Draft
Site Investigation Report
Remedial Investigation Phase
Former Small Arms Ranges: Evergreen (AOC 4-6.3), Miller Hill (4-2.2) and Skeet (AOC 4-3)
Fort Lewis, Washington

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EXECUTIVE SUMMARY

This report summarizes the soil investigations conducted by the Corps of Engineers at three former small arms training ranges, as part of the Remedial Investigation (RI) studies at Fort Lewis, Washington (Figure 1). The three ranges include the Evergreen Infiltration Range, the Miller Hill Pistol Range, and the Skeet Range. This investigation provides preliminary information on the soil quality at these sites.

The objectives of the sampling included confirming the presence of contamination; delineating the vertical and horizontal extent of lead contamination; determining if lead can be used as a driver to define extent at ranges; conducting a demonstration of method applicability (DMA) to determine usability of field-based technology for soil lead sampling; and refining the conceptual site model based on field results.

Results from the demonstration of method applicability study indicated that XRF field technology was adequate and appropriate for this site investigation. The linear regression correlation coefficient factor (r^2) for the data set was 0.96, well above the 0.75 required by the Sampling and Analysis Plan (SAP) Addendums associated with these sites.

The results from this investigation indicated that soils at the former Evergreen Infiltration Range, the former Skeet Range, and the former Miller Hill Pistol Range have been impacted by past operational practices. Elevated concentrations of lead were detected in soil above the Washington State Department of Ecology (Ecology) Model Toxic Control Act (MTCA) Method A cleanup levels at each of the closed ranges. In addition, elevated concentrations of cPAHs above the MTCA Method A/B cleanup levels were detected at the former Skeet Range. Sufficient data was gathered to provide a reasonable estimate of horizontal extent and depth of contamination for use in the feasibility study at all three sites.

Laboratory analysis of collaborative soil samples confirmed that lead is the primary contaminant as other metals were not above MTCA levels when lead was not above criteria; therefore lead can be used as the driver to define extent at the ranges with the exception of PAHs at the former skeet range. Antimony was the most frequent contaminant after lead above MTCA, with copper being detected in one soil sample from the evergreen infiltration range and one sample with arsenic above MTCA criteria at the former skeet range.

Based on the soil analytical results, five samples from each range were submitted for the Toxicity Characteristic Leaching Procedure (TCLP) analysis. These samples were selected as being representative of the types of contamination seen at each range. The results of this analysis varied with each site. For example, TCLP analysis conducted on five samples from the Evergreen Berm resulted in exceedance of the maximum concentration of contaminants for the Toxicity Characteristic of 5 mg/L. Based on these

results, it is likely that any soils from the Evergreen site exceeding the MTCA criteria of 250 mg/kg would likely be considered hazardous waste. The TCLP analysis conducted on five samples from the Miller Hill site resulted in exceedance for only one sample, which had a XRF lead value of 6500 mg/kg. All other samples were below the Toxicity Characteristic criteria. TCLP analysis was conducted on five samples from the former skeet range; results did not exceed the maximum TLCP concentration of contaminants for any of the samples submitted from this range.

Results from the investigation indicate that site activities have impacted the surface soils at the former ranges. Based on the refined conceptual site model, lead concentrations in soils pose a risk to potential human health and ecological receptors by direct contact, ingestion, root contact, or inhalation of dust. Remedial action is recommended to reduce this risk at all three sites. Discussion of remedial actions will be presented in the feasibility study.

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LIST OF ACRONYMS AND ABBREVIATIONS

FLAO	Fort Lewis Agreed Order
AOC	Area of Concern
bgs	Below Ground Surface
COC	Chain-of-custody
COPC	Contaminant(s) of Potential Concern
CSM	Conceptual Site Model
DCQCR	Daily Chemical Quality Control Reports
DMA	Demonstration of Method Applicability
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DTM	Draft Technical Memorandum
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
ER	Engineering Regulation
FTM	Final Technical Memorandum
FWP	Field Work Plan
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MTCA	Model Toxics Control Act
PM	Project Manager
PNNL	Pacific Northwest National Laboratory
PW	Fort Lewis Public Works
RFA	RCRA Facility Assessment
RL	Reporting Limits
QA	Quality Assurance
QC	Quality Control
RIWP	Remedial Investigation Work Plan
SAP	Sampling and Analysis Plan
SWMU	Solid Waste Management Units
TBD	To Be Determined
TCLP	Toxicity Characteristic Leaching Procedure Analyses
TEE	Terrestrial Ecological Evaluation
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
VSP	Visual Sampling Plan
XRF	X-Ray Fluorescence

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1.0 INTRODUCTION

Fort Lewis Public Works (PW) and the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) (DE00HWTR-1122) in 2001. In the AO, Fort Lewis agreed to conduct a Remedial Investigation/Feasibility Study (RI/FS), and complete a Cleanup Action Plan for selected Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). This report is a summary of the Site Investigation conducted at the Evergreen former Infiltration Range (AOC 4-6.3), Miller Hill former Pistol Range (AOC 4-2.2), and the former Skeet Range (AOC 4-3) to examine if soils have been impacted by past activities.

This work is being performed by the United States Army Corps of Engineers (USACE) Seattle District at the request of PW. The site investigation is based on the sampling approach outlined in the Ecology-approved Sampling and Analysis Plan Addendums dated August 2003 (USACE 2003a; 2003b).

2.0 SITE DESCRIPTION AND USE

Fort Lewis is a major military facility located approximately 6 miles south of Tacoma, Washington, in Pierce County. The facility consists of approximately 34, 875 hectares of cantonment areas, natural prairies, lakes, wetlands, and forest. Weapons qualifications and field training has occurred at Fort Lewis since around the time the Fort was established.

These three range sites described below were not included in the "1996" RCRA Facility Assessment (RFA). However, these sites were added to the AO Remedial Investigation Work Plan because existing evidence suggest that these sites are former ranges similar to other sites within AOC 4.

Discontinued use of the former ranges discussed in this report has allowed nature to reclaim large portions of these former ranges. Most of these sites are overgrown with trees, grasses, and scrubs. A site map is shown in Figure 1. Site histories are presented below.

2.1 Former Miller Hill Pistol Range

The former Miller Hill Pistol Range is located near the intersection of Colorado and Jackson Avenues on Fort Lewis. This potential range may have been active as early as the 1920s shortly after Fort Lewis was established (1917). A 1929 Fort Lewis map identifies this area as a pistol range. Aerial photography from the 1940s shows indications of clearing and a possible berm (Figure 3). The suspected berm was identified along the roadway during a site visit. However, later historical maps do not indicate an active range and aerial photography indicated re-vegetation by 1951. There are no records pertaining to use or discontinued use of this range; however, growth of vegetation on the range and historical analyses of aerial photography indicates this area likely has not been used since the late 1930s, if a range did exist in this area.

For pistol ranges, most training is done with fixed or stationary targets at known distances, resulting in the formation of "bullet pockets' on the face of the berm similar to Engineer Bluff and other former Miller Hill ranges. The high-impact energy of these high-speed rounds with the rounds accumulated in the bullet pockets results in significant fragmentation and ricochet. Ammunition associated with pistol training during this era was the 45-caliber cartridge. The primary constituents in the bullet slugs consist of 97% lead and < 2% antimony with trace amounts of antimony, arsenic, copper, tin, and zinc.

No bullets or bullet fragments were discovered within the primary suspect berm, however live ammunition was found within the trench behind the berm. Additional metal debris found within the far ends of the trench suggests that this trench may have been utilized for dumping (see Photographs 8, 9, 10, and 11).

2.2 Former Evergreen Infiltration Range

The former Evergreen Infiltration Range is located approximately 0.25 miles north of the intersection of Evergreen Avenue and 4th Division Drive on Fort Lewis. This former range was identified from a 1951 aerial photograph (Figure 2). There are no records pertaining to discontinued use of this range; however, growth of vegetation on the range, observed during site visits, and historical analyses of aerial photography, indicates activity at this range was decreasing during 1955 and 1957. The range appears to be in disuse in photographs from 1965. Identified as an infiltration range, the impact berm was set back approximately 300 feet from the firing discharge area. The impact berm is a constructed earthen bank approximately 40 feet high. A concrete footing, used to hold the machine gun posts, was constructed approximately 300 feet from the front of the base of the berm. Bullet slugs and fragments are evident at the impact berm.

In general, infiltration ranges provided opportunity for conditioning soldiers to move under live fire and under combat type situations. Fixed-position machine guns provided the live fire training. The ammunition associated with infiltration range training during this era was the 30-caliber cartridge. The primary constituents in the bullet slugs consist of 97% lead and < 2% antimony with trace amounts of copper. Potential contaminants of concern are lead, antimony, arsenic, copper, tin, and zinc.

Site visits indicate that explosives may have been part of training at this range. Therefore, additional potential contaminants of concern are explosives residues (TNT, 2,4-DNT, 2,6-DNT, RDX, HMX). Nine demolition sites were identified at this range (see Figure 8 and Photographs 4 and 5). From remains present at the range, each of the demolition sites was surrounded by a low fence of wood and chicken wire, approximately 1 foot high and 20 feet by 20 feet on the sides. (Not all the fences remain.) Some of the pits have remains of command wires for detonating explosives during training. One of the original signs, stating "DEMO PIT NO. 8", has survived. Barbed wired is also present, especially between ED1 and ED2. All of the demolition pits have some vegetation growing within and around the craters. Several of the demolition craters have trees growing out of them (ED1, ED9, and ED7).

2.3 Former Skeet Range

In low-velocity shotgun shooting ranges, shotguns are used to shoot clay targets. The size and shape of the shot fall zone is a function of the layout of the site and results in a generally uniform distribution of shot no more than 770 feet from the shooting position and spanning about 95º to 150º, with the majority of the lead being deposited at a distance between 300 feet and 600 feet from the shooter (ITRC 2003; Battelle 1997). The pellets will typically be found within inches of the surface, unless tilling or digging has physically disturbed the area. Potential contamination from polycyclic aromatic hydrocarbons (PAHs) in the clay targets would most likely be found between 0 to 300 feet from the shooter (ITRC 2003). Metals with PAHs from clay targets are the potential contaminants of concern at this type of inactive range.

Historical analyses of Fort Lewis site maps and aerial photography indicate that the skeet range was built sometime around 1962, when it was first identified as a skeet range (Figure 4). By 1990 the western portion of the site was covered by paving from the NCO club, and by 2002 a baseball field had been built on the site. This site is currently an open grassy area with a poorly maintained baseball diamond, a covered picnic table, play area and RV parking sites. It is not known how often this area is used for recreational purposes.

3.0 PROJECT OBJECTIVES

The objectives of this site investigation include the following:

- confirming the presence of contamination;
- collecting data for XRF DMA;
- delineating the vertical and horizontal extent of lead contamination;
- determining the concentration of contaminant of concern;
- determining if lead can be used as a driver to define extent at ranges; and
- refining conceptual site model based on field results

This information will be used in the Fort Lewis Remedial Investigation (RI) to determine whether additional characterization or remedial actions for the areas are warranted.

4.0 FIELD SAMPLING ACTIVITIES

The Corps conducted soil sampling at the former ranges (Figure 1) during September 2003 and December 2 – 3, 2003, in accordance with the approved Sampling and Analysis Plan (SAP) Addendums (USACE 2003a). Rationale for additional sampling was delineated in an Ecology-approved memorandum presented in Appendix C (USACE 2003b).

4.1 Soil Sampling and Analysis

Sampling was conducted in general accordance with the SAP Addendum. A small backhoe was used to assist in loosening the soil such that hand tools could be used to collect soil (except for the front face of the Evergreen berm samples, where only hand tools were used). Using stainless steel spoons, soil was placed into a number 10 sieve (< 2 mm) to remove oversize fragments, rock, and organic debris. The screened soil was placed into a stainless steel bowl and homogenized, then placed into a gallon-sized plastic baggie for analysis via XRF. One soil sample was collected from the 0 to 1-foot, and from 1-foot to 2-foot depth intervals at the sampling locations (except for the Skeet range where the depth intervals were 0 to 0.5 foot, 1 to 2-foot, and at select sampling locations 0 to 1 inch, 0 to 3 inch, and 0 to 6 inch below ground surface (bgs) to ascertain depth interval with the greatest concentration of lead to determine risk to recreational visitors).

A systematic grid was used to delineate the vertical and horizontal extent of contamination if present at all sites. Starting at the areas most likely to be contaminated (e.g., impact berms), sample locations were stepped out laterally until lead XRF values were below the action level. Sample location density was initially determined using process knowledge of site usage and was modified as real-time data was collected. At the Evergreen and Miller Hill sites the initial grid spacing was set at 10-foot intervals, based upon the reasonable volume of soil that potentially could be excavated for remedial action. At the skeet range the initial sampling density was judgmentally determined based on the size of the area of concern (greater than 400,000 square feet) and the general uniform distribution of lead shot at skeet ranges. The initial sampling density was evaluated once real time data from XRF results was obtained for determining if increased sampling density was required. The 1-foot depth interval was based upon the reasonable depth of soil that could be removed by a backhoe.

Collaborative samples were submitted for fixed laboratory analysis from the range within the "window of decision uncertainty" determined by the demonstration of method applicability (DMA). Metals to be analyzed by Method 6010/6020 included lead, antimony, arsenic, copper, tin, zinc and iron, contaminants mostly likely to be found at small arms firing ranges based on bullet composition.

The overall data quality objectives for this work are to determine the correlation of the XRF and laboratory data, and to produce data of known and appropriate quality to support the selection of remedial actions for soil at the former range. Appropriate procedures and quality control (QC) checks were used so that known and acceptable levels of accuracy and precision are maintained for each data set. In order to assess field variability of lead contamination between samples, co-located field duplicates were collected from 0.5 to 3 feet away from the primary sampling point. The frequency of col-located field duplicates was 10% during the DMA and 3% overall. To measure sample variability within the sample baggie, precision samples were selected and analyzed. Five to seven readings for lead were taken from various locations on the bag, if the sample was chosen as precision sample. Precision samples were selected from samples where lead was detected at one of the project's action levels. The overall frequency of precision samples was 20%; the frequency of precision samples during the DMA was 50%.

4.1.1 Demonstration of Method Applicability

Before fieldwork at all other sites was started, a demonstration of method applicability (DMA) was conducted on the impact berm at the Former Evergreen Infiltration Range, in order to determine the usability of the XRF for lead soil sampling and to assure that a reasonable correlation can be substantiated between the proposed field-based sampling method and fixed lab analysis. Twenty samples locations were chosen from the impact zone, below the impact zone and the toe of the berm. At each sampling location selected, surface samples were collected with hand tools from two depth intervals, 0 to 12 inches and 12 to 24 inches (for a total of 40 samples).

During the DMA collaborative samples were submitted to the fixed laboratory for all samples collected. The information obtained from the collaborative sample collection in the DMA was used to determine the frequency and types of collaborative samples for the remainder of the XRF sampling. The number of collaborative samples was guided by the need to manage decision uncertainty in defining the extent of contamination at the XRF detection limit of 45 mg/kg and the project action levels of 250 and 1000 mg/kg.

For the entire characterization, including the DMA, the frequency of collaborative samples was determined by the following criteria:

- the interval where field results are considered ambiguous; dependant upon metal concentration results and instrument sensitivity; and
- how frequently field results are close to the project's action level; a confident decision of "clean" or "dirty" may require more data.

4.1.2 Evergreen Infiltration Range Impact Berm

Following the DMA, additional samples were collected at the Evergreen Infiltration Range. The impact berm is roughly 40 feet in height, and is approximately 300 feet long. The sample grid was initially spaced 10 feet apart lengthwise within the impact zone, below the impact zone (to evaluate the extent of the contamination down the slope), and at the toe of the berm to determine any impacts of potential sloughing. The impact zone, where contamination is believed to be the highest, is easily identified by the lack of vegetation. Figure 5 provides sample locations the final field sampling design.

Potential contamination of the back face of the berm was considered, due to either the "tidily-wink" effect of high velocity bullets flipping over the top of the berm or the possibility that the berm was constructed with contaminated materials. In order to establish the extent of contamination on the back face of the berm, additional samples were collected from this side of the berm. Areas sampled included at the toe of the berm, at the same height of the impact zone and the trench, located approximately 75 feet from the berm (Figure 6). Initially six sample locations from each area were collected (approximately 50 feet apart), with additional sample locations chosen as necessary to minimize uncertainty in defining the extent of contamination at the XRF detection limit of 45 mg/kg and the project action levels of 250 and 1000 mg/kg. Samples were collected from both the 0 to12 inch and 12 to 24 inch depth intervals. A total of 64 collaborative samples were collected for fixed-lab analysis; 79 precision samples and 7 co-located field duplicates were also collected.

Soil samples were also collected at each of the four firing point locations to determine if shells potentially impacted the surrounding soil. Samples from the 0 to 12 inch depth interval were collected from each side of the concrete pads, composited and measured with XRF. Figure 7 presents the sample locations at the firing points. Collaborative samples for all four points were submitted for fixed-lab analysis. No field duplicates or precision samples were collected for the firing points.

Samples were collected from the nine demolition sites within the Infiltration Range (Figure 8). A set of seven surface samples was collected in a wheel pattern from the crater at each site, composited, and analyzed to determine if explosive residues are present. The top 6 inches of soil were excavated using a decontaminated hand trowel and placed in a decontaminated stainless steel bowl, homogenized and placed into a labeled 8 oz clear wide mouth glass jar. A second set of composite samples were collected from the 6 to 12 inch depth interval in the same manner and submitted for analysis. All samples were submitted, to a fixed laboratory, for analysis by EPA Method 8330. Four field duplicates were also collected.

4.1.3 Miller Hill Pistol Range

Initial soil samples were collected from what was thought to be the impact side of the suspected primary berm. Sample locations were initially placed in 10 foot intervals lengthwise along the berm face from 0 to 1 foot and 1 to 2 foot depth intervals. Additional sample locations were collected within the trench behind the main berm, in the area directly before the berm, and at the smaller berm close to the road (Figure 9) in order to establish boundaries of the lead contamination in this area; these locations were excavated to 1-foot depth bgs. There were four sample locations per area in a row (approximately 50 feet apart), with additional samples added as needed to minimize uncertainty in defining the extent of contamination at the XRF detection level of 45 mg/kg and the project action levels of 250 and 1000 mg/kg. Additionally, two sample locations were placed at either end of the main berm to establish boundaries of contamination.

To effectively cost evaluate depth of contamination at this site additional depth samples, 2 to 3 feet and 3 to 4 feet bgs, were collected at locations MH4, MH9, and

MH16. These locations were selected to establish depth of contamination likely expected from a concentration range of surface contamination.

As the original sample locations were spaced 10 feet apart on the main berm, no co-located field duplicates were collected. Three collaborative samples were collected for fixed-lab analysis and 10 samples were selected for precision analysis.

4.1.4 Skeet Range

A systematic grid was used to delineate the vertical and horizontal extent of contamination at AOC 4-3. Starting at the area directly behind the firing area, sample locations were stepped out laterally until XRF field-screened values were below criteria for lead. Sample locations were initially determined based on professional judgment using process knowledge of site usage and conceptual site models (IRTC 2003; Battelle 1997; EPA 2002) and was modified as real-time data was collected (Figure 10).

To determine vertical extent of contamination, samples were collected in 0 to 6 inch intervals at every location with additional samples collected from 0 to 1 inch, 0 to 3 inches, and 0 to 6 inches bgs from select sampling locations to ascertain depth interval with the greatest concentration of lead to determine risk to recreational visitors. The depth intervals were based upon the depth of soil determined to be a risk to recreational visitors and the reasonable depth that could be potentially removed by a backhoe. Enough soil volume was collected for all analytical purposes including split samples for ICP metals analysis, PAH, TCLP and archived samples.

PAH contamination was determined by collecting homogenized split samples from sample locations mostly likely to have been impacted by fallen clay targets.

Initial samples were chosen from sample locations ST10 to ST30. Five additional samples were collected in addition to the original samples in order to delineate the horizontal extent of PAH contamination. In addition, two sample locations, ST11 and ST16, were sampled from the 12 to 24 inch depth interval to determine the vertical extent of the PAH contamination.

Additional samples were collected to fill in areas of uncertainty to define the extent of contamination determined from initial sampling at the project action levels of 250 and 1000 mg/kg. Thirteen new locations were sampled, including from sample locations across the gravel road to the northwest of the former skeet range. New samples were collected from three depth intervals (0 to 1 inch, 0 to 3 inches, and 0 to 6 inches bgs). The locations were also sampled at the subsurface (12 to 24 inches). Additionally, sample locations ST32, ST35, and ST46 were revisited and resampled at the three depth intervals. These sample locations were selected to provide a range of lead concentrations to evaluate concentration gradients with depth.

Co-located field duplicates were collected at sample locations ST34 and ST65. These samples were selected because they represent potential outliers in the contamination distribution patterns. These locations were examined to further determine influence of field variability on potential decisions. Thirteen collaborative samples were collected for fixed-lab analysis, 19 samples were selected for precision analysis and a total of ten co-located field duplicates were also collected.

