening Results

Sample ID	Location ID	Screening Method/Results
0316-95-1601	16-1329	XRF(Ba): 699 ppm
0316-95-1602	16-2125	XRF(Ba): No Reading
0316-95-1603	16-1330	XRF(Ba): 1129 ppm
0316-95-1604	16-2126	XRF(Ba): 545 ppm
0316-95-1605	16-1331	XRF(Ba): 635 ppm
0316-95-1606	16-2127	XRF(Ba): 578 ppm
0316-95-1607	16-1332	XRF(Ba): 674 ppm
0316-95-1608	16-1333	XRF(Ba): 655 ppm
0316-95-1609	16-2128	XRF(Ba): 627 ppm
0316-95-1610	16-2129	XRF(Ba): 577 ppm

5.7.3 Comments

Three subsurface samples were not collected. These samples were not collected because there were no Ba results above background and the soil/ tuff interface in this drainage is consistently less than 8 inches.

5.8 PRS 16-021(a)

Five subsurface analytical samples were collected at PRS 16-021 (a).

5.8.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.8. 1. Sample locations are also illustrated in Figure 5.8. 1.

Table 5.8.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0210	16-1526	Outfall location Bldg 450	9-18 inches*
0316-95-0210	16-1526	Outfall location Bldg 450	9-18 inches*
0316-95-0211	16-1526	Outfall location Bldg 450	5.0-5.5 feet*
Soil/tuff interface	16-1526	5.5 feet	9-18 inches*
0316-95-0212	16-1527	5 ft. dn. Drainage fr. outfall	9-18 inches*
0316-95-0213	16-1527	5 ft. dn. Drainage fr. outfall	4'8"-5'-2"
Soil/tuff interface	16-1527	5'2"	

*= sampled used a hand auger

5.8.2 Screening Results

Screening results are listed in Table 5.8.2. The PID was the only screening instrument required for this PRS.

Table 5.8.2
Sample Depths and Locations

Sample ID	Location ID	Screening Method/Results
0316-95-0210	16-1526	PID 20 ppm
0316-95-0210	16-1526	PID 20 ppm
0316-95-0211	16-1526	PID 50 ppm
0316-95-0212	16-1527	PID 30 ppm
0316-95-0213	16-1527	PID 30 ppm

5.8.3 Deviations from the OU 1082 RFI Work Plan

All samples specified in the OU1082 RFI Work Plan for PRS 16-021 (a) were collected during the 1995 field campaign. In addition, a VOC (volatile organic compound) aliquot was collected for samples 0316-95-0210 and 0316-95-0212. The two samples were also collected from 9-18 inches instead of 0-6 inches. This approach was taken because of the elevated PID readings encountered during sampling and the unexpected depth of the soil/ tuff interface. Details are discussed in Section 5.8.4.

5.8.4 Comments

The field team expected that the depth to tuff at PRS 16-02 1 (a) would be shallower than 4 feet. When the sampling crew encountered the elevated PID readings and had not encountered the soil/ tuff interface by 5 feet, work was stopped and the situation was re- evaluated. The field team decided to re-sample immediately adjacent to the first auger hole and to incorporate the sampling strategy discussed in Section 5.8.3.

A duplicate was taken in the hand auger location 16-1526. Sample 0316-95-2010 is a duplicate of sample 0316-95-0210 and was collected because the team observed a field indicator of contamination (the elevated PID readings).

5.9 PRS 16-026(j2)

Nine surface analytical samples and seven subsurface analytical samples were collected at PRS 16-026(j2). Also, twelve subsurface screening samples and fourteen surface screening samples were collected.

5.9.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.9.1. Sample locations are also illustrated in Figure 5.9.1.

Table 5.9.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0245	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0246	16-1551	Outfall at bldg 345	0-6 inches
Soil/interface	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0247	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0248	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0249	16-1551	Outfall at bldg 345	0-6 inches
Soil/interface	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0250	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0251	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0252	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0253	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0254	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0255	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0500	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0502	16-1551	Outfall at bldg 345	0-6 inches
Soil/tuff interface	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0503	16-1551	Outfall at bldg 345	0-6 inches
0316-95-0504	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1246	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1247	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1248	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1249	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1250	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1251	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1252	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1253	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1254	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1255	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1256	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1257	16-1551	Outfall at bldg 345	0-6 inches
0316-95-1258	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches
PID screening	16-1551	Outfall at bldg 345	0-6 inches

*= sampled using a hand auger

^= sampled using the spilt spoon

5.9.2 Screening Results

Significant screening results and any values above background are listed in Table 5.9.2. The other screening results were non-detects or were at or below background.

TABLE 5.9.2
Screening Results

Sample ID	Location ID	Screening Method/ Result
0316-95-0248	16-1665	PID: 20ppm
0316-95-0249	16-1665	PID: 20ppm
0316-95-0250	16-1665	PID: 40ppm
0316-95-0254	16-1555	PID: 4ppm
0316-95-0500	16-1555	PID: 20ppm
0316-95-0504	16-2166	PID: 60ppm
PID Screening	N/A	PID: 25ppm
PID Screening	N/A	PID: 30ppm
PID Screening	N/A	PID: 40ppm
PID Screening	N/A	PID: 62ppm
PID Screening	N/A	PID: 20ppm
PID Screening	N/A	PID: 20ppm
PID Screening	16-2166	PID: 95ppm
PID Screening	N/A	PID: 65ppm
PID Screening	N/A	PID: 50ppm
PID Screening	N/A	PID: 60ppm
PID Screening	N/A	PID: 50ppm
PID Screening	N/A	PID: 55ppm

5.9.3 Deviations from the OU 1082 RFI Work Plan

All samples prescribed in the RFI work plan for PRS 16-02602) were collected during the 1995 field campaign at OU1082. An additional surface sample that was analyzed for VOCs only was collected at location 16-1555 because elevated PID readings were observed during the screening and collection of the primary surface sample at this location. In addition, a re-sampling effort at the outfall and sediment trap boreholes was expanded to a "Phase II'-type of investigation. Re-sainpling was needed because the initial analytical samples from the two boreholes (16-1551 and 16-1665) arrived at the analytical laboratory at ambient temperature. The "Phase-H" re-sampling effort is discussed in Section 5.9.4.

5.9.4 Comments

The samples that arrived at the analytical laboratory at ambient temperature are 0316-95- 0245 through 0316-95-0250. These samples were not analyzed because of the lack of confidence in their integrity.

High PID readings were observed during the drilling and collection of samples at borehole 16-1665. As a result, an effort was made to evaluate the nature and extent of the apparent contamination during re-sampling. An extensive screening sampling scheme was used to determine the location with the highest near-subsurface concentration of organic vapors in the area around the outfafl and boreholes. The new borehole (borehole 16-2166) was then drilled at this location.

A hand auger was used to excavate through the soil layer down to the soivtuff interface and a PID was used to determine the organic vapor concentration in the auger hole. The auger holes were sighted on 5.0 foot intervals; the interval was reduced to 2.5 feet around locations with elevated

PID readings. Nine locations were screened along the center line of the drainage channel in the area between the outfall and 45 feet down drainage from the outfall. Four locations were screened perpendicular to the drainage channel along a transect that includes location 16-1665. Borehole 16-2166 is located 22 feet down drainage from the outfall where the highest PID reading - 95 ppm - was observed during the screening.

5.10 PRS 16-026(d)

Seven surface analytical samples and four subsurface analytical samples were collected at PRS 16-026(d). Also, six surface screening samples were collected.

5.10.1 Sample Depths and Locations

Sampledepths and locations are listed in Table 5.10.1. Sample locations are also illustrated in Figure 5. 10.1.

Table 5.10.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0132	16-1465	Outfall at bldg 303	0-6 inches
0316-95-0133	16-1465	Outfall at bldg 303	7-12 inches*
Soil/interface	16-1465	10 inches	
0316-95-0134	16-1465	Outfall at bldg 303	3-5 feet^
0316-95-0135	16-1656	5-8 ft. from outfall	0-6 inches
0316-95-0136	16-1656	5-8 ft. from outfall	6-10 inches*
Soil/interface	16-1465	8 inches	
0316-95-0137	16-1656	5-8 ft. from outfall	6-10 inches
0316-95-0138	16-1466	39 ft. fr outfall in drainage	0-6 inches
0316-95-0139	16-1467	59 ft. fr outfall in drainage	0-6 inches
0316-95-0140	16-1468	79 ft. fr outfall in drainage	0-6 inches
0316-95-0141	16-1469	189 ft. fr outfall in drainage	0-6 inches
0316-95-0142	16-1470	229 ft. fr outfall in drainage	0-6 inches
0316-95-1034	16-1828	109 ft. fr outfall in drainage	0-6 inches
0316-95-1035	16-1829	149 ft. fr outfall in drainage	0-6 inches
0316-95-1036	16-1830	189 ft. fr outfall in drainage	0-6 inches
0316-95-1037	16-1831	229 ft. fr outfall in drainage	0-6 inches
0316-95-1038	16-1832	249 ft. fr outfall in drainage	0-6 inches
0316-95-1039	16-1833	289 ft. fr outfall in drainage	0-6 inches

*=Sampled using a hand auger
^= Sampled using the split spoon

5.10.2 Screening Results

The screening results were non-detects or were below or at background.

5.10.3 Deviations from the OU 1082 RFI Work Plan

The PRS 16-026(d) drainage was not screened for 500 feet because the drainage is less than 500 feet long. At 289 feet from the PRS 16-026(d) outfall, the drainage passes under the building 305 drive and resurfaces at the PRS 16-026(c) outfall.

5.11 PRS 16-026(e)

Seven surface analytical samples and four subsurface analytical samples were collected at PRS

16-026(e). Also, seven surface screening samples were collected.

5.11.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.11.1 Sample locations are also illustrated in Figure 5.11.1.

TABLE 5.11.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0143	16-1471	Outfall location Bldg. 301	0-6 inches
0316-95-0144	16-1471	Outfall location Bldg. 301	21-27 inches
Soil/tuff interface	16-1471	2 feet	
0316-95-0145	16-1471	Outfall location Bldg. 301	5.5-7.0 feet^
0316-95-0146	16-1657	10 ft. from outfall	0-8 inches
0316-95-0147	16-1657	10 ft. from outfall	9-15 inches
Soil/tuff interface	16-1657	12 inches	7.5-9.0 feet^
0316-95-0148	16-1657	10 ft. from outfall	0-6 inches
0316-95-0149	16-1472	22 ft from outfall drainage	0-6 inches
0316-95-0150	16-1473	42 ft from outfall drainage	0-6 inches
0316-95-0151	16-1474	62 ft from outfall drainage	0-6 inches
0316-95-0152	16-1475	182 ft from outfall drainage	0-6 inches
0316-95-0153	16-1476	342 ft from outfall drainage	0-6 inches
0316-95-1049	16-1853	102 ft from outfall drainage	0-6 inches
0316-95-1050	16-1854	142 ft from outfall drainage	0-6 inches
0316-95-1051	16-1855	182 ft from outfall drainage	0-6 inches
0316-95-1052	16-1856	222 ft from outfall drainage	0-6 inches
0316-95-1053	16-1857	262 ft from outfall drainage	0-6 inches
0316-95-1054	16-1858	302 ft from outfall drainage	0-6 inches
0316-95-1055	16-1859	342 ft from outfall drainage	0-6 inches

*= sampling using a hand auger
^= sampled using the split spoon

5.11.2 Screening Results

There was an organic vapor (PID) reading of 3 ppm in the split spoon sampler for sample 0316-95-0148. The other screening results were non-detects or were below or at background.

5.11.3 Deviations from the OU 1082 RFI Work Plan

The drainage was not screened for 500 feet because the drainage is less than 500 feet long, At 342 feet from the PRS 16-026(e) outfafl, the drainage passes under the building 303 drive and resurfaces at the PRS 16-026(d) outfall.

5.12 PRS 16-003(a)

Seven surface analytical samples and three subsurface analytical samples were collected in PRS 16-003(a). Also, fourteen surface screening samples were collected.

5.12.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.12. 1. Sample locations are also illustrated in Figure 5.12. 1.

TABLE 5.12.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0256	16-1587	outfall location Bldg. 410	0-6 inches
0316-95-0257	16-1587	outfall location Bldg. 410	3-4 feet^
SoiVtuff interface	16-1587	3.5 feet	
0316-95-0258	16-1587	outfall location Bldg. 4 1 0	5.5-6.5 feet ^
0316-95-0259	16-6666	15 ft7Tro-m outfall	1 0-6 inches
0316-95-0260	16-1666	-f 5 ft@fro@m outfall	8-12 inches*
Soil/tuff interface	16-1666	10 inches	
0316-95-0261	16-1666	15 ft from outfall	Not Collected
0316-95-OT62	16-1588	60 ft. fr outfall in drainage	0-6 inches
0316-95-0263	16-1589	70 ft. fr outfall, in drainage	0-6 inches
0316-95-0264	16-1590	TO ft fr outfall, in drainage	0-6 inches
0316-95-0265	16-1591	170 ft. fr outfall in drainage	0-6 inches
0316-95-0266	16-1592	5 1 0 ft. fr outfall in drainage	0-6 inches
0316-95-1266	16-1588	60 ft. fr outfall in drainage	0-6 inches
0316-95-1267	16-1589	70 ft. fr outfall in drainage	0-6 inches
0316-95-1268	16-1590	90 ft. fr outfall in drainage	0-6 inches
0316-95-1269	16-2053	130 ft. fr outfan in drainage	0-6 inches
0316-95-1270	16-1591	170 ft. fr outfall in drainage	0-6 inches
0316-95-1271	16-2055	2 1 0 ft. fr outfall in drainage	0-6 incaes
0316-95-1272	16-2056	230 ft. fr outfall in drainage	0-6 inches
0316-95-1273	16-2057	270 ft. fr outfafl in drainage	0-6 inches
0316-95-1274	16-2058	3 1 0 ft. fr outfall in drainage	0-6 inches
0316-95-1275	16-2059	350 ft. fr outfall in drain	0-6 inches
0316-95-1276	16-2060	390 ft. :fr. outfall in drainage	0-6 inches
0316-95-1277	16-2061	430 ft.. fr. outfall in drainage	0-6 inches
0316-95-1278	16-2062	470 ft. fr outfall in drainage	0-6 inches
0316-95-1379	16-1592	5 1 0 ft. fr outfall in drainage	0-6 inches

*= Sampled using a hand auger
^= sampled using the split spoon (Minute Man Drill Rig)

5.12.2 Screening Results

The screening results for all sainples were non-detects or were below or at background,

5.12.3 Deviations from the OU 1082 RFI Work Plan

The 16-003(a) outfall was drilled using the Minuteman Mobile Drill Rig because the field team was not able to access the area with the hollow-stem Auger drill rig. The first sediment catchment could not be drilled with the Minuteman rig due to the steep, densely vegetated slope and the difficult terrain surrounding the down drainage locations. Therefore, sample 03 16-95-026 1, which is the bottom of the borehole sample at 16-1666, was not collected.

5.13 PRS 16-006(c)

Four surface analytical samples and four subsurface analytical samples were collected in PRS 16-006(c). Also, nine subsurface screening samples were collected.

5.13.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.13. 1. Sample locations are also illustrated in Figure 5.13. 1.

Table 5.13.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0289	16-1615	Septic Proiximal Bldg 270	2.5-4.0 feet^
0316-95-0290	16-1615	Septic Proiximal Bldg 270	5-6 feet^
0316-95-0291	16-1616	Septic Proiximal Bldg 270	0-1 feet^
0316-95-0292	16-1616	Septic Proiximal Bldg 270	1.0-3.5 feet^
0316-95-0293	16-1614	Septic Proiximal Bldg 270	0-6 inches
0316-95-0294	16-1614	Septic Proiximal Bldg 270	6-8 inches
0316-95-0295	16-1612	2.5 ft. fr. outfall	0-6 inches
0316-95-0296	16-1613	5.0 ft. fr. outfall	0-6 inches
0316-95-1746	16-1615	Septic Proiximal Bldg 270	0-1 feet^
0316-95-1747	16-1615	Septic Proiximal Bldg 270	1-2 feet^ no recovery
0316-95-1748	16-1615	Septic Proiximal Bldg 270	2-3 feet^
0316-95-1749	16-1615	Septic Proiximal Bldg 270	3-4 feet^
0316-95-1750	16-1615	Septic Proiximal Bldg 270	4-5 feet^ no recovery
0316-95-1751	16-1615	Septic Proiximal Bldg 270	5-6 feet^
Soil/tuff interface	16-1615	5 feet	
0316-95-1752	16-1615	Septic Proiximal Bldg 270	6-7 feet^
0316-95-1753	16-1615	Septic Proiximal Bldg 270	7-8 feet^
0316-95-1769	16-1616	Septic Proiximal Bldg 270	0-1 feet^
0316-95-1770	16-1616	Septic Proiximal Bldg 270	1-2 feet^
Soil/tuff interface	16-1616	2 feet	
0316-95-1771	16-1616	Septic Proiximal Bldg 270	2-3 feet ^

*= sampled using a hand auger
^= sampled using the split spoon

5.13.2 Screening Results

The screening results for all samples were non-detects or were below or at background. However, in borehole 16-1616 the P.I.D readings of the cuttings and down the borehole were elevated. In the interval from 0 to 2 feet, the P.I.D. measurement of the cuttings was 120 ppm; the down hole reading was 4 ppm. In the interval from 3 to 4.5 feet the P.I.D. measurement of the cuttings was 50 ppm; the down hole reading was 10 ppm.

5.13.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is not enough material for a full suite analysis. Also, Borehole 16-1616, the distal drainline borehole, is located approximately two-thirds of the distance down the drainline due to the difficult terrain farther down drainage.

5.13.4 Comments

At the proximal borehole location, the field team investigated the septic tank to determine the depth of the drainline and where the drainline exits the tank. The drill rig was then sighted over the estimated location of the drainline, just down drainage from the tank. VCP was not recovered in the cuttings or in the split-spoon sampler during the drilling of borehole 16-1615. However, during drilling at the estimated depth of the drain line there was a grinding noise characteristic of the hollow-stem auger turning on VCP. Furthermore, the drill rig met temporary refusal at this depth and then suddenly advanced rapidly through the next half-foot interval. The grinding noise indicates that the drainline pipe was contacted and, most likely, the auger then penetrated through or collapsed the VCP. The sample prescribed for the depth of the drainline was collected at the interval from 2.5 to 4.0 feet. The field team is confident that this depth brackets the depth of the drainline based on both the estimated depth of the drainline and our drilling experiences

mentioned above.

The drain line pipe was not located during a potholing effort at 16-1616, the distal borehole. The field team suspects that the drain line was removed in this location. There are pieces of VC pipe and tuff cobbles littering the surface in the region where the drain line should be. The borehole was positioned along the line of sight from the outfall to the septic tank. Five potholes were drilled to a depth of at least 2 feet into tuff in an attempt to locate the drainline. The potholes were drilled across a transect perpendicular to the line of sight. The analytical samples were collected from the borehole with the highest PID readings because the drain line was not intersected during the potholing effort. The borehole with the highest PID readings was the initial test hole located along the line of sight of the drain line pipe.

5.14 PRS 16-006(d)

Six subsurface analytical samples and nineteen subsurface screening samples were collected at PRS 16-006(d).

5.14.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.14. illustrated in Figure 5.14. 1.

Sample locations are also illustrated in figure 5.14.1.