In order to determine if particle size should be considered when evaluating contaminant distribution, archived soil samples from the following sample locations (0 to 6 inch depth interval) was sieved with a No. 60 sieve and reanalyzed with the XRF: ST33, ST35, ST36, ST37, ST38, ST44, ST45, ST46, ST48. These results were compared with the measurements obtained from the No. 10 sieved samples to determine if the finer soil fraction presented a greater risk to human health and the environment.

5.0 SOIL ANALYSIS RESULTS

This section presents a summary of the soil chemical analysis results. An evaluation of potential impacts of site activities is also presented.

5.1 Demonstration of Method Applicability (DMA) Results

An evaluation of the results from the DMA is presented in Appendix B.

5.2 Evergreen Infiltration Range Results

Soils encountered were predominately a 2-foot-thick layer of gravel and cobbles underlain by sandy gravel.

5.2.1 Metals Results

Lead was detected at concentrations above the MTCA criterion of 250 mg/kg at the impact berm at the former infiltration range (Figures 11 to 14). These maps were used as a tool to assist in delineating vertical and horizontal contamination and should not be interpreted as representing areas requiring remediation. Bullet fragments were present to at least 2 feet deep within the impact zone.

Front Side of Impact Berm

Soil concentrations greater than 250 mg/kg are present across the front face of the berm with highest concentrations located at the impact zone. Lead concentrations greater than 250 mg/kg are present down slope along the toe of the berm in the 0 to 12 inch depth interval (Figure 11). Concentrations remain significantly higher in the middle of the impact zone in the 12 to 24 inch depth interval, with decreasing lead concentrations moving away from the impact zone (Figure 12).

Back Side of Impact Berm

Soil lead concentrations greater than 250 mg/kg are present in the 0 to 12 inch depth interval across the back face of the impact berm (Figure 13). Lead contamination is highly heterogeneous due to the “tidily-wink” nature of the contamination source. Highest concentrations are primarily in the 1-foot depth interval with significant decrease of lead concentration in the 2 foot depth interval (Figure 14). Some limited lead contamination was encountered in samples collected within a trench approximately 75 feet SE from the berm.

5.2.2 Explosive Residues

Explosive residues were not detected in any of the samples collected from the infiltration, including the four field duplicates (Table 5).

5.2.3 TCLP Results

The TCLP analysis was conducted on five samples from the Evergreen Berm with soil concentrations ranging from 37.5 to 62,500 mg/kg. Sample results are presented in Table 7. The TCLP results exceeded the maximum concentration of contaminants for the Toxicity Characteristic of 5 mg/L. Based on these results, it is likely that any soils exceeding the MTCA criteria of 250 mg/kg would likely be considered hazardous waste.

5.2.4 Potential Impacts to Groundwater

Although detected lead results were greater than 3,000 mg/kg, theses levels only extended approximately 2 feet into the berm, therefore, impact is not likely. Similar results were seen at Engineer Bluff and Miller Hill with no groundwater impact confirmed.

5.3 Miller Hill Pistol Range Results

Soils encountered were predominately a 4-foot-thick layer of gravel and cobbles underlain by sandy gravel.

5.3.1 Metals Results

Lead contamination was observed at concentration above 250 mg/kg in the majority of sampled berm (Figure 15 and 16), and extending to approximately 15 feet in front of the berm. Maximum observed concentration was 6500 mg/kg (sample location MH32 within the trench). In almost all cases, exceedances of 250 mg/kg were also observed in the 1 to 2 foot interval within the primary berm area. Samples collected to 4 feet bgs at MH4, MH9 and MH16 indicate lead concentrations less than 250 mg/kg). Since no bullets were observed during sampling, it is not clear if the lead contamination is derived from use as a range or if the contamination was derived from the berm source material used (e.g., graded material from Miller Hill Main ranges) or from other possible past uses. Rusted scrap metal, including drum sections and two rounds live ammunition (30 caliber) was found within either end of the trench, suggesting possible past use as a garbage trench. Some small scrap metal was also encountered at sample location MH27. The highest lead concentrations encountered were located at the northwest end of the trench.

5.3.2 TCLP Results

The TCLP analysis was conducted on five samples from the Miller Hill site with soil concentrations ranging from 45 to 6500 mg/kg. Sample results are presented in Table 7. The TCLP results exceeded the maximum concentration of contaminants for the Toxicity Characteristic of 5 mg/L for only one sample (MH32S1), which had a XRF lead value of 6500 mg/kg. Other samples with XRF lead values as high as 706 mg/kg were below the Toxicity Characteristic criteria.

5.3.4 Potential Impact to Groundwater

Groundwater was not encountered at this site. Lead concentrations are seen to decrease with depth, and all detected soil concentrations were below the 3-phase action level of 3000 mg/kg with the exception of MH32. Therefore, additional delineation of contamination may be required to determine potential impact to groundwater.

5.4 Skeet Range Results

Soils encountered were predominately a 2-foot-thick layer of gravel and cobbles underlain by sandy gravel.

5.4.1 Metals Results

Initial sample results from the Skeet Range sampling indicate that the majority of lead contamination at this site is limited to an area roughly 450 feet away from the firing points, extending past the gravel road to the northwest (Figures 17 and 18). The extent of lead contamination past the gravel road is not known and might be a result of grading. Isolated areas may have elevated lead levels greater than 2 feet in depth. Lead was detected in several samples at concentrations above the MTCA criterion of 250 mg/kg.

Comparisons of lead concentration between samples sieved with No. 10 and No. 60 did not indicate differences that suggest particle sizes smaller than No. 10 should be an additional consideration for risk (Table 8).

5.4.2 PAHs Results

PAHs were detected in several of the samples; Table 6 provides the cPAH TEF values for those sample locations. In general exceedances of the MTCA Method A unrestricted land use cleanup level for cPAH TEF as benzo(a)pyrene were limited to an area roughly 100 feet from the shooting area (Figure 19). Two sample locations, ST11 and ST16, were sampled from the 12 to 24 inch depth interval to determine the vertical extent of the PAH contamination (Table 6).

5.4.3 TCLP Results

The TCLP analysis was conducted on five samples from the former skeet range with soil concentrations ranging from 48.7 to 1970 mg/kg. Sample results are presented in Table 7. TCLP results did not exceed the maximum concentration of contaminants for the Toxicity Characteristic of 5 mg/L for any of the samples submitted from this range.

5.4.4 Potential Impact to Groundwater

Groundwater was not encountered at this site. Lead concentrations are seen to decrease with depth, and all detected soil concentrations were below the 3-phase action level of 3000 mg/kg. Therefore, additional delineation of contamination with depth for lead is not required to determine potential impact to groundwater.

6.0 CONCEPTUAL SITE MODELS

Conceptual site models (CSMs) were developed to provide a framework for a preliminary risk evaluation by identifying and organizing potential exposure pathways (sources, release mechanisms, transport media, exposure media, exposure routes, and receptors) and identifying those pathways that are complete and incomplete. The first part of the conceptual site model is to summarize the nature and extent of contamination and its migration potential at each of these sites. Then one risk-based human health and ecological CSM was developed for the former range sites since site conditions are similar. Both current and reasonably likely future land use conditions were considered.

A summary of the nature and extent of contamination and its migration potential is presented below for each of the sites.

6.1.1 Human Health Conceptual Site Model

A human health CSM identifying exposure pathway has been developed for the sites (Figure 20). For soil, the potentially complete exposure pathways that have been identified at this site include: soil ingestion, direct contact, and inhalation of contaminants emitted as dust from soil. Since the lead concentrations are limited to the surface soils and have not impacted groundwater quality, the pathway of soil to groundwater was considered incomplete.

6.1.2 Ecological Conceptual Site Model

An ecological CSM identifying exposure pathways was developed for this site (Figure 20). The potentially complete exposure pathways that have been identified at this site include: soil ingestion and direct contact, and inhalation of contamination emitted as dust from soil. Root contact with soils has also been identified as a potentially complete pathway. None of the sites qualifies for a Terrestrial Ecological Evaluation (TEE) exclusion.

7.0 RECOMMENDATIONS

The results from the soil investigation indicate that site activities have impacted the surface soils at each of the ranges at depths of at least 2 feet below ground surface.

The metals concentrations in soil likely pose a risk to human health or the environment by either direct contact, inhalation of dust, or ingestion. Remedial action is recommended to reduce this risk. The feasibility study will address remedial action alternatives.

8.0 References

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Tables

Table 1 – DMA Lead Soil Results

Sample ID	XRF Bag Value (mg/kg)	Prec (±)	XRF Cup Value (mg/kg)	Prec (±)	Fixed-Lab Value (mg/kg)	Depth (in)
EB31S-1			613	55	622	0-12
EB31S-2			**45**	53	150	12-24
EB32S-1			11600	290	12300	0-12
EB32S-2			2940	120	1750	12-24
EB33S-1			18200	500	21600	0-12
EB33S-2			3170	130	6770	12-24
EB34S-1	486	55	492	54	335	0-12
EB34S-2	71.4	38	148	43	133	12-24
EB35S-1	2620	140	2490	110	2610	0-12
EB35S-2	522	60	630	56	2410	12-24
EB36S-1	10100	440	13300	370	21500	0-12
EB36S-2	1450	91	2180	100	2870	12-24
EB37S-1			404	50	274	0-12
EB37S-2			**45**	53	23.4	12-24
EB38S-1			25400	720	31600	0-12
EB38S-2			6590	210	7960	12-24
EB39S-1			5830	180	6940	0-12
EB39S-2			600	57	1130	12-24
EB40S-1	834	70	918	67	746	0-12
EB40S-2	276	65	326	48	331	12-24
EB41S-1	1290	160	2060	95	1870	0-12
EB41S-2	813	99	738	60	768	12-24
EB42S-1	26700	1100	31600	930	37100	0-12
EB42S-2	5570	460	5680	190	7290	12-24
EB43S-1	973	130	762	62	639	0-12
EB43S-2	300	52	958	67	601	12-24
EB44S-1	671	97	1070	70	726	0-12
EB44S-2	708	97	732	61	941	12-24
EB45S-1			29300	890	33500	0-12
EB45S-2			7420	220	13900	12-24
EB46S-1	295	61	144	42	215	0-12
EB46S-2	**45**	93	62.2	38	61.5	12-24
EB47S-1			20500	570	24400	0-12
EB47S-2			650	57	1250	12-24
EB48S-1			41600	1300	50800	0-12
EB48S-2			19000	530	19400	12-24
EB50S-1			838	63	1040	0-12
EB50S-2			**45**	51	36.6	12-24
EB51S-1			38400	1200	62500	0-12
EB51S-2			8380	250	15600	12-24

Table 2 - Comparison of all Lab-Analyzed Metals at all Sites (in mg/kg)

Parameter	Antimony		Copper	Iron	Lead	Tin		Zinc	Arsenic
Method A/B	32(B)		2960(B)	NA	250.0(A)	48000(B)		24000(B)	20(A)
Method B - Groundwater Protection	5.79		262	NA	3000	NA		5970	2.92
EB31S1	8.85 U	U	45.6	16400	**622.0**	8.85	U	33.1	6.35
EB31S2	9.16	U	24.8	16700	150.0	9.16		30	4.1
EB32S1	**207**		309	16000	**12300.0**	13.6		63.6	5
EB32S2	**34.9**		66.6	15800	**1750.0**	9.77	U	35.8	3.56
EB33S1	**287**		454	14800	**21600.0**	5.09		85.3	4.65
EB33S2	**87.7**		139	16700	**6770.0**	8.58	U	66.2	3.59
EB34S1	9.85	U	40.9	14000	**335.0**	9.85	U	32.4	4.24
EB34S2	10	U	30.2	17000	133.0	10	U	30.9	4.52
EB35S1	**46.4**		91.4	16000	**2610.0**	10.1	U	35.2	3.54
EB35S2	**31.9**		46.6	16700	**2410.0**	9.56	U	33.5	3.99
EB36S1	**369**		358	16500	**21500.0**	20.9		59.3	6.69
EB36S2	**58.4**		76	15400	**2870.0**	9.56	U	31.2	3.83
EB37S1	9.3	U	33.9	14300	**274.0**	9.3	U	26.6	3.83
EB37S2	9.29	U	21.2	16400	23.4	9.29	U	26.9	3.01
EB38S1	**634**		916	18000	**31600.0**	47.7		110	10.8
EB38S2	**192**		242	17800	**7960.0**	7.01		58.1	5.68
EB39S1	**149**		155	19500	**6940.0**	7.22	J	48.1	5.27
EB39S2	29.7		47.2	16300	**1130.0**	9.15	U	29.8	3.39
EB40S1	8.18		56.3	15700	**746.0**	9.85	U	31.7	4.92
EB40S2	9.28	U	44.7	17600	**331.0**	9.28	U	32	4.13
EB41S1	**42.1**		78.4	15500	**1870.0**	9.34	U	37.1	4.37
EB41S2	16.4		39.3	16900	**768.0**	10.2	U	31.3	3.87
EB42S1	**673**		1330	18600	**37100.0**	40.5		176	10.8
EB42S2	**140**		233	15400	**7290.0**	7.76		70.2	4.61
EB43S1	8.89	U	57.7	14700	**639.0**	8.89	U	31	4.8
EB43S2	10.2	U	48.1	14100	**601.0**	10.2	U	30.2	4.43
EB44S1	18.4		39.8	15900	**726.0**	9.41	U	34.2	3.99
EB44S2	21.8		51.8	16800	**941.0**	10.2	U	30.3	3.67
EB45S1	**727**		997	16800	**33500.0**	34.8		139	11.5
EB45S2	**213**		273	15400	**13900.0**	10		57.4	4.42
EB46S1	10.1	U	35.5	15400	215.0	10.1	U	28.2	4.46
EB46S2	9.98	U	28.5	16300	61.5	9.98	U	30.1	3.97
EB47S1	**427**		**25100**	17100	**24400.0**	15.8		2560	9.33
EB47S2	23.8		217	16300	**1250.0**	9.55	U	33.9	4.24
EB48S1	**831**		985	16700	**50800.0**	44.2		146	10.7
EB48S2	**269**		527	17500	**19400.0**	6.11		109	6.79
EB50S1	16.1		107	16100	**1040.0**	8.78	U	32.2	3.95
EB50S2	9.25	U	69.6	16700	36.6	ND		28	3.41
EB51S1	**879**		804	15100	**62500.0**	42.2		117	15.3

Parameter	Antimony	Copper	Iron	Lead	Tin	Zinc	Arsenic
Method A/B	**32(B)**	**2960(B)**	**NA**	**250.0(A)**	**48000(B)**	**24000(B)**	**20(A)**
Method B - Groundwater Protection	**5.79**	**262**	**NA**	**3000**	**NA**	**5970**	**2.92**
EB51S2	**217**	308	14800	**15600.0**	6.48	76.3	4.12
EB117SI	ND	16.1	16300	20.3	ND	30.3	5.11
EB116SI	ND	14.3	15200	9.1	ND	25	4.62
EB107SI	ND	24.4	15500	202.0	ND	29.5	4.44
EB108SI	ND	22.5	16500	197.0	ND	33.5	4.42
EB123SI	ND	17.8	15400	48.2	ND	28.6	2.58
EF1-S1	ND	54	16500	19.2	ND	45.5	4.11
EF2-S1	ND	52.2	16300	17.4	ND	36.3	3.71
EF3-S1	ND	45.7	18800	17.8	ND	49.7	5.19
EF4-S1	ND	45.5	18500	20.9	ND	44.3	4.99
EB87-S1	ND	20.5	17900	42.6	ND	34.4	6.17
EB87-S2	ND	22.1	20100	12.2	ND	36.3	5.07
EB88-S1	ND	19.2	15700	34.0	ND	27.6	3.51
EB88-S2	ND	21.2	17100	4.8	ND	28.8	3.26
EB90-S1	ND	28.5	17300	92.6	ND	36.2	4.88
EB90-S2	ND	23.3	19800	43.4	ND	39.1	4.3
EB91-S1	ND	19.8	18000	47.0	ND	33.1	4.27
EB91-S2	ND	18.6	16800	35.7	ND	29.7	3.25
EB92-S1	ND	32	17600	75.2	ND	37.3	3.8
EB92-S2	ND	18.7	18200	9.8	ND	31.8	3.45
EB93-S2	ND	21.8	16400	18.3	ND	31.5	3.27
EB94-S1	ND	20	15800	22.2	ND	29.1	3.63
EB94-S2	ND	18.8	17200	14.9	ND	29.9	3.7
EB96-S1	ND	22.3	19600	37.5	ND	39.6	6.35
EB96-S2	ND	17	16500	15.1	ND	30.8	4.57
EB97-S1	ND	21.7	17300	30.8	ND	37	8.31
EB97-S2	ND	18	18800	24.5	ND	33.6	5.74
EB98-S1	ND	34.4	17800	78.1	ND	36.2	6.83
EB98-S2	ND	27.1	17800	36.5	ND	34.8	5.82
ST2SI	ND	26.5	19100	14.1	ND	36	5.22
ST3SI	ND	31.2	17800	**283.0**	ND	51.6	12.1
ST6SI	ND	37.8	17900	206.0	ND	330	13.5
ST49SI	ND	27.1	17100	**258.0**	ND	64	12.5
ST39SI	ND	35.3	17600	134.0	ND	58.3	12.6
ST41SI	ND	21.5	19400	48.7	ND	38	5.37
ST50SI	ND	29	18000	74.5	ND	49.3	11.2
ST22SI	ND	27.1	18700	155.0	ND	47.5	9.65
ST22SID	ND	36.3	18100	**444.0**	ND	68.2	14.7
ST38SI	7.94	35.3	19500	**436.0**	ND	64.9	11.9
ST40SI	ND	22.9	18300	113.0	ND	39.8	6.6
ST66SI	ND	23.6	17300	165.0	ND	40.8	9.48

Parameter	Antimony		Copper	Iron	Lead	Tin		Zinc	Arsenic
Method A/B	**32(B)**		**2960(B)**	**NA**	**250.0(A)**	**48000(B)**		**24000(B)**	**20(A)**
Method B - Groundwater Protection	**5.79**		**262**	**NA**	**3000**	**NA**		**5970**	**2.92**
ST64SI	5.97	J	34.3	17500	**529.0**	6.76	J	70	**21.6**
MH33SI	ND		29.2	18200	78.1	ND		62.6	12.3
MH34SI	ND		34.7	16500	105.0	ND		53.4	8.89
MH35SI	ND		24.4	19400	13.1	ND		45.3	6.46

Table 3 – Lead Exceedances > 250 (excluding Precision samples)

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB2S1	352.4	46.6				0-12
EB3S1	12198.4	350				0-12
EB3S2	892.8	77.6				12-24
EB11S1	1600	82.6				0-12
EB11S2	1800	100				12-24
EB12S1	14694.4	460				0-12
EB12S2	4160	170				12-24
EB16S1	614.8	57.9				0-12
EB20S1	1149.6	73.5				0-12
EB21S1	50995.2	2000				0-12
EB21S2	36480	1300				12-24
EB22S1	266.8	45.9				0-12
EB25S1	266	49.4				0-12
EB28S1	630.8	58.6				0-12
EB30S1	2459.2	110				0-12
EB31S1	700	68	613	55	622	0-12
EB32S1			11600	290	12300	0-12
EB32S2			2940	120	1750	12-24
EB33S1	11700	560	18200	500	21600	0-12
EB33S2	1780	120	3170	130	6770	12-24
EB33S1D	911	97				
EB33S2D	339	84				
EB34S1	486	55	492	54	335	0-12
EB34S1D	345	49	346	49		0-12
EB35S1	2620	140	2490	110	2610	0-12
EB35S2	522	60	630	56	2410	12-24
EB36S1	10100	440	13300	370	21500	0-12
EB36S2	1450	91	2180	100	2870	12-24
EB37S1			404	50	274	0-12
EB38S1			25400	720	31600	0-12
EB38S2			6590	210	7960	12-24
EB39S1			5830	180	6940	0-12
EB39S2			600	57	1130	12-24
EB40S1	834	70	918	67	746	0-12
EB40S2	276	65	326	48	331	12-24
EB41S1	1290	160	2060	95	1870	0-12
EB41S2	813	99	738	60	768	12-24
EB42S1	26700	1100	31600	930	37100	0-12
EB42S2	5570	460	5680	190	7290	12-24

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB43S1	973	130	762	62	639	0-12
EB43S2	300	52	958	67	601	12-24
EB44S1	671	97	1070	70	726	0-12
EB44S1D	1530	110				0-12
EB44S2	708	97	732	61	941	12-24
EB45S1			29300	890	33500	0-12
EB45S2			7420	220	13900	12-24
EB47S1			20500	570	24400	0-12
EB47S2			650	57	1250	12-24
EB48S1			41600	1300	50800	0-12
EB48S2			19000	530	19400	12-24
EB50S1			838	63	1040	0-12
EB51S1			38400	1200	62500	0-12
EB51S2			8380	250	15600	12-24
EB52S1	268.6	47.5				0-12
EB53S1	8915.2	260				0-12
EB53S2	573.6	55.5				12-24
EB54S1	33075.2	1000				0-12
EB54S2	15897.6	500				12-24
EB55S1	275.8	50.8				0-12
EB56S1	13696	450				0-12
EB57S1	43187.2	1400				0-12
EB57S2	3139.2	130				12-24
EB58S1	565.2	56.5				0-12
EB61S1	430.4	52				0-12
EB65S1	411.6	49.4				0-12
EB65S2	259.6	44.5				12-24
EB66S1	32896	1000				0-12
EB66S2	2960	120				12-24
EB74S1	1620	82.6				0-12
EB75S1	25792	960				0-12
EB75S2	5177.6	180				12-24
EB83S1	1140	71.4				0-12
EB84S1	365	52.4				0-12
EB85S1	3417.6	130				0-12
EB85S2	1960	92.2				12-24
EB99S1	1110	76				0-12
EB99S2	385	58				12-24
EB101S1	821	69				0-12
EB102S1	4020	160				0-12
EB103S1	929	92				0-12
EB103S2	725	89				12-24

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB104S1	291	53				0-12
EB105S1	805	73				0-12
EB106S1	1490	99				0-12
EB109S1	538	55				0-12
EB110S1	1550	110				0-12
EB110S2	375	51				12-24
EB111S1	957	70				0-12
EB112S1	829	84				0-12
EB112S2	407	70				12-24
EB113S1	304	55				0-12
EB115S1	329	51				0-12
EB118S1	586	62				0-12
EB119S2	868	77				12-24
EB120S1	1080	73				0-12
EB121S1	1240	84				0-12
EB121S2	287	49				12-24
EB122S1	799	78				0-12
MH1S1	324	43				0-12
MH2S1	477	50				0-12
MH3S1	574	51				0-12
MH3S2	458	46				12-24
MH4S1	797	56				0-12
MH4S2	727	57				12-24
MH5S1	767	58				0-12
MH6S1	703	58				0-12
MH6S2	393	46				12-24
MH7S1	834	66				0-12
MH7S2	446	51				12-24
MH8S1	294	47				0-12
MH9S1	1780	90				0-12
MH9S2	934	68				12-24
MH10S1	1560	84				0-12
MH10S2	424	49				12-24
MH11S1	821	61				0-12
MH11S2	706	60				12-24
MH12S1	1160	72				0-12
MH12S2	788	58				12-24
MH13S1	519	55				0-12
MH16S1	255	45				0-12
MH17S1	269	41				0-12
MH19S1	291	42				0-12
MH20S1	1250	74				0-12

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
MH21S1	275	55				0-12
MH23S1	321	52				0-12
MH27S1	1500	74				0-12
MH29S1	699	55				0-12
MH32S1	6500	260				0-12
MH36S1	1060	100				0-12
MH37S1	508	65				0-12
ST3S1 (0-6)	295	45	311	45	283	0 to 6
ST3S1 (6-12)	312	44				6 to 12
ST22DS1	446	45	471	48	444	0 to 6
ST25S1	623	61				0 to 6
ST32S1	1750	84				0 to 6
ST32S2	698	72				12 to 24
ST33S1	1180	64				0 to 6
ST34S1D (0-1)	902	57				0 to 1
ST34S1D (0-3)	639	61				0 to 3
ST34S1D (0-6)	347	50				0 to 6
ST35S1	978	58				0 to 6
ST35S1 (0-1)	1530	83				0 to 1
ST35S1 (0-3)	1080	70				0 to 3
ST35S1 (0-6)	528	54				0 to 6
ST36S1	375	41				0 to 6
ST36S1 (0-1)	603	57				0 to 1
ST37S1	918	60				0 to 6
ST38S1	401	45	409	46	436	0 to 6
ST43S2	373	61				12 to 24
ST44S1	1170	71				0 to 6
ST45S1	1010	67				0 to 6
ST45S2	262	60				12 to 24
ST46S1	1010	66				0 to 6
ST46S1 (0-1)	590	62				0 to 1
ST46S1 (0-3)	1000	70				0 to 3
ST47S1	669	54				0 to 6
ST49S1	123	37	314	43	258	0 to 6
ST62S1	534	72				0 to 6
ST64S1	409	61	552	56	529	0 to 6
ST64S2	325	52				12 to 24
ST65S1D (0-1)	978	76				0 to 1
ST65S1D (0-3)	261	47				0 to 3
ST67S1	886	74				0 to 6
ST83S1 (0-1)	1430	74				0 to 1
ST84S1 (0-3)	468	81				0 to 3

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
ST84S1 (0-6)	259	45				0 to 6
ST85S1 (0-1)	1970	85				0 to 1
ST85S1 (0-3)	678	56				0 to 3
ST85S1 (0-6)	440	47				0 to 6
ST87S1 (0-1)	902	66				0 to 1
ST88S1 (0-1)	790	66				0 to 1
ST88S1 (0-3)	687	63				0 to 3
ST88S1 (0-6)	676	61				0 to 6
ST89S1 (0-1)	863	60				0 to 1
ST89S1 (0-3)	783	73				0 to 3
ST89S1 (0-6)	503	54				0 to 6
ST90S1 (0-1)	470	44				0 to 1
ST90S1 (0-3)	689	54				0 to 3
ST90S1 (0-6)	363	46				0 to 6
ST91S1 (0-1)	809	63				0 to 1
ST91S1 (0-3)	708	62				0 to 3
ST91S1 (0-6)	343	46				0 to 6
ST92S1 (0-1)	404	50				0 to 1
ST92S1 (0-6)	339	56				0 to 6
ST93S1 (0-1)	398	46				0 to 1
ST93S1 (0-3)	445	52				0 to 3
ST93S1 (0-6)	1280	82				0 to 6
ST94S1 (0-1)	505	66				0 to 1
ST94S1 (0-3)	642	60				0 to 3
ST95S1 (0-1)	477	49				0 to 1
ST95S1 (0-3)	431	49				0 to 3
ST95S1 (0-6)	310	39				0 to 6

Table 4 – All Soil Lead Data (excluding Precision samples)

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
Evergreen Range Berm						
EB0S1	165.7	41.8				0-12
EB1S1	231.4	45.9				0-12
EB1S1D	90.3	42.3				0-12
EB1S2	**45**	56.85				12-24
EB2S1	352.4	46.6				0-12
EB2S2	94.6	37.6				12-24
EB3S1	12198.4	350				0-12
EB3S2	892.8	77.6				12-24
EB4S1	138	46.4				0-12
EB4S2	**45**	54.3				12-24
EB7S1	**45**	59.4				0-12
EB7S2	**45**	54.45				12-24
EB10S1	73.9	39.2				0-12
EB10S2	**45**	53				12-24
EB11S1	1600	82.6				0-12
EB11S2	1800	100				12-24
EB12S1	14694.4	460				0-12
EB12S2	4160	170				12-24
EB13S1	77	40.1				0-12
EB13S2	**45**	52.8				12-24
EB16S1	614.8	57.9				0-12
EB16S2	232.2	47.7				12-24
EB19S1	183.9	43.5				0-12
EB19S2	**45**	53.25				12-24
EB20S1	1149.6	73.5				0-12
EB20S2	128	42.6				12-24
EB21S1	50995.2	2000				0-12
EB21S2	36480	1300				12-24
EB22S1	266.8	45.9				0-12
EB22S2	**45**	55.05				12-24
EB25S1	266	49.4				0-12
EB25S2	**45**	53.4				12-24
EB28S1	630.8	58.6				0-12
EB28S2	**45**	55.2				12-24
EB30S1	2459.2	110				0-12
EB31S1	700	68	613	55	622	0-12
EB31S2	45	98	**45**	53	150	12-24

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB32S1			11600	290	12300	0-12
EB32S2			2940	120	1750	12-24
EB33S1	11700	560	18200	500	21600	0-12
EB33S2	1780	120	3170	130	6770	12-24
EB33S1D	911	97				
EB33S2D	339	84				
EB34S1	486	55	492	54	335	0-12
EB34S1D	345	49	346	49		0-12
EB34S2	71.4	38	148	43	133	12-24
EB34S2D	**45**	55				12-24
EB35S1	2620	140	2490	110	2610	0-12
EB35S2	522	60	630	56	2410	12-24
EB36S1	10100	440	13300	370	21500	0-12
EB36S2	1450	91	2180	100	2870	12-24
EB37S1			404	50	274	0-12
EB37S2			**45**	53	23.4	12-24
EB38S1			25400	720	31600	0-12
EB38S2			6590	210	7960	12-24
EB39S1			5830	180	6940	0-12
EB39S2			600	57	1130	12-24
EB40S1	834	70	918	67	746	0-12
EB40S2	276	65	326	48	331	12-24
EB41S1	1290	160	2060	95	1870	0-12
EB41S2	813	99	738	60	768	12-24
EB42S1	26700	1100	31600	930	37100	0-12
EB42S2	5570	460	5680	190	7290	12-24
EB43S1	973	130	762	62	639	0-12
EB43S2	300	52	958	67	601	12-24
EB44S1	671	97	1070	70	726	0-12
EB44S1D	1530	110				0-12
EB44S2	708	97	732	61	941	12-24
EB44S2D	95.6	52				12-24
EB45S1			29300	890	33500	0-12
EB45S2			7420	220	13900	12-24
EB46S1	295	61	144	42	215	0-12
EB46S2	**45**	93	62.2	38	61.5	12-24
EB47S1			20500	570	24400	0-12
EB47S2			650	57	1250	12-24
EB48S1			41600	1300	50800	0-12
EB48S2			19000	530	19400	12-24
EB49S1	192.6	52.1	235	45		0-12
EB49S2	115.3	41.2	151	42		12-24

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB50S1			838	63	1040	0-12
EB50S2			**45**	51	36.6	12-24
EB51S1			38400	1200	62500	0-12
EB51S2			8380	250	15600	12-24
EB52S1	268.6	47.5				0-12
EB52S2	75	40.1				12-24
EB53S1	8915.2	260				0-12
EB53S2	573.6	55.5				12-24
EB54S1	33075.2	1000				0-12
EB54S2	15897.6	500				12-24
EB55S1	275.8	50.8				0-12
EB55S2	**45**	57.3				12-24
EB56S1	13696	450				0-12
EB56S2	164.6	41.2				12-24
EB57S1	43187.2	1400				0-12
EB57S2	3139.2	130				12-24
EB58S1	565.2	56.5				0-12
EB58S2	**45**	52.2				12-24
EB61S1	430.4	52				0-12
EB61S2	**45**	57.3				12-24
EB64S1	77.5	40.9				0-12
EB64S2	**45**	55.05				12-24
EB65S1	411.6	49.4				0-12
EB65S2	259.6	44.5				12-24
EB66S1	32896	1000				0-12
EB66S2	2960	120				12-24
EB67S1	80.9	42.1				0-12
EB67S2	**45**	52				12-24
EB70S1	129.9	41.5				0-12
EB70S2	**45**	54.3				12-24
EB73S1	104.2	39.6				0-12
EB73S2	**45**	55.8				12-24
EB74S1	1620	82.6				0-12
EB74S2	239.2	42				12-24
EB75S1	25792	960				0-12
EB75S2	5177.6	180				12-24
EB76S1	**45**	54				0-12
EB76S2	**45**	53.55				12-24
EB79S1	**45**	55.95				0-12
EB79S2	55.9	36.3				12-24
EB82S1	218.4	44.8				0-12

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB82S2	**45**	52.8				12-24
EB83S1	1140	71.4				0-12
EB83S2	98.7	34.7				12-24
EB84S1	365	52.4				0-12
EB84S2	**45**	69.45				12-24
EB85S1	3417.6	130				0-12
EB85S2	1960	92.2				12-24
EB86S1	153.6	40.4				0-12
EB86S2	181.1	46.9				12-24
EB87S1	**45**	55.5	98.5	37.5	42.6	0-12
EB87S2	**45**	62.25	**45**	51	12.2	12-24
EB88S1	**45**	87.75	**45**	57	34	0-12
EB88S2	**45**	78	**45**	56	4.77	12-24
EB90S1	90.7	54.9	119	40	92.6	0-12
EB90S2	**45**	60.15	86.8	38	43.4	12-24
EB91S1	**45**	65	**45**	56	47	0-12
EB91S2	**45**	77	**45**	56	35.7	12-24
EB92S1	**45**	85.8	69.1	40	75.2	0-12
EB92S2	**45**	58.05	**45**	55	9.8	12-24
EB93S1	**70.6**	43				0-12
EB93S2	**45**	80	**45**	55	18.3	12-24
EB94S1	**45**	68.55	**45**	54	22.2	0-12
EB94S2	**45**	81.15	**45**	56	14.9	12-24
EB96S1	**45**	56.1	**45**	53	37.5	0-12
EB96S2	**45**	66.15	**45**	53	15.1	12-24
EB97S1	**45**	56.25	**45**	52	30.8	0-12
EB97S2	**45**	54.6	**45**	53	24.5	12-24
EB98S1	**45**	69.9	68.4	37	78.1	0-12
EB98S2	**45**	75.3	63.8	36	36.5	12-24
EB99S1	1110	76				0-12
EB99S2	385	58				12-24
EB100S1	100	41				0-12
EB100S2	**45**	63				12-24
EB101S1	821	69				0-12
EB101S2	120	51				12-24
EB102S1	4020	160				0-12
EB102S2	99.7	41				12-24
EB103S1	929	92				0-12
EB103S2	725	89				12-24
EB104S1	291	53				0-12
EB104S2	67.9	44				12-24

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EB105S1	805	73				0-12
EB105S2	**45**	81				12-24
EB106S1	1490	99				0-12
EB106S2	**45**	81				12-24
EB107S1	214	49	263	47	202	0-12
EB107S2	84.6	46				12-24
EB108S1	205	51	274	84	197	0-12
EB108S2	**45**	69				12-24
EB109S1	538	55				0-12
EB109S2	88.6	46				12-24
EB110S1	1550	110				0-12
EB110S2	375	51				12-24
EB111S1	957	70				0-12
EB111S2	161	47				12-24
EB112S1	829	84				0-12
EB112S2	407	70				12-24
EB113S1	304	55				0-12
EB113S2	73.6	45				12-24
EB114S1	159	53				0-12
EB114S2	94.4	45				12-24
EB115S1	329	51				0-12
EB115S2	68.2	45				12-24
EB116S1	**45**	71	**45**	60	20.3	0-12
EB116S2	**45**	65				12-24
EB117S1	**45**	67	**45**	57	13.1	0-12
EB117S2	**45**	77				12-24
EB118S1	586	62				0-12
EB118S2	45	60				12-24
EB119S1	197	56				0-12
EB119S2	868	77				12-24
EB120S1	1080	73				0-12
EB120S2	177	61				12-24
EB121S1	1240	84				0-12
EB121S2	287	49				12-24
EB122S1	799	78				0-12
EB122S2	**45**	100				12-24
EB123S1	**45**	66	**45**	56	48.2	0-12
EB123S2	**45**	75				12-24
Evergreen Range Firing Points						
EF1-S1	45	59	69.4	38	19.2	0-12
EF2-S1	45	52	45	55	17.4	0-12

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
EF3-S1	45	52	45	55	17.8	0-12
EF4-S1	45	55	45	55	20.9	0-12
Miller Hill Pistol Range						
MH1S1	324	43				0-12
MH1S2	229	41				0-12
MH2S1	477	50				0-12
MH2S2	182	37				12-24
MH3S1	574	51				0-12
MH3S2	458	46				12-24
MH4S1	797	56				0-12
MH4S2	727	57				12-24
MH4S3	**45**	60				24-36
MH4S4	158	38				36-48
MH5S1	767	58				0-12
MH5S2	221	41				12-24
MH6S1	703	58				0-12
MH6S2	393	46				12-24
MH7S1	834	66				0-12
MH7S2	446	51				12-24
MH8S1	294	47				0-12
MH8S2	219	42				12-24
MH9S1	1780	90				0-12
MH9S2	934	68				12-24
MH9S3	**45**	76				24-36
MH9S4	57.1	34				36-48
MH10S1	1560	84				0-12
MH10S2	424	49				12-24
MH11S1	821	61				0-12
MH11S2	706	60				12-24
MH12S1	1160	72				0-12
MH12S2	788	58				12-24
MH13S1	519	55				0-12
MH13S2	237	44				12-24
MH14S1	107	39				0-12
MH14S2	113	38				12-24
MH15S1	139	39				0-12
MH15S2	86.9	37				12-24
MH16S1	255	45				0-12
MH16S2	108	39				12-24
MH16S3	**45**	52				24-36
MH16S4	101	43				36-48
MH17S1	269	41				0-12

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
MH17S2	110	39				12-24
MH18S1	222	42				0-12
MH18S2	85.5	38				0-12
MH19S1	291	42				0-12
MH20S1	1250	74				0-12
MH21S1	275	55				0-12
MH22S1	71.5	29				0-12
MH23S1	321	52				0-12
MH24S1	206	39				0-12
MH25S1	124	39				0-12
MH26S1	**45**	47				0-12
MH27S1	1500	74				0-12
MH28S1	71.9	37				0-12
MH29S1	699	55				0-12
MH30S1	242	38				0-12
MH31S1	180	44				0-12
MH32S1	6500	260				0-12
MH33S1	73	31	71.6	28	78.1	0-12
MH34S1	96.9	58	96.1	29	105	0-12
MH35S1	**45**	46	**45**	46	13.1	0-12
MH36S1	1060	100				0-12
MH37S1	508	65				0-12
MH38S1	104	35				0-12
Former Skeet Range						
ST1S1	**45**	53				0 to 12
ST2S1	**45**	51	55	34	14.1	0 to 12
ST3S1 (0-6)	295	45	311	45	283	0 to 6
ST3S1 (6-12)	312	44				6 to 12
ST3S2	127	45				12 to 24
ST4S1 (0-6)	57.2	34				0 to 6
ST4S1 (6-12)	**45**	51				6 to 12
ST4S2	**45**	53				12 to 24
ST5S1	**45**	55				0 to 6
ST6S1 (0-6)	154	39	140	40	206	0 to 6
ST6S1 (6-12)	84.9	35				6 to 12
ST6S2	85.6	37				12 to 24
ST7S1	**45**	51				0 to 6
ST8S1	**45**	48				0 to 6
ST9S1	**45**	50				0 to 6
ST10S1	229	40				0 to 6
ST11S1	232	40				0 to 6

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
ST12S1	**45**	50				0 to 6
ST12DS1	**45**	48				0 to 6
ST13S1	51.6	34				0 to 6
ST15S1	58.2	34				0 to 6
ST16S1	179	39				0 to 6
ST17S1	82.5	34				0 to 6
ST18S1	**45**	51				0 to 6
ST19S1	228	40				0 to 6
ST20S1	54.6	32				0 to 6
ST21S1	143	35				0 to 6
ST22S1	246	41	192	39	155	0 to 6
ST22DS1	446	45	471	48	444	0 to 6
ST23S1	179	37				0 to 6
ST24S1	65.1	33				0 to 6
ST25S1	623	61				0 to 6
ST25S2	162	49				12 to 24
ST26S1	169	37				0 to 6
ST27S1	193	38				0 to 6
ST28S1	162	37				0 to 6
ST29S1	131	35				0 to 6
ST30S1	205	39				0 to 6
ST32S1	1750	84				0 to 6
ST32S2	698	72				12 to 24
ST33S1	1180	64				0 to 6
ST33S2	221	43				12 to 24
ST34S1	72.7	45				0 to 6
ST34S2	**45**	53				12 to 24
ST34S1D (0-1)	902	57				0 to 1
ST34S1D (0-3)	639	61				0 to 3
ST34S1D (0-6)	347	50				0 to 6
ST34S2D	76	37				12 to 24
ST35S1	978	58				0 to 6
ST35S2	54.2	33				12 to 24
ST35S1 (0-1)	1530	83				0 to 1
ST35S1 (0-3)	1080	70				0 to 3
ST35S1 (0-6)	528	54				0 to 6
ST36S1	375	41				0 to 6
ST36S2	62.4	35				12 to 24
ST36S1 (0-1)	603	57				0 to 1
ST36S1 (0-3)	190	36				0 to 3
ST36S1 (0-6)	161	37				0 to 6
ST37S1	918	60				0 to 6