TABLE 5.14.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0297	16-1617	Septic Proximal Bldg 380	2-4.0 feet^
0316-95-0298	16-1617	Septic Proximal Bldg 380	4-6.5 feet^
0316-95-0299	16-1617	Septic N. Proximal Bldg 380	2-3 feet^
0316-95-0300	16-1617	Septic N. Proximal Bldg 380	4.5-6.5 feet^
0316-95-0301	16-1617	Septic S. Proximal Bldg 380	3-4 inches
0316-95-1673	16-1617	Septic S. Proximal Bldg 380	0-1 inches
0316-95-1674	16-1617	Septic Proximal Bldg 380	1-2 inches
0316-95-1675	16-1617	Septic Proximal Bldg 380	2-3 inches
0316-95-1676	16-1617	Septic Proximal Bldg 380	3-4 feet^
Soil/tuff interface	16-1617	4 feet	
0316-95-1677	16-1617	Septic Proximal Bldg 380	4-5 feet^
0316-95-1678	16-1617	Septic Proximal Bldg 380	5-6 feet^
0316-95-1688	16-1618	Septic N. Proximal Bldg 380	0-1. feet^
0316-95-1689	16-1618	Septic N. Proximal Bldg 380	1-2 feet^ No recovery
0316-95-1690	16-1618	Septic N. Proximal Bldg 380	2-3 feet^ No recovery
0316-95-1691	16-1618	Septic N. Proximal Bldg 380	3-4 feet^ No recovery
0316-95-1692	16-1618	Septic N. Proximal Bldg 380	4-5 feet^
Soil/tuff interface	16-1618	5 feet	
0316-95-1693	16-1618	Septic N. Proximal Bldg 380	5-6 feet^
0316-95-1694	16-1618	Septic N. Proximal Bldg 380	6.5-7.0 feet^
0316-95-1695	16-1618	Septic N. Proximal Bldg 380	7.0-8.5 feet^
0316-95-1703	16-1619	Septic S. Proximal Bldg 380	0-1 feet ^
0316-95-1704	16-1619	Septic S. Proximal Bldg 380	1-2 feet ^
0316-95-1705	16-1619	Septic S. Proximal Bldg 380	2-3 feet ^
0316-95-1706	16-1619	Septic S. Proximal Bldg 380	3-4 feet ^
0316-95-1707	16-1619	Septic S. Proximal Bldg 380	4-5 feet ^
Soil/tuff interface	16-1619	4-5 feet	
0316-95-1708	16-1619	Septic S. Proximal Bldg 380	5-6 feet ^
0316-95-1709	16-1619	Septic S. Proximal Bldg 380	6-7 feet ^

0316-95-1710	16-1619	Septic S. Proximal Bldg 380	7-8 feet ^
0316-95-1711	16-1619	Septic S. Proximal Bldg 380	8-9 feet ^

5.14.2 Screening Results

Significant screening results and any values above background are listed in Table 5.14.2. The other screening results were non-detects or were at or below background.

TABLE 5.14.2
Screening Results

Sample ID	Location ID	Screening Method/ Result
0316-95-1674	16-1617	PID : 2ppm
0316-95-1689	16-1618	PID : 30ppm
0316-95-1690	16-1618	PID : 160ppm
0316-95-1694	16-1618	PID : 14ppm
0316-95-1695	16-1618	PID : 14ppm

5.14.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is not enough material for full suite analysis.

In borehole 16-1619, the depth of the drain line pipe was not sampled because material was not recovered from this interval. The interval directly below the depth of the drain line pipe was sampled instead.

5.14.4 Comments

The three boreholes were located using the results of a GPR Geophysical Survey.

Borehole 16-1617, the proximal borehole, is located near the distribution box. The drain line VC pipe was intersected at a depth of 2 feet as indicated by the significant volume of engineering fill gravels and fragments of VC pipe recovered in the cuttings. Refusal was met at 3 feet due to a subsurface structure associated with the distribution box. The drill rig was re-sighted 10 feet down gradient from the distribution box in order to avoid the subsurface structure. A test hole was dfflled to a depth of 5.5 feet and intersected the VC pipe at a depth of 2.0 feet. Fragments of the pipe and a significant volume of engineering fill gravels were brought up in the cuttings. The drill rig was again re-sighted one foot further down gradient and borehole 16-1617 was drilled.

Borehole 16-1618, the northern disw borehole, is located along the northern drain line pipe. The VC pipe was intersected at a depth of 2.0 feet. This was indicated by the characteristic scraping noise of the drill rig grinding on the VC pipe, the significant volume of engineering fill gravels in the cuttings, and the fragments of VC pipe in the cuttings. There were elevated PID readings in borehole 16-1618. The highest PID reading corresponded to the depth of the drain line pipe. This interval was sampled.

Borehole 16-1619, the southern distal borehole, is located along the southern drain line pipe. The VC pipe was intersected at a depth of 2.0 feet. This was indicated by the characteristic scraping noise of the drill rig grinding on the VC pipe, the significant volume of engineering fill gravels in the cuttings, and the fragments of VC pipe in the cuttings. There was no recovery in the interval that bracketed the drain line pipe. Therefore, an analytical sample was not collected from the depth of the drain line pipe. The interval directly below the drain line pipe (3-4 feet) was sampled.

5.15 PRS 16-003(n)

Four subsurface analytical samples and six surface analytical samples were collected at PRS 16-003(n). Also, fourteen surface screening samples were collected.

5.15.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.15. Sample locations are also illustrated in Figure 5.15.1

Table 5.15.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0214	16-1529	outfall at bldg. 342	0-6 inches
0316-95-0215	16-1529	outfall at bldg. 342	2-2.5 feet*
Soil/tuff interface	16-1529	2-5 feet	
0316-95-0216	16-1529	outfall at bldg. 342	4-5 feet^
0316-95-0217	16-1662	12fr outfall at bldg. 342	Not collected
0316-95-0218	16-1662	12fr outfall at bldg. 342	0-2 inches
Soil/tuff interface	16-1662	2 inches	
0316-95-0219	16-1662	12fr outfall at bldg. 342	2.5-3.5 feet^ MM
0316-95-0220	16-1530	62 fr outfall at bldg. 342	0-6 inches
0316-95-0221	16-1531	82 outfall at bldg. 342	0-6 inches
0316-95-0222	16-1532	102 outfall at bldg. 342	0-6 inches
0316-95-0223	16-1533	302 outfall at bldg. 342	0-6 inches
0316-95-0224	16-1534	422 outfall at bldg. 342	0-6 inches
0316-95-1211	16-1975	27 outfall in drain	0-6 inches
0316-95-1212	16-1976	47 outfall in drain	0-6 inches
0316-95-1213	16-1530	62 outfall in drain	0-6 inches
0316-95-1214	16-1531	82 outfall in drain	0-6 inches
0316-95-1215	16-1532	102 outfall in drain	0-6 inches
0316-95-1217	16-1981	142 outfall in drain	0-6 inches
0316-95-1218	16-1982	182 outfall in drain	0-6 inches
0316-95-1219	16-1983	222 outfall in drain	0-6 inches
0316-95-1220	16-1984	262 outfall in drain	0-6 inches
0316-95-1221	16-1985	302 outfall in drain	0-6 inches
0316-95-1222	16-1986	342 outfall in drain	0-6 inches
0316-95-1223	16-1987	382 outfall in drain	0-6 inches
0316-95-1224	16-1534	422 outfall in drain	0-6 inches
0316-95-1225	16-1989	462 outfall in drain	0-6 inches

*= sampled using a hand auger
^= sampled using the split spoon
MM= Minute Man Drill Rig was used to collect the sample

5.15.2 Screening Results

Significant screening results and any values above background are listed in Table 5.15.2. The other screening results were non-detects or were at or below background.

Table 5.15.2
Screening Results

Sample ID	Location ID	Screening Method/Result
0316-95-0214	16-1529	PID : 2ppm
0316-95-0218	16-1662	HE spot test: Positive
0316-95-1211	16-1975	HE spot test: Positive
0316-95-1212	16-1976	HE spot test: Positive

5.15.3 Deviations from the OU 1082 RFI Work Plan

At the first sediment trap down drainage from the outfall a surface analytical sample (0316- 95-0217) was not collected. The soil/ tuff interface is only 2 inches deep at this location and therefore only a soil/ tuff interface sample was collected.

5.16 PRS 16-003(o)

Eight subsurface analytical samples and eleven surface analytical samples were collected at PRS 16-003(o). Also, twenty-five surface screening samples were collected.

5.16.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.16.1. Sample locations are also illustrated in Figure 5.16.1.

Table 5.16.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0225	16-1536	outfall at bldg. 340	not collected
0316-95-00226	16-1536	outfall at bldg. 340	0-4 inches
Soil/tuff interface	16-1536	4 inches	
0316-95-0227	16-1536	outfall at bldg. 340	3.0-3.5 feet^
0316-95-0228	16-1663	18fr outfall at bldg. 340	Not collected
0316-95-0229	16-1663	102fr outfall at bldg. 340	0-4 inches
Soil/tuff interface	16-1663	2-3 inches	
0316-95-0230	16-1663	18fr outfall at bldg. 340	6-18 inches^ MM
0316-95-0231	16-1669	102 fr outfall at bldg. 340	0-6 inches
0316-95-0232	16-1670	142 outfall at bldg. 340	0-6 inches
0316-95-0233	16-1671	182 outfall at bldg. 340	0-6 inches
0316-95-0498	16-2023	162 outfall at bldg. 340	0-6 inches
0316-95-0499	16-2024	302 outfall at bldg. 340	0-6 inches
0316-95-0234	16-1537	At the aerator outfall,340	0-6 inches
0316-95-0235	16-1537	At the aerator outfall,340	18-24 inches*
Soil/tuff interface	16-1537	24 inches	
0316-95-0236	16-1537	At the aerator outfall,340	2.5-3.5feet^
0316-95-0237	16-1537	20 ft. fr. Aerator in drainage	Not collected
0316-95-0238	16-1537	30 ft. fr. Aerator in drainage	0-4 inches
Soil/tuff interface	16-1537	0-6 inches	
0316-95-0239	16-1537	20 ft. fr. Aerator in drainage	2.5-3.5feet^
0316-95-0240	16-1538	50 ft. fr. Aerator in drainage	0-6 inches
0316-95-0241	16-1539	50 ft. fr. Aerator in drainage	0-6 inches
0316-95-0242	16-1540	70 ft. fr. Aerator in drainage	0-6 inches
0316-95-0243	16-1541	190 ft. fr. Aerator in drainage	0-6 inches
0316-95-0244	16-1542	410ft. fr. Aerator in drainage	0-6 inches
0316-95-1226	16-2000	22ft. fr. outfall in drainage	0-6 inches
0316-95-1227	16-2001	42 ft. fr. outfall in drainage	0-6 inches
0316-95-1228	16-2002	62 ft. fr. outfall in drainage	0-6 inches
0316-95-1229	16-1538	30ft. fr. Aerator in drainage	0-6 inches
0316-95-1230	16-1539	50 ft. fr. Aerator in drainage	0-6 inches
0316-95-1231	16-1540	70 ft. fr. Aerator in drainage	0-6 inches
0316-95-1232	16-2006	110 ft. fr. Aerator in drainage	0-6 inches
0316-95-1233	16-2007	150ft. fr. Aerator in drainage	0-6 inches
0316-95-1234	16-1541	190 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1235	16-2009	230 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1236	16-2010	290 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1237	16-2011	330 ft. fr. Aerator I in drainage	0-6 inches

Sample ID	Location ID	Location Description	Sample Depth
0316-95-1238	16-2012	370 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1239	16-1542	410 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1240	16-2014	450 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1241	16-2015	500 ft. fr. Aerator I in drainage	0-6 inches
0316-95-1242	16-2016	72 ft. fr. outfall in drainage	0-6 inches
0316-95-1243	16-2017	82 ft. fr. outfall in drainage	0-6 inches
0316-95-1244	16-2018	92 ft. fr. outfall in drainage	0-6 inches
0316-95-1245	16-1669	102 ft. fr. outfall in drainage	0-6 inches
0316-95-1261	16-1770	142 ft. fr. outfall in drainage	0-6 inches
0316-95-1262	16-1771	182 ft. fr. outfall in drainage	0-6 inches
0316-95-1263	16-2022	222ft. fr. outfall in drainage	0-6 inches
0316-95-1264	16-2023	262ft. fr. outfall in drainage	0-6 inches
0316-95-1265	16-2024	302 ft. fr. outfall in drainage	0-6 inches

*= sampled using a hand auger
^= sampled using the split spoon
MM= Minute Man Drill Rig was used to collect the sample

5.16.2 Screening Results

Significant screening results and any values above background are listed in Table 5.16.2. The other screening results were non-detects or were at or below background.

Table 5.16.2
Screening Results

Sample ID	Location ID	Screening Method/ Result
0316-95-0226	16-1536	HE spot test: Positive
0316-95-0227	16-1536	PID : 13ppm
0316-95-0229	16-1663	HE spot test: Positive
0316-95-1226	16-2000	HE spot test: Positive
0316-95-1227	16-2001	HE spot test: Positive
0316-95-1228	16-2002	HE spot test: Positive
0316-95-1242	16-2016	HE spot test: Positive
0316-95-1243	16-2017	HE spot test: Positive
0316-95-1244	16-2018	HE spot test: Positive

5.16.3 Deviations from the OU 1082 RFI Work Plan

The HE screening in the upper part of the drainage was conducted on a 20 foot interval instead of a 10 foot interval. The team resumed screening on a 10 foot interval at 62 feet down drainage. This turned out to be insignificant because HE contamination extends to a distance of at least 92 feet based on the HE spot test kit.

At the outfall location, at the first sediment trap down drainage from the outfall, and at the first sediment trap down drainage from the discharge of the aerator, a surface analytical sample was not collected. The uncollected samples are 0316-95-0225, 0316-95-0228, and 0316-95-0237. The soil/ tuff interface is 4 inches deep or less at these locations and therefore only a soil/ tuff interface sample was collected.

Boreholes 16-1536, 16-1663, and 16-1537 were not drilled 3 feet into tuff. In all three boreholes the specified depth of the deepest sample was not reached because the sampling team met refusal during drilling at a shallower depth. Details are discussed in Section 5.16.4.

5.16.4 Comments

At Borehole 16-1536, the Simco Drill Rig was used to collect the deepest sample. At this location, there is only 2-3 inches of soil that overlies the tuff. Also, the tuff at this location is highly compacted. Getting the bit started into highly compacted tuff with little soil to guide the drill string is very difficult. When the rotation of the drill string is initiated, the drill string moves laterally down the top of the bedrock, instead of boring vertically into the tuff. The sampling team was able to control this problem by using the drill stem guide and varying the combination of downward movement and rotational speed of the drill string. Even after getting started, drilling remained extremely slow and difficult. Using the standard drill bit, the team met refusal at 3 feet. The team was able to extend the depth of refusal to 3.5 feet using a specially built combination drill bit. Sample 0316-95-0227 was collected from the 3' to 3'6" interval, 2'911 to 3'3" in to tuff.

The Minute Man Drill Rig was needed to drill borehole 16-1663 because the Simco drill rig could not be driven to this location. The sarne soil and tuff conditions exist at Borehole 16- 1663 as at Borehole 16-1536. However, the Minute Man Drill Rig has significantly less downward power than the Simco Drill Rig. Refusal was met at an even shllower depth, The sampling team was only able to reach a total depth of 18 inches, I foot into tuff. The Minute Man Drill Rig was also needed to drill Borehole 16-1537. The tuff is also highly compacted at this location, making the drilling difficult. The sampling team met refusal at 3.5 feet total depth, 1.5 feet into tuff.

The positive screening results for HE in the upper drainage start at the outfall location and end 92 feet from the outfall. There were no positive screening results for HE further than 92 feet ftom the outfall.

5.17 PRS16-026(v)

Three subsurface analytical samples and seven surface analytical samples were collected at PRS 16-026(v). Also, fourteen surface screening samples were collected.

5.17.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.17.1. Sample locations are also illustrated in Figure 5.17.1.

TABLE 5.17.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0188	16-1513	outfall at bldg. 460	0-2 inches
0316-95-0189	16-1513	outfall at bldg. 460	2-12 inches^MM
Soil/tuff interface	16-1513	5 inches	
0316-95-0190	16-1513	outfall at bldg. 460	2.0-3.5 feet^
0316-95-0191	16-1659	6 ft fr outfall at bldg. 460	0-4 inches
0316-95-0192	16-1659	6 ft fr outfall at bldg. 460	Not Collected
Soil/tuff interface	16-1659	4 inches	
0316-95-0193	16-1659	6 ft fr outfall at bldg. 460	2.5-4.0 feet^
0316-95-0194	16-1514	17 ft fr outfall at bldg. 460	0-6 inches
0316-95-0195	16-1515	37 ft fr outfall at bldg. 460	0-6 inches
0316-95-0196	16-1516	57 ft fr outfall in drainage	0-6 inches
0316-95-0197	16-1517	340 ft fr outfall in drainage	0-6 inches
0316-95-0198	16-1518	500 ft fr outfall in drainage	0-6 inches
0316-95-1106	16-1514	17 ft fr outfall in drainage	0-6 inches
0316-95-1107	16-1515	37 ft fr outfall in drainage	0-6 inches
0316-95-1108	16-1516	57 ft fr outfall in drainage	0-6 inches

0316-95-1109	16-1928	100 ft fr outfall in drainage	0-6 inches
0316-95-1110	16-1929	140 ft fr outfall in drainage	0-6 inches
0316-95-1111	16-1930	180 ft fr outfall in drainage	0-6 inches
0316-95-1112	16-1931	220 ft fr outfall in drainage	0-6 inches
0316-95-1113	16-1932	260ft fr outfall in drainage	0-6 inches
0316-95-1114	16-1933	300 ft. fr. outfall in drainage	0-6 inches
0316-95-1115	16-1517	340 ft. fr. outfall in drainage	0-6 inches
0316-95-1116	16-1935	380 ft. fr. outfall in drainage	0-6 inches
0316-95-1117	16-1936	420ft. fr. outfall in drainage	0-6 inches
0316-95-1118	16-1937	460 ft. fr. outfall in drainage	0-6 inches
0316-95-1119	16-1518	500 ft. fr. outfall in drainage	0-6 inches

*= sampled using a hand Auger
^= sampled using the split spoon
MM= Minute Man Drill Rig was used to collect the sample

5.17.2 Screening Results

Significant screening results and any values above background are listed in Table 5.17.2, The other screening results were non-detects or were at or below background.

TABLE 5.17.2
Screening Results

Sample ID	Location ID	Screening Method/Result
0316-95-0189	16-1513	PID : 2 ppm
0316-95-0190	16-1513	PID : 2 ppm

5.17.3 Deviations from the OU 1082 RFI Work Plan

Sample 0316-95-0192 was not collected because the soil/ tuff interface is at a depth of 4 inches.

Borehole 16-1513 was not drilled 3 feet into tuff. The prescribed depth of the deepest sample was not reached because the sampling team met refusal at a shAllower depth. DeWls are discussed in Section 5.16.4.

5.17.4 Comments

The Minute Man Drill Rig was needed to drill Borehole 16-1513 since the Simco Drill Rig could not be driven to this location. The tuff is moderately to highly compacted at this location. The drilling was slow and the sampling team eventually met refusal at 3.5 feet, only 2.5 feet into tuff.

5.18 PRS 16-030(g)

Five subsurface analytical samples and seven surface analytical samples were collected at PRS 16-030(g). Also, twelve surface screening samples were collected.

5.18.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.18.1. Sample locations are also illustrated in Figure 5.18.1.

TABLE 5.18. 1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth

0316-95-0267	16-1606	outfall at bldg. 380	0-6 inches
0316-95-0268	16-1606	outfall at bldg. 380	6-18 inches
0316-95-0505	16-1606	outfall at bldg. 380	8.5-9.5 feet^
Soil/tuff interface	16-1606	9 feet	2.0-3.5 feet^
0316-95-0269	16-1606	outfall at bldg. 380	11-12 feet^
0316-95-0270	16-1668	16 ft fr outfall at bldg. 380	0-6 inches
0316-95-0271	16-1668	16 ft fr outfall at bldg. 380	6-10 inches
Soil/tuff interface	16-1668	4 feet	
0316-95-0272	16-1668	16 ft fr outfall at bldg. 380	5-7 feet ^MM
0316-95-0273	16-1607	26 ft fr outfall in drainage	0-6 inches
0316-95-0274	16-1608	46 ft fr outfall in drainage	0-6 inches
0316-95-0275	16-1609	66 ft fr outfall in drainage	0-6 inches
0316-95-0276	16-1610	191 ft fr outfall in drainage	0-6 inches
0316-95-0277	16-1611	315ft fr outfall in drainage	0-6 inches
0316-95-1122	16-1607	26ft fr outfall in drainage	0-6 inches
0316-95-1123	16-1608	46 ft fr outfall in drainage	0-6 inches
0316-95-1124	16-1609	66 ft fr outfall in drainage	0-6 inches
0316-95-1125	16-2133	106 ft fr outfall in drainage	0-6 inches
0316-95-1126	16-2134	151ft fr outfall in drainage	0-6 inches
0316-95-1127	16-1610	191ft fr outfall in drainage	0-6 inches
0316-95-1128	16-2136	235 ft fr outfall in drainage	0-6 inches
0316-95-1129	16-2137	275 ft fr outfall in drainage	0-6 inches
0316-95-1130	16-1611	315 ft fr outfall in drainage	0-6 inches
0316-95-1131	16-2139	365 ft fr outfall in drainage	0-6 inches
0316-95-1132	16-2140	405 ft fr outfall in drainage	0-6 inches
0316-95-1133	16-2141	450 ft fr outfall in drainage	0-6 inches

*= sampled using a hand Auger
^= sampled using the split spoon
MM= Minute Man Drill Rig was used to collect the sample

5.18.2 Screening Results

The screening results for all PRS 16-030(g) samples were non-detects or were below or at background.