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
ST37S2	116	39				12 to 24
ST38S1	401	45	409	46	436	0 to 6
ST38S2	144	42				12 to 24
ST39S1	149	39	178	42	134	0 to 6
ST40S1	159	40	164	40	113	0 to 6
ST41S1	53.3	35	**45**	52	48.7	0 to 6
ST42S1 (0-6)	**45**	40				0 to 6
ST42S1 (6-12)	126	36				6 to 12
ST43S1	109	34				0 to 6
ST43S2	373	61				12 to 24
ST44S1	1170	71				0 to 6
ST44S2	142	40				12 to 24
ST45S1	1010	67				0 to 6
ST45S2	262	60				12 to 24
ST46S1	1010	66				0 to 6
ST46S2	55.3	35				12 to 24
ST46S1 (0-1)	590	62				0 to 1
ST46S1 (0-3)	1000	70				0 to 3
ST46S1 (0-6)	79	40				0 to 6
ST46S2	74	35				12 to 24
ST47S1	669	54				0 to 6
ST47S2	101	39				12 to 24
ST48S1	242	41				0 to 6
ST49S1	123	37	314	43	258	0 to 6
ST50S1	**45**	55	82	38	74.5	0 to 6
ST51S1	**45**	51				0 to 6
ST51S2	**45**	65				12 to 24
ST52S1	50.9	32				0 to 6
ST52S2	**45**	54				12 to 24
ST53S1	104	45				0 to 6
ST53S2	**45**	71				12 to 24
ST55S1	**45**	53				0 to 6
ST55S2	**45**	54				12 to 24
ST56S1	**45**	62				0 to 6
ST56S2	83.2	46				12 to 24
ST58S1	63.6	40				0 to 6
ST58S2	77	35				12 to 24
ST59S1	112	46				0 to 6
ST59S2	156	54				12 to 24
ST61S1	**45**	51				0 to 6
ST61S2	**45**	58				12 to 24

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
ST62S1	534	72				0 to 6
ST62S2	157	45				12 to 24
ST63S1	184	53				0 to 6
ST63S2	172	40				12 to 24
ST64S1	409	61	552	56	529	0 to 6
ST64S2	325	52				12 to 24
ST65S1	93.5	37				0 to 6
ST65S2	96.1	38				12 to 24
ST65S1D (0-1)	978	76				0 to 1
ST65S1D (0-3)	261	47				0 to 3
ST65S1D (0-6)	67	43				0 to 6
ST65S2D	**45**	54				12 to 24
ST66S1	205	57	191	39	165	0 to 6
ST66S2	**45**	76				12 to 24
ST67S1	886	74				0 to 6
ST67S2	106	72				12 to 24
ST75S1	212	46				0 to 12
ST76S1	103	30				0 to 12
ST77COMP	**53.7**	34				0 to 12
ST83S1 (0-1)	1430	74				0 to 1
ST83S1 (0-3)	84	42				0 to 3
ST83S1 (0-6)	**45**	54				0 to 6
ST83S2	**45**	57				12 to 24
ST84S1 (0-1)	**45**	83				0 to 1
ST84S1 (0-3)	468	81				0 to 3
ST84S1 (0-6)	259	45				0 to 6
ST84S2	98	47				12 to 24
ST85S1 (0-1)	1970	85				0 to 1
ST85S1 (0-3)	678	56				0 to 3
ST85S1 (0-6)	440	47				0 to 6
ST85S2	**45**	49				12 to 24
ST86S1 (0-1)	210	43				0 to 1
ST86S1 (0-3)	68.5	34				0 to 3
ST86S1 (0-6)	**45**	61				0 to 6
ST86S2	**45**	72				12 to 24
ST87S1 (0-1)	902	66				0 to 1
ST87S1 (0-3)	141	43				0 to 3
ST87S1 (0-6)	195	39				0 to 6
ST87S2	84	44				12 to 24
ST88S1 (0-1)	790	66				0 to 1
ST88S1 (0-3)	687	63				0 to 3

Sample ID	XRF Bag Lead Value (mg/kg)	Precision (±)	XRF Cup Lead Value (mg/kg)	Precision (±)	Fixed-Lab Lead Value (mg/kg)	Depth Interval (in)
ST88S1 (0-6)	676	61				0 to 6
ST88S2	78	38				12 to 24
ST89S1 (0-1)	863	60				0 to 1
ST89S1 (0-3)	783	73				0 to 3
ST89S1 (0-6)	503	54				0 to 6
ST89S2	**45**	87				12 to 24
ST90S1 (0-1)	470	44				0 to 1
ST90S1 (0-3)	689	54				0 to 3
ST90S1 (0-6)	363	46				0 to 6
ST90S2	**45**	64				12 to 24
ST91S1 (0-1)	809	63				0 to 1
ST91S1 (0-3)	708	62				0 to 3
ST91S1 (0-6)	343	46				0 to 6
ST91S2	**45**	78				12 to 24
ST92S1 (0-1)	404	50				0 to 1
ST92S1 (0-3)	213	59				0 to 3
ST92S1 (0-6)	339	56				0 to 6
ST92S2	**45**	56				12 to 24
ST93S1 (0-1)	398	46				0 to 1
ST93S1 (0-3)	445	52				0 to 3
ST93S1 (0-6)	1280	82				0 to 6
ST93S2	**45**	61				12 to 24
ST94S1 (0-1)	505	66				0 to 1
ST94S1 (0-3)	642	60				0 to 3
ST94S1 (0-6)	166	52				0 to 6
ST94S2	**45**	51				12 to 24
ST95S1 (0-1)	477	49				0 to 1
ST95S1 (0-3)	431	49				0 to 3
ST95S1 (0-6)	310	39				0 to 6
ST95S2	64	34				12 to 24

Table 5 – Explosive Residues at the Evergreen Former Infiltration Range

Compound	2,4-Dinitro-toluene	HMX	RDX	1,3,5-Trinitro-benzene	1,3-Dinitro-benzene	Tetryl	2,4,6-Trinitro-toluene	Nitro-benzene
MTCA Method A/B	1600	NA	9.09	21400	8	NA	NA	40
Reporting Limit		0.049	0.049	0.049	0.049	0.049	0.049	0.049
(Units)	(%)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Sample ID								
ED1S1	102	ND	ND	ND	ND	ND	ND	ND
ED1S2	100	ND	ND	ND	ND	ND	ND	ND
ED2S1	99	ND	ND	ND	ND	ND	ND	ND
ED2S2	101	ND	ND	ND	ND	ND	ND	ND
ED3S1	102	ND	ND	ND	ND	ND	ND	ND
ED3S2	102	ND	ND	ND	ND	ND	ND	ND
ED4S1	103	ND	ND	ND	ND	ND	ND	ND
ED4S2	99.7	ND	ND	ND	ND	ND	ND	ND
ED5S1	101	ND	ND	ND	ND	ND	ND	ND
ED5S2	101	ND	ND	ND	ND	ND	ND	ND
ED6S1	103	ND	ND	ND	ND	ND	ND	ND
ED6S2	104	ND	ND	ND	ND	ND	ND	ND
ED7S1	102	ND	ND	ND	ND	ND	ND	ND
ED7S2	102	ND	ND	ND	ND	ND	ND	ND
ED8S1	101	ND	ND	ND	ND	ND	ND	ND
ED8S2	103	ND	ND	ND	ND	ND	ND	ND
ED9S1	102	ND	ND	ND	ND	ND	ND	ND
ED9S2	103	ND	ND	ND	ND	ND	ND	ND
ED10S1D	102	ND	ND	ND	ND	ND	ND	ND
ED10S2D	103	ND	ND	ND	ND	ND	ND	ND
ED11S1D	102	ND	ND	ND	ND	ND	ND	ND
ED11S2D	102	ND	ND	ND	ND	ND	ND	ND

Compound	2-Aminodinitro-toluene	4-Aminodinitro-toluene	2,4-Dinitro-toluene	2,6-Dinitro-toluene	2-Nitro-toluene	3-Nitro-toluene	4-Nitro-toluene
MTCA Method A/B	1600	NA	9.09	21400	8	NA	NA
Reporting Limit	0.049	0.049	0.049	0.049	0.099	0.099	0.099
(Units)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Sample ID							
ED1S1	ND	ND	ND	ND	ND	ND	ND
ED1S2	ND	ND	ND	ND	ND	ND	ND
ED2S1	ND	ND	ND	ND	ND	ND	ND
ED2S2	ND	ND	ND	ND	ND	ND	ND
ED3S1	ND	ND	ND	ND	ND	ND	ND
ED3S2	ND	ND	ND	ND	ND	ND	ND
ED4S1	ND	ND	ND	ND	ND	ND	ND
ED4S2	ND	ND	ND	ND	ND	ND	ND
ED5S1	ND	ND	ND	ND	ND	ND	ND
ED5S2	ND	ND	ND	ND	ND	ND	ND
ED6S1	ND	ND	ND	ND	ND	ND	ND
ED6S2	ND	ND	ND	ND	ND	ND	ND
ED7S1	ND	ND	ND	ND	ND	ND	ND
ED7S2	ND	ND	ND	ND	ND	ND	ND
ED8S1	ND	ND	ND	ND	ND	ND	ND
ED8S2	ND	ND	ND	ND	ND	ND	ND
ED9S1	ND	ND	ND	ND	ND	ND	ND
ED9S2	ND	ND	ND	ND	ND	ND	ND
ED10S1D	ND	ND	ND	ND	ND	ND	ND
ED10S2D	ND	ND	ND	ND	ND	ND	ND
ED11S1D	ND	ND	ND	ND	ND	ND	ND
ED11S2D	ND	ND	ND	ND	ND	ND	ND

Table 6 – PAH Concentrations at the Former Skeet Range

Compound	Sample ID / MTCA B (mg/kg)	ST10-S1	ST11-S1	ST12-S1	ST13-S1	ST14-S1	ST15-S1	ST16-S1	ST17-S1	ST18-S1
Acenaphthene	97.9	0.07J	0.17	0.31	0.37	ND	0.2	2.8	ND	ND
Acenaphthylene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	2270	0.13	0.15	0.4	0.52	0.22J	0.24	2.8	ND	ND
Benzo(a)anthracene	0.0859	2.1	3	4.1	3.8	2.9	2	34	0.32	0.15
Benzo(b)fluoranthene	0.295	3.4	4.3	6.6	5.9	4.7	3.3	56	0.56	0.21
Benzo(k)fluoranthene	0.295	1.8	3.2	2.4	3.2	2.7	1.8	32	0.37	0.15
Benzo(g,h,i)perylene	NA	1.9	2.4	3.6	3.5	3	1.9	34	0.28	0.13
Benzo(a)pyrene	0.233	3	3.8	5.5	5.6	4.5	3	54	0.47	0.21
Chrysene	0.0956	2.5	3	4.5	4.6	3.4	2.4	39	0.38	0.19
Dibenzo(a,h)anthracene	0.429	0.74	1.3	1.4	1.3	1	0.7	12	0.11	ND
Dibenzofuran	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	631	2.7	3.2	4.8	4.6	4	2.5	47	0.37	0.22
Fluorene	101	ND	ND	0.12J	0.2	ND	0.081	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.833	2.3	3.5	4.8	4.4	3.4	2.4	42	0.37	0.15
2-Methylnaphthalene	5(1)	ND	ND	ND	0.11J	ND	ND	ND	ND	ND
Naphthalene	1600	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	NA	0.76	0.69	2	2.4	1.2	1.1	15	ND	0.055J
Pyrene	655	2.8	3.2	5.3	5.4	4	2.7	46	0.33	0.23

Compound	Sample ID MTCA B (mg/kg)	ST20-S1	ST22-S1	ST23-S1	ST24-S1	ST25-S1	ST27-S1	ST29-S1	ST30-S1	ST31-S1
Acenaphthene	97.9	ND	ND	ND	0.065J	ND	ND	ND	ND	0.17J
Acenaphthylene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	2270	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.0859	0.1	0.17	0.58	1.4	0.082	0.19	ND	0.066J	4.1
Benzo(b)fluoranthene	0.295	0.15	0.32	0.99	2.3	0.14	0.36	ND	0.11	8.3
Benzo(k)fluoranthene	0.295	0.14	0.26	0.76	1.2	0.1	0.26	ND	0.1	4.2
Benzo(g,h,i)perylene	NA	0.11	0.21	0.66	1.1	0.086	0.22	0.04J	0.11	5.2
Benzo(a)pyrene	0.233	0.16	0.32	0.98	1.9	0.12	0.29	0.046J	0.12	7.1
Chrysene	0.0956	0.13	0.21	0.69	1.5	0.098	0.23	ND	0.089	4.5
Dibenzo(a,h)anthracene	0.429	ND	0.067J	0.22	0.52	ND	0.067J	ND	ND	1.9
Dibenzofuran	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	631	0.12	0.18	0.64	1.3	0.1	0.23	0.035J	0.085	3.2
Fluorene	101	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.833	0.13	0.25	0.76	1.4	0.096	0.25	0.039J	0.11	6
2-Methylnaphthalene	5(1)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	1600	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	NA	ND	ND	0.12	0.13	ND	ND	ND	ND	0.42
Pyrene	655	0.12	0.18	0.66	1.2	0.1	0.25	0.041J	0.096	3.3

Compound	Sample ID MTCA B (mg/kg)	ST11S2	ST16S2	ST78S1	ST79S1	ST80S1	ST81S1	ST82S1
Acenaphthene	97.9	0.041	0.15	ND	2	0.13	0.47	ND
Acenaphthylene	NA	ND	ND	ND	ND	ND	ND	ND
Anthracene	2270	0.062	0.14	ND	2.9	0.049	0.48	0.45
Benzo(a)anthracene	0.0859	1	2.8	0.062	46	0.5	9.2	11
Benzo(b)fluoranthene	0.295	1.1	3.5	0.09	52	0.65	11	22
Benzo(k)fluoranthene	0.295	1.4	3.2	0.079	60	0.66	12	19
Benzo(g,h,i)perylene	NA	0.94	2.7	0.078	46	0.67	11	27
Benzo(a)pyrene	0.233	1.6	4	0.096	70	0.88	16	24
Chrysene	0.0956	1.5	3.8	0.089	62	0.59	13	16
Dibenzo(a,h)anthracene	0.429	0.32	0.95	0.025	13	0.18	3.1	4.9
Dibenzofuran	NA	ND	ND	ND	0.18	ND	0.032	ND
Fluoranthene	631	1.7	3.7	0.078	64	0.69	14	13
Fluorene	101	0.012	0.03	ND	0.52	0.015	0.12	ND
Indeno(1,2,3-cd)pyrene	0.833	0.85	2.5	0.071	41	0.59	9.4	20
2-Methylnaphthalene	5(1)	ND	0.013J	ND	0.19	ND	0.055	ND
Naphthalene	1600	ND	0.018	ND	0.19	ND	0.06	ND
Phenanthrene	NA	0.4	0.8	0.022	15	0.23	3.1	1.9
Pyrene	655	2	4.3	0.096	76	0.7	15	17

Table 7 – Analytical TCLP Results for Soil Lead Samples

Range	Lab No.	Sample	Date Sampled	TCLP Lead (mg/L)	ICP Soil Lead (mg/kg)	XRF Soil Lead (mg/kg)
Evergreen	118788-1	EB42S2	9/2/2003	487	37100	31600
	118788-2	EB51S1	9/2/2003	1030	62500	38400
	118788-3	EB46S1	9/2/2003	4.62	215	295
	118788-4	EB39S2	9/2/2003	38.9	1130	600
	118788-5	EB96S1	9/15/2003	0.301	37.5	45
Miller Hill	118788-6	MH3S1	9/25/2003	0.492		574
	118788-7	MH17S1	9/25/2003	0.395		269
	118788-8	MH11S2	9/25/2003	3.35		706
	118788-9	MH26S1	12/3/2003	ND		45
	118788-10	MH32S1	12/3/2003	10.7		6500
Skeet	118788-11	ST41S1	9/22/2003	ND	48.7	45
	118788-12	ST47S1	9/22/2003	1.21		669
	118788-13	ST35S1	12/2/2003	0.47		978
	118788-14	ST84S1	12/2/2003	0.559		259
	118788-15	ST85S1	12/2/2003	3.74		1970

Table 8 – Lead Concentrations from the No. 60 Sieve size in the 0 to 6 inch depth interval at the Skeet Range

Sample ID	Sampling Date	No. 10 Sieve XRF Value (mg/kg)	Precision (±)	No. 60 Sieve Value (mg/kg)	Precision (±)
ST33S1	9/22/2003	1180	64	1520	72
ST35S1	9/22/2003	978	58	642	51
ST36S1	9/22/2003	375	41	328	41
ST37S1	9/22/2003	918	60	1270	70
ST38S1	9/22/2003	401	45	477	46
ST44S1	9/22/2003	1170	71	1600	85
ST45S1	9/22/2003	1010	67	1270	78
ST46S1	9/22/2003	1010	66	1470	79
ST48S1	9/25/2003	242	41	295	40

Figures

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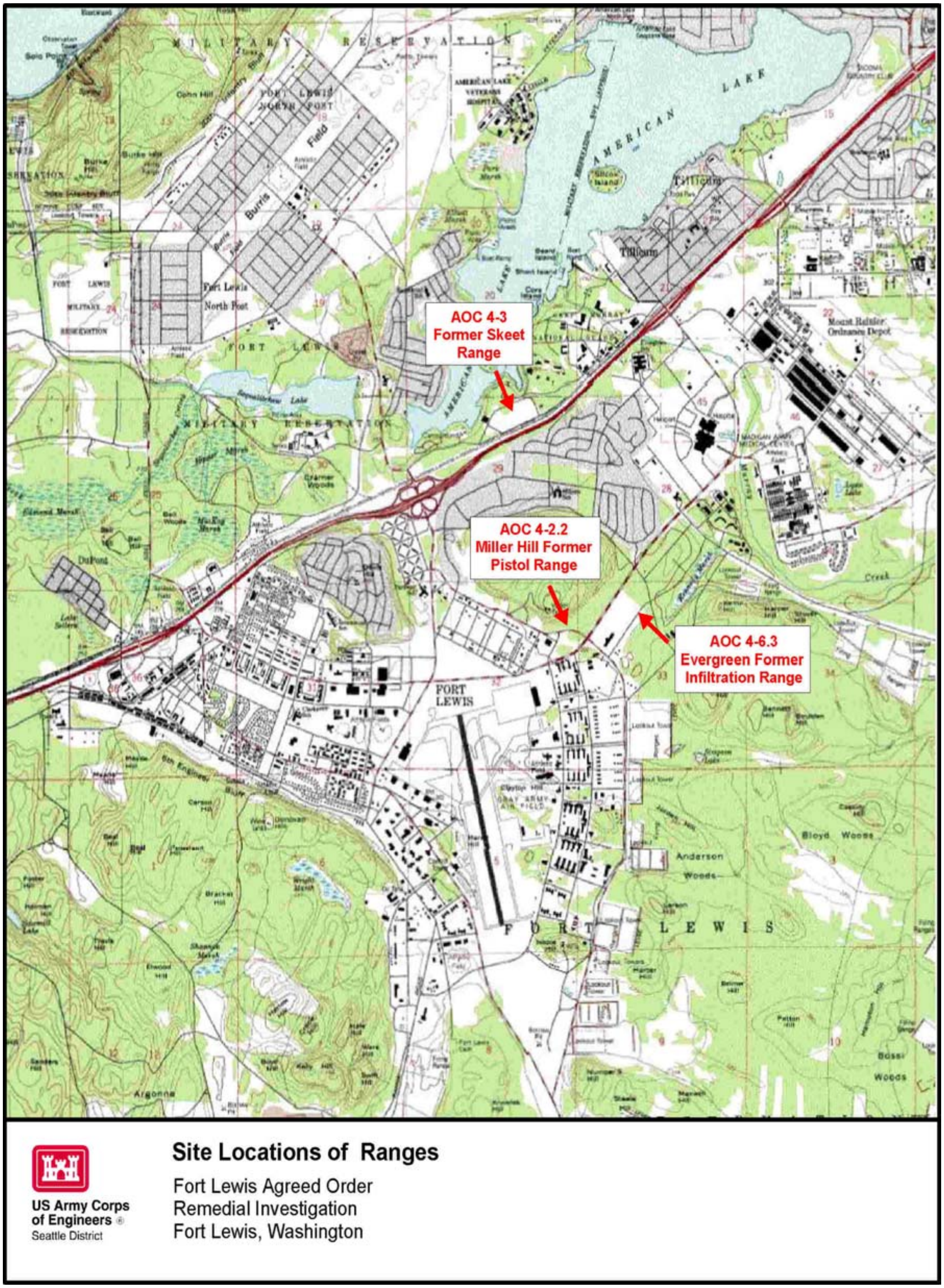