5.18.3 Deviations from the OU 1082 RFI Work Plan

The drainage was not screened for 500 feet because the drainage is less than 500 feet long. At 450 feet the drainage drops off the edge of a tuff cliff and joins with Water Canyon.

An additional sample (0316-95-0505) was collected at Borehole 16-1606 because the soil/ tuff interface sample (0316-95-0268) was initially sampled at the incorrect depth. Details are discussed in Section 5.18.4.

The soil/ tuff interface sample (0316-95-0271) at Borehole 16-1668 was not collected at the soiv tuff interface. Details are discussed in Section 5.18.4.

5.18.4 Comments

The surface sample and the soil/ tuff interface sample for Borehole 16-1606 were sampled using the spade and scoop and the hand auger methods. Both samples were collected at an earlier date than the subsurface sample collected using the drill rig. While drilling Borehole 16-1606, the sampling team recognized that the soil/ tuff interface was significantly deeper than reported during collection of sample 0316-95-0268. Because the soiv tuff interface was not represented by sample 0316-95-0268, the sampling team collected an additional sample, 0316-95-0505, at the interval bracketing the soil/ tuff interface.

Sample 0316-95-0271 was collected using a hand auger. During sample collection the sampling team met refusal at 10 inches. The team recovered tuff in the sample and assumed they had Auger into the top of the tuff. However, during drilling the sampling team identified the depth to tuff to be 4 feet. Most likely the sampling team hit a large tuff cobble with the hand auger and not the soil/ tuff interface.

5.19 PRS 16-010(a)

Eight subsurface analytical samples and five surface analytical samples were collected at PRS 16-010(a). Also, thirty surface screening samples were collected.

5.19.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.19.1. Sample locations are also illustrated in Figure 5.19.1.

TABLE 5.19.1: Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0383	16-1343	Grid location 20,40:16-486	0-6 inches
0316-95-0384	16-1343	Grid location 20,40:16-486	6-18 inches
Soil/tuff interface	16-1343	2.5 feet	
0316-95-0385	16-1343	Grid location 20,40:16-486	2.0-3.5 feet^
0316-95-0386	16-1344	Grid location 20,60:16-486	11-12 feet^
Soil/tuff interface	16-1344	<2 feet	
0316-95-0387	16-1344	Grid location 20,60:16-486	6-10 inches
0316-95-0388	16-1344	Grid location 20,60:16-486	
0316-95-0389	16-1345	Grid location 20,100:16-486	5-7 feet ^MM
Soil/tuff interface	16-1345	Grid location 20,100:16-486	0-6 inches
0316-95-0390	16-1345	Grid location 20,100:16-486	0-6 inches
0316-95-0391	16-1345	Grid location 20,100:16-486	0-6 inches
0316-95-0392	16-2167	Grid location 20,100:16-486	0-6 inches
0316-95-2017	16-2167	Grid location 20,100:16-486	0-6 inches
Soil/tuff interface	16-2167	Grid location 20,100:16-486	0-6 inches
0316-95-0393	16-2167	Grid location 20,100:16-486	0-6 inches
0316-95-0394	16-2167	Grid location 20,100:16-486	0-6 inches
0316-95-1496	N/A	Grid: 0,0	0-6 inches
0316-95-1497	N/A	Grid: 0,20	0-6 inches
0316-95-1498	N/A	Grid: 0,40	0-6 inches
0316-95-1499	N/A	Grid: 0,60	0-6 inches
0316-95-1500	N/A	Grid: 0,80	0-6 inches
0316-95-1501	N/A	Grid: 0,100	0-6 inches
0316-95-1502	N/A	Grid: 20,0	0-6 inches
0316-95-1503	N/A	Grid: 20,20	0-6 inches
0316-95-1504	16-1343	Grid: 20,40	0-6 inches
0316-95-1505	16-1344	Grid: 20,60	0-6 inches
0316-95-1506	N/A	Grid: 20,80	0-6 inches
0316-95-1507	N/A	Grid: 20,100	0-6 inches
0316-95-1508	N/A	Grid: 40,0	0-6 inches
0316-95-1509	N/A	Grid: 40,20	0-6 inches
0316-95-1510	N/A	Grid: 40,40	0-6 inches
0316-95-1511	N/A	Grid: 40,60	0-6 inches
0316-95-1512	N/A	Grid: 40,80	0-6 inches
0316-95-1513	N/A	Grid: 40,100	0-6 inches
0316-95-1514	N/A	Grid: 60,0	0-6 inches
0316-95-1515	N/A	Grid: 60,20	0-6 inches
0316-95-1516	N/A	Grid: 60,40	0-6 inches
0316-95-1517	N/A	Grid: 60,60	0-6 inches

0316-95-1518	N/A	Grid: 60,80	0-6 inches
0316-95-1519	16-2167	Grid: 60,100	0-6 inches
0316-95-1520	N/A	Grid: 80,0,	0-6 inches
0316-95-1521	N/A	Grid: 80,20	0-6 inches
0316-95-1522	N/A	Grid: 80,40	0-6 inches
0316-95-1523	N/A	Grid: 80,60	0-6 inches
0316-95-1524	N/A	Grid: 80,80	0-6 inches
0316-95-1525	N/A	Grid: 80,100	0-6 inches

*= sampled using a hand auger
^= sampled using the split spoon
MM= Minute Man Drill Rig was used to collect the sample

5.19.2 Screening Results

Significant screening results and any values above background are listed in Table 5.19.2 The other screening results were non-detects or were at or below background.

TABLE 5.19.2
Screening Results

Sample ID	Location ID	XRF: Ba	LIBS: Ba	HE Spot Test
0316-95-1496	Grid 0,0	386 ppm	207 ppm	Negative
0316-95-1497	Grid 0,20	292 ppm	178 ppm	Negative
0316-95-1498	Grid 0,40	660 ppm	383 ppm	Negative
0316-95-1499	Grid 0,60	3318 ppm	2935 ppm	Negative
0316-95-1500	Grid 0,80	1182 ppm	868 ppm	Negative
0316-95-1501	Grid 0,100	268 ppm	186 ppm	Negative
0316-95-1502	Grid 20,0	294 ppm	159 ppm	Negative
0316-95-1503	Grid 20,20	370 ppm	214 ppm	Negative
0316-95-1504	16-1343	4624 ppm	2884 ppm	Negative
0316-95-1505	16-1344	4258 ppm	2038 ppm	Negative
0316-95-1506	Grid 20,80	1473 ppm	1435 ppm	Negative
0316-95-1507	16-1345	3645 ppm	2073 ppm	Negative
0316-95-1508	Grid 40,0	470 ppm	127 ppm	Negative
0316-95-1509	Grid 40,20	434 ppm	65 ppm	Negative
0316-95-1510	Grid 40,40	370 ppm	145 ppm	Negative
0316-95-1511	Grid 40,60	1612 ppm	1322 ppm	Negative
0316-95-1512	Grid 40,80	2753 ppm	2365 ppm	Negative
0316-95-1513	Grid 40,100	3455 ppm	293 ppm	Negative
0316-95-1514	Grid 60,0	433 ppm	200 ppm	Negative
0316-95-1515	Grid 60,20	432 ppm	157 ppm	Negative
0316-95-1516	Grid 60,40	584 ppm	212 ppm	Negative
0316-95-1517	Grid 60,60	457 ppm	231 ppm	Negative
0316-95-1518	Grid 60,80	482 ppm	326 ppm	Negative
0316-95-1519	16-2167	237 ppm	1336 ppm	Negative
0316-95-1520	Grid 80,0	388 ppm	95 ppm	Negative
0316-95-1521	Grid 80,20	338 ppm	84 ppm	Negative
0316-95-1522	Grid 80,40	632 ppm	262 ppm	Negative
0316-95-1523	Grid 80,60	522 ppm	244 ppm	Negative
0316-95-1524	Grid 80,80	543 ppm	235 ppm	Negative
0316-95-1525	Grid 80,100	487 ppm	194 ppm	Negative

5.19.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during the sampling effort at PRS 16-010(a).

5.19.4 Comments

The four analytical sample locations were chosen based on screening results. Borehole 16- 2167

was positive for HE and the other three boreholes were drilled at the locations highest in Ba. None of the Ba results were above SALs (5600 ppm).

A duplicate was taken at Borehole 16-2167. Sample 0316-95-2017 is a duplicate of the surface sarnple 0316-95-0392 and was collected because of a field indication of contamination.

5.20 PRS 16-007(a)

Three subsurface analytical samples and fourteen subsurface screening samples were collected at PRS 16-007(a).

5.20.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.20.1. Sample locations are also illustrated in Figure 5.20.1.

TABLE 5.20.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0001	16-1562	Northern pond (pond#1)	5-6 feet^
0316-95-0002	16-1560	Northern pond (pond#1)	3-4 feet^
0316-95-0003	16-1561	Northern pond (pond#1)	6-7'4"
0316-95-1281	16-1562	Northern pond (pond#1)	0-1 feet^
No Sample	16-1562	Northern pond (pond#1)	1-2 feet^ no recov.
0316-95-1282	16-1562	Northern pond (pond#1)	3-4 feet^
0316-95-1283	16-1562	Northern pond (pond#1)	4-5 feet^
0316-95-1284	16-1562	Northern pond (pond#1)	5-6 feet^
Soil/tuff interface	16-1562	Northern pond (pond#1)	Approximately 7 feet^
0316-95-1295	16-1560	Northern pond (pond#1)	0-1 feet^
No Sample	16-1560	Northern pond (pond#1)	1-2 feet^
0316-95-1296	16-1560	Northern pond (pond#1)	2-3 feet^
0316-95-1297	16-1560	Northern pond (pond#1)	3-4 feet^
0316-95-1298	16-1560	Northern pond (pond#1)	4-5 feet^
0316-95-1299	16-1560	Northern pond (pond#1)	5-6 feet^
0316-95-1300	16-1560	Northern pond (pond#1)	6'-7'4"^
Soil/tuff interface	16-1560	Northern pond (pond#1)	Approximately 7 feet^
0316-95-1310	16-1561	Northern pond (pond#1)	0-1 feet^
0316-95-1311	16-1561	Northern pond (pond#1)	1-2 feet^
0316-95-1312	16-1561	Northern pond (pond#1)	2-3 feet^
0316-95-1313	16-1561	Northern pond (pond#1)	3-4 feet^
Soil/tuff interface	16-1561	Northern pond (pond#1)	4-5 feet^

^= sampled using the split spoon

5.20.2 Screening Results

All screening results were non-detects or were below or at background

5.20.3 Deviations from the OU 1082 RFI Work Plan

Drilling and sampling were conducted in the northern pond only. No attempt was made to drill in the other three 16-007(a) ponds. Details are discussed in Section 5.20.4. None of the three boreholes were completed to a total depth of three feet into tuff. Details are also discussed in Section 5.20.4.

In addition, the drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch inner diameter (ID) split spoon is insufficient material for full suite analysis.

5.20.4 Comments

PRS 16-007(a) initially was not scheduled for the 1995 field campaign at OU 1082. The priority for sampling at 16-007(a) was moved up when the PRS was designated as a CAMU candidate. The LANL ER Program changed plans for the CAMU process shortly after the sampling campaign started at PRS 16-007(a). FU3 decided not to emphasize sampling at PRS 16-007(a) in response to the change in LANL's CAMU effort and because of the low probability of contamination at the PRS. When the field team encountered significant technical difficulties with drilling, FU3 decided to defer the remaining sampling at 16-007(a) to a future field campaign.

A thick colluvial wedge of tuff and dacite cobbles and boulders derived from the Pajarito fault scarp overlies much of the north-west section of TA-16. This material appears to persist throughout PRS 16-007(a) and created considerable problems with the subsurface investigation. Two different drill rigs and two different drilling methods were employed in an attempt to complete the specified sampling plan.

Drilling in the colluvium with the remote operated drill rigs was extremely slow and refusal and near refusal conditions were encountered repeatedly during the 16-007(a) investigation. The first two bore holes drilled in the northern pond had to be abandoned because the field team met refusal after drilling only a few feet. Also, the field team experienced significant problems with the recovery of sampleable material in the split-spoon throughout the drilling activities at 16-007(a). The sampling team switched to a sonic vibratory drilling method in an effort to enhance recovery. This technique improved recovery greatly but was very inefficient at drilling through the couuvium and proved incapable of penetrating the highly compacted Bandelier Tuff that underlies the backf'dled ponds. Ultimately, the field team had to use the sonic drilling method to conduct the screening within the colluvial profile (proceeding at an extremely slow rate) and then had to switch to a different, more powerful hollow-stem Auger rig in order to drill in the tuff. By repeatedly switching back and forth between the two drilling methods, the team was able to complete the three boreholes in pond # 1 down to at least the fill/ tuff interface.

An analytical sample was collected from each of the three pond # I boreholes. The field team targeted the fiU/tuff interface for sample collection on the speculation that there would be no elevated screening results in samples from the underlying tuff. This assumption was supported by the fact that all the analyses performed on the screening samples collected in the colluvium were non-detects.

Sample 0316-95-0003 in borehole 16-1561 was successfully recovered from the filv tuff interface. However, samples 0316-95-0001 and 0316-95-0002 were not collected from the interface. There was no recovery of material from the interval bracketing the fi1v tuff interface in borehole 16-1562, therefore, sample 0316-95-0001 was collected from the interval directly above the interface. At borehole 16-1560, the sampling team was confident the fill/ tuff interface had been reached at a depth of 4 feet and the team collected 0316-95-0002. However, when drilling was resumed with a different drill rig at a later date, the field team discovered that the fill/ tuff interface was deeper. Unfortunately, there was no recovery from any interval using the second drill rig.

The investigation at 16-007(a) was halted on 6/13/1995

5.21 PRS 16-021(c)

Thirty-three surface samples (including two co-located duplicates) and four subsurface analytical samples (including one co-located duplicate) were collected at PRS 16-021(c). Also, eight subsurface screening samples were collected.

What should 5.21.1 be?

TABLE 5.21.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0013	16-1397	Bldg 260 at outfall:5'N	0-6 inches
0316-95-0014	16-1396	Bldg 260 at outfall:10'S	0-6 inches
0316-95-0015	16-1399	Bldg 260 at 100':5'N	0-6 inches
0316-95-0016	16-1398	Bldg 260 at 100':10' S	0-6 inches
0316-95-0017	16-1401	Bldg 260 at 200': 5'N	0-6 inches
0316-95-0018	16-1400	Bldg 260 at 200": 10'S	0-6 inches
0316-95-0019	16-1403	Bldg 260 at 300': 15'N	0-6 inches
0316-95-0020	16-1402	Bldg 260 at 300': 15'S	0-6 inches
0316-95-0021	16-1405	Bldg 260 at 400': 15'S	0-6 inches
0316-95-0022	16-1404	Bldg 260 at 400': 15'S	0-6 inches
0316-95-0023	16-1407	Bldg 260 500': 5'N	0-6 inches
0316-95-0024	16-1406	Bldg 260 500': 5'S	0-6 inches
0316-95-0025	16-1409	Bldg 260 600': 5' N	0-6 inches
0316-95-0026	16-1408	Bldg 260 600': 5' S	0-6 inches
0316-95-0027	16-1379	Bldg 260 at outfall	0-6 inches
0316-95-0028	16-1380	Bldg 260 outfall+20 feet	0-6 inches
0316-95-0029	16-1381	Bldg 260 outfall+40 feet	0-6 inches
0316-95-0030	16-1382	Bldg 260 outfall+60 feet	0-6 inches
0316-95-2012	16-1382	Bldg 260 outfall+60 feet	0-6 inches (dup)
0316-95-0031	16-1383	Bldg 260 outfall+80 feet	0-6 inches
0316-95-2013	16-1383	Bldg 260 outfall+80 feet	0-6 inches (dup)
0316-95-0032	16-1384	Bldg 260 outfall+100 feet	0-6 inches
0316-95-0033	16-1385	Bldg 260 outfall+120 feet	0-6 inches
0316-95-0034	16-1386	Bldg 260 outfall+140 feet	0-6 inches
0316-95-0035	16-1387	Bldg 260 outfall+160 feet	0-6 inches
0316-95-0036	16-1388	Bldg 260 outfall+180 feet	0-6 inches
0316-95-0037	16-1389	Bldg 260 outfall+200 feet	0-6 inches
0316-95-0038	16-1390	Bldg 260 outfall+260 feet	0-6 inches
0316-95-0039	16-1391	Bldg 260 outfall+320 feet	0-6 inches
0316-95-0040	16-1392	Bldg 260 outfall+380 feet	0-6 inches
0316-95-0041	16-1393	Bldg 260 outfall+440 feet	0-6 inches
0316-95-0042	16-1394	Bldg 260 outfall+500 feet	0-6 inches
0316-95-0043	16-1395	Bldg 260 outfall+560 feet	0-6 inches
0316-95-0044	16-1379	Bldg 260 outfall	1'-1'6" *
0316-95-2015	16-1379	Bldg 260 outfall	0-6 inches* (dup)
0316-95-0045	16-1382	Bldg 260 outfall+60 feet	1'-1'6"* (dup)
0316-95-0046	16-1383	Bldg 260 outfall+80 feet	0-6 inches 1'8"-2'2"
0316-95-1637	16-1379	Bldg 260 outfall	0-6 inches 1'-1'6"
0316-95-1638	16-1380	Bldg 260 outfall+20 feet	0-6 inches 1'9"-2'3"
0316-95-1639	16-1381	Bldg 260 outfall+41 feet	0-6 inches 2-2.5 feet*
0316-95-1640	16-1382	Bldg 260 outfall+60 feet	1'-6"-1'11"*
0316-95-1641	16-1383	Bldg 260 outfall+80 feet	1'8"-2'2"
0316-95-1642	16-1384	Bldg 260 outfall+100 feet	1'6"-1'14"*
0316-95-1643	16-1385	Bldg 260 outfall+120 feet	10"-1'4"*
0316-95-1644	16-1386	Bldg 260 at outfall:140	0'8"-1'2"*
0316-95-1645	16-1387	Bldg 260 at outfall:160	Not Collected
0316-95-1646	16-1388	Bldg 260 at outfall:180	Not Collected
0316-95-1647	16-1389	Bldg 260 at outfall:200	Not Collected

*= sampled using a hand auger
dup. = QA/QC collocated duplicate sample

5.21.2 Screening Results

Significant screening results and any values above background are listed in Table 5.21.2. The other screening results were non-dects or were at or below background.

TABLE 5.21.2
Screening Results

Sample ID	Location ID	HE Spot Test	NaI2 Detector	PID Reading
0316-95-0013	16-1397	Negative	22510cpm	Background
0316-95-0014	16-1396	Negative	22250cpm	Background
0316-95-0015	16-1399	Negative	24560cpm	Background
0316-95-0016	16-1398	Negative	26080cpm	18ppm
0316-95-0017	16-1401	Negative	22550cpm	Background
0316-95-0018	16-1400	Negative	22580cpm	20ppm
0316-95-0019	16-1403	Negative	19760cpm	Background
0316-95-0020	16-1402	Negative	23740cpm	Background
0316-95-0021	16-1405	Negative	24470cpm	Background
0316-95-0022	16-1404	Negative	26030cpm	Background
0316-95-0023	16-1407	Negative	13320cpm	Background
0316-95-0024	16-1406	Negative	13480cpm	Background
0316-95-0025	16-1409	Negative	14560cpm	Background
0316-95-0026	16-1408	Negative	14320cpm	Background
0316-95-0027	16-1379	Positive	13340cpm	Background
0316-95-0028	16-1380	Positive	10720cpm	Background
0316-95-0029	16-1381	Positive	11700cpm	Background
0316-95-0030	16-1382	Positive	9960cpm	Background
0316-95-2012	16-1382	Positive	10092cpm	Background
0316-95-0031	16-1383	Positive	13160cpm	Background
0316-95-0032	16-1384	Positive	12000cpm	Background
0316-95-0033	16-1385	Positive	11087cpm	Background
0316-95-0034	16-1386	Positive	10052cpm	Background
0316-95-0035	16-1387	Positive	11038cpm	Background
0316-95-0036	16-1388	Positive	12000cpm	Background
0316-95-0037	16-1389	Positive	13660cpm	Background
0316-95-0038	16-1390	Positive	11200cpm	Background
0316-95-0039	16-1391	Positive	18440cpm	Background
0316-95-0040	16-1392	Positive	19200cpm	Background
0316-95-0041	16-1393	Positive	14570cpm	Background
0316-95-0042	16-1394	Positive	9240cpm	Background
0316-95-0043	16-1395	Positive	10340cpm	Background
0316-95-0044	16-1379	Positive	9240cpm	Background
0316-95-0045	16-1382	Positive	10340cpm	Background
0316-95-0046	16-1383	Positive	10500cpm	Background

5.21.3 Deviations from the OU 1082 RFI Work Plan

Three subsurface screening samples requiring PID analysis were not collected. The three samples were intended to be collected at sediment accumulation areas 160, 180, and 200 feet down drainage from the outfall.

TCLP extraction and metals and organics analyses were performed on samples 0316-95-0030 and 0316-95-0031 9 and their duplicates in addition to the other analyses specified in the Work Plan. The decision to submit the TCLP anakyses was made by the FU# team during a field review of the 1995 sample locations.

5.21.4 Comments

The drainage channel (lateral) bounding samples were collected at locations that were negative for high explosive based on the HE Spot Test Kit as specified in the RFI Work Plan. The lateral bounding sample points were established by screemning with the HE Spot Test kit on five foot intervals up both banks of the drainage channel at he required down drainage distances. Multiple

HE spot test analyses were conducted at each of the specified distances to determine the first HE negative horizon up on the banks of the drainage channel. The lateral sample points presented in figure 5.21.1 show the maximum width of HE contamination as determined with the HE Spot Test Kit (i.e.the figure shows the first point to test negative for HE with the spot test at the required down drainage distances).

Elevated PID reading were not observed during the subsurface screening effort in the upper 200 feet of the building 260 outfall drainage. The subsurface analytical samples were biased to the three areas believed to have the greatest contamination. The locations are at the two surface sample locations within the "pond" area.

A co-located duplicate was taken at surface locations 16-1382 and 16-1383. A co-located duplicate was also taken at the hand auger location 16-1379. Sample 0316-95-2012 is a duplicate of the surface sample 0316-95-0030. Sample 0316-95-2013 is a duplicate of the surface sample 0316-95-0031. Sample 0316-95-2015 is a duplicate of the subsurface sample 0316-95-0044. All three co-located duplicates were collected at locations where an indication of contamination was observed in the field.

5.22 PRS 16-003(k)

Ten subsurface analytical samples and twenty-two subsurface screening samples were collected at PRS 16-003(k).

5.22.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.22.1 Sample locations are illustrated in Figure 5.22. 1.

TABLE 5.22.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0047	16-1361	Bldg 260 Sump 4 N.Corner	Not collected
0316-95-0048	16-1361	Bldg 260 Sump 4 N.Corner	3-4 feet^
0316-95-0049	16-1345	Bldg 260 Sump 4 S.Corner	0-1 feet^
0316-95-0050	16-1345	Bldg 260 Sump 4 S.Corner	3.5-4.5feet^
0316-95-0051	16-1365	Bldg 260 Sump 13 N.Corner	1-2 feet^
0316-95-0052	16-1365	Bldg 260 Sump 13 S.Corner	2.5-3.5 feet^
0316-95-0053	16-1646	Bldg 260 Sump 13 S.Corner	1'4"-2'4"^
0316-95-0054	16-1646	Bldg 260 Sump 13 S.Corner	3'-8"-4'3"^
0316-95-0055	16-1356	Bldg 260 trough jct.	Not collected
0316-95-0056	16-1356	Bldg 260 trough jct.	5-6 feet^
0316-95-0057	16-1357	Bldg 260 trough jct.+12 E	3.0-4.5 feet^
0316-95-0058	16-1357	Bldg 260 trough jct.+12 E	5-5feet^
0316-95-1656	16-1361	Bldg 260 Sump 4 N.corner	0-1 feet^
0316-95-1657	16-1361	Bldg 260 Sump 4 N.corner	1-2 feet^ No recovery
0316-95-1658	16-1361	Bldg 260 Sump 4 N.corner	2-3 feet^ No recovery
0316-95-1659	16-1361	Bldg 260 Sump 4 N.corner	3-4 feet^
0316-95-1664	16-1365	Bldg 260 Sump 13 N.Corner	0-1 feet^ No recovery
0316-95-1665	16-1365	Bldg 260 Sump 13 N.Corner	1-2 feet^
Soil/tuff interface	16-1365	1.5 feet	See Comments
0316-95-1666	16-1365	Bldg 260 Sump 13 N.Corner	2-2.5 feet^ No Rec.
0316-95-1667	16-1365	Bldg 260 Sump 13 N.Corner	2.5-3.5 feet^
0316-95-1668	16-1346	Bldg 260 Sump 13 S.Corner	0-1 feet^ No rec.
0316-95-1669	16-1346	Bldg 260 Sump 13 S.Corner	1-2 feet^
Soil/tuff interface	16-1346	1.5 feet	See Comments

Sample ID	Location ID	Location Description	Sample Depth
0316-95-1670	16-1346	Bldg 260 Sump 13 S.Corner	2-3 feet^ No recov.
0316-95-1671	16-1346	Bldg 260 Sump 13 S.Corner	3-4'3"feet^
0316-95-1735	16-1345	Bldg 260 Sump 4 S.Corner	0-1feet^
0316-95-1736	16-1345	Bldg 260 Sump 4 S.Corner	1-2 feet^
0316-95-1737	16-1345	Bldg 260 Sump 4 S.Corner	2-3.5 feet^
0316-95-1738	16-1345	Bldg 260 Sump 4 S.Corner	3.5-4.5 feet^
Soil/tuff interface	16-1345	4 feet	See comments
0316-95-1739	16-1345	Bldg 260 Sump 4 S.Corner	4.5-5 feet^
0316-95-1740	16-1356	Bldg 260 trough jct.	0-1 feet^
0316-95-1741	16-1356	Bldg 260 trough jct.	1-2 feet^ No recov
0316-95-1742	16-1356	Bldg 260 trough jct.	2-3 feet^
0316-95-1743	16-1356	Bldg 260 trough jct.	3-4 feet^
0316-95-1744	16-1356	Bldg 260 trough jct.	4-5 feet^
0316-95-1745	16-1356	Bldg 260 trough jct.	5-6 feet^
0316-95-1763	16-1357	Bldg 260 trough jct. +12 w	0-1 feet^
0316-95-1764	16-1357	Bldg 260 trough jct. +12 w	1-2 feet^
0316-95-1765	16-1357	Bldg 260 trough jct. +12 w	2-3 feet^
0316-95-1766	16-1357	Bldg 260 trough jct. +12 w	3-4 feet^
0316-95-1767	16-1357	Bldg 260 trough jct. +12 w	4-5 feet^
Soil/ tuff interface	16-1357	4.5 feet	
0316-95-951768	16-1357	Bldg 260 trough jct. +12 w	5-6 feet^

*= sampled using a hand auger

5.22.2 Screening Results

Significant screening results and any values above background are listed in Table 5.22.2. The other screening results were non-detects or were at or below background.

TABLE 5.22.2
Screening Results

Sample ID	Location ID	HE Spot Test	NaI2 Detector	PID Reading
0316-95-1656	16-1361	Negative	10580 cpm	13 ppm
0316-95-1659	16-1361	Negative	11250 cpm	brackground
0316-95-1665	16-1365	Positive	N/A	5 ppm
0316-95-1667	16-1365	Positive	N/A	brackground
0316-95-1671	16-1346	Positive	N/A	brackground
0316-95-1735	16-1345	Positive	11680 cpm	brackground
0316-95-1736	16-1345	Negative	11960 cpm	brackground
0316-95-1737	16-1345	Negative	11960 cpm	brackground
0316-95-1738	16-1345	Positive	11960 cpm	brackground
0316-95-1739	16-1345	Negative	11640 cpm	brackground
0316-95-1740	16-1356	Negative	14320 cpm	1 ppm
0316-95-1741	16-1356	No recovery	N/A	1 ppm (in hole)
0316-95-1742	16-1356	Negative	N/A	2 ppm
0316-95-1743	16-1356	Negative	N/A	2 ppm
0316-95-1744	16-1356	Negative	N/A	2 ppm
0316-95-1763	16-1357	Negative	N/A	30 ppm
0316-95-1764	16-1357	Negative	N/A	30ppm
0316-95-1765	16-1357	Negative	N/A	30ppm
0316-95-1766	16-1357	Negative	N/A	110 ppm
0316-95-1767	16-1357	Negative	N/A	110 ppm
0316-95-951768	16-1357	Negative	N/A	1 ppm

5.22.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is not enough material for full suite analysis.

Also, the borehole was drilled verticoy, not at an angle. Angled boreholes were not allowed

because TA- 16 personnel believe there to be a greater potential for creating an HE confining hazard with this type of drilling.

The field team collected and submitted two analytical samples from borehole 16-1357 even though none of the screening samples tested positive for BE.

Boreholes were only drilled at two sumps: Sump 4 and 13. At each Sump, two boreholes were drilled, one at the southeast comer and one at the northeast comer. The decision by FU3 team members not to drill and sample every sump at Building 260 was discussed with and approved by the EPA.

In addition, FU3 decided to drill only two of the feeder trough boreholes. This was also approved by the EPA.

5.22.4 Comments

Drilling at PRS 16-003(k) proved to be very challenging. The sampling team consistently met refusal at depths between 2-3 feet using the hollow-stem auger rig. The field team switched to a coring method using a speciAlly designed carbide tipped cutting shoe and split-spoon to drill the remaining 2-3 feet in each borehole. Every borehole was drilled to the specified depth.

At the sump boreholes both the shAllowest and deepest HE positive intervals were collected except at Borehole 16-1361. There was only one positive interval in Borehole 16-1361 and, therefore, only one sample was collected.

The feeder trough boreholes were biased to obvious cracks in the concrete. In both cases, the crack areas were extensive and indicated that water may have leaked at these locations. There were, however, no HE positive intervals at either of the feeder trough boreholes. Two analytical samples were collected in Borehole 16-1357.

The soil/tuff interface in PRS 16-003(k) may be deeper than was thought during drilling. The sampling team reported finding engineering fill gravels and lenses of material more closely resembling soil horizons at deeper depths than the soiv tuff interface. The soil horizons could be highly weathered tuff or a surge bed within the tuff. And, the engineering fill gravels and cobbles could have slid down the hole from a shallower interval. However, tuff and dacite cobbles and gravels are very common at this PRS and were identified in most of the boreholes. What was believed to be tuff (bedrock) may instead be a large tuff cobble that was intersected by the borehole. The interpretation of the depth to tuff in boreholes 16-1365 and 16-1646 is the most suspect. These boreholes have the shallowest intervals for the soiv tuff interface and numerous dacite and tuff gravels/ cobbles were encountered during the drilling of these two boreholes.

5.23 PRS 16-030(d)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-030(d). Also, thirteen surface screening samples were collected.

TABLE 5.23.1
Screening Results

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0059	16-1428	Outfall at blg 280	0-6 inches
0316-95-0060	16-1428	Outfall at blg 380	4-8 inches*
Soil/tuff interface	16-1428	8 inches	
0316-95-0061	16-1428	Outfall at blg 380	3.5-5.5 feet ^

0316-95-0062	16-1652	6 ft. fr. outfall,in drain	0-6 inches
Soil/tuff interface	16-1652	5 inches	0-6 inches
0316-95-0063	16-1652	6 ft. fr. outfall,in drain	3.5-5.5 feet^
0316-95-0064	16-1652	6 ft. fr. outfall,in drain	0-6 inches
0316-95-0065	16-1652	20 ft. fr. outfall,in drain	0-6 inches
0316-95-0066	16-1429	40 ft. fr. outfall,in drain	0-6 inches
0316-95-0067	16-1430	60 ft. fr. outfall,in drain	0-6 inches
0316-95-0068	16-1431	205 ft. fr. outfall,in drain	0-6 inches
0316-95-0069	16-1432	340 ft. fr. outfall,in drain	0-6 inches
0316-95-1181	16-1433	20 ft. fr. outfall,in drain	0-6 inches
0316-95-1182	16-1429	40 ft. fr. outfall,in drain	0-6 inches
0316-95-1183	16-1430	60 ft. fr. outfall,in drain	0-6 inches
0316-95-1184	16-1431	100 ft. fr. outfall,in drain	0-6 inches
0316-95-1185	16-1728	140 ft. fr. outfall,in drain	0-6 inches
0316-95-1186	16-1729	180 ft. fr. outfall,in drain	0-6 inches
0316-95-1187	16-1432	205 ft. fr. outfall,in drain	0-6 inches
0316-95-1188	16-1732	245 ft. fr. outfall,in drain	0-6 inches
0316-95-1189	16-1733	290 ft. fr. outfall,in drain	0-6 inches
0316-95-1190	16-1733	340 ft. fr. outfall,in drain	0-6 inches
0316-95-1191	16-1735	380 ft. fr. outfall,in drain	0-6 inches
0316-95-1192	16-1736	420 ft. fr. outfall,in drain	0-6 inches
0316-95-1193	16-1737	500 ft.fr. outfall,in drain	0-6 inches

*= sampled using a hand auger
^=sampled using the spilt spoon

5.23.2 Screening Results

Significant screening results and any values above background are listed in Table 5.23.2, The other screening results were non-detects or were at or below background.

TABLE 5.23.2
Screening Results

Sample ID	Location ID	PID Reading	NaI2 Detector
0316-95-0059	16-1428	3 ppm	2301cpm
0316-95-0060	16-1428	0.5 ppm	2446 cpm
0316-95-0061	16-1428	14 ppm	12320 cpm
0316-95-0062	16-1652	2 ppm	2247 cpm
0316-95-0064	16-1652	N/A	12810 cpm
0316-95-0065	16-1652	N/A	15000 cpm
0316-95-0066	16-1429	N/A	14000 cpm
0316-95-0067	16-1430	N/A	14000 cpm
0316-95-0068	16-1431	N/A	15000 cpm
0316-95-0069	16-1432	N/A	15000 cpm
0316-95-1181	16-1433	N/A	15000 cpm
0316-95-1182	16-1429	N/A	14000 cpm
0316-95-1183	16-1430	N/A	13000 cpm
0316-95-1184	16-1431	N/A	15000 cpm
0316-95-1185	16-1728	N/A	16000 cpm
0316-95-1186	16-1729	N/A	16000 cpm
0316-95-1187	16-1432	N/A	19000 cpm
0316-95-1188	16-1732	N/A	15000 cpm
0316-95-1189	16-1733	N/A	19000 cpm
0316-95-1190	16-1733	N/A	15000 cpm
0316-95-1191	16-1735	N/A	16000 cpm
0316-95-1192	16-1736	N/A	14000 cpm
0316-95-1193	16-1737	N/A	16000 cpm

5.23.3 Deviations from the OU 1082 RFI Work Plan

Three down drainage surface screening locations were not collected on the specified 40 foot

interval. All three were biased based on a geomorphologic survey of the drainage. Sample 0316-95-1187 was collected at the location where discharge from the outfall stopped flowing on the surface of the drainage. Sample 0316-95-1190 was sampled at the junction of the Building 280 drainage channel and a septic tank drainage. Finally, sample 0316-95- 1193 was sampled at the down drainage end of the culvert that crosses beneath the access road.

5.24 PRS 16-003(i)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-003(i). Also, ten surface screening samples were collected.

5.24.1 PRS 16-003(i) Sample Location and Depths

Sample depths and locations are listed in Table 5.24.1. Sample locations are also illusrated in Figure 5.24.1.

TABLE 5.24.1
Sample Location and Depths

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0070	16-1412	Outfall at Bldg 265	0-6 inches
0316-95-0071	16-1412	Outfall at Bldg 265	12-16 inches*
Soil/tuff interface	16-1412	14 inches	
0316-95-0072	16-1412	Outfall at Bldg 265	3.5-5.5 feet^
0316-95-0073	16-1450	30 ft fr outfall, in drain.	0-6 inches
0316-95-0074	16-1450	30 ft fr outfall, in drain.	6-12 inches*
Soil/tuff interface	16-1450	10 inches	
0316-95-0075	16-1450	30 ft fr outfall, in drain.	3-5 feet^
0316-95-0076	16-1413	63 ft fr outfall, in drain.	0-6 inches
0316-95-0077	16-1414	83 ft fr outfall, in drain.	0-6 inches
0316-95-0078	16-1415	100 ft fr outfall, in drain.	0-6 inches
0316-95-0079	16-1416	220 ft fr outfall, in drain.	0-6 inches
0316-95-0080	16-1417	300 ft fr outfall, in drain.	0-6 inches
0316-95-1152	16-1413	63 ft fr outfall, in drain.	0-6 inches
0316-95-1153	16-1414	83 ft fr outfall, in drain.	0-6 inches
0316-95-1154	16-1415	100 ft fr outfall, in drain.	0-6 inches
0316-95-1155	16-1678	140 ft fr outfall, in drain.	0-6 inches
0316-95-1156	16-1679	180 ft fr outfall, in drain.	0-6 inches
0316-95-1157	16-1416	220 ft fr outfall, in drain.	0-6 inches
0316-95-1158	16-1681	260 ft fr outfall, in drain.	0-6 inches
0316-95-1159	16-1417	300 ft fr outfall, in drain.	0-6 inches
0316-95-1160	16-1683	340 ft fr outfall, in drain.	0-6 inches
0316-95-1161	16-1684	380 ft fr outfall, in drain.	0-6 inches

*= sampled using a hand auger
^=sampled using a spilt spoon

5.24.2 Screening Results

Significant screening results and any values above background are listed in Table 5.24.2. The other screening results were non-detects or were at or below background.

TABLE 5.24.2
Screening Results

Sample ID	Location ID	NaI2
0316-95-0070	16-1412	12180 cpm
0316-95-0071	16-1412	12730 cpm
0316-95-0072	16-1412	12670 cpm

0316-95-0073	16-1450	12610 cpm
0316-95-0074	16-1450	12130 cpm
0316-95-0075	16-1450	12060 cpm
0316-95-0076	16-1413	14000 cpm
0316-95-0077	16-1414	14000 cpm
0316-95-0078	16-1415	13000 cpm
0316-95-0079	16-1416	16000 cpm
0316-95-0080	16-1417	14000 cpm
0316-95-1152	16-1413	14000 cpm
0316-95-1153	16-1414	15000 cpm
0316-95-1154	16-1415	14000 cpm
0316-95-1155	16-1678	14000 cpm
0316-95-1156	16-1679	15000 cpm
0316-95-1157	16-1416	15000 cpm
0316-95-1158	16-1681	15000 cpm
0316-95-1159	16-1417	14000 cpm
0316-95-1160	16-1683	15000 cpm
0316-95-1161	16-1684	16000 cpm

5.24.3 Deviations from the OU 1082 RFI Work Plan

The PRS 16-003(i) drainage was not screened for 500 feet because the drainage is less than 500 feet long. At 380 feet from the PRS 16-003(i) outfall the drainage passes under the building 267 access road and resurfaces near the PRS 16-003(j) outfall.

5.25 PRS 16-003(i)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-003(j). Also, thirteen surface screening samples were collected.

TABLE 5.25.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0081	16-1419	Outfall at Bldg. 267	0-6 inches
0316-95-0082	16-1419	Outfall at Bldg. 267	6-14 inches*
Soil/tuff interface	16-1419	12 inches	
0316-95-0083	16-1419	Outfall at Bldg. 267	3.5-5.5 feet^
0316-95-0084	16-1651	8 ft. fr. outfall, in drain	0-6 inches
0316-95-0085	16-1651	8 ft. fr. outfall, in drain	7-13 inches*
Soil/tuff interface	16-1651	11 inches	
0316-95-0086	16-1651	8 ft. fr. outfall, in drain	2'11"-4'6" ^
0316-95-0087	16-1420	15 ft. fr. outfall, in drain	0-6 inches
0316-95-0088	16-1421	35 ft. fr. outfall, in drain	0-6 inches
0316-95-0089	16-1422	55 ft. fr. outfall, in drain	0-6 inches
0316-95-0090	16-1423	175 ft. fr. outfall, in drain	0-6 inches
0316-95-0091	16-1424	372 ft. fr. outfall, in drain	0-6 inches
0316-95-1166	16-1420	15 ft. fr. outfall, in drain	0-6 inches
0316-95-1167	16-1421	35 ft. fr. outfall, in drain	0-6 inches
0316-95-1168	16-1422	55 ft. fr. outfall, in drain	0-6 inches
0316-95-1169	16-1703	95 ft. fr. outfall, in drain	0-6 inches
0316-95-1170	16-1704	135 ft. fr. outfall, in drain	0-6 inches
0316-95-1171	16-1423	175 ft. fr. outfall, in drain	0-6 inches
0316-95-1172	16-1706	215 ft. fr. outfall, in drain	0-6 inches
0316-95-1173	16-1707	255 ft. fr. outfall, in drain	0-6 inches
0316-95-1174	16-1708	295 ft. fr. outfall, in drain	0-6 inches
0316-95-1175	16-1424	372 ft. fr. outfall, in drain	0-6 inches
0316-95-1176	16-1710	412 ft. fr. outfall, in drain	0-6 inches
0316-95-1177	16-1711	452 ft. fr. outfall, in drain	0-6 inches
0316-95-1178	16-1712	492 ft. fr. outfall, in drain	0-6 inches

* = sampled using a hand auger
^ =sampled using a spilt spoon

5.25.2 Screening Results

Significant screening results and any values above background are listed in Table 5.25.2, The other screening results were non-detects or were at or below background.