Figure 1. Site Locations

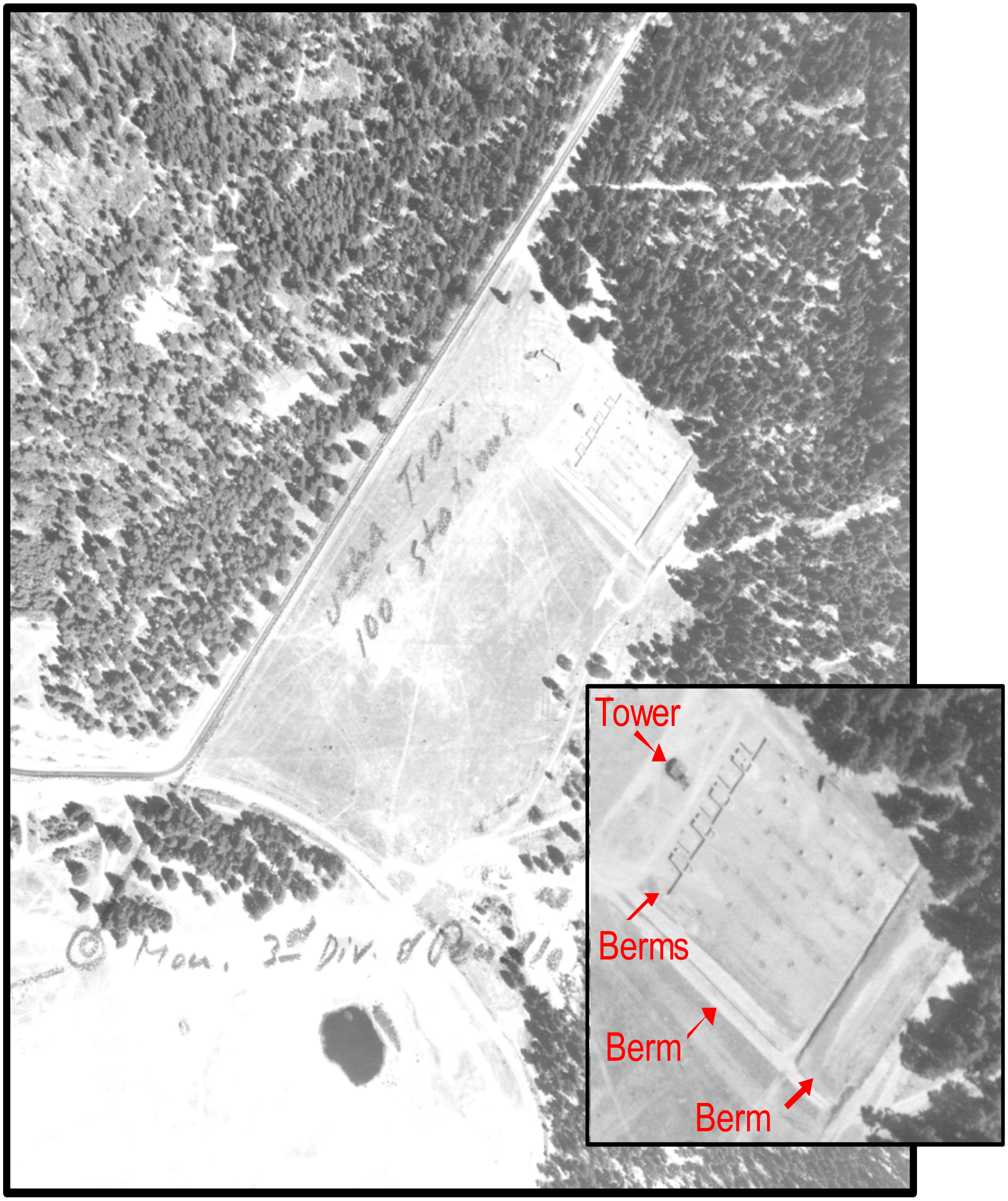


Figure 2. 1951 Aerial Photograph of Evergreen former Infiltration Range (AOC 4-6.3)

Figure 3. 1942 Aerial Photograph of the Miller Hill Former Pistol Range (AOC 4-2.2)

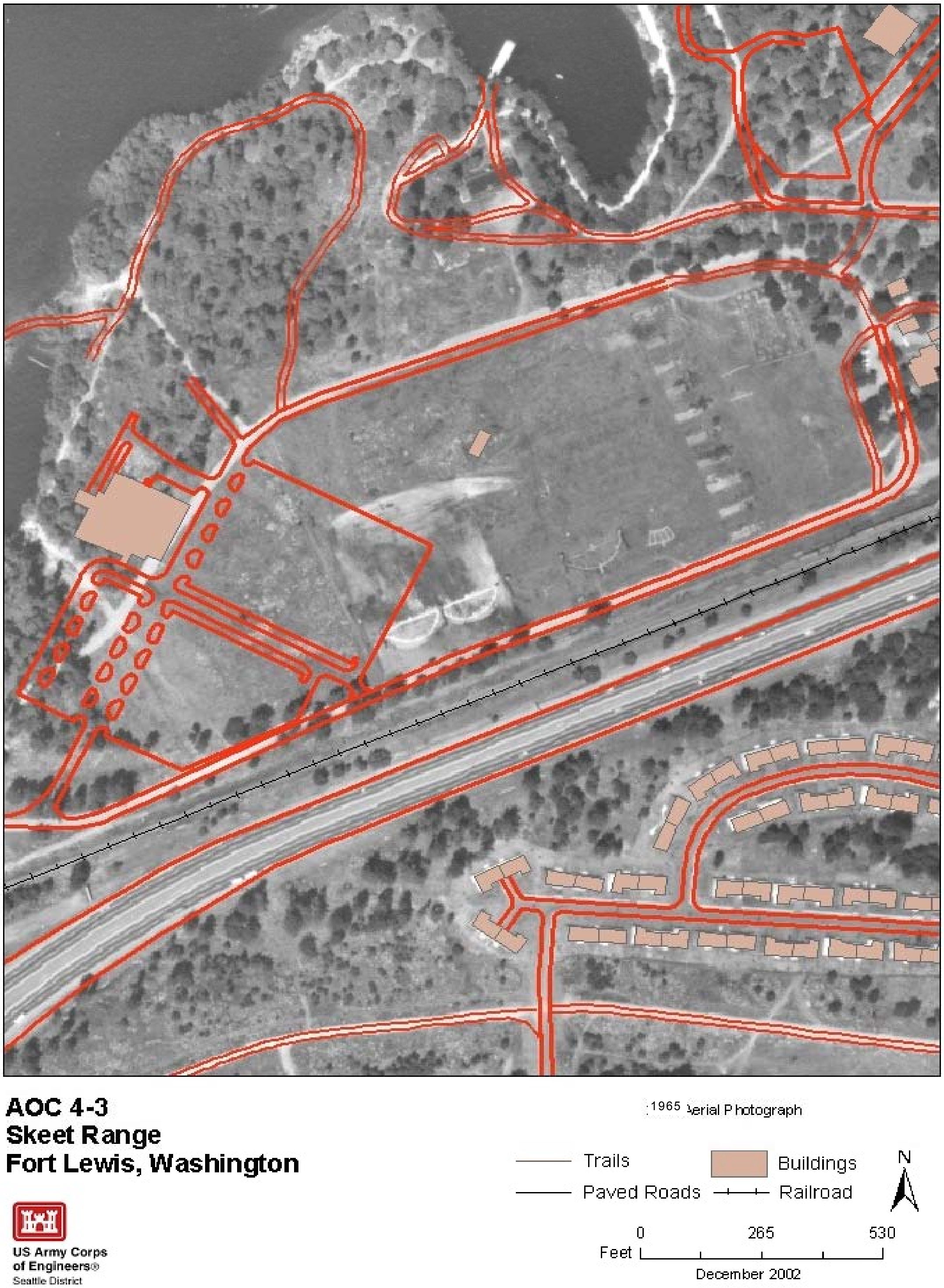


Figure 4. 1965 Aerial Photograph of the Former Skeet Range (AOC 4-3)

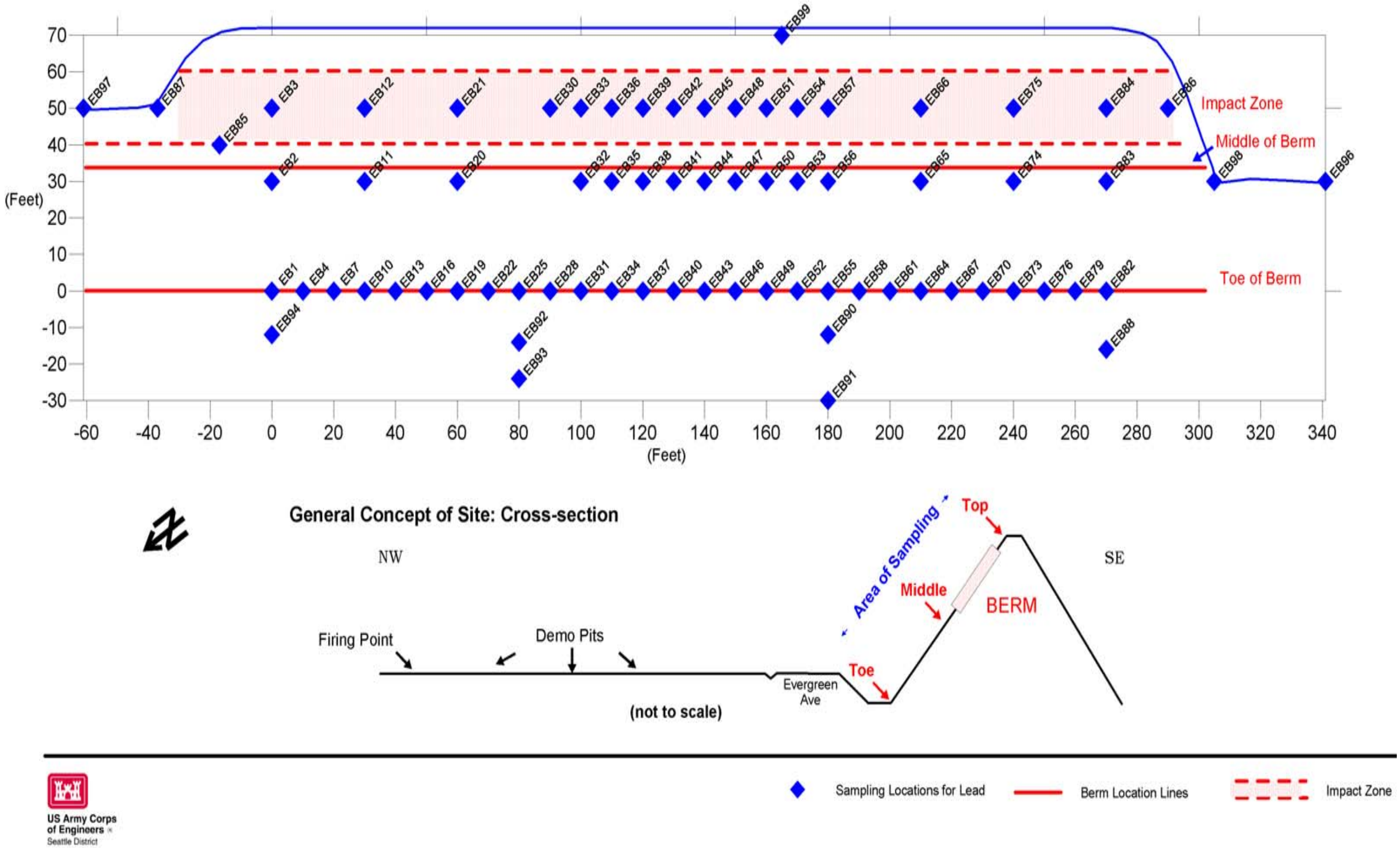


Figure 5. Final Sampling Locations at Evergreen Infiltration Range (AOC 4-6.3)

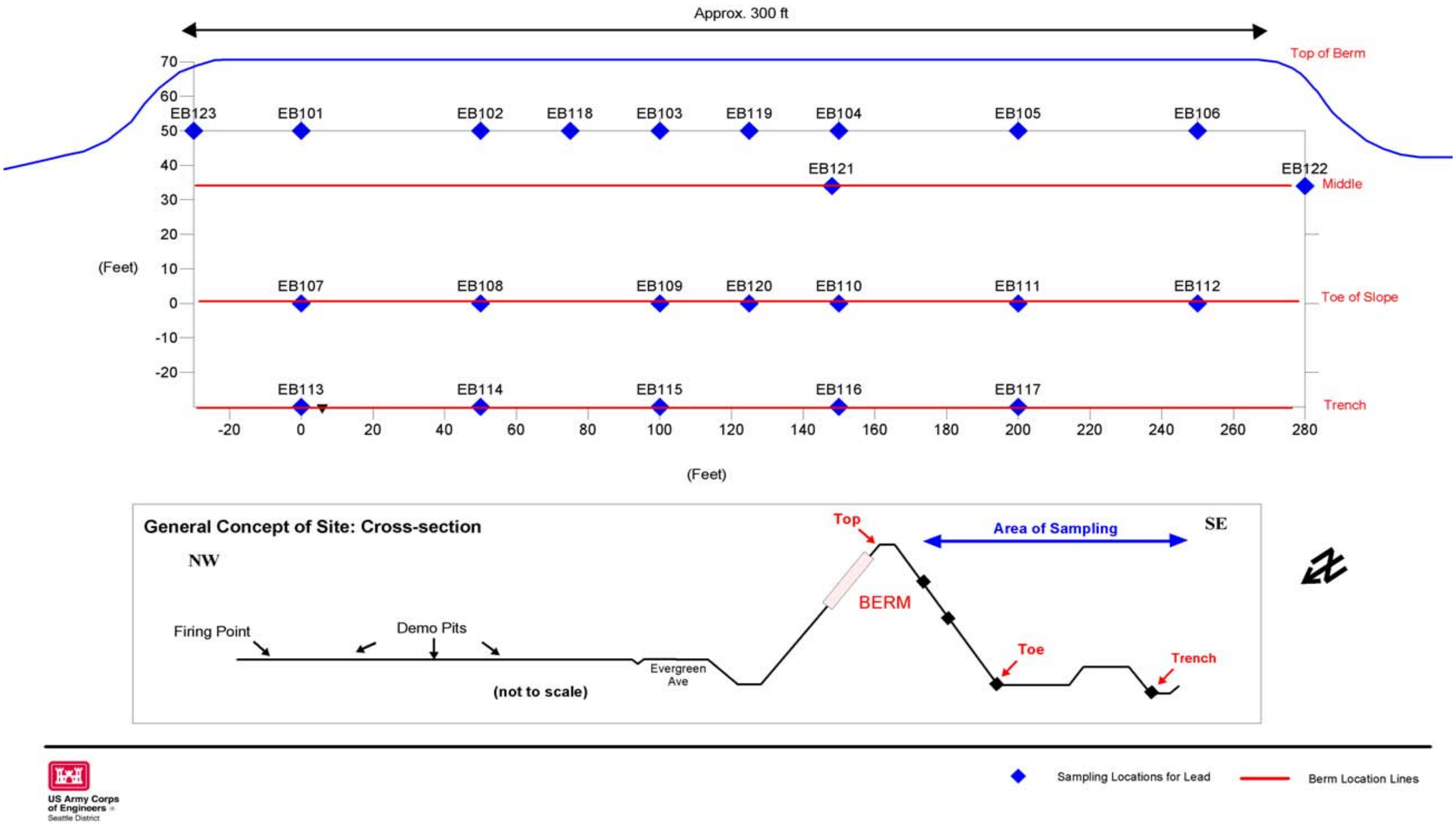


Figure 6. Final Sampling Locations for the Back Face of the Impact Berm at the Evergreen Infiltration Range (AOC 4-6.3)

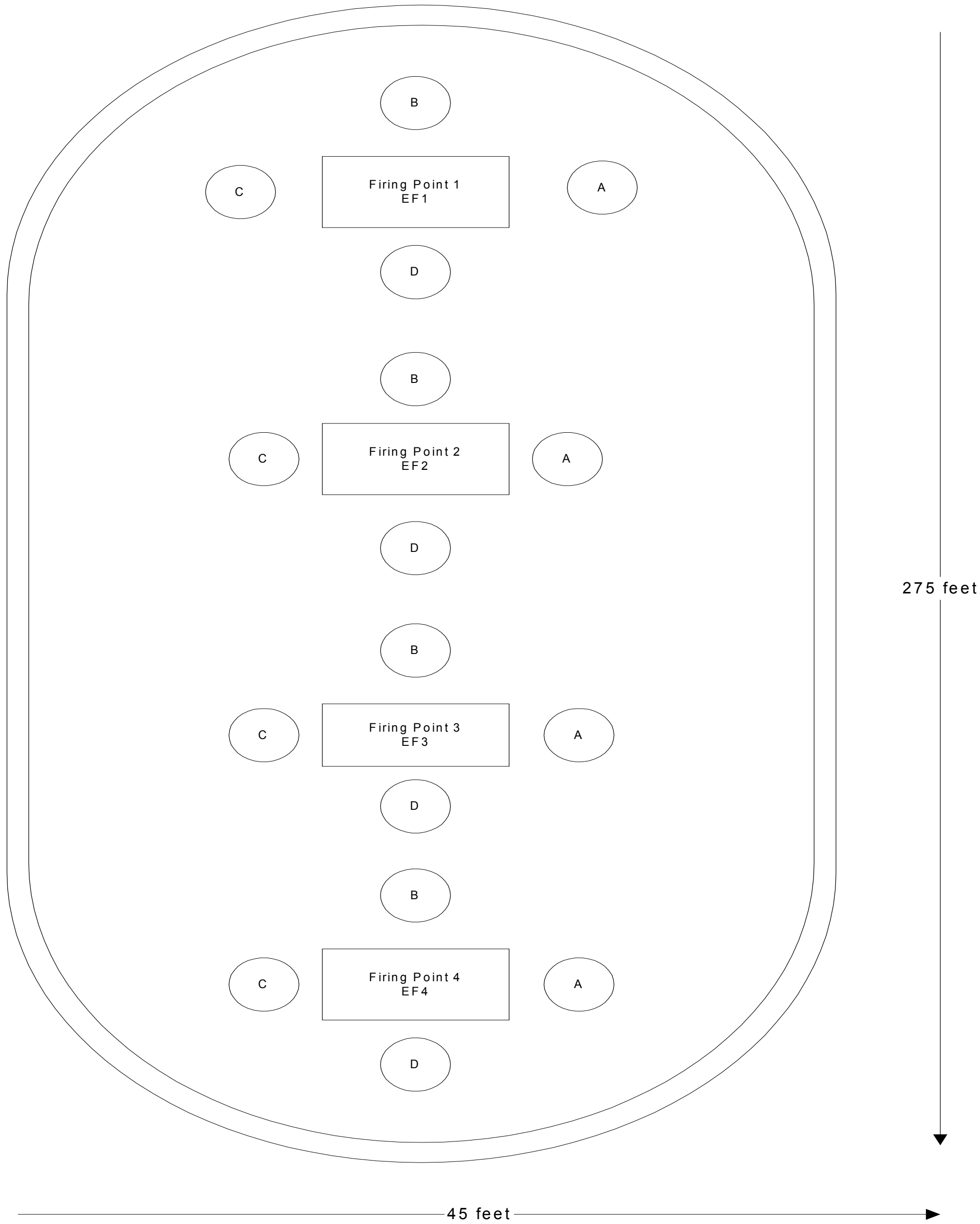


Figure 7. Sampling Locations for the Firing Points in the Command Island at Evergreen Infiltration Range (drawing not to scale)