TABLE 5.25.2
Screening Results

Sample ID	Location ID	PID Reading	NaI2 Detector
0316-95-0081	16-1419	Background	8610 cpm
0316-95-0082	16-1419	Background	12170 cpm
0316-95-0083	16-1419	7 ppm	12020 cpm
0316-95-0084	16-1651	Background	7680 cpm
0316-95-0085	16-1651	Background	12760 cpm
0316-95-0086	16-1651	3 ppm	12090 cpm
0316-95-0087	16-1420	Background	14000 cpm
0316-95-0088	16-1421	Background	15000 cpm
0316-95-0089	16-1422	Background	15000 cpm
0316-95-0090	16-1423	Background	15000 cpm
0316-95-0091	16-1424	Background	14000 cpm
0316-95-1166	16-1420	Background	16000 cpm
0316-95-1167	16-1421	Background	14000 cpm
0316-95-1168	16-1422	Background	15000 cpm
0316-95-1169	16-1703	Background	15000 cpm
0316-95-1170	16-1704	Background	14000 cpm
0316-95-1171	16-1423	Background	15000 cpm
0316-95-1172	16-1706	Background	16000 cpm
0316-95-1173	16-1707	Background	15000 cpm
0316-95-1174	16-1708	Background	15000 cpm
0316-95-1175	16-1424	Background	14000 cpm
0316-95-1176	16-1710	Background	15000 cpm
0316-95-1177	16-1711	Background	14000 cpm
0316-95-1178	16-1712	Background	15000 cpm

5.25.3 Deviations from the OU 1082 RFI Work Plan

One down drainage surface screening location was not collected at the specified 40 foot interval. Sample 0316-95-1175 was sampled at the far end of the culvert that crosses under the Building 260 access road. The 40 foot interval falls within the culvert.

5.26 PRS 16-001(e)

Two subsurface analytical samples and one surface analytical sample were collected at PRS 16-001 (e).

5.26.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.26.l. Sample locations are also illustrated in Figure 5.26. 1.

TABLE 5.26.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0092	16-1411	Dry well near 300 in outfal	0-6 inches
0316-95-0093	16-1411	Outfall at Bldg 267	6-12 inches*

Soil/tuff interface	16-1411	12 inches	
0316-95-0094	16-1411	Outfall at Bldg 267	3.5-5 feet^

*= sampled using a hand auger
^=sampled using the split spoon
dup.=QA/QC collocated duplicate sample

5.26.2 Screening Results

Significant screening results and any values above background are listed in Table 5.26.2. The other screening results were non-detects or were at or below background.

TABLE 5.26.2
Screening results

Sample ID	Location ID	PID Reading	NaI2 Detector
0316-95-0092	16-1411	Background	11730 cpm
0316-95-0093	16-1411	2 ppm	12060 cpm
0316-95-0094	16-1411	Background	12770 cpm

5.26.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during the sampling effort at PRS 16-001(e).

5.27 PRS 16-003(f) [AKA 16-003(d)]

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-003(f). Also, eleven surface screening samples were collected.

5.27.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.27.1. Sample locations are also illustrated in Figure 5.27. 1.

TABLE 5.27.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0095	16-1434	Outfall at Bldg 306	0-6 inches
0316-95-0096	16-1434	Outfall at Bldg 306	4-10 inches*
Soil/tuff interface	16-1434	7 inches	
0316-95-0097	16-1434	Outfall at Bldg 306	3.5-5 feet^
0316-95-0098	16-1453	30 ft fr,. outfall, in drain.	0-6 inches
0316-95-0099	16-1453	30 ft fr,. outfall, in drain.	6-15- inches*
Soil/tuff interface	16-1453	12 inches	
0316-95-0100	16-1453	30 ft fr,. outfall, in drain.	4.5-5.5 feet^
0316-95-0101	16-1435	38 ft fr,. outfall, in drain.	0-6 inches
0316-95-0102	16-1436	58 ft fr,. outfall, in drain.	0-6 inches
0316-95-0103	16-1437	78 ft fr,. outfall, in drain.	0-6 inches
0316-95-0104	16-1438	88 ft fr,. outfall, in drain.	0-6 inches
0316-95-0105	16-1439	458ft fr,. outfall, in drain.	0-6 inches
0316-95-1000	16-1750	118 ft fr,. outfall, in drain.	0-6 inches
0316-95-1001	16-1751	158 ft fr,. outfall, in drain.	0-6 inches
0316-95-1002	16-1752	198 ft fr,. outfall, in drain.	0-6 inches
0316-95-1003	16-1753	238 ft fr,. outfall, in drain.	0-6 inches
0316-95-1004	16-1754	278 ft fr,. outfall, in drain.	0-6 inches
0316-95-1005	16-1755	318 ft fr,. outfall, in drain.	0-6 inches
0316-95-1006	16-1756	358 ft fr,. outfall, in drain.	0-6 inches

0316-95-1007	16-1757	398 ft fr,. outfall, in drain.	0-6 inches
0316-95-1008	16-1758	438 ft fr,. outfall, in drain.	0-6 inches
0316-95-1009	16-1759	478 ft fr,. outfall, in drain.	0-6 inches
0316-95-1010	16-1760	518 ft fr,. outfall, in drain.	0-6 inches

*= sampled using a hand auger
^=sampled using the split spoon

5.27.2 Screening Results

Significant screening results and any values above background are listed in Table 5.27.2 The other screening results were non-detects or were at or below background.

TABLE 5.27.2
Screening Results

Sample ID	Location ID	NaI2 Detector
0316-95-0095	16-1434	12650 cpm
0316-95-0096	16-1434	13880 cpm
Soil/tuff interface	16-1434	13290 cpm
0316-95-0098	16-1453	13910 cpm
0316-95-0099	16-1453	13510 cpm
0316-95-0100	16-1453	14000 cpm

5.27.3 Deviations from the OU 1082 RFI Work Plan

The two down drainage surface analytical samples were not collected at the specified 40 foot interval. The surface screening samples were collected on the specified interval; there were no positive screening hits. The sampling team decided to bias the two analytical samples based on the geomorphologic survey of the drainage. The two most appropriate locations did not coincide with any of the surface screening locations.

5.27.4 Comments

During the 1995 Campaign the field team referred to PRS 16-003(f) as 16-003(d). The confusion in the correct name for this outfall arises because the outfall serves four buildings in the 300s Line. All of paperwork sent to FU3 team members, not including this report, will most likely refer to this PRS as 16-003(d).

5.28 PRS 16-003(e)

Two subsurface analytical samples and seven subsurface screening samples were collected at PRS 16-003(e).

5.28.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.28.1 Sample locations are also illustrated in Figure 5.28.1.

TABLE 5.28.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0106	16-1443	Bldg 302 sump, SE cor.	Not Collected
0316-95-0107	16-1443	Bldg 302 sump, SE cor.	3.5-5 feet^
0316-95-0108	16-1647	Bldg 302 sump, NW cor.	Not Collected

0316-95-0109	16-1647	Bldg 302 sump, NW cor.	3.5-5 feet^
0316-95-1648	16-1443	Bldg 302 sump, SE cor.	0-1 feet^
0316-95-1649	16-1443	Bldg 302 sump, SE cor.	1-2 feet^
0316-95-1650	16-1443	Bldg 302 sump, SE cor.	2-3 feet^ No recovery
0316-95-1651	16-1443	Bldg 302 sump, SE cor.	3.5-5 feet^
0316-95-1652	16-1647	Bldg 302 sump, NW cor.	0-1 feet^
0316-95-1653	16-1647	Bldg 302 sump, NW cor.	1-2 feet^
0316-95-1654	16-1647	Bldg 302 sump, NW cor.	2-3 feet^
0316-95-1655	16-1647	Bldg 302 sump, NW cor.	3.5-5 feet^

*= sampled using a hand auger
^=sampled using the split spoon

5.28.2 Screening Results

Significant screening results and any values above background are listed in Table 5.28.2. The other screening results were non-detects or were at or below background.

TABLE 5.28.2
Screening Results

Sample ID	Location ID	PID Reading
0316-95-1650	16-1443	3 ppm
0316-95-1651	16-1443	3 ppm
0316-95-1655	16-1647	3 ppm

5.28.3 Deviations from the OU 1082 RFI Work Plan

The drilling core was screened on 12 inch intervals because a 6 inch interval in a 1.55 inch ID split spoon is not enough material for full suite analysis.

The two boreholes at this PRS were not chosen based on analytical results from the associated outfall, as required by the Work Plan. These two boreholes were drilled and sampled as a result of discussions between FU3 team members and the EPA.

5.28.4 Comments

There were no intervals that tested positive for HE in either Borehole 16-1443 or Borehole 16-1647. Therefore, the shAllow analytical sample was not collected in either borehole.

5.29 PRS 16-026(b)

Five subsurface analytical samples, including one co-located duplicate, and eight surface analytical samples, including one co-located duplicate, were collected at PRS 16-026(b). Also, seven surface screening samples were collected.

5.29.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.29.1. Sample locations are also illustrated in Figure 5.29. 1.

TABLE 5.29.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0110	16-1453	Out fall at bldg 307.	0-6 inches
0316-95-0111	16-1453	Out fall at bldg 307.	4-16 inches

Sample ID	Location ID	Location Description	Sample Depth
0316-95-2014	16-1453	Out fall at bldg 307.	4-16 inches (dup.)
Soil/tuff interface	16-1453	10 inches	
0316-95-0112	16-1453	Out fall at bldg 307.	3-4 feet^
0316-95-0113	16-1654	40 ft. fr. outfall, in drain	0-6 inches
0316-95-0114	16-1654	40 ft. fr. outfall, in drain	6-12-inches*
Soil/tuff interface	16-1654	6 inches .	
0316-95-0115	16-1654	40 ft. fr. outfall, in drain	5-6 feet^ 4.29.4
0316-95-0116	16-1654	52 ft. fr. outfall, in drain	0-6 inches
0316-95-0117	16-1655	72 ft. fr. outfall, in drain	0-6 inches
0316-95-0118	16-1656	92 ft. fr. outfall, in drain	0-6 inches
0316-95-2011	16-1656	92 ft. fr. outfall, in drain	0-6 inches (dup.)
0316-95-0119	16-1657	132 ft. fr. outfall, in drain	0-6 inches
0316-95-0120	16-1658	353 ft. fr. outfall, in drain	0-6 inches
0316-95-1091	16-1657	132 ft. fr. outfall, in drain	0-6 inches
0316-95-1092	16-1776	172 ft. fr. outfall, in drain	0-6 inches
0316-95-1093	16-1777	212 ft. fr. outfall, in drain	0-6 inches
0316-95-1094	16-1778	252 ft. fr. outfall, in drain	0-6 inches
0316-95-1095	16-1458	353 ft. fr. outfall, in drain	0-6 inches
0316-95-1096	16-1780	393 ft. fr. outfall, in drain	0-6 inches
0316-95-1097	16-1781	433 ft. fr. outfall, in drain	0-6 inches

*= Sampled using a hand Auger
^= sampled using the split spoon
dup.= QA/QC colocated duplicate sample

5.29.2 Screening Results

Significant screening results and any values above background are listed in Table 5.29.2. The other screening results were non-detects or were at or below background.

TABLE 5.29.2
Screening Results

Sample ID	Location ID	HE Spot Test	PID Reading	NaI2 Detector
0316-95-0110	16-1453	Positive	Background	14900 cpm
0316-95-0111	16-1453	Positive	Background	15270 cpm
0316-95-0112	16-1453	Negative	50 ppm	13790 cpm
0316-95-0113	16-1654	Negative	7 ppm	16170 cpm
0316-95-0114	16-1654	Positive	Background	16040 cpm
0316-95-0115	16-1654	Negative	65 ppm	9725 cpm
0316-95-0116	16-1654	Negative	Background	267 cpm
0316-95-0117	16-1655	Negative	Background	267 cpm
0316-95-0118	16-1656	Positive	Background	16000 cpm
0316-95-0119	16-1657	Negative	Background	250 cpm
0316-95-0120	16-1658	Negative	Background	250 cpm

5.29.3 Deviations from the OU 1082 RFI Work Plan

The drainage was not screened for 500 feet because the drainage is less than 500 feet long, At 433 feet from the PRS 16-026(b) outfall, the drainage intersects the PRS 16-003(f) drainage. The confluence of the two drainages is approximately fifty feet down drainage from the PRS 16-003(f) outfall.

Sample 0316-95-1095 was not collected at the specified 40 foot interval. The sample was collected at the outlet of the culvert that runs under the 300s Line access road. The 40 foot interval is located under the access road.

5.29.4 Comments

The field team experienced significant recovery problems during the drilling of borehole 16-1654. As a result, sample 0316-95-0115 was comprised of drilling cuttings.

Subsurface dacite and tuff cobbles in the area in and around the drainage mostly caused the recovery problems. The team initially drilled and attempted to sample the five to six foot interval using the split-spoon sampler. The team then milled out the borehole using a center bit in place of the split-spoon in an effort to clear out the cobbles and slough from the borehole. At six feet, the sampling team replaced the center bit with the split spoon sampler. However, the sampling team met refusal with the split-spoon and could not recover core for a sample. The sampling team had to sample the drill cuttings recovered during the milling process. The sampling team is confident that the sampled cuttings represent the interval from five to six feet. The milling process recovered cobbles, gravels and fine, crushed tuff from the borehole. The crushed tuff was not observed in the cuttings or split-spoon samples from shallower depths and is probably from the five to six foot interval. None of the cobble/gravel material was sampled.

A duplicate sample was taken at Borehole 16-1453 and at surface location 16-1456.

Duplicate sample 0316-95-2011 is at location 16-1456, and is of the surface sample 0316- 95-0118. Duplicate sample 0316-95-2014 is at location 16-1453, and is of the subsurface sample 0316-95-01 1 1. Both duplicate samples were collected because an indication of contamination was observed in the field.

5.30 PRS 16-026(c)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-026(c). Also, twelve surface screening samples were collected.

5.30.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.30. 1. Sample locations are also illustrated in Figure 5.30. 1.

TABLE 5.30.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0121	16-1459	Out fall at bldg 305.	0-6 inches
0316-95-0122	16-1459	Out fall at bldg 305.	21-27 inches
Soil/tuff interface	16-1459	24 inches	
0316-95-0123	16-1459	Out fall at bldg 305.	3.5-4.5 feet^
0316-95-0124	16-1655	13 ft. fr. outfall, in drain	0-6 inches
0316-95-0125	16-1655	13 ft. fr. outfall, in drain	12-18 inches*
Soil/tuff interface	16-1655	15 inches .	
0316-95-0126	16-1655	13 ft. fr. outfall, in drain	3.5-4.5 feet^
0316-95-0127	16-1460	25 ft. fr. outfall, in drain	0-6 inches
0316-95-0128	16-1461	45 ft. fr. outfall, in drain	0-6 inches
0316-95-0129	16-1462	65 ft. fr. outfall, in drain	0-6 inches
0316-95-0130	16-1463	145 ft. fr. outfall, in drain	0-6 inches
0316-95-0131	16-1464	365 ft. fr. outfall, in drain	0-6 inches
0316-95-1016	16-1460	25 ft. fr. outfall, in drain	0-6 inches
0316-95-1017	16-1461	45 ft. fr. outfall, in drain	0-6 inches
0316-95-1018	16-1462	65 ft. fr. outfall, in drain	0-6 inches
0316-95-1019	16-1803	105 ft. fr. outfall, in drain	0-6 inches

0316-95-1020	16-1463	145 ft. fr. outfall, in drain	0-6 inches
0316-95-1021	16-1805	185 ft. fr. outfall, in drain	0-6 inches
0316-95-1022	16-1806	225 ft. fr. outfall, in drain	0-6 inches
0316-95-1023	16-1807	325 ft. fr. outfall, in drain	0-6 inches
0316-95-1024	16-1464	365 ft. fr. outfall, in drain	0-6 inches
0316-95-1025	16-1809	405 ft. fr. outfall, in drain	0-6 inches
0316-95-1026	16-1810	445 ft. fr. outfall, in drain	0-6 inches
0316-95-1027	16-1811	485 ft. fr. outfall, in drain	0-6 inches

*= Sampled using a hand auger
^= sampled using the split spoon

5.30.2 Screening Results

The screening results for the samples were non-detects or were below or at background,

5.30.3 Deviations from the OU 1082 RFI Work Plan

Sample 0316-95-1023 was not collected at the specified 40 foot interval. The sample was collected at the exit of the culvert that runs tinder a tunnel connecting Buildings 307 and 306. The 40 foot interval location is under -the access road.

5.31 PRS 16-030(h)

Twelve subsurface analytical samples and eleven surface analytical samples were collected at PRS 16-030(h). Also, fifteen surface screening samples were collected.

5.31.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.3 1. 1. Sample locations are also illustrated in Figure 5.31.1.

TABLE 5.31.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0154	16-1495	w. outfall at bldg 430.	0-6 inches
0316-95-0155	16-1495	w. outfall at bldg 430.	6-5-8 feet^
Soil/tuff interface	16-1495	6'8"	
0316-95-0156	16-1495	w. outfall at bldg 430.	8.5-10 feet^
0316-95-0157	16-1672	8 ft. fr. W. outfall, in drain	0-6 inches
0316-95-0158	16-1672	8 ft. fr. W. outfall, in drain	8-9 feet^
Soil/tuff interface	16-1672	6 feet	
0316-95-0159	16-1672	8 ft. fr. W. outfall, in drain	9-10 feet^
0316-95-0160	16-1496	M outfall, bldg 430	0-6 inches
0316-95-0161	16-1496	M outfall, bldg 430	3-4.5 inches
Soil/tuff interface	16-1496	4 feet	
0316-95-0162	16-1496	M outfall, bldg 430	5.5-6.5 feet^
0316-95-0163	16-1673	10 ft. fr. M. outfall, in drain	0-6 inches
0316-95-0164	16-1673	10 ft. fr. M. outfall, in drain	6-24 inches^
Soil/tuff interface	16-1673	12 inches	
0316-95-0165	16-1673	10 ft. fr. M. outfall, in drain	3-4.5 feet^
0316-95-0166	16-1497	E outfall at bldg 430	0-6 inches
0316-95-0167	16-1497	E outfall at bldg 430	6-7.5 feet^
Soil/tuff interface	16-1497	7 feet	
0316-95-0168	16-1497	E outfall at bldg 430	8.5-10.5 feet
0316-95-0169	16-1658	5 ft. fr. E. outfall, in drain	0-6 inches
0316-95-0170	16-1658	5 ft. fr. E. outfall, in drain	6.5-8 feet^

Sample ID	Location ID	Location Description	Sample Depth
Soil/tuff interface	16-1658	7 feet	
0316-95-0171	16-1658	5 ft. fr. E. outfall, in drain	
0316-95-0172	16-1498	At Weir box, bldg 430 drain	8.5-10.5 feet^
0316-95-0173	16-1499	12 ft. fr.weir box, in drain	0-6 inches
0316-95-0174	16-1500	32 ft. fr.weir box, in drain	0-6 inches
0316-95-0175	16-1501	292 ft. fr.weir box, in drain	0-6 inches
0316-95-0176	16-1502	517 ft. fr.weir box, in drain	0-6 inches
0316-95-1196	16-1498	At weir box, bldg 430 drain	0-6 inches
0316-95-1197	16-1499	12 ft. fr.weir box, in drain	0-6 inches
0316-95-1198	16-1500	32 ft. fr.weir box, in drain	0-6 inches
0316-95-1199	16-1878	50 ft. fr.weir box, in drain	0-6 inches
0316-95-1200	16-1879	90 ft. fr.weir box, in drain	0-6 inches
0316-95-1201	16-1880	130 ft. fr.weir box, in drain	0-6 inches
0316-95-1202	16-1881	170 ft. fr.weir box, in drain	0-6 inches
0316-95-1203	16-1882	210 ft. fr.weir box, in drain	0-6 inches
0316-95-1204	16-1883	250 ft. fr.weir box, in drain	0-6 inches
0316-95-1205	16-1501	292 ft. fr.weir box, in drain	0-6 inches
0316-95-1206	16-1885	330 ft. fr.weir box, in drain	0-6 inches
0316-95-1207	16-1886	370 ft. fr.weir box, in drain	0-6 inches
0316-95-1208	16-1887	410 ft. fr.weir box, in drain	0-6 inches
0316-95-1209	16-1888	450 ft. fr.weir box, in drain	0-6 inches
0316-95-1210	16-1502	517 ft. fr.weir box, in drain	0-6 inches

^= sampled using the split spoon

5.31.2 Screening Results

Significant screening results and any values above background are listed in Table 5.31.2, The other screening results were non-detects or were at or below background. Also, analytical samples 0316-95-0166 and 0316-95-0169 tested positive for HE during sampling.

TABLE 5.31.2
Screening Results

Sample ID	Location ID	HE Spot Test	NaI2 Detector
0316-95-0154	16-1495	negative	15300 cpm
0316-95-0157	16-1672	negative	15650 cpm
0316-95-0160	16-1496	negative	15250 cpm
0316-95-0163	16-1673	negative	16020 cpm
0316-95-0166	16-1497	positive	14170 cpm
0316-95-0169	16-1658	positive	15380 cpm
0316-95-0172	16-1498	negative	15280 cpm
0316-95-0173	16-1499	negative	15160 cpm
0316-95-0174	16-1500	negative	15161 cpm
0316-95-0175	16-1501	negative	20300 cpm
0316-95-0176	16-1502	negative	15000 cpm
0316-95-1196	16-1498	negative	15000 cpm
0316-95-1197	16-1499	negative	15000 cpm
0316-95-1198	16-1500	negative	15000 cpm
0316-95-1199	16-1878	negative	15000 cpm
0316-95-1200	16-1879	negative	15000 cpm
0316-95-1201	16-1880	negative	16000 cpm
0316-95-1202	16-1881	negative	16000 cpm
0316-95-1203	16-1882	negative	20000 cpm
0316-95-1204	16-1883	negative	18000 cpm
0316-95-1205	16-1501	negative	19000 cpm
0316-95-1206	16-1885	negative	19000 cpm
0316-95-1207	16-1886	negative	19000 cpm
0316-95-1208	16-1887	negative	20000 cpm

0316-95-1209	16-1888	negative	21000 cpm
0316-95-1210	16-1502	negative	21000 cpm

5.31.3 Deviations from the OU 1082 RFI Work Plan

Sample 0316-95-0158 in Borehole 16-1672 was not collected at the specified interval, Details are discussed in Section 5.31.4.

Samples 0316-95-1210 and 0316-95-0176, both from location 16-1502, were not collected on the specified 40 foot interval. The sample location was biased to the junction of the outfall drainage and a tributary canyon of Water Canyon.

5.31.4 Comments

Sample 0316-95-0158 was not collected at the specified interval. The desired interval should have bracketed the soil/ tuff interface, which is at 6 feet. During drilling, there was no recovery until a depth of 8 feet was reached. The sample was collected from 8-9 feet, the closest interval with recovered material to the specified interval.

At this PRS, there are three outfalls that share a common outfall drainage. The drainage samples were not spaced in relation to one particular outfall. Instead, the Weir Box, located at the confluence of the three outfall drainages, was chosen as the point to start the screening and analytical sample collection. Therefore, the down drainage distances for this outfall drainage are relative to the Weir Box rather than an outfall.

5.32 PRS16-029(g)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-029(g). Also, ten surface screening samples were collected.

5.32.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.32. 1. Sample locations are also illustrated in Figure 5.32. 1.

TABLE 5.32.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0506	16-1519	outfall at bldg 450.	0-3 inches
0316-95-0507	16-1519	outfall at bldg 450.	3-7 inches*
Soil/tuff interface	16-1519	4 inches	
0316-95-0508	16-1519	outfall at bldg 450.	2'6"-3'3"^
0316-95-0509	16-1661	13 ft. fr. outfall, in drain	0-2 inches
0316-95-0510	16-1661	13 ft. fr. outfall, in drain	3-6 inches^
Soil/tuff interface	16-1661	4 inches	
0316-95-0511	16-1661	13 ft. fr. outfall, in drain	2.5-3 feet^
0316-95-0183	16-1520	30 ft. fr. outfall, in drain	0-6 inches
0316-95-0184	16-1521	50 ft. fr. outfall, in drain	0-6 inches
0316-95-0185	16-1522	70 ft. fr. outfall, in drain	0-6 inches
0316-95-0186	16-1523	190 ft. fr. outfall, in drain	0-6 inches
0316-95-0187	16-1524	310 ft. fr. outfall, in drain	0-6 inches
0316-95-1061	16-1950	110ft. fr. outfall, in drain	0-6 inches
0316-95-1062	16-1951	150 ft. fr. outfall, in drain	0-6 inches
0316-95-1063	16-1523	190 ft. fr. outfall, in drain	0-6 inches

0316-95-1064	16-1953	230 ft. fr. outfall, in drain	0-6 inches
0316-95-1065	16-1954	270 ft. fr. outfall, in drain	0-6 inches
0316-95-1066	16-1524	310 ft. fr. outfall, in drain	0-6 inches
0316-95-1067	16-1956	350 ft. fr. outfall, in drain	0-6 inches
0316-95-1068	16-1957	390 ft. fr. outfall, in drain	0-6 inches
0316-95-1069	16-1958	430 ft. fr. outfall, in drain	0-6 inches
0316-95-1070	16-1959	470 ft. fr. outfall, in drain	0-6 inches

*= sampled using hand auger
^= sampled using the split spoon

5.32.2 Screening Results

Significant screening results and any values above background are listed in Table 5.32.2 The other screening results were non-detects or were at or below background.

TABLE 5.31.2
Screening Results

Sample ID	Location ID	NaI2 Detector
0316-95-0506	16-1519	12910 cpm
0316-95-0507	16-1519	12450 cpm
0316-95-0508	16-1519	12290 cpm
0316-95-0509	16-1661	7950 cpm
0316-95-0510	16-1661	8160 cpm
0316-95-0511	16-1661	11850 cpm
0316-95-0183	16-1520	15000 cpm
0316-95-0184	16-1521	16000 cpm
0316-95-0185	16-1522	15000 cpm
0316-95-0186	16-1523	17000 cpm
0316-95-0187	16-1524	17000 cpm
0316-95-1061	16-1950	15000 cpm
0316-95-1062	16-1951	16000 cpm
0316-95-1063	16-1523	15000 cpm
0316-95-1064	16-1953	15000 cpm
0316-95-1065	16-1954	18000 cpm
0316-95-1066	16-1524	18000 cpm
0316-95-1067	16-1956	16000 cpm
0316-95-1068	16-1957	20000 cpm
0316-95-1069	16-1958	17000 cpm
0316-95-1070	16-1959	18000 cpm

5.32.3 Deviations from the OU 1082 RFI Work Plan

Sample 0316-95-0511 was not collected at specified depth. Details are discussed in Section 5.32.4.

5.32.4 Comments

In Borehole 16-1661, the drilling was extremely difficult. The tuff at this location was very near to the surface (at about 3 inches) and highly compacted. The sample team met refusal at 3 feet, a little more than 2.5 feet into tuff. Part of the sample material had to be collected from the cuttings on the drill bit due to poor recovery and refusal at a shallower depth than the specified sampling depth.

5.33 PRS 16-003(b)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-003(b). Also, fourteen surface screening samples were collected.

5.33.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.33.1 Sample locations are also illustrated in Figure 5.33.1.

TABLE 5.33.1
Sampling Depth and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0177	16-1503	outfall at bldg 400.	0-6 inches
0316-95-0178	16-1503	outfall at bldg 400.	22-28 inches*
Soil/tuff interface	16-1503	25 inches	
0316-95-0201	16-1503	outfall at bldg 400.	605-5.5 feet^
0316-95-0180	16-1659	12 ft. fr. outfall, in drain	0-6 inches
0316-95-0181	16-1659	12 ft. fr. outfall, in drain	30-36 inches*
Soil/tuff interface	16-1659	33 inches	
0316-95-0204	16-1659	12 ft. fr. outfall, in drain	4.5-6.5feet^
0316-95-0205	16-1504	22 ft. fr. outfall, in drain	0-6 inches
0316-95-0206	16-1505	42 ft. fr. outfall, in drain	0-6 inches
0316-95-0207	16-1506	62 ft. fr. outfall, in drain	0-6 inches
0316-95-0208	16-1507	182 ft. fr. outfall, in drain	0-6 inches
0316-95-0209	16-1508	342 ft. fr. outfall, in drain	0-6 inches
0316-95-1076	16-1900	N/A	Not collected
0316-95-1077	16-1504	22 ft. fr. outfall, in drain	0-6 inches
0316-95-1078	16-1505	42 ft. fr. outfall, in drain	0-6 inches
0316-95-1079	16-1506	62 ft. fr. outfall, in drain	0-6 inches
0316-95-1080	16-1904	102 ft. fr. outfall, in drain	0-6 inches
0316-95-1081	16-1905	142 ft. fr. outfall, in drain	0-6 inches
0316-95-1082	16-1507	182 ft. fr. outfall, in drain	0-6 inches
0316-95-1083	16-1907	222 ft. fr. outfall, in drain	0-6 inches
0316-95-1084	16-1908	262 ft. fr. outfall, in drain	0-6 inches
0316-95-1085	16-1909	302 ft. fr. outfall, in drain	0-6 inches
0316-95-1086	16-1508	342 ft. fr. outfall, in drain	0-6 inches
0316-95-1087	16-1911	382 ft. fr. outfall, in drain	0-6 inches
0316-95-1088	16-1912	422 ft. fr. outfall, in drain	0-6 inches
0316-95-1089	16-1913	462 ft. fr. outfall, in drain	0-6 inches
0316-95-1090	16-1914	502 ft. fr. outfall, in drain	0-6 inches

*= sampled using hand auger
^= sampled using the split spoon

5.33.2 Screening Results

Significant screening results and any values above background are listed in Table 5.33.2, The other screening results were non-detects or were at or below background.

TABLE 5.33.2
Screening Results

Sample ID	Location ID	NaI2 Detector
0316-95-0177	16-1503	20230 cpm
0316-95-0178	16-1503	12460 cpm
0316-95-0201	16-1503	15000 cpm
0316-95-0180	16-1659	16000 cpm
0316-95-0181	16-1659	16000 cpm
0316-95-0204	16-1659	16000 cpm
0316-95-0205	16-1504	15000 cpm
0316-95-0206	16-1505	16000 cpm
0316-95-0207	16-1506	16000 cpm
0316-95-0208	16-1507	16000 cpm
0316-95-0209	16-1508	16000 cpm
0316-95-1076	16-1900	16000 cpm

Sample ID	Location ID	NaI2 Detector
0316-95-1077	16-1504	16000 cpm
0316-95-1078	16-1505	16000 cpm
0316-95-1079	16-1506	16000 cpm
0316-95-1080	16-1904	16000 cpm
0316-95-1081	16-1905	16000 cpm
0316-95-1082	16-1507	15000 cpm
0316-95-1083	16-1907	15000 cpm
0316-95-1084	16-1908	15000 cpm
0316-95-1085	16-1909	14000 cpm
0316-95-1086	16-1508	14000 cpm
0316-95-1087	16-1911	16000 cpm
0316-95-1088	16-1912	13000 cpm
0316-95-1089	16-1913	15000 cpm
0316-95-1090	16-1914	18000 cpm

5.33.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during sampling at this PRS

5.33.4 Comments

Screening sample 0316-95-1076 was not collected during screening of the Building 400 outfall drainage. The Site ID 16-1900 that corresponds with Sample 0316-95-1076 could not be located. The sample team decided to start the screening sampling at the next screening location.

5.34 PRS 16-026(h2)

Four subsurface analytical samples and seven surface analytical samples were collected at PRS 16-026(h2). Also, fifteen surface screening samples were collected.

5.34.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.34.1. Sample locations are also illustrated in Figure 5.34.1.

TABLE 5.34.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0278	16-1598	outfall at bldg 360.	0-6 inches
0316-95-0279	16-1598	outfall at bldg 360.	1.5-2 feet^
Soil/tuff interface	16-1598	1' 10"	
0316-95-0280	16-1598	outfall at bldg 360.	8.5-9.5 feet^
0316-95-0281	16-1667	8 ft. fr. outfall, in drain	0-6 inches
0316-95-0282	16-1667	8 ft. fr. outfall, in drain	1-2.5 feet^ (MM)
Soil/tuff interface	16-1667	1'6"	
0316-95-0283	16-1667	8 ft. fr. outfall, in drain	3-4.5 feet^ (MM)
0316-95-0284	16-1599	18 ft. fr. outfall, in drain	0-6 inches
0316-95-0285	16-1600	38 ft. fr. outfall, in drain	0-6 inches
0316-95-0286	16-1601	58 ft. fr. outfall, in drain	0-6 inches
0316-95-0287	16-1602	298 ft. fr. outfall, in drain	0-6 inches
0316-95-0288	16-1603	488 ft. fr. outfall, in drain	0-6 inches
0316-95-1137	16-1599	18 ft. fr. outfall, in drain	0-6 inches
0316-95-1138	16-1600	38 ft. fr. outfall, in drain	0-6 inches
0316-95-1139	16-1601	58 ft. fr. outfall, in drain	0-6 inches
0316-95-1140	16-2148	98 ft. fr. outfall, in drain	0-6 inches

0316-95-1141	16-2149	138 ft. fr. outfall, in drain	0-6 inches
0316-95-1142	16-2150	178 ft. fr. outfall, in drain	0-6 inches
0316-95-1143	16-2151	218 ft. fr. outfall, in drain	0-6 inches
0316-95-1144	16-2152	258 ft. fr. outfall, in drain	0-6 inches
0316-95-1145	16-1602	298 ft. fr. outfall, in drain	0-6 inches
0316-95-1146	16-2154	338 ft. fr. outfall, in drain	0-6 inches
0316-95-1147	16-2155	378 ft. fr. outfall, in drain	0-6 inches
0316-95-1148	16-2156	418 ft. fr. outfall, in drain	0-6 inches
0316-95-1149	16-2157	458 ft. fr. outfall, in drain	0-6 inches
0316-95-1150	16-1603	488 ft. fr. outfall, in drain	0-6 inches
0316-95-1151	16-2159	538 ft. fr. outfall, in drain	0-6 inches

^= sampled using the split spoon
MM= sampled using the Minute Man Drill Rig

5.34.2 Screening Results

Sample 0316-95-0279 tested positive for HE on the HE Spot Test. Sample 0316-95-0279 also had a PID reading of 20 ppm in the sampler. The other screening results were non- detects or were at or below background.

5.34.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during sampling at this PRS

5.34.4 Comments

There were recovery problems at Borehole 16-1598. There was little or no recovery from 0-8.5 feet. Numerous tuff cobbles and gravels in the drainage cAllsed the penetration problems and contributed to the lack of recovery. The deepest interval was sampled 6.5 to 7.5 feet into tuff, the first recovered interval within the tuff. Also, the soiv tuff interface interval was not sampled directly from the split spoon because there was no recovery at this interval. Fortunately, the soil/ tuff interface was visible from the top of the borehole. The soil/ tuff interface sample (0316-95-0279) was collected by hand from the sides of the borehole.

5.35 PRS16-010(h)

Three subsurface analytical samples and three surface analytical samples were collected at PRS 16-010(h). Also, five surface screening samples were collected.

5.35.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.35.1 illustrated in Figure 5.35.1.

Sample locations are also

TABLE 5.35.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0303	16-1352	SE corner of Bldg 390	0-6 inches
0316-95-0304	16-1352	SE corner of Bldg 390	6-18 inches*
Soil/tuff interface	16-1352	18 inches	
0316-95-0305	16-1351	W side apron of Bldg 390	0-6 inches
0316-95-0306	16-1351	W side apron of Bldg 390	12-24 inches*
Soil/tuff interface	16-1351	24 inches	

0316-95-0307	16-1349	E. side of apron Bldg 390	0-6 inches
0316-95-0308	16-1349	E. side of apron Bldg 390	0-6 inches
Soil/tuff interface	16-1349	22 inches	
See Sect.4.35.4	16-1349	W side apron of Bldg 390	0-6 inches
0316-95-1616	16-1350	W side of Bldg 390 off asphalt	Not colllected
0316-95-1617	16-1349	E. side apron of Bldg 390	0-6 inches
0316-95-1618	16-1352	E corner of Bldg 390	0-6 inches
0316-95-1619	16-1353	E. aclove of bldg 390	0-6 inches
0316-95-1620	16-1354	58 ft. fr. outfall, in drain	0-6 inches

*= sampled using a hand auger

5.35.2 Screening Results

Significant screening results and any values above background are listed in Table 5.35.2. The other screening results were non-detects or were at or below background.

TABLE 5.35.2
Screening Results

Sample ID	Location ID	NaI2 Detector	HE Spot Test
0316-95-0303	16-1352	13540 cpm	negative
0316-95-0304	16-1352	14320 cpm	negative
0316-95-0305	16-1351	12110 cpm	negative
0316-95-0306	16-1351	12150 cpm	negative
0316-95-0307	16-1349	12380 cpm	negative
0316-95-0308	16-1349	13340 cpm	negative
0316-95-1616	16-1350	250 cpm	negative
0316-95-1617	16-1349	190 cpm	negative
0316-95-1618	16-1352	No reading	negative
0316-95-1619	16-1353	No reading	negative
0316-95-1620	16-1354	No reading	negative

*= sampled using a hand auger

5.35.3 Deviations from the OU 1082 RFI Work Plan

Samples 0316-95-0303 and 0316-95-0304 were not sampled in the specified location. Details are discussed in Section 5.35.4.

5.35.4 Comments

Locations 16-1349 and 16-1351 were biased to positive screening results. These two locations were the only locations to test positive for HE. There were no other positive screening results during sampling at this PRS.

Both locations 16-1349 and 16-1351 were sampled beneath the concrete apron behind Building 390. The sampling team used a smAll, electric demolition tool to expose the soil at each location. The team bored through four inches of concrete to get to the soil at each location.

Location 16-1350 was not sampled during the 1995 Field Campaign. The OU 1082 RFI Work Plan specified that two samples were to be collected at this location; however, samples 0316-95-0303 and 0316-95-0304 were collected unintentionally at location 16- 1352. The error was not discovered until after demobilization during the quality assurance review of the 1995 Field Campaign.

5.36 PRS 16-010(i)

Seven subsurface analytical samples and seven surface analytical samples were collected at

PRS 16-010(i).

5.36.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.36.1. Sample locations are also illustrated in Figure 5.36.1.

TABLE 5.36.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0309	16-1296	Center of 392 pad	0-6 inches
0316-95-0310	16-1296	Center of 392 pad	7-12 inches*
0316-95-0311	16-1272	Random location in pad grid	0-6 inches
0316-95-0312	16-1272	Random location in pad grid	7-12 inches*
0316-95-0313	16-1278	Random location in pad grid	0-6 inches
0316-95-0314	16-1278	Random location in pad grid	7-12 inches*
0316-95-0315	16-1297	Outfall pipe at 392 filter pad	4-10 inches
0316-95-0316	16-1297	Outfall pipe at 392 filter pad	10-16- inches*
Soil/tuff interface	16-1297	13 inches	
0316-95-0317	16-1298	1' upgradient orf pipe 392	0-8 inches
0316-95-0318	16-1299	1' upgradient orf pipe 392	0-8 inches
0316-95-0319	16-1300	Immediately below outfall	0-6 inches
0316-95-0320	16-1301	16-1300+50 feet	0-6 inches
0316-95-0321	16-1302	16-1300+100 feet	0-6 inches
0316-95-0322	16-1303	16-1300+150 feet	0-6 inches

*= sampled using a hand auger

5.36.2 Screening Results

Significant screening results and any values above background are listed in Table 5.36.2. The other screening results were non-detects or were at or below background.

TABLE 5.36.2
Screening Results

Sample ID	Location ID	NaI2 Detector	HE Spot Test
0316-95-0309	16-1296	10124 cpm	positive
0316-95-0310	16-1296	12140 cpm	positive
0316-95-0311	16-1272	11290 cpm	positive
0316-95-0312	16-1272	11390 cpm	positive
0316-95-0313	16-1278	11470 cpm	positive
0316-95-0314	16-1278	11260 cpm	positive
Rad Survey	16-1271	17380 cpm	negative
Rad Survey	16-1272	16230 cpm	negative
Rad Survey	16-1273	19080 cpm	negative
Rad Survey	16-1274	17400 cpm	negative
Rad Survey	16-1296	13640 cpm	negative
Rad Survey	16-1275	18270 cpm	negative
Rad Survey	16-1276	20000 cpm	negative
Rad Survey	16-1277	16510 cpm	negative
Rad Survey	16-1278	20700 cpm	negative
Rad Survey	16-1279	14720 cpm	negative
Rad Survey	16-1280	14470 cpm	negative
Rad Survey	16-1281	14480 cpm	negative
Rad Survey	16-1282	14490 cpm	negative

5.36.3 Deviations from the OU 1082 RFI Work Plan

The screening locations for the radiation survey at the TA-16-392 filter pad were set on a grid

instead of being set randomly. Details are discussed in Section 5.36.4.