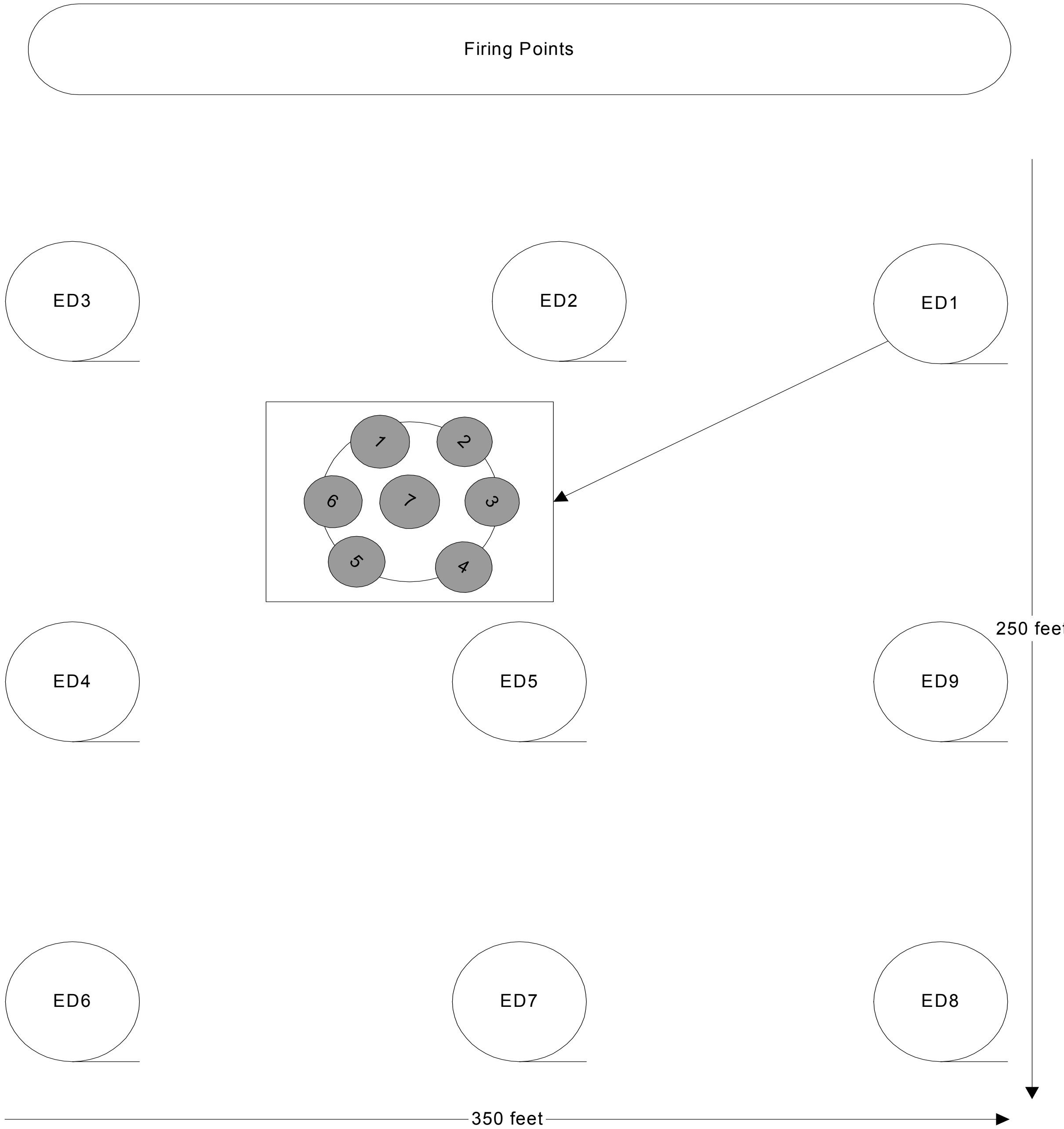
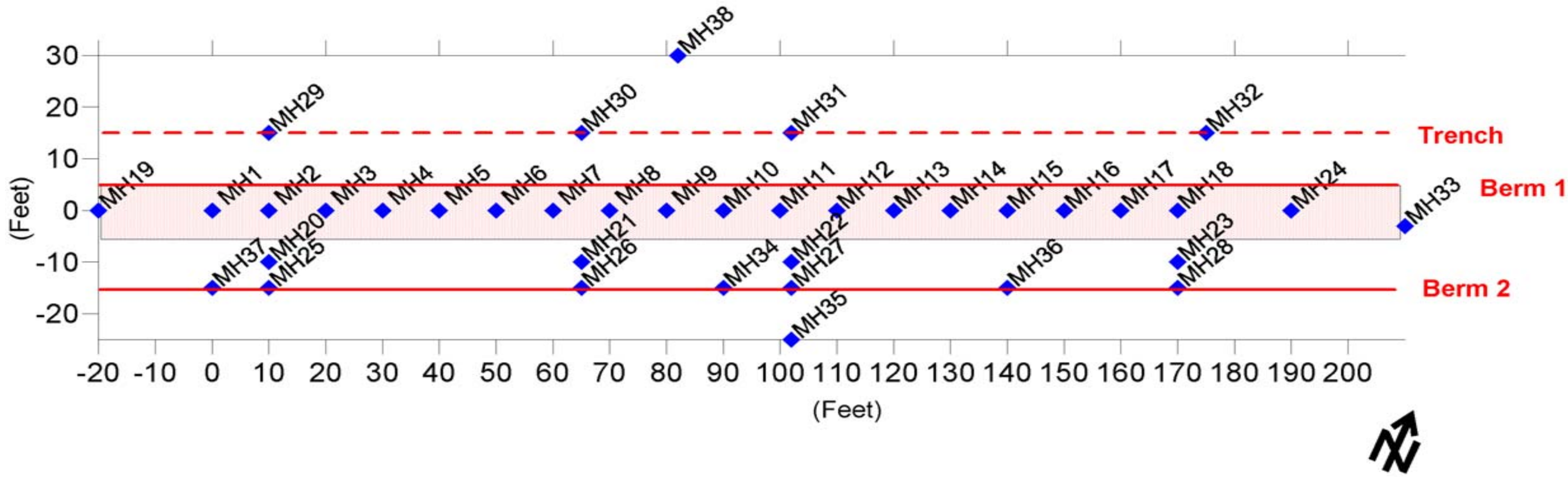
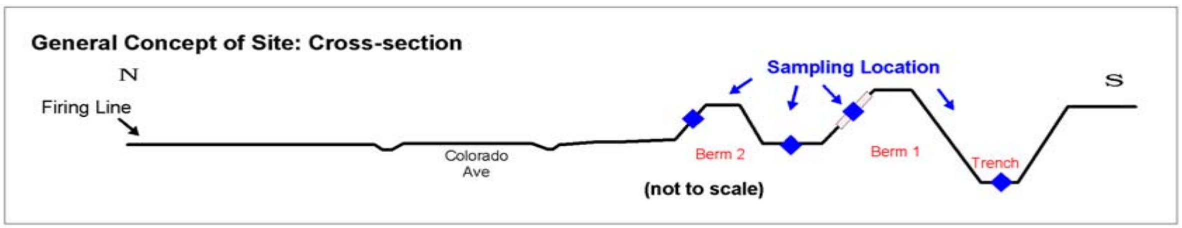


Figure 8. Sampling Locations for Nine Demolition Sites at Evergreen Infiltration Range (drawing not to scale). The insert for ED1 is representative of the composited samples collected from each of the demolition sites.





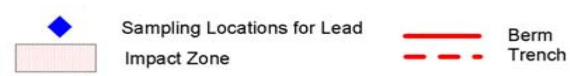


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Figure 9. Final Sampling Locations for Impact Berm at Miller Hill

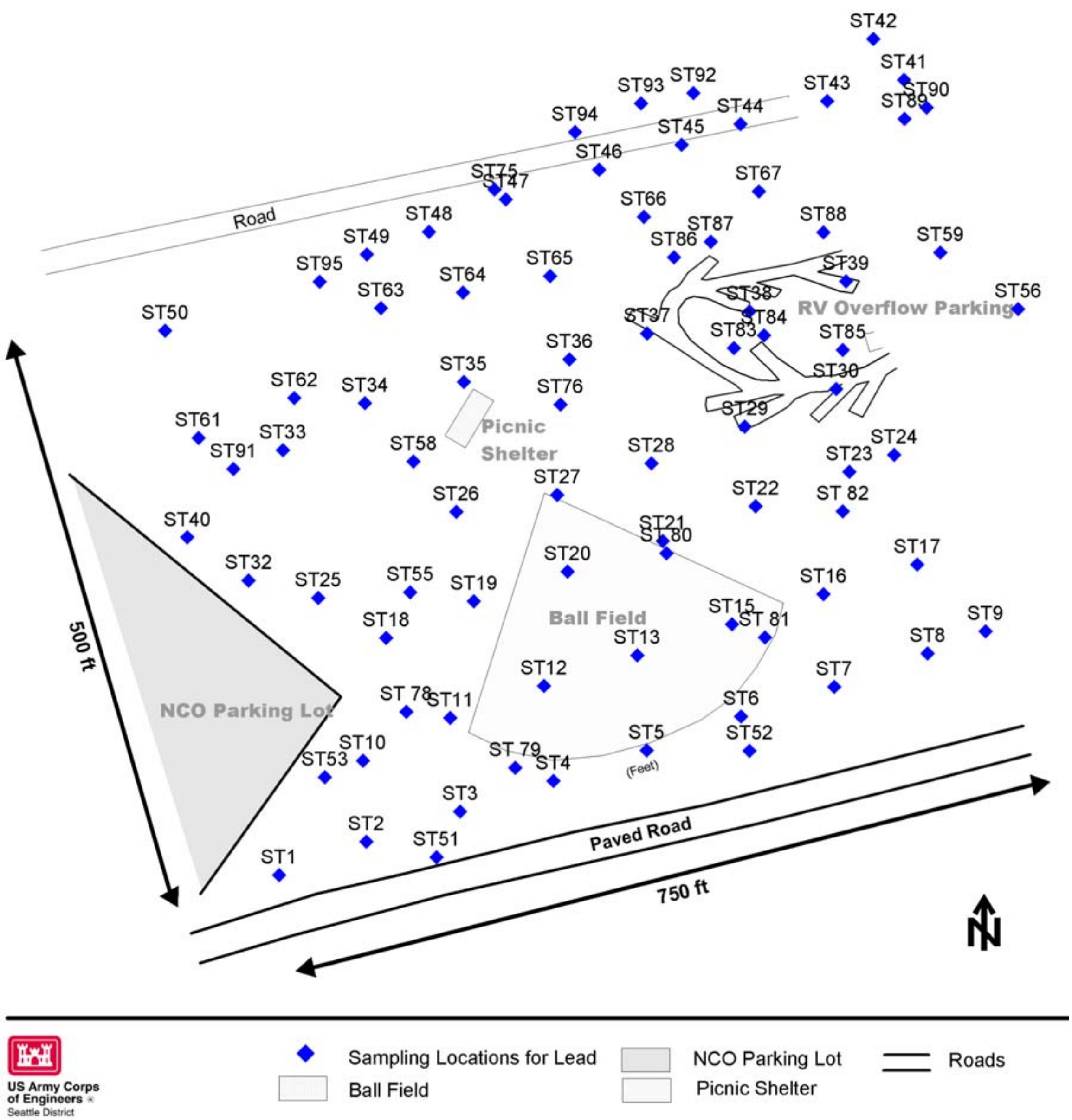

Figure 10. Final Sampling Locations for AOC 4-3 former Skeet Range

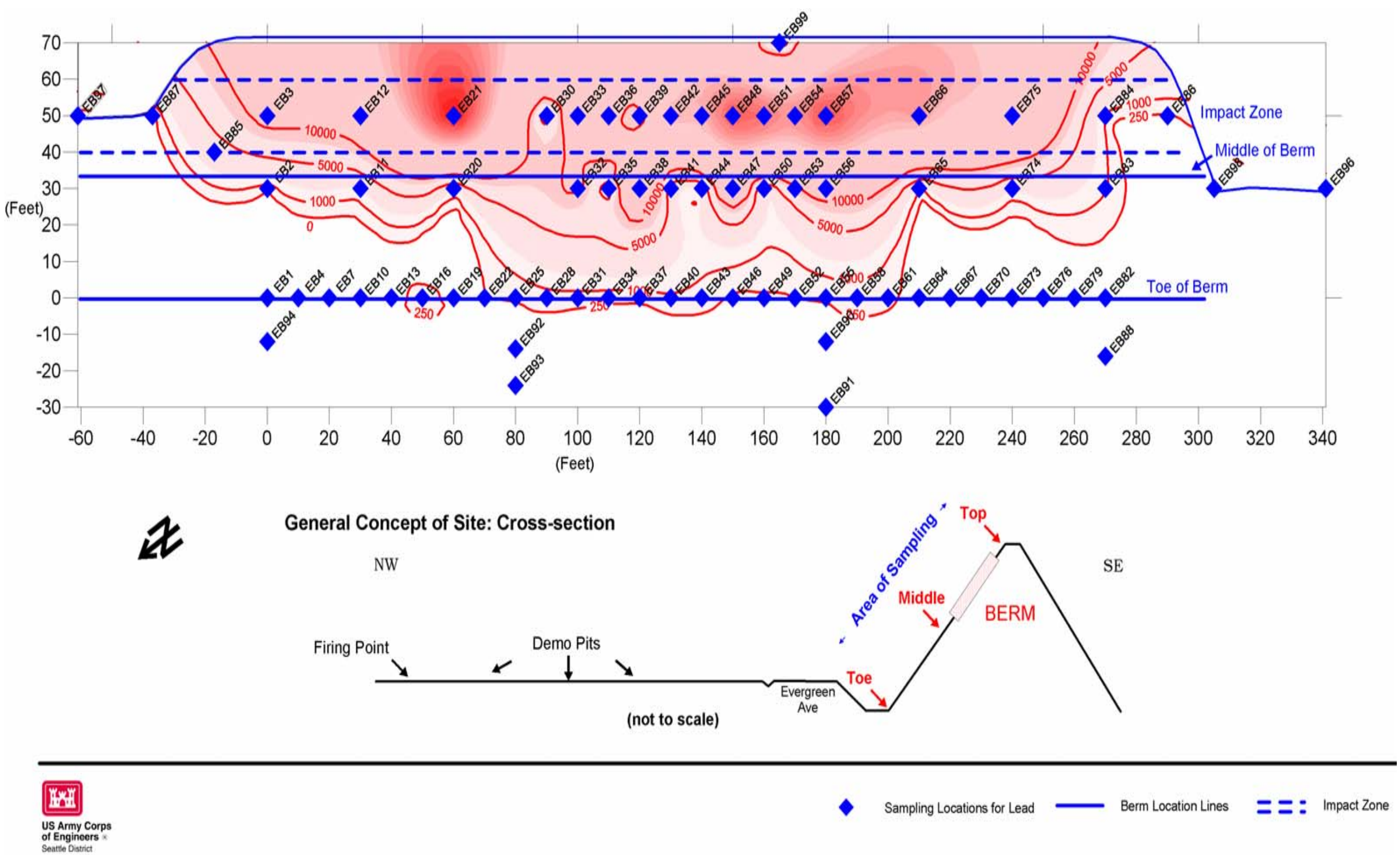

Figure 11. Lead Concentration Results for the Evergreen Former Infiltration Range (0-12 inches)

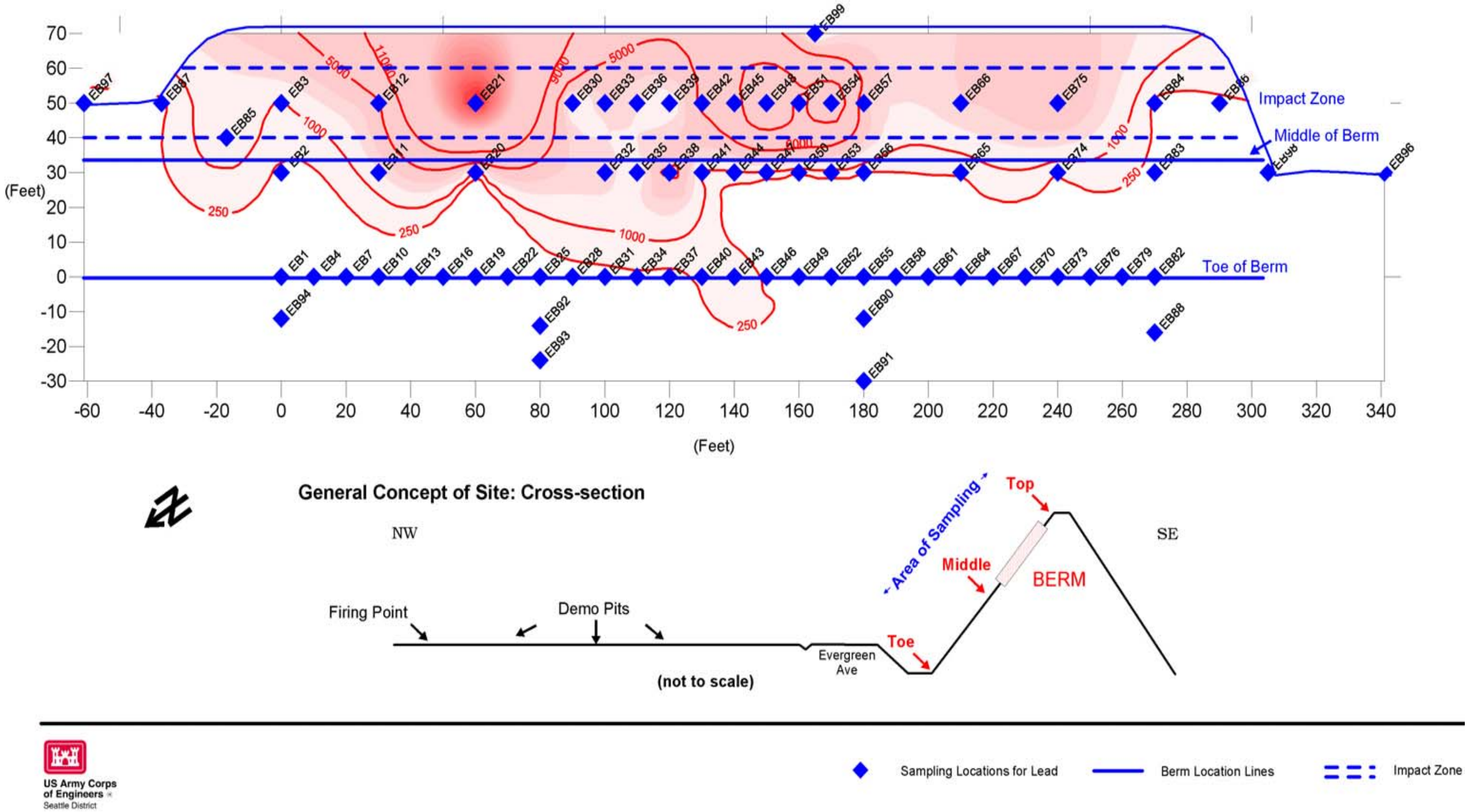

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Figure 12. Lead Concentration Results for the Evergreen Former Infiltration Range (12-24 inches)

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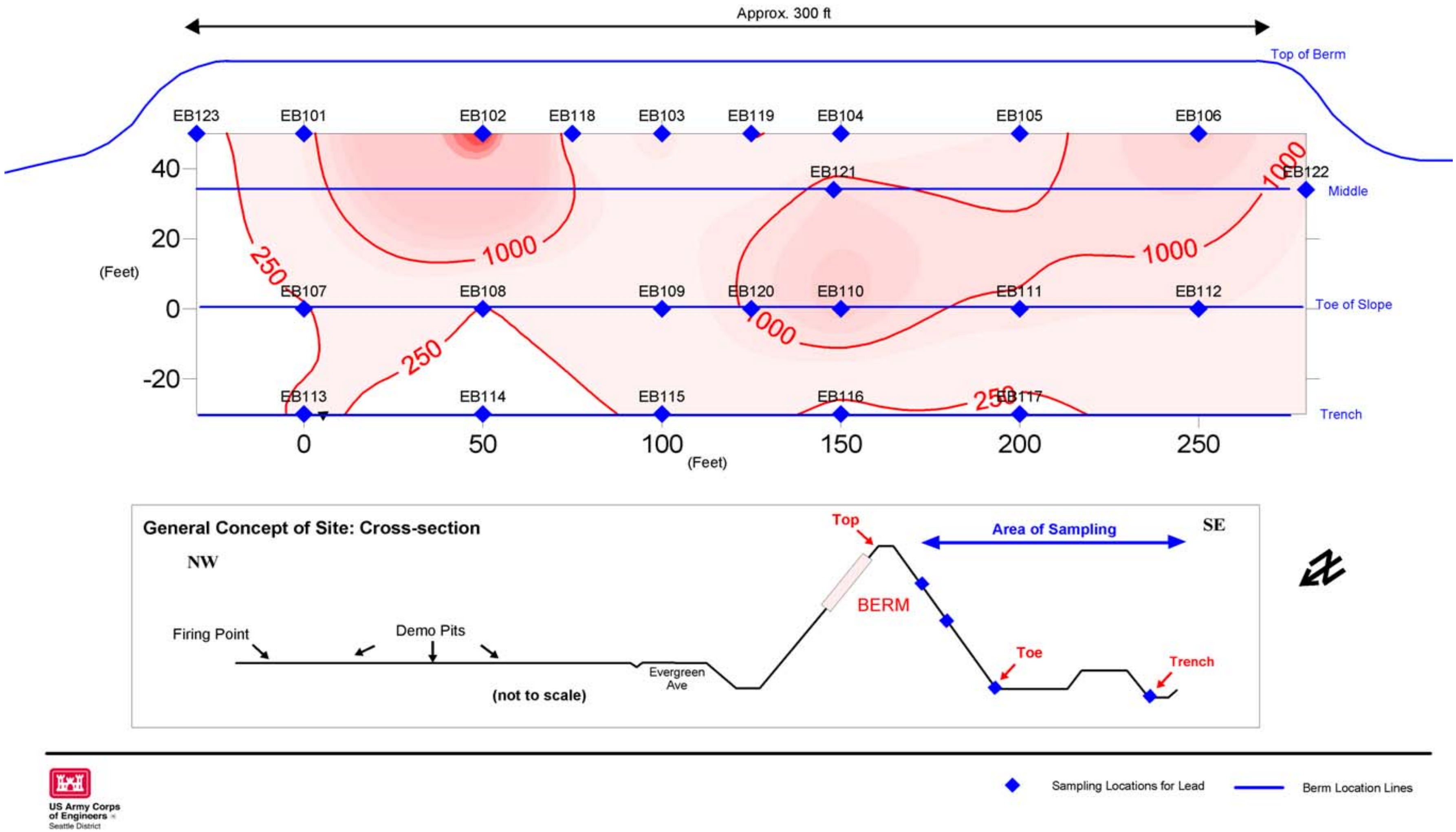

Figure 13. Lead Concentration Results for the Back Face of the Evergreen Former Infiltration Range (0 –12 inches)