5.36.4 Comments

During the field review of the 1995 Field Campaign sampling locations, FU3 team members decided that an organized grid would more effectively cover the TA-16-392 filter pad than random screening locations. The grid was evenly spaced and included eight locations along the pad edges, four within the pad, and one location in the center of the pad.

A radiation survey was conducted at the grid locations in the TA-16-392 filter pad. Two sample locations were intended to be biased to above background readings observed during the survey. However, there were no above background readings and the two sample locations were chosen randomly.

5.37 PRS 16-010(l)

Two subsurface analytical samples and four surface analytical samples were collected at PRS 16-010(l). Also, eighteen surface screening samples were collected.

5.37.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.37.1. Sample locations are also illustrated in Figure 5.37.1.

TABLE 5.37.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0323	16-1273	BG trough 50 ft. N. of pad	0-6 inches
0316-95-0324	16-1239	BG trough 10th anchor.	0-6 inches
0316-95-0325	16-1240	BG trough 13th anchor.	0-6 inches
0316-95-0326	16-1246	BG trough 26th anchor.	0-6 inches
0316-95-0376	16-1237	BG trough 50 ft. N. of pad	0-6 inches
0316-95-0377	16-1239	BG trough 10th anchor.	0-6 inches
0316-95-1460	16-1237	BG trough 50 ft. N. of pad	0-6 inches
0316-95-1461	16-1238	BG trough 7th anchor.	0-6 inches
0316-95-1462	16-1239	BG trough 10th anchor.	0-6 inches
0316-95-1463	16-1240	BG trough 13th anchor.	0-6 inches
0316-95-1464	16-1241	BG trough 14th anchor.	0-6 inches
0316-95-1465	16-1242	BG trough 18th anchor.	0-6 inches
0316-95-1466	16-1243	BG trough 23th anchor.	0-6 inches
0316-95-1467	16-1244	BG trough 24th anchor.	0-6 inches
0316-95-1468	16-1245	BG trough 25th anchor.	0-6 inches
0316-95-1469	16-1246	BG trough 26th anchor.	0-6 inches
0316-95-1470	16-1247	BG trough 27th anchor.	0-6 inches
0316-95-1471	16-1248	BG trough 28th anchor.	0-6 inches
0316-95-1472	16-1249	BG trough 29th anchor.	0-6 inches
0316-95-1473	16-1250	BG trough 30th anchor.	0-6 inches
0316-95-1474	16-1251	BG trough 31th anchor.	0-6 inches
0316-95-1475	16-1252	BG trough 32th anchor.	0-6 inches
0316-95-1476	16-1253	BG trough 33th anchor.	0-6 inches
0316-95-1477	16-1254	BG trough 34th anchor.	0-6 inches

*= sampled using a hand auger

5.37.2 Screening Results

Significant screening results and any values above background are listed in Table 5.37.2 The other screening results were non-detects or were at or below background.

TABLE 5.37.2
Screening Results

Sample ID	Location ID	NaI2 Detector	Barium by XRF	HE Spot Test
0316-95-0323	16-1237	N/A	699	positive
0316-95-0324	16-1239	N/A	606	positive
0316-95-0325	16-1240	N/A	891	negative
0316-95-0326	16-1246	N/A	826	negative
0316-95-0376	16-1237	N/A	699	positive
0316-95-0377	16-1239	N/A	606	positive
0316-95-1460	16-1237	No Reading	699	positive
0316-95-1461	16-1238	No Reading	606	negative
0316-95-1462	16-1239	9960 cpm	843	positive
0316-95-1463	16-1240	9370 cpm	891	negative
0316-95-1464	16-1241	9700 cpm	438	negative
0316-95-1465	16-1242	9100 cpm	569	negative
0316-95-1466	16-1243	8550 cpm	367	negative
0316-95-1467	16-1244	9090 cpm	442	negative
0316-95-1468	16-1245	9800 cpm	398	negative
0316-95-1469	16-1246	9600 cpm	826	negative
0316-95-1470	16-1247	9940 cpm	691	negative
0316-95-1471	16-1248	8550 cpm	392	negative
0316-95-1472	16-1249	9650 cpm	494	negative
0316-95-1473	16-1250	9540 cpm	565	negative
0316-95-1474	16-1251	10020 cpm	515	negative
0316-95-1475	16-1252	9160 cpm	316	negative
0316-95-1476	16-1253	9550 cpm	460	negative
0316-95-1477	16-1254	9380 cpm	292	negative

5.37.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during sampling at this PRS.

5.37.4 Comments

The six analytical sainples were biased to locations with positive screening results. Samples 0316-95-0323 and 0316-95-0324 were biased to the only two locations that tested positive for HE.

Samples 0316-95-0325 and 0316-95-0326 were biased to the two locations with the highest Ba concentrations. These two locations are the two highest Ba locations exclusive of locations that tested positive for HE.

Finally, subsurface samples 0316-95-0376 and 0316-95-0377 were also biased to locations that tested positive for HE. These two samples are part of the group of seven subsurface samples prescribed for the Basket Wash Facility PRSs in the OU1082 RFI Work Plan.

The seven locations were chosen from the screening locations that tested positive for HE at PRSs 16-010(l), 16-010(k), 16-010(m), and 16-010(n). Since there were more than seven locations that tested positive for HE, the sampled locations were biased to the points furthest from the Basket Wash Facility in each PRS.

5.38 PRS 16-010(k)

Four subsurface analytical samples and eight surface analytical samples were collected at PRS 16-010(k). Also, eleven surface screening samples were collected.

5.38.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.38.1. Sample locations are also illustrated in Figure 5.38.1.

TABLE 5.38.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0333	16-1282	BG trough near BW facility	0-6 inches
0316-95-0334	16-1283	BG trough evenly spaced	0-6 inches
0316-95-0335	16-1284	BG trough evenly spaced	0-6 inches
0316-95-0336	16-1285	BG trough evenly spaced	0-6 inches
0316-95-0337	16-1286	BG trough evenly spaced	0-6 inches
0316-95-0338	16-1287	BG trough evenly spaced	0-6 inches
0316-95-0339	16-1288	BG trough evenly spaced	0-6 inches
0316-95-0340	16-1289	BG trough evenly spaced	0-6 inches
0316-95-0341	16-1290	BG trough evenly spaced	0-6 inches
0316-95-0378	16-1290	BG trough evenly spaced	12-18 inches*
0316-95-2018	16-1290	BG trough evenly spaced	12-18 inches*(dup)
0316-95-0379	16-1289	BG trough evenly spaced	0-8 inches
Soil/tuff interface	16-1289	8 inches	
0316-95-1557	16-1292	BG trough evenly spaced	0-6 inches
0316-95-1558	16-1291	BG trough evenly spaced	0-6 inches
0316-95-1559	16-1290	BG trough evenly spaced	0-6 inches
0316-95-1560	16-1289	BG trough evenly spaced	0-6 inches
0316-95-1561	16-1288	BG trough evenly spaced	0-6 inches
0316-95-1562	16-1287	BG trough evenly spaced	0-6 inches
0316-95-1563	16-1286	BG trough evenly spaced	0-6 inches
0316-95-1564	16-1285	BG trough evenly spaced	0-6 inches
0316-95-1565	16-1284	BG trough evenly spaced	0-6 inches
0316-95-1566	16-1283	BG trough evenly spaced	0-6 inches
0316-95-1567	16-1282	BG trough evenly spaced	0-6 inches

*= sampled using a hand auger

5.38.2 Screening Results

Significant screening results and any values above background are listed in Table 5.38.2 The other screening results were non-detects or were at or below background.

TABLE 5.38.2
Screening Results

Sample ID	Location ID	NaI2 Detector	Barium by XRF	HE Spot Test
0316-95-0333	16-1282	NA	1293	positive
0316-95-0334	16-1283	NA	345	positive
0316-95-0335	16-1284	NA	400	positive
0316-95-0336	16-1285	NA	498	positive
0316-95-0337	16-1286	NA	384	positive
0316-95-0338	16-1287	NA	632	positive
0316-95-0339	16-1288	NA	638	positive
0316-95-0340	16-1289	NA	686	positive
0316-95-0341	16-1290	NA	773	positive
0316-95-0378	16-1290	NA	773	positive

0316-95-0379	16-1289	NA	686	positive
0316-95-1557	16-1292	9730 cpm	347	negative
0316-95-1558	16-1291	9820 cpm	619	negative
0316-95-1559	16-1290	9810 cpm	773	positive
0316-95-1560	16-1289	9810 cpm	686	positive
0316-95-1561	16-1288	9620 cpm	638	positive
0316-95-1562	16-1287	9630 cpm	632	positive
0316-95-1563	16-1286	9710 cpm	384	positive
0316-95-1564	16-1285	9720 cpm	498	positive
0316-95-1565	16-1284	9470 cpm	400	positive
0316-95-1566	16-1283	9850 cpm	345	positive
0316-95-1567	16-1282	9810 cpm	1293	positive

*= sampled using a hand auger

5.38.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during sampling at this PRS.

5.38.4 Comments

The surface analytical samples were biased to locations that tested positive for HE. Two of these locations, 16-1282 and 16-1290, are also the locations with the highest Ba concentrations.

Samples 0316-95-0378 and 0316-95-0379 were collected as part of the group of seven subsurface samples prescribed for the Basket Wash Facility PRSs (see section 4.37.4).

A duplicate was taken at sample location 16-1290. The duplicate sample, 0316-95-2018, is of the subsurface sample 0316-95-0378, and was collected because an indication of contamination was observed in the field.

5.39 PRS 16-010(m)

Three subsurface analytical samples and seven surface analytical samples were collected at PRS 16-010(m). Also, eleven surface screening samples were collected.

Where's Sections 5.39.1?

TABLE 5.39.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0343	16-1226	BG trough near BW facility	0-6 inches
0316-95-0344	16-1230	BG trough evenly spaced	0-6 inches
0316-95-0345	16-1232	BG trough evenly spaced	0-6 inches
0316-95-0346	16-1233	BG trough evenly spaced	0-6 inches
0316-95-0348	16-1234	BG trough evenly spaced	0-6 inches
0316-95-0349	16-1235	BG trough evenly spaced	0-6 inches
0316-95-0380	16-1236	BG trough filter vessel	0-6 inches
0316-95-2019	16-1236	BG trough filter vessel	12-18 inches *
0316-95-0381	16-1236	BG trough filter vessel	12-18 inches *(dup)
0316-95-1568	16-1236	BG trough near BW facility	12-18 inches*
0316-95-1569	16-1235	BG trough filter vessel	0-6 inches
0316-95-1570	16-1234	BG trough evenly spaced	0-6 inches
0316-95-1571	16-1233	BG trough evenly spaced	0-6 inches
0316-95-1572	16-1232	BG trough evenly spaced	0-6 inches
0316-95-1573	16-1231	BG trough evenly spaced	0-6 inches

0316-95-1574	16-1230	BG trough evenly spaced	0-6 inches
0316-95-1575	16-1229	BG trough evenly spaced	0-6 inches
0316-95-1576	16-1228	BG trough evenly spaced	0-6 inches
0316-95-1577	16-1227	BG trough evenly spaced	0-6 inches
0316-95-1578	16-1226	BG trough evenly spaced	0-6 inches

*= sampled using a hand auger

5.39.2 Screening Results

Significant screening results and any values above background are listed in Table 5.39.2. The other screening results were non-detects or were at or below background.

TABLE 5.39.2
Screening Results

Sample ID	Location ID	NaI2 Detector	Barium by XRF	HE Spot Test
0316-95-0343	16-1226	12170 cpm	343 ppm	positive
0316-95-0344	16-1230	12310 cpm	787 ppm	negative
0316-95-0345	16-1232	13320 cpm	731 ppm	negative
0316-95-0346	16-1233	13240 cpm	472 ppm	positive
0316-95-0348	16-1234	15320 cpm	921 ppm	positive
0316-95-0349	16-1235	14320 cpm	476 ppm	positive
0316-95-0380	16-1236	13330 cpm	384 ppm	positive
0316-95-2019	16-1236	No reading	384 ppm	positive
0316-95-0381	16-1236	No reading	384 ppm	positive
0316-95-1568	16-1236	No reading	533 ppm	positive
0316-95-1569	16-1235	No reading	476 ppm	positive
0316-95-1570	16-1234	No reading	921 ppm	positive
0316-95-1571	16-1233	No reading	472 ppm	positive
0316-95-1572	16-1232	No reading	731 ppm	negative
0316-95-1573	16-1231	No reading	475 ppm	negative
0316-95-1574	16-1230	No reading	787 ppm	negative
0316-95-1575	16-1229	No reading	389 ppm	negative
0316-95-1576	16-1228	No reading	412 ppm	negative
0316-95-1577	16-1227	No reading	532 ppm	negative
0316-95-1578	16-1226	No reading	343 ppm	positive

5.39.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during sampling at this PRS.

5.39.4 Comments

The seven analytical samples were biased to locations with positive screening results. Samples 0316-95-0343, 0316-95-0346, 0316-95-0347, 0316-95-0348, and 0316-95- 0349 were biased to the only locations that tested positive for HE.

Samples 0316-95-0344 and 0316-95-0345 were biased to the two locations with the highest Ba concentrations. These two locations are the two highest Ba locations exclusive of locations that tested positive for HE.

Samples 0316-95-0380 and 0316-95-0381 were collected as part of the group of seven subsurface samples prescribed for the Basket Wash Facility PRSs (see section 4.37.4).

A duplicate was taken at sample location 16-1236. The duplicate sample, 0316-95-2019, is of the subsurface sample 0316-95-0380, and was collected because an indication of contamination was observed in the field.

5.40 PRS 16-010(n)

One subsurface analytical sample and four surface analytical samples were collected at PRS 16-010(n). Also, ten surface screening samples were collected.

5.40.1 Sample Depths and Locations

Sarnple depths and locations are listed in Table 5.40.1. Sarnple locations are also illustrated in Figure 5.39.1.

TABLE 5.40.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0353	16-1304	BG trough near BW facility	0-6 inches
0316-95-0354	16-1307	BG trough evenly spaced	0-6 inches
0316-95-0355	16-1311	BG trough evenly spaced	0-6 inches
0316-95-0356	16-1313	BG trough evenly spaced	0-6 inches
0316-95-0382	16-1313	BG trough near pad 392	8-14 inches
0316-95-1579	16-1313	BG trough near pad 392	0-6 inches
0316-95-1580	16-1312	BG trough evenly spaced	0-6 inches
0316-95-1581	16-1311	BG trough evenly spaced	0-6 inches
0316-95-1582	16-1310	BG trough evenly spaced	0-6 inches
0316-95-1583	16-1309	BG trough evenly spaced	0-6 inches
0316-95-1584	16-1308	BG trough evenly spaced	0-6 inches
0316-95-1585	16-1307	BG trough evenly spaced	0-6 inches
0316-95-1586	16-1306	BG trough evenly spaced	0-6 inches
0316-95-1587	16-1305	BG trough evenly spaced	0-6 inches
0316-95-1588	16-1304	BG trough near BW facility	0-6 inches

*= sampled using a hand auger

5.40.2 Screening Results

Significant screening results and any values above background are listed in Table 5.40.2 The other screening results were non-detects or were at or below background.

TABLE 5.40.2
Screening Results

Sample ID	Location ID	NaI2 Detector	Barium by XRF	HE Spot Test
0316-95-0353	16-1304	13320 cpm	330 ppm	negative
0316-95-0354	16-1307	12120 cpm	341 ppm	negative
0316-95-0355	16-1311	12360 cpm	337 ppm	negative
0316-95-0356	16-1313	12360 cpm	no reading	positive
0316-95-0382	16-1313	15650 cpm	no reading	negative
0316-95-1579	16-1313	no reading	no reading	negative
0316-95-1580	16-1312	no reading	278 ppm	negative
0316-95-1581	16-1311	no reading	337 ppm	negative
0316-95-1582	16-1310	no reading	249 ppm	negative
0316-95-1583	16-1309	no reading	191 ppm	negative
0316-95-1584	16-1308	no reading	247 ppm	negative
0316-95-1585	16-1307	no reading	341 ppm	negative
0316-95-1586	16-1306	no reading	321 ppm	negative
0316-95-1587	16-1305	no reading	208 ppm	negative
0316-95-1588	16-1304	no reading	330 ppm	negative

5.40.3 Deviations from the OU 1082 RFI Work Plan

There were no deviations from the OU 1082 RFI Work Plan during sampling at this PRS.

5.40.4 Comments

The five analytical samples were all biased to locations with positive screening results. Sample 0316-95-0356 was biased to the only location that tested positive for HE. Samples 0316-95-0354, 0316-95-0355, and 0316-95-0356 are biased to the three locations with the highest Ba concentrations.

Sample 0316-95-0382 was collected as part of the group of seven subsurface samples prescribed for the Basket Wash Facility PRSs (see Section 5.37.4).

5.41 PRS 16-016(c)

Three subsurface analytical samples and fifteen surface analytical samples were collected at PRS 16-016(c). Also, twenty-six surface screening samples were collected.

5.41.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.41.1. Sample locations are also illustrated in Figure 5.41.1.

TABLE 5.41.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0422	16-1314	25' from NE corner of 386	0-6 inches
0316-95-0423	16-2175	In small drainage N. of 386	0-6 inches
0316-95-0424	16-1317	Area between 386 and 387	0-6 inches
0316-95-0425	16-1643	Row 1 of grid, west point	0-6 inches
0316-95-0426	16-1643	2 feet depth	Not collected
0316-95-0427	16-1643	5 feet depth	Not collected
0316-95-0428	16-1642	Row 1 of grid, east point	0-6 inches
0316-95-0429	16-1642	2 feet depth	Not collected
0316-95-0430	16-1642	5 feet depth	Not collected
0316-95-0431	16-1316	Row 2 of grid, east point	0-6 inches
0316-95-0432	16-1316	2 feet depth	Not collected
0316-95-0433	16-1318	5 feet depth	Not collected
0316-95-0434	16-1318	Row 4 of grid, east point	0-6 inches
0316-95-0435	16-1318	2 feet depth	Not collected
0316-95-0436	16-1319	5 feet depth	Not collected
0316-95-0437	16-1319	Row 5 of grid, east point	0-6 inches
0316-95-0438	16-1319	2 feet depth	0-6 inches
0316-95-0439	16-1319	5 feet depth	0-6 inches
0316-95-0450°	16-1320	Ctr. Of drain., 20' fr. grid	0-6 inches
0316-95-0451	16-1321	Ctr. Of drain., 40' fr. grid	9-14 inches*
0316-95-0452	16-1322	Ctr. Of drain., 60' fr. grid	
0316-95-0453	16-1324	Ctr. Of drain., 80' fr. grid	0-1'8"* inches
0316-95-0454	16-1326	Ctr. Of drain., 100' fr. grid	0-2 feet*
0316-95-0455	16-1327	Ctr. Of drain., 120' fr. grid	0-6 inches
0316-95-0456	16-1328	Ctr. Of drain., 140' fr. grid	0-6 inches
0316-95-0457	16-1321	Ctr. Of drain., 40' fr. grid	0-6 inches
Soil/tuff interface	16-1321	12 inches	0-6 inches
0316-95-0458	16-1326	Ctr. Of drain., 100' fr. grid	0-6 inches
0316-95-0459	16-1322	Ctr. Of drain., 60' fr. grid	0-6 inches
0316-95-1532	16-1643	Row 1 of grid, west point	0-6 inches
0316-95-1533	N/A	Row 1 of grid, ctr. point	0-6 inches
0316-95-1534	16-1642	Row 1 of grid, east point	0-6 inches
0316-95-1535	N/A	Row 2 of grid, west point	0-6 inches
0316-95-1536	N/A	Row 2 of grid, ctr. point	0-6 inches

Sample ID	Location ID	Location Description	Sample Depth
0316-95-1537	16-1316	Row 2 of grid, east point	0-6 inches
0316-95-1538	N/A	Row 3 of grid, west point	0-6 inches
0316-95-1539	N/A	Row 3 of grid, ctr. point	0-6 inches
0316-95-1540	N/A	Row 3 of grid, east point	0-6 inches
0316-95-1541	N/A	Row 4 of grid, west point	0-6 inches
0316-95-1542	N/A	Row 4 of grid, ctr. point	0-6 inches
0316-95-1543	16-1318	Row 4 of grid, east point	0-6 inches
0316-95-1544	161319	Row 5 of grid, west point	0-6 inches
0316-95-1545	N/A	Row 5 of grid, ctr. point	0-6 inches
0316-95-1546	N/A	Row 5 of grid, east point	0-6 inches
0316-95-1547	N/A	Row 6 of grid, west point	0-6 inches
0316-95-1548	N/A	Row 6 of grid, ctr. point	0-6 inches
0316-95-1549	N/A	Row 6 of grid, east point	0-6 inches
0316-95-1550	16-1644	Row 7 of grid, west point	0-6 inches
0316-95-1551	N/A	Row 7 of grid, ctr. point	0-6 inches
0316-95-1552	16-1641	Row 7 of grid, east point	0-6 inches
0316-95-1754	16-1315	Area between 386 and 387	0-6 inches
0316-95-1755	16-1317	Area between 386 and 387	0-6 inches
0316-95-1756	16-2173	Area between 386 and 387	0-6 inches
0316-95-1757	16-2174	Area between 386 and 387	0-6 inches
0316-95-1758	16-2175	In small drainage N of 386	0-6 inches

*= sample using a hand auger

°= Samples 0316-95-0440 through 0316-95-0449 were not collected. See Section 5.14.4 for details

5.41.2 Screening Results

Significant screening results and any values above background are listed in Table 5.41.2 The other screening results were non-detects or were at or below background.