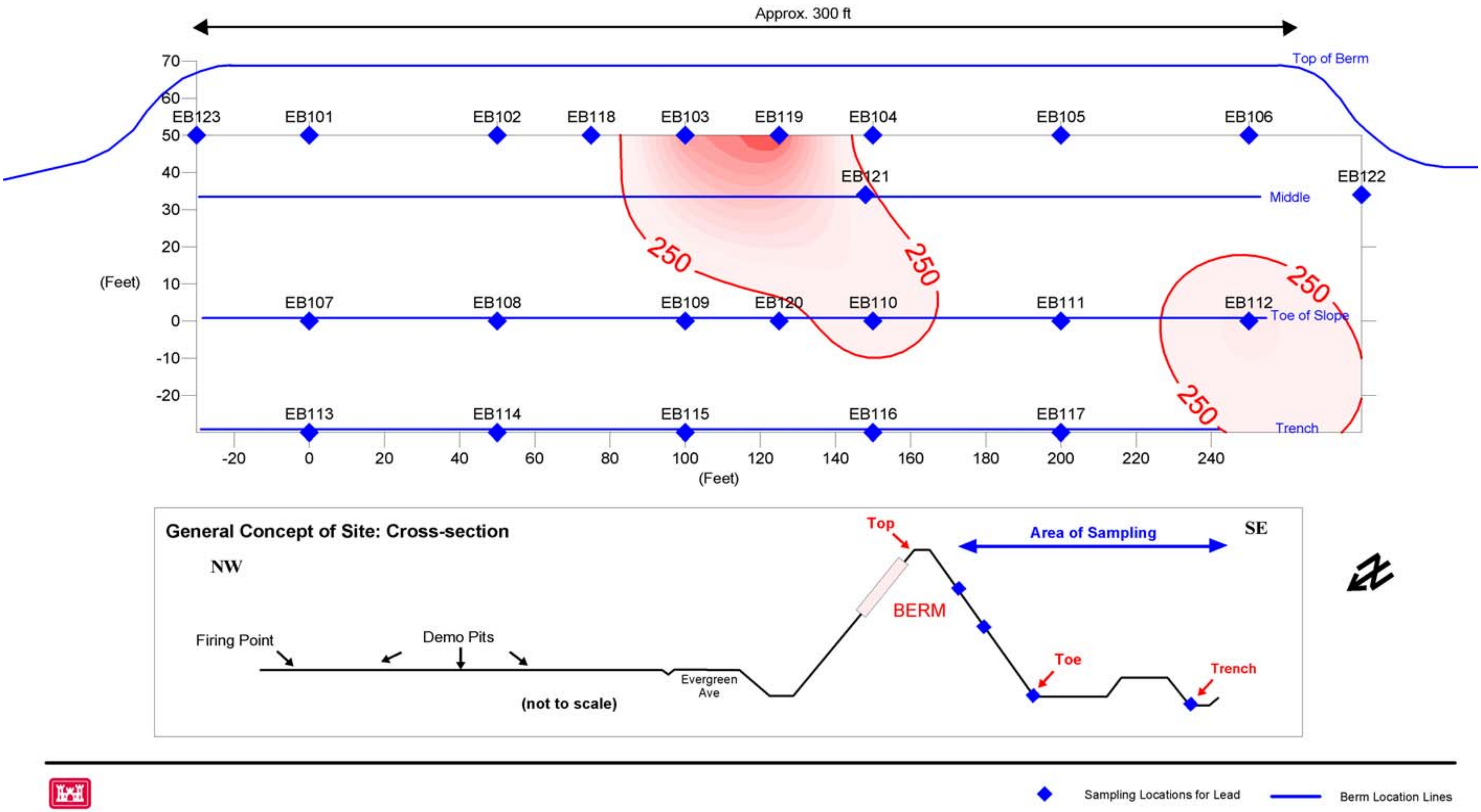

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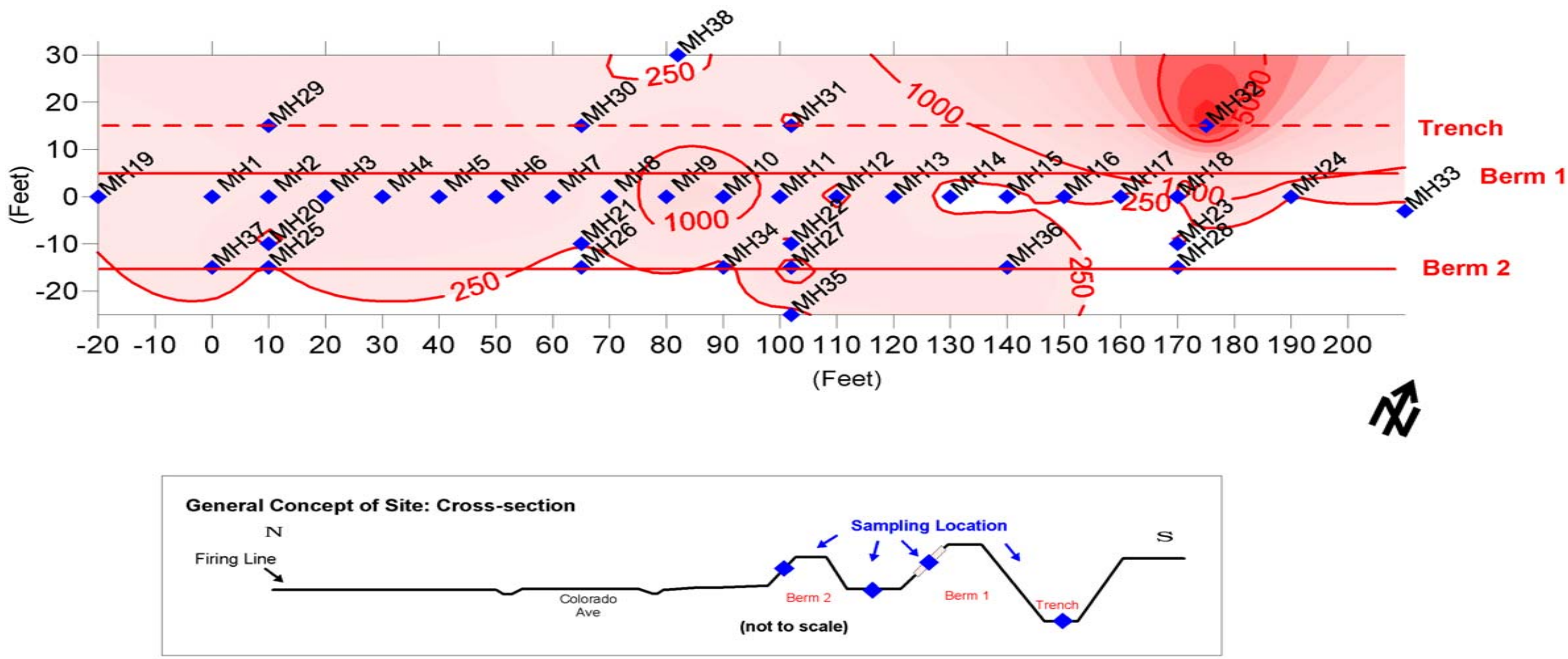
Figure 14. Lead Concentration Results for the Back Face of the Evergreen Former Infiltration Range (12-24 inches)



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Sampling Locations for Lead
Impact Zone
Berm
Trench

Figure 15. Lead Concentrations for the Miller Hill Former Pistol Range (0-12 inches)

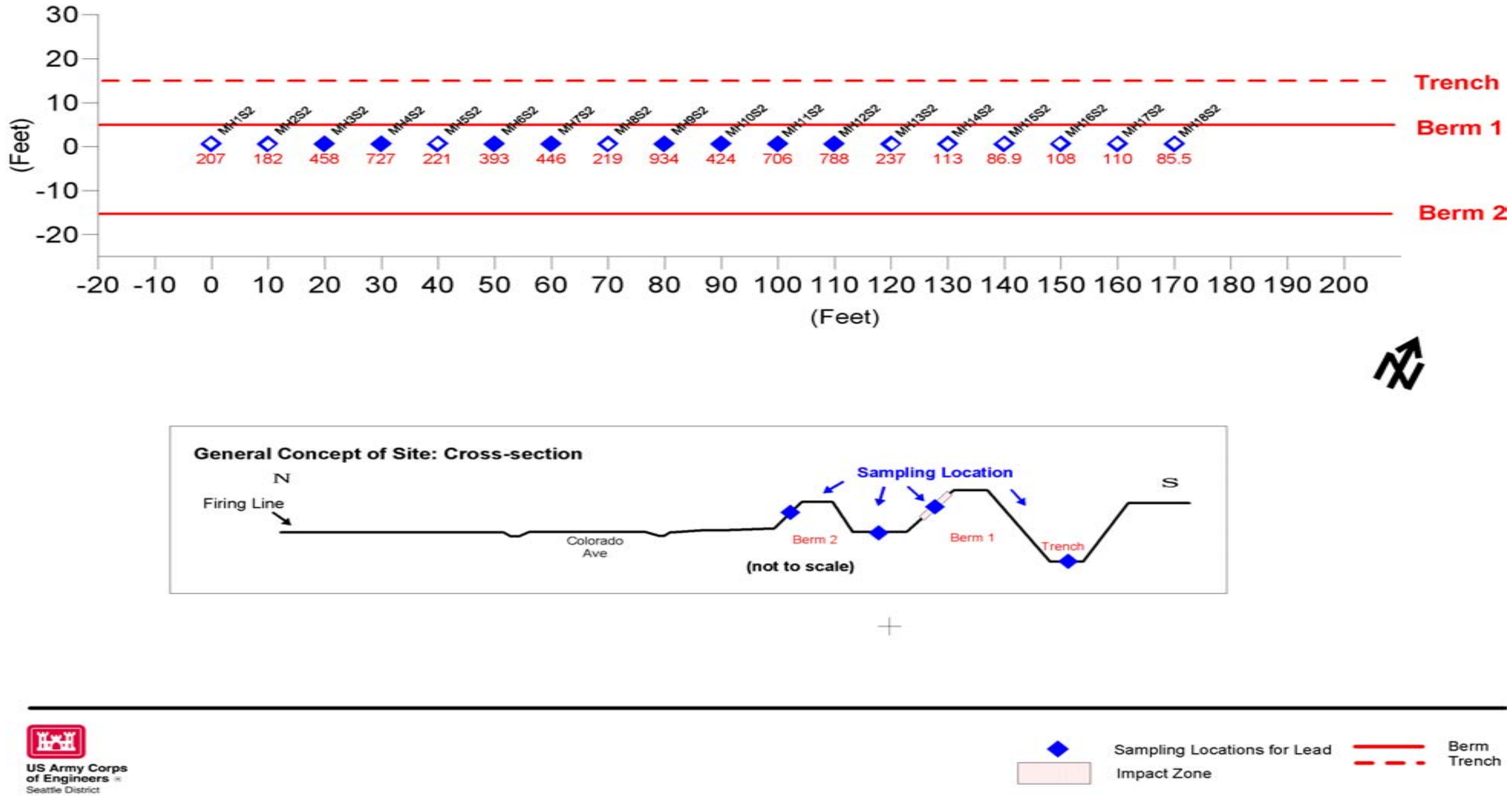

Figure 16. Lead Concentrations for the Miller Hill Former Pistol Range (12-24 inches)

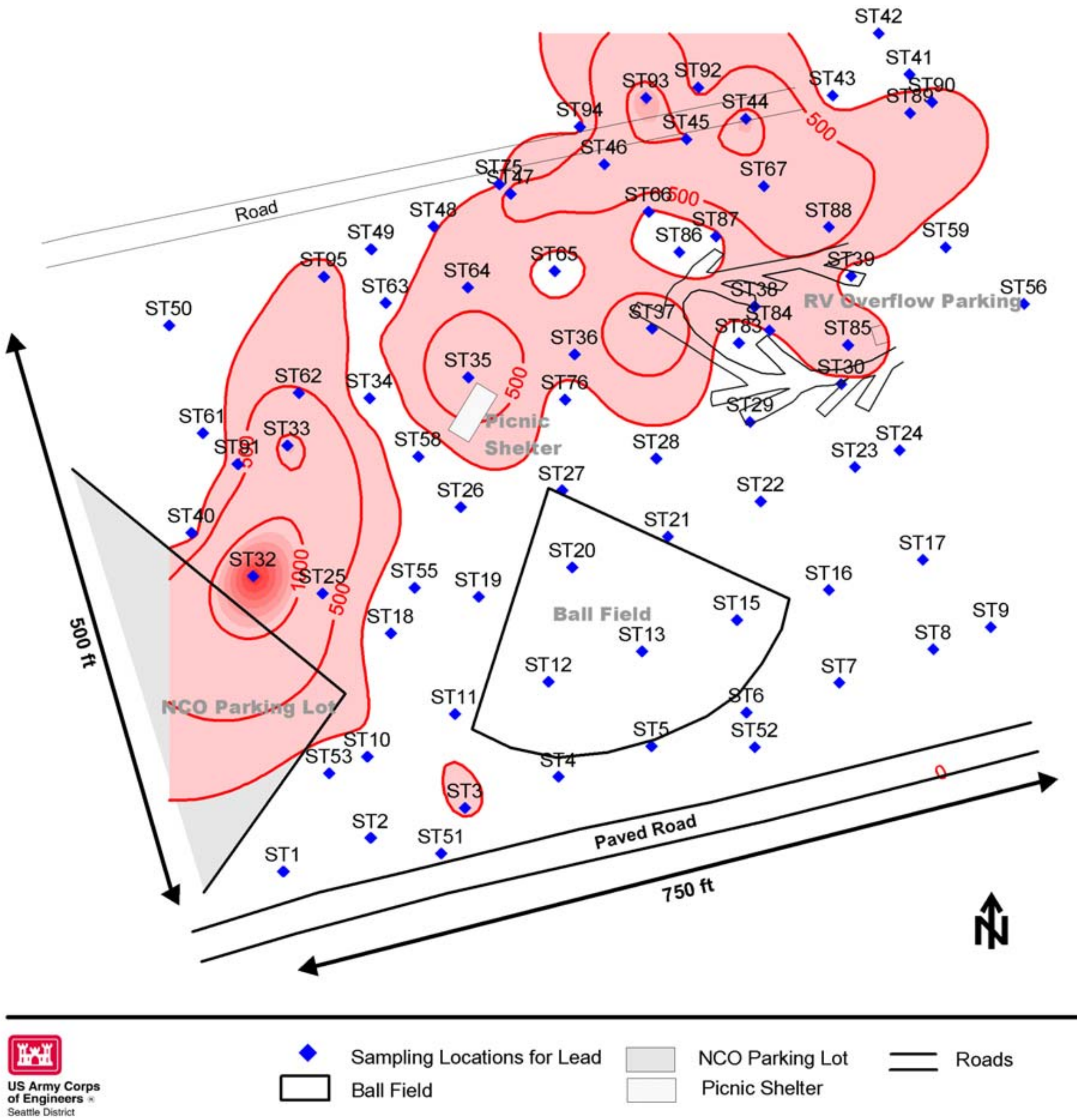

Figure 17. Lead Results for the Former Skeet Range (0-6 inches)

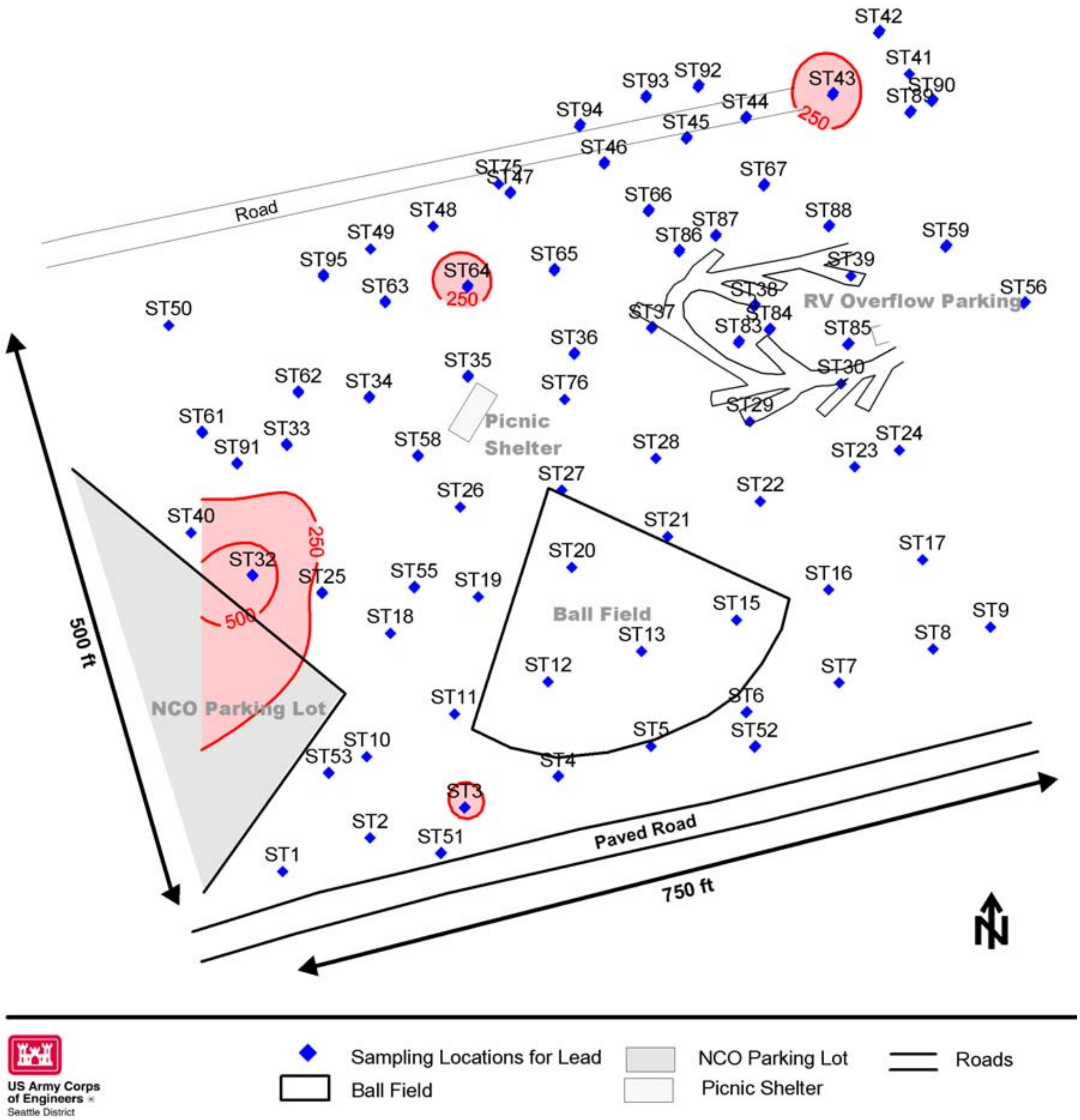

Figure 18. Lead Results for the Former Skeet Range (12-24 inches)

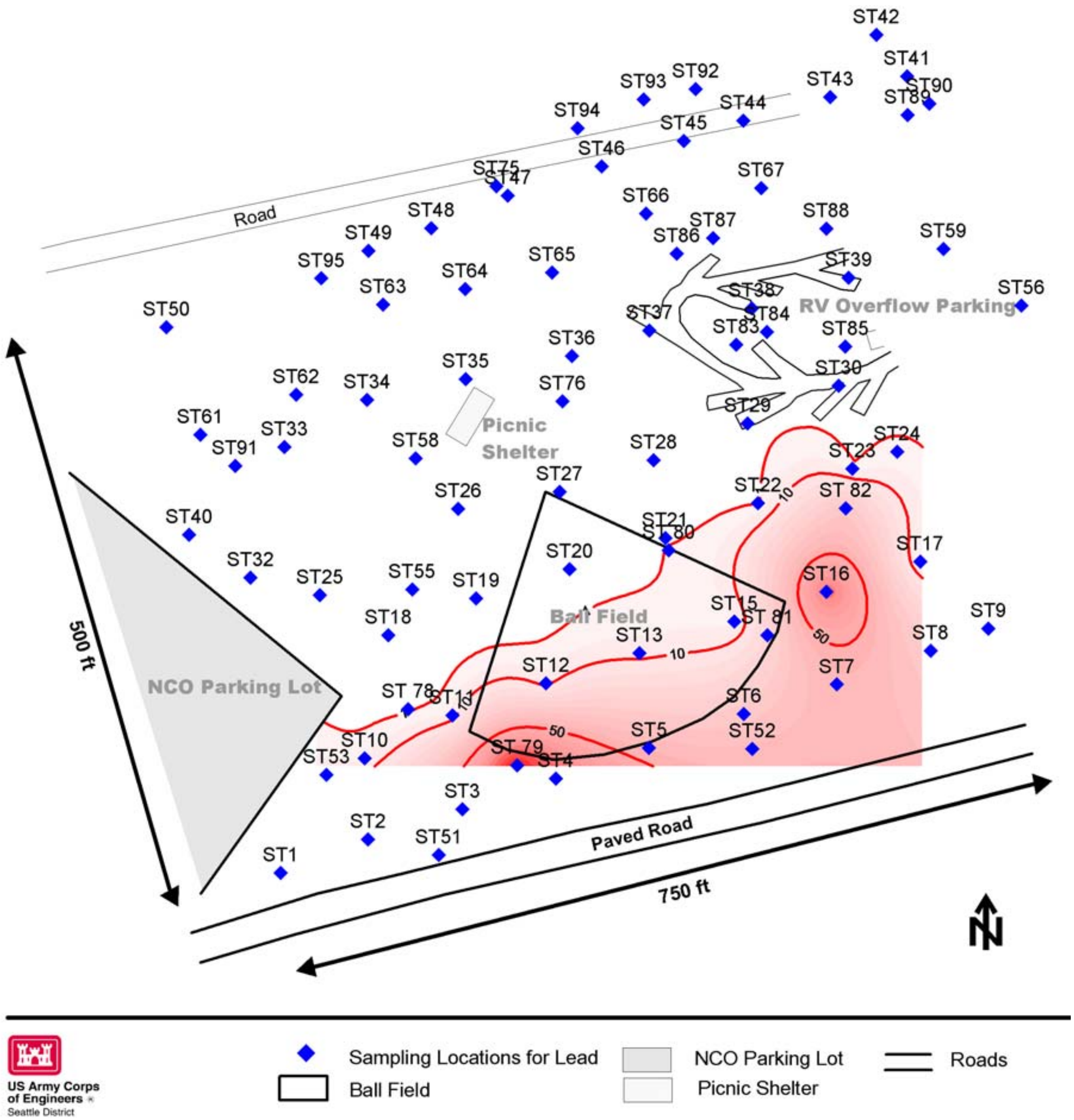

Figure 19. PAH Results for the Former Skeet Range (0-6 inches)