TABLE 5.41.2
Screening Results

Sample ID	Location ID	Barium by XRF	Barium by LIBS	NaI2 Detector
0316-95-0422	16-1314	N/A	N/A	11200 cpm
0316-95-0423	16-2175	N/A	N/A	10240 cpm
0316-95-0424	16-1317	N/A	N/A	11250 cpm
0316-95-0425	16-1643	N/A	N/A	11280 cpm
0316-95-0428	16-1642	N/A	N/A	12000 cpm
0316-95-0431	16-1316	N/A	N/A	12460 cpm
0316-95-0434	16-1318	N/A	N/A	11220 cpm
0316-95-0437	16-1319	N/A	N/A	12800 cpm
0316-95-0450	16-1320	1116	2443 ppm	13550 cpm
0316-95-0451	16-1321	2416	3233 ppm	13410 cpm
0316-95-0452	16-1322	2198	2233 ppm	16610 cpm
0316-95-0453	16-1324	1486	2341 ppm	17060 cpm
0316-95-0454	16-1326	2294	2352 ppm	16240 cpm
0316-95-0455	16-1327	1110	3857 ppm	13950 cpm
0316-95-0456	16-1328	1886	No Reading	14840 cpm
0316-95-1532	16-1643	7185	2933 ppm	13160 cpm
0316-95-1533	N/A	2243	2243 ppm	14030 cpm
0316-95-1534	16-1642	2251	2251 ppm	14480 cpm
0316-95-1535	N/A	637	535 ppm	14950 cpm
0316-95-1536	N/A	1896	1596 ppm	13750 cpm
0316-95-1537	16-1316	5180	1994 ppm	14130 cpm
0316-95-1538	N/A	1935	1496 ppm	13680 cpm
0316-95-1539	N/A	1786	759 ppm	13430 cpm
0316-95-1540	N/A	1141	446 ppm	13390 cpm
0316-95-1541	N/A	2904	1692 ppm	14650 cpm
0316-95-1542	N/A	4298	1893 ppm	13760 cpm
0316-95-1543	16-1318	11070	1543 ppm	14270 cpm
0316-95-1544	16-1319	4982	1641 ppm	14090 cpm

Sample ID	Location ID	Barium by XRF	Barium by LIBS	NaI2 Detector
0316-95-1545	N/A	2120	955 ppm	13250 cpm
0316-95-1546	N/A	507	139 ppm	13250 cpm
0316-95-1547	N/A	486	269 ppm	14020 cpm
0316-95-1548	N/A	2121	719 ppm	14820 cpm
0316-95-1549	N/A	494	114 ppm	13330 cpm
0316-95-1550	16-1644	329	90 ppm	14080 cpm
0316-95-1551	N/A	3108	999 ppm	13990 cpm
0316-95-1552	16-1641	2859	1238 ppm	14620 cpm
0316-95-1754	16-1315	456	N/A	14000 cpm
0316-95-1755	16-1317	507	N/A	16000 cpm
0316-95-1756	16-2173	475	N/A	13000 cpm
0316-95-1757	16-2174	420	N/A	15000 cpm
0316-95-1758	16-2175	1246	N/A	18000 cpm

5.41.3 Deviations from the OU 1082 RFI Work Plan

Samples 0316-95-0457 and 0316-95-0458 were not collected at the specified depth. For sample 0316-95-0457 soil/ tuff interface was reached at 12 inches and refusal was met at 14 inches. Refusal was met at 20 inches for sample 0316-95-458. Details are discussed in Section 5.41.4.

FU3 team members decided to collect an additional screening sample, 0316-95-1758, in the documented Ba nitrate pile area based on observations made during the field review of 1995 sample locations.

5.41.4 Comments

Samples 0316-95-0440 through 0316-95-0449 were not collected because there were no locations that screened positive for HE in PRS 16-016(c). These samples were designated for locations that screened positive for HE. The other subsurface samples were not collected because there were no Ba screening results above SALs in those locations. The subsurface samples that were not collected are listed in Table 5.41.1.

The five analytical sample locations in the drainage grid and the three subsurface analytical sample locations in the lower drainage were biased based on screening results. All of the analytical sample locations were biased to the highest Ba concentrations in each area. The locations with the highest three XRF Ba values and the highest two LIBS Ba values were collected for analysis. The XRF Ba values for two of these locations were above screening action levels (SALs). However, the LIBS Ba values for the same two locations were less than half SALS. Because of the low LIBS values the field team decided not to collect the subsurface samples at these locations.

Samples 0316-95-0457 and 0316-95-458 were not collected at the specified depth. Refusal was met at less than 2 feet in both locations. These samples were collected in a drainage on a steep grade with numerous tuff and dacite cobbles in the subsurface soil. The abundance of the cobbles created very difficult conditions for hand Augering. At each location the sampling team had to hand auger at least two holes to reach the final depth.

For sample 0316-95-0457, the sampler may have met refusal at a large tuff boulder instead of at the soil/ tuff interface. The abundance of tuff cobbles in this area suggests that the soiv tuff interface was not encountered. However, the sampling team assumed that the soil/ tuff interface had been reached at this location.

5.42 PRS 16-020

Seventeen subsurface analytical samples and sixteen surface analytical samples were collected at PRS 16-020.

5.42.1 Sample Depths and Locations

TABLE 5.42.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-0471	16-1579	At the outfall bldg 222	0-6 inches
0316-95-0472	16-1579	At the outfall bldg 222	2.5-4.5 feet^
0316-95-0473	16-1579	At the outfall bldg 222	4.5-5.5 feet^
0316-95-0474	16-1573	At bldg 222 outfall E. bank	0-6 inches
0316-95-0475	16-1574	At bldg 222 outfall W. bank	0-6 inches
0316-95-0476	16-1580	Outfall + 25 feet	0-6 inches
0316-95-0477	16-1580	Outfall + 25 feet	2'6"-2'11" *
Soil/tuff interface	16-1580	2'9"	
0316-95-0478	16-1580	Outfall + 25 feet	4.5-5.5 feet^
0316-95-0479	16-1581	Outfall + 50 feet	0-6 inches
0316-95-0480	16-1581	Outfall + 50 feet	1'3"-1'9"
Soil/tuff interface	16-1581	1.5 feet	
0316-95-0481	16-1581	Outfall + 50 feet	3.5-5 feet^
0316-95-0482	16-1582	Outfall + 75 feet	0-6 inches
0316-95-0483	16-1582	Outfall + 75 feet	2-3 feet^
0316-95-2016	16-1582	Outfall + 75eet	2-3 feet^ (dup)
Soil/tuff interface	16-1582	2.5 feet	
0316-95-0484	16-1582	Outfall + 75feet	4.5-5 feet^
0316-95-0485	16-1583	Outfall + 100 feet	0-6 inches
0316-95-0486	16-1583	Outfall + 100 feet	1'10"-3'^
Soil/tuff interface	16-1583	2.5 feet	
0316-95-0487	16-1583	Outfall + 100 feet	3-4 feet^
0316-95-0488	16-1584	Outfall + 492 feet	0-6 inches
0316-95-0489	16-1584	Outfall + 492 feet	8-14 inches*
0316-95-0490	16-1584	Outfall + 492 feet	14-17 inches*
0316-95-0491	16-1575	Outfall + 492 feet S. bank	0-6 inches
0316-95-0492	16-1576	Outfall + 492 feet N.bank	0-6 inches
0316-95-0493	16-1585	Outfall + 738 feet	0-6 inches
0316-95-0494	16-1585	Outfall + 738 feet	0-6 inches
0316-95-0495	16-1585	Outfall + 738 feet	8-13 inches*
0316-95-0496	16-1577	Outfall + 738 feet S. bank	14-18 inches*
0316-95-0497	16-1578	Outfall + 738 feet N bank	0-6 inches
0316-95-0512	16-2168	Outfall + 1000 feet	0-6 inches
0316-95-0513	16-2168	Outfall + 1000 feet	8-13 inches*
0316-95-0514	16-2168	Outfall + 1000 feet	14-16 inches*
0316-95-0515	16-2169	Outfall + 1000 feet N bank	0-6 inches
0316-95-0516	16-1670	Outfall + 1000 feet S bank	0-6 inches

*= Sampled using a hand auger
^=sampled using the spilt spoon

Significant screening results and any values above background are listed in Table 5.42.2. The other screening results were non-detects or were at or below background.

TABLE 5.42.2
Screening Results

Sample ID	Location ID	PID Reading
0316-95-0478	16-1580	15 ppm
0316-95-0486	16-1583	4 ppm
0316-95-0489	16-1584	7 ppm
0316-95-0490	16-1584	8 ppm
0316-95-0494	16-1585	5 ppm

5.42.3 Deviations from the OU 1082 RFI Work Plan

Borehole 16-1583 was not drilled to the specified depth. Details are discussed in Section 5.42.4.

An additional five samples were collected 1000 feet from the outfall. These samples were required to bound the down-drainage extent of contamination because initial analytical sample results indicated contamination was present at 738 feet from the outfall.

5.42.4 Comments

Borehole 15-1583 was not drilled to the specified depth because the sampling team met refusal at a depth of 4 feet. There were numerous tuff and dacite cobbles at depth in this area. The cobbles impeded the drilling effort at each borehole and hand auger hole. Two drilling methods were required to reach the specified depth in each borehole: hollow stem auger and core/ Cut-rite drilling.

A duplicate was taken at Borehole 16-1582. The duplicate sample, 0316-95-2016, is of the subsurface sample 0316-95-0483, and was collected because there was an indication of contamination observed in the field. Elevated PID readings were observed down the hole at this interval and the preceding interval. The elevated readings were 7 ppm and 10 ppm, respectively; however, there were no elevated readings observed in the recovered split- spoon samples.

5.43 HE Field Screening at the Burning Ground

Thirty surface screening samples and eight surface analytical samples were collected as part of the HE Field Screening effort at the Burning Ground.

5.43.1 Sample Depths and Locations

Sample depths and locations are listed in table 5.43.1 Sample are also illustrated in Figure 5.43.1.

TABLE 5.43.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-95-1777	16-2177	5 feet north of 16-1237	0-6 inches
0316-95-1778	16-2178	5 feet west of 16-1237	0-6 inches
0316-95-1779	16-2179	5 feet south of 16-1237	0-6 inches
0316-95-1780	16-2180	5 feet east of 16-1237	0-6 inches
0316-95-1781	16-2181	5 feet north of 16-1226	0-6 inches
0316-95-1782	16-2182	5 feet west of 16-1226	0-6 inches
0316-95-1783	16-2183	5 feet south of 16-1226	0-6 inches
0316-95-1784	16-2184	5 feet east of 16-1226	0-6 inches
0316-95-1785	16-2185	5 feet north of 16-1233	0-6 inches

Sample ID	Location ID	Location Description	Sample Depth
0316-95-1786	16-2186	5 feet west of 16-1233	0-6 inches
0316-95-1787	16-2187	5 feet south of 16-1233	0-6 inches
0316-95-1788	16-2188	5 feet east of 16-1233	0-6 inches
0316-95-1789	16-2189	5 feet north of 16-1313	0-6 inches
0316-95-1790	16-2190	5 feet west of 16-1313	0-6 inches
0316-95-1791	16-2191	5 feet south of 16-1313	0-6 inches
0316-95-1792	16-2192	5 feet east of 16-1313	0-6 inches
0316-95-1793	16-2193	10 feet north of 16-1237	0-6 inches
0316-95-1794	16-2194	10 feet west of 16-1237	0-6 inches
0316-95-1795	16-2195	10 feet south of 16-1237	0-6 inches
0316-95-1796	16-2196	10 feet east of 16-1237	0-6 inches
0316-95-1797	16-2197	10 feet north of 16-1226	0-6 inches
0316-95-1798	16-2198	10 feet west of 16-1226	Not collected
0316-95-1799	16-2199	10 feet south of 16-1226	0-6 inches
0316-95-1800	16-2200	10 feet east of 16-1226	0-6 inches
0316-95-1801	16-2201	10 feet north of 16-1233	0-6 inches
0316-95-1802	16-2202	10 feet west of 16-1233	0-6 inches
0316-95-1803	16-2203	10 feet south of 16-1233	0-6 inches
0316-95-1804	16-2204	10 feet east of 16-1233	0-6 inches
0316-95-1805	16-2205	10 feet north of 16-1313	0-6 inches
0316-95-1806	16-2206	10 feet west of 16-1313	0-6 inches
0316-95-1807	16-2307	10 feet south of 16-1313	0-6 inches
0316-95-1808	16-2208	10 feet east of 16-1313	Not collected
0316-95-1809	16-2179	5 feet south of 16-1237	0-6 inches
0316-95-1810	16-2180	5 feet east of 16-1237	0-6 inches
0316-95-1811	16-2183	5 feet south of 16-1226	0-6 inches
0316-95-1812	16-2200	10 feet east of 16-1226	0-6 inches
0316-95-1813	16-2186	5 feet west of 16-1233	0-6 inches
0316-95-1814	16-2188	5 feet east of 16-1233	0-6 inches
0316-95-1815	16-2190	5 feet west of 16-1313	0-6 inches
0316-95-1816	16-2191	5 feet south of 16-1313	0-6 inches

Significant screening results and any values above background are listed in Table 5.42.2. The other screening results were non-detects or were at or below background.

5.43.2 Screening Results

All HE screening results are listed in Table 5.43.2. There were no elevated PID readings for any of the samples collected during this effort. HE screening (using Ensys and Dtech) and volatile screening (using the PID) were the only screening methods specified for these samples.

TABLE 5.43.2
Screening Results

Sample ID	Location ID	Ensys results	Dilution	Dtech Results	Dilution
0316-95-1777	16-2177	1.2 ppm	none	N/A	N/A
0316-95-1778	16-2178	<1.0 ppm	none	N/A	N/A
0316-95-1779	16-2179	604 ppm	1:25	86 ppm RDX	1:19
0316-95-1780	16-2180	639 ppm	1:25	387 ppm RDX	1:650
0316-95-1781	16-2181	2076 ppm	1:100	N/A	N/A
0316-95-1782	16-2182	4133 ppm	1:1000	N/A	N/A
0316-95-1783	16-2183	6089 ppm	1:1000	3021 ppm RDX	N/A
0316-95-1784	16-2184	572 ppm	1:25	N/A	N/A
0316-95-1785	16-2185	25 ppm	1:25	N/A	N/A
0316-95-1786	16-2186	4578 ppm	1:1000	279 ppm RDX	1:65
0316-95-1787	16-2187	79 ppm	1:25	N/A	N/A

Sample ID	Location ID	Ensys results	Dilution	Dtech Results	Dilution
0316-95-1788	16-2188	2222 ppm	1:100	7 ppm RDX	1:19
0316-95-1789	16-2189	90 ppm	none	N/A	N/A
0316-95-1790	16-2190	5689 ppm	1:1000	2783 ppm RDX	1:650
0316-95-1791	16-2191	14622 ppm	1:1000	2584 ppm RDX	1:650
0316-95-1792	16-2192	1302 ppm	1:100	N/A	N/A
0316-95-1793	16-2193	303 ppm	1:25	N/A	N/A
0316-95-1794	16-2194	3 ppm	none	N/A	N/A
0316-95-1795	16-2195	5 ppm	none	N/A	N/A
0316-95-1796	16-2196	4 ppm	none	N/A	N/A
0316-95-1798	16-2198	11 ppm	none	N/A	N/A
0316-95-1799	16-2199	164 ppm	1:25	N/A	N/A
0316-95-1800	16-2200	6844 ppm	1:1000	1800 ppm RDX	1:650
0316-95-1801	16-2201	9 ppm	none	N/A	N/A
0316-95-1802	16-2202	310 ppm	1:25	N/A	N/A
0316-95-1803	16-2203	6 ppm	none	N/A	N/A
0316-95-1804	16-2204	6 ppm	none	N/A	N/A
0316-95-1805	16-2205	578 ppm	1:25	N/A	N/A
0316-95-1806	16-2206	5 ppm	none	N/A	N/A
0316-95-1807	16-2307	173 ppm	1:25	N/A	N/A

5.43.3 Deviations from the OU 1082 RFI Work Plan

The Burning Ground HE screening effort was not specified as part of the OU 1082 RFI Work Plan. The field screening was designed by FU3 team members to augment data generated during the RFI Phase I of the Burning Ground PRSS.

5.43.4 Comments

Samples were screened for HE using the Ensys and Dtech field screening kits. The sample locations were biased to areas of known contamination in PRSs 16-010(l), 16-010(m), and 16-010(n). The screening effort attempted to bound the extent of contamination at four locations. The locations are: Site ID 16-1237, Site ID 16-1233, Site ID 16-1226, and Site ID 16-1313. At each location four samples were collected at five foot intervals north, west, south, and east of the contaminated location. These samples were screened; results indicated that there was contamination at all these locations. An additional four samples were collected at ten foot intervals north, west, south, and east of each original contariiinated location. One ten foot sample was not collected at Site ID 16-1226 and Site ID 1313 because of an existing structure in each location.

For both test kits, sample dilutions were required to obtain accurate results. The Ensys kit samples were Muted to a 25 times dilution, a 100 times dilution, and a 1000 times dilution The Dtech kit also required more than one dilution for most samples. The dilutions are a nineteen times dilution, a sixty-five times dilution and a six-hundred fifty times dilution.

All of the samples collected were screened with the Ensys kit. Only the two locations from each contaminated area with the highest HE values from Ensys were analyzed using the Dtech kit. These eight samples correspond with the eight samples submitted to DX-2 for HE analysis.

Eight surface analytical samples were collected and submitted to DX-2 for HE analysis. The two highest screening locations from each contaminated location were collected. The analytical results were used to gAllge the accuracy of the two screening techniques.

5.44 Additional TCLP Sample Collection at TA-16

Four surface analytical samples were collected for TCLP analysis. Two samples were collected at PRS 16-020, one sample was collected at PRS 16-010(i), and one sample was collected at PRS 16-0 1 0(l).

5.43.1 Sample Depths and Locations

Sample depths and locations are listed in Table 5.44.1. Sample locations are also illustrated in Figure 5.44.1

TABLE 5.44.1
Sample Depths and Locations

Sample ID	Location ID	Location Description	Sample Depth
0316-96-0001	16-1580	25' fr. outfall bldg. 222	0-6 inches
0316-96-0002	16-1581	50' fr. outfall bldg. 222	0-6 inches
0316-96-0003	16-1272	W. edge of 392 Filter Bed	0-6 inches
0316-96-0004	16-1240	14th joint/anchor in tough	0-6 inches

5.44.2 Screening Results

Sample 0316-96-0003 tested positive for HE using the HE Spot Test kit. The other screening results were non-detects or were at or below background.

5.44.3 Deviations from the OU 1082 RFI Work Plan

The four TCLP samples were requested by FU3 team members because of the Phase I analytical results at these locations. The analytical results indicated that contamination is present at these locations above regulatory clean-up levels. The TCLP samples were collected in order to characterize the wastes that might be generated during future soil removals at these PRSs.