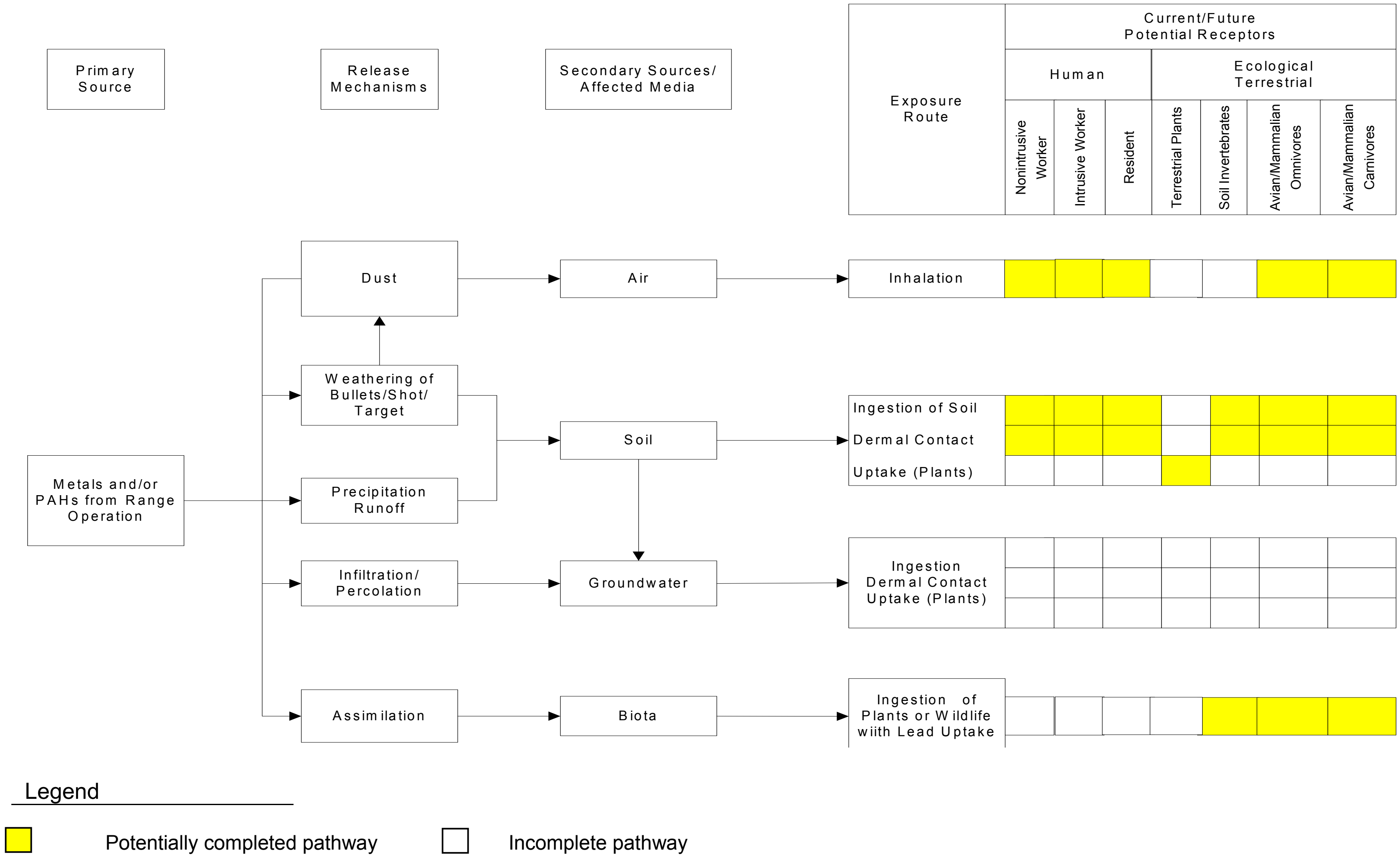

Figure 20. Refined Conceptual Site Model for the former Ranges

APPENDIX A

PHOTOGRAPHS

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Photograph 1. Berm at the Evergreen former Infiltration Range (impact zone visible as vegetation free area).

Photograph 2. Back face of the berm at the Evergreen former Infiltration Range

Photograph 3. Large trench behind the berm at the Evergreen former Infiltration Range

Photograph 4. Demolition Pit sign at the Evergreen former Infiltration Range

Photograph 5. Demolition Pit with trees and remains of fence at the Evergreen former Infiltration Range

Photograph 6. One of the firing points at the Evergreen former Infiltration Range

Photograph 7. Suspected berm at the Miller Hill former Pistol Range

Photograph 8. Trench behind the suspected berm at the Miller Hill former Pistol Range

Photograph 9. Metal debris found in the trench at the Miller Hill former Pistol Range

Photograph 10. Metal debris found in the trench at the Miller Hill former Pistol Range

Photograph 11. Live ammunition found in the trench at the Miller Hill former Pistol Range

Photograph 12. Bullets fragments recovered from the berm at the Evergreen former Infiltration Range

Photograph 13. Field Laboratory Set-up for XRF and Soil Samples

Photograph 14. Sieved sample

Photograph 15. Typical gravels encountered in soils at Fort Lewis

APPENDIX B

DMA Results

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MEMORANDUM
FORT LEWIS AGREED ORDER RI
DEMONSTRATION OF METHOD APPLICABILITY
SAMPLING AND ANALYSIS PLAN ADDENDUM
FORMER SMALL ARMS RANGES

1.0 INTRODUCTION

This memorandum present the results of the Demonstration of Method Applicability conducted as part of the Fort Lewis Agreed Order Remedial Investigation Former Small Arms Ranges Sampling Plan Addendum. This memo has been updated with additional information, as requested by Ecology in the 25 September meeting.

Sampling was conducted on the impact berm at the Evergreen former Infiltration Range and soil analyzed using both analytical laboratory and XRF methodologies, as presented below. Both sets of date were used to determine the correlation between the XRF and analytical laboratory results and appropriate XRF protocols for use in future rounds of sampling. A summary of the correlation, precision sample results and field duplicate comparison results are presented below.

2.0 SUMMARY OF FIELD ACTIVITIES

As part of the first round of sampling for this project, soil samples were collected from 20 sample locations on three areas of the impact berm: the impact zone, below the impact zone and at the bottom of the berm. Figure 1 of Appendix A presents the sampling locations on the Evergreen impact berm. Two composite soil samples were collected at each location by compositing soils from similar depths from each of the holes. Sampling intervals were from 0 to 1 foot and from 1 foot to 2 feet at each sampling location. Fourteen samples were collected from the impact zone, 14 from below the impact zone, and 12 from the bottom of the berm.

Each composite sample was sieved through a No. 10 sieve then placed into a gallon-sized plastic baggie and bag homogenized   A cup aliquot was collected from each sample and measured by XRF and submitted to Severn Trent Laboratories (STL) for analysis of lead, arsenic, copper, antimony, zinc, tin, and iron using EPA Method 6010/6020.

In addition, four co-located field duplicate locations were sampled and analyzed by XRF to determine field variability during the DMA. Three additional field duplicates were collected during the following the site characterization sampling event.

Sampling conditions encountered at the site included considerable tree growth at the bottom of the berm, loose upper layers of soil within the impact zone and the middle of the berm that sloughed continually, as well as numerous gravel from small pebbles to large cobbles, encountered from approximately 0.5 ft to 2 ft bgs.

3.0 EVALUATION OF LABORATORY vs. XRF DATA

A summary of the XRF and laboratory results is presented below. There results were used to determine appropriate XRF methodologies for use in future sampling events for the former Small Arms Ranges RI project.

3.1 Comparison of XRF to Laboratory Results

The sample results from both the XRF and laboratory analyses for each sample were compared to evaluate the correlation between the two methodologies. Table 1 of Appendix C presents the XRF and fixed lab cup analyses results for lead collected during the DMA. Figures 2 and 3 of Appendix B present the correlation of laboratory data to the entire lead data set and the 0 to 1000 mg/kg data sub-set. A summary of the correlations is presented below.

3.1.1 Correlations

As shown on Figure 2, the correlation between XRF and laboratory analyses lead results was linear. The correlation coefficient (r^2) factor for the entire sample set was 0.97. The average ratio of laboratory to XRF lead results was 1.06, with a 99^{th} UCL of 1.29 for this ratio. The correlation for the data sub-set of 0 to 1000 mg/kg, presented in Figure 3, was also linear with an r^2 value of 0.82 and an average ration of laboratory to XRF lead results of 0.84 with a 99^{th} UCL of 1.09.

3.1.2 Correlations Near Detection Levels

Per Ecology request, additional correlation samples were submitted for ICP analyses from samples below detection limit when measured by the XRF. This information was used to evaluate the accuracy of the XRF near the detection limit. A summary of the results is presented in Table 3, Appendix C. Only one sample submitted had fixed laboratory concentrations above the reporting limit. This information cannot be added to the correlation, since the XRF was all not detected.

3.2 Laboratory Results for Other Metals

Review of the laboratory analysis of the sample aliquots for metals presented in Table 2 of Appendix C indicates that lead is the primary contaminate. Antimony and copper exceedances were detected only when lead was above 250 mg/kg. Arsenic, tin, and zinc had no exceedances.

3.3 Recommendations for Data Comparison

Based on the uncertainty of XRF values near the action level, collaborative sampling was conducted on XRF equivalent concentrations near the action level to verify appropriate remedial actions are selected. Since the XRF and ICP measurements correlated with the exception of one sample, the XRF method detection level is deemed suitable for screening near the potential action level of 50 mg/kg. However, collaborative samples may be submitted for ICP analyses for XRF concentrations near detection limits depending on site conditions and potential remedial options.

Based on the XRF and laboratory analytical data it is lead contamination will drive remedial actions for the Evergreen former infiltration range and the Miller Hill former pistol range. Therefore, it is recommended that collaborative analysis be limited for lead for theses ranges, as needed.

As a different type of ammunition was used at the Skeet Range it is recommended that initial collaborative analysis include all metals (antimony, copper, iron, lead, tin, zinc and arsenic) until is it determined whether lead is the primary contaminate at this site.

4.0 XRF DATA

Precision samples and co-located field duplicates were collected and XRF analyzed in order to determine within sample variability and field variability. Each precision sample was analyzed seven times by XRF. An RSD was determined for each precision sample.

Four co-located field duplicates were chosen for comparison with the primary samples. An RPD was determined for the field duplicates and primary samples.

4.1 Precision Samples

Results for the precision samples are presented in Table 4 in Appendix C (updated to include new data from Evergreen Range). Thirty eight percent of the RSD values are greater than 20% recommended in the SAP Addendum. Within sample variability may affect decision when sample results are near the action levels.

4.2 Co-located Field Duplicates

Results of the field duplicated are presented in Table 5 in Appendix C (updated to include new data). Five out of seven RPD values exceed 50%. Within field variability may affect decision when sample results are near the action levels.

5.0 RECOMMENDATION FOR XRF SAMPLING STRATEGY REVISIONS

Based on the review of the sampling data collected from the first round of sampling (September 2, 2003), the following modifications to protocols have been recommended for future sampling rounds. Additional modifications may be determined during subsequent rounds of sampling.

To focus on reducing uncertainty near the action levels:

1. Analyze precision samples when primary result is near the action levels relevant to decision making based on distribution data (below detection to 100 mg/kg; 200 to 300

mg/kg; and 900 to 1200 mg/kg). When focusing on potential remedial boundaries, if the precision sample average within matrix variability falls within the uncertainty region surrounding the action levels, then:

2. Collect and measure a XRF cup sample from the precision sample for comparison with the precision sample. If within matrix variability is appreciably different, evaluate the need for co-located field duplicate 2 feet from primary sample based on decision uncertainty.

3. Collect collaborative samples for fixed laboratory analysis on as needed basis focusing on XRF samples measured near the detection limit.

4. Evaluate options for collecting samples from the 2 to 3 foot depth interval at the site.

APPENDIX A
DMA SOIL SAMPLING
LOCATION MAP

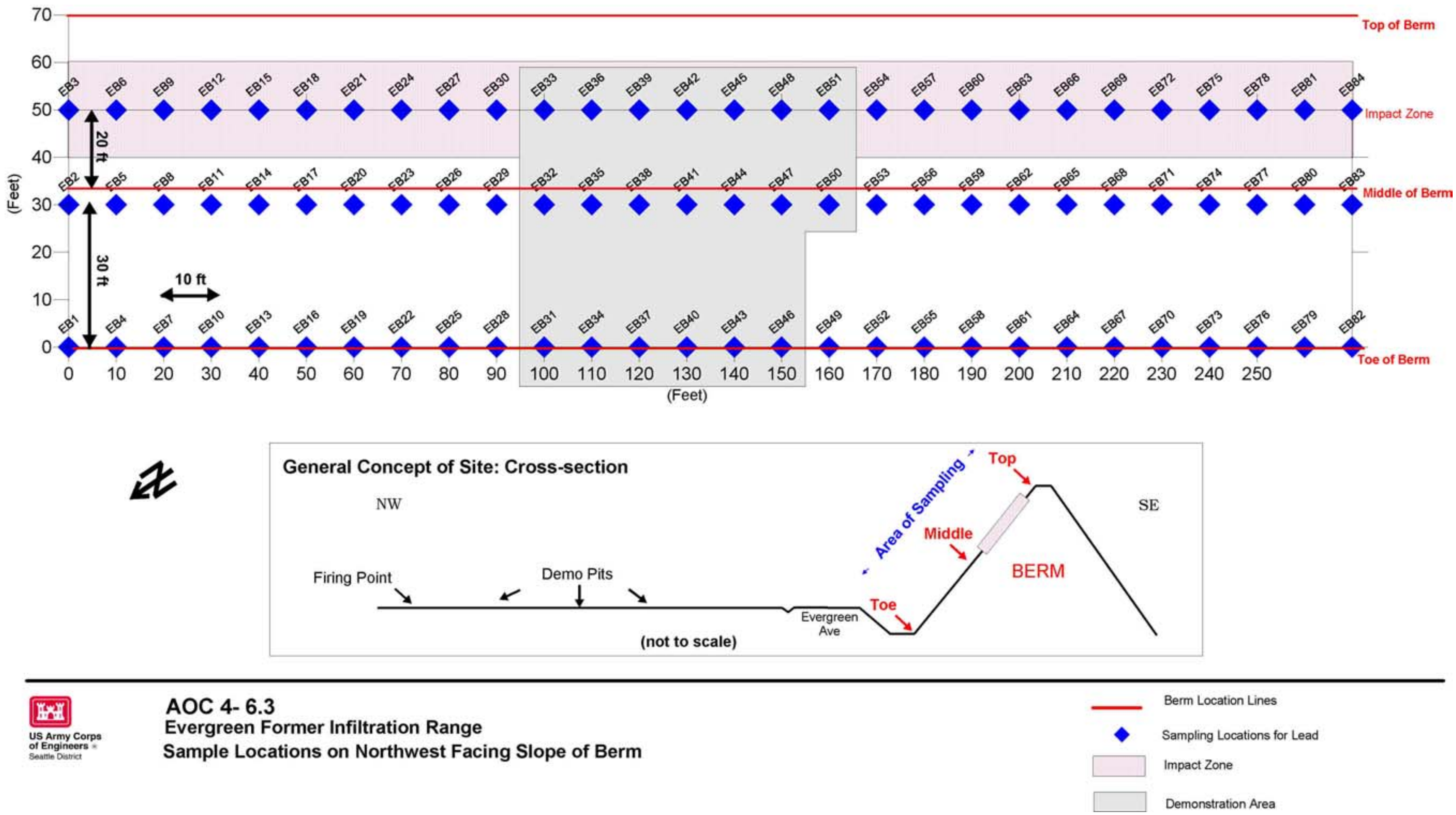

Figure 1. Sampling Grid For DMA at Impact Berm at the Evergreen Infiltration Range (AOC 4-6).

APPENDIX B
DMA SOIL SAMPLE
XRF CORRELATION
FIGURES

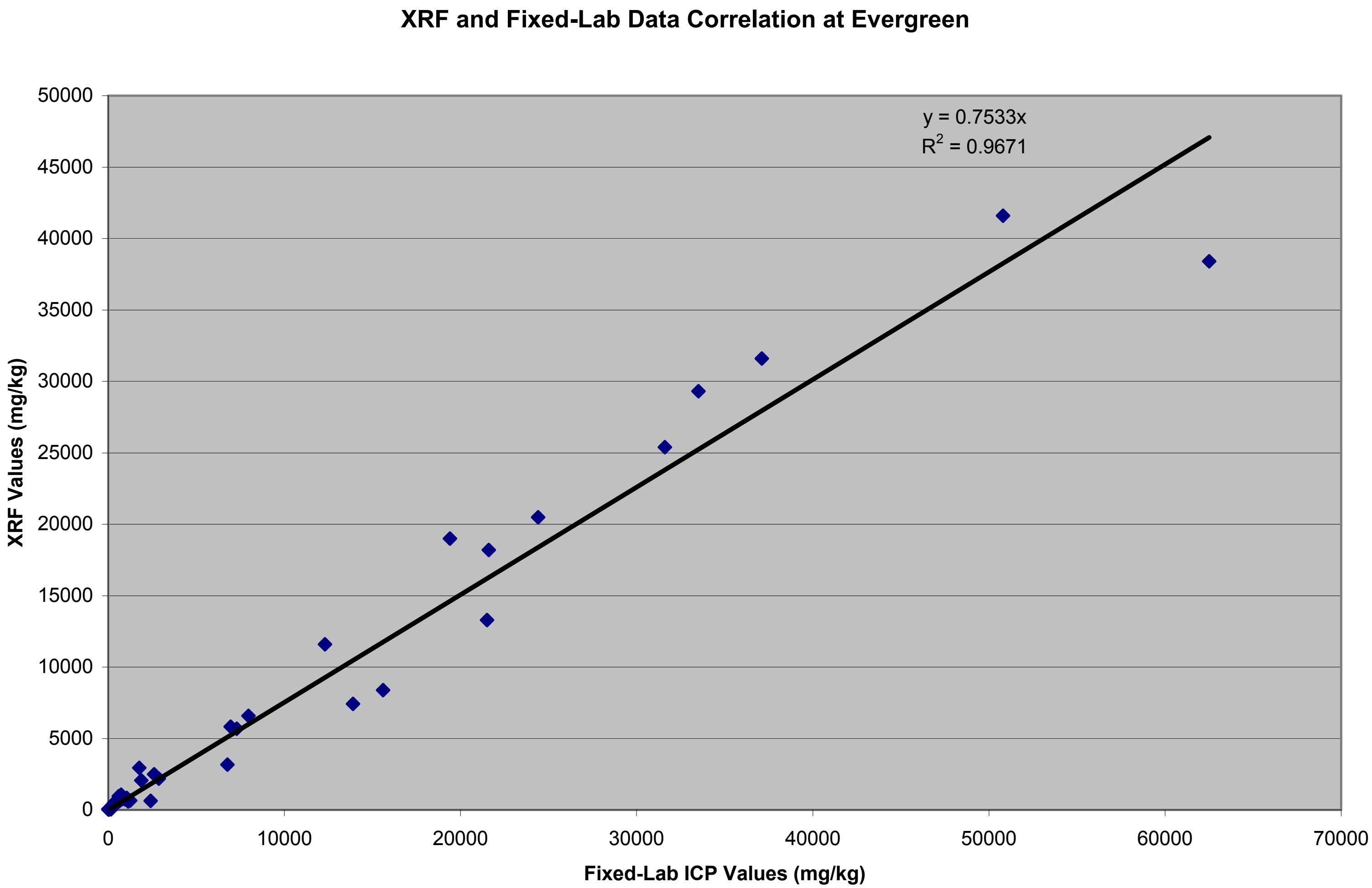

Figure 2. XRF Correlation to Fixed Laboratory Analyses (updated to include all data from the Evergreen Berm)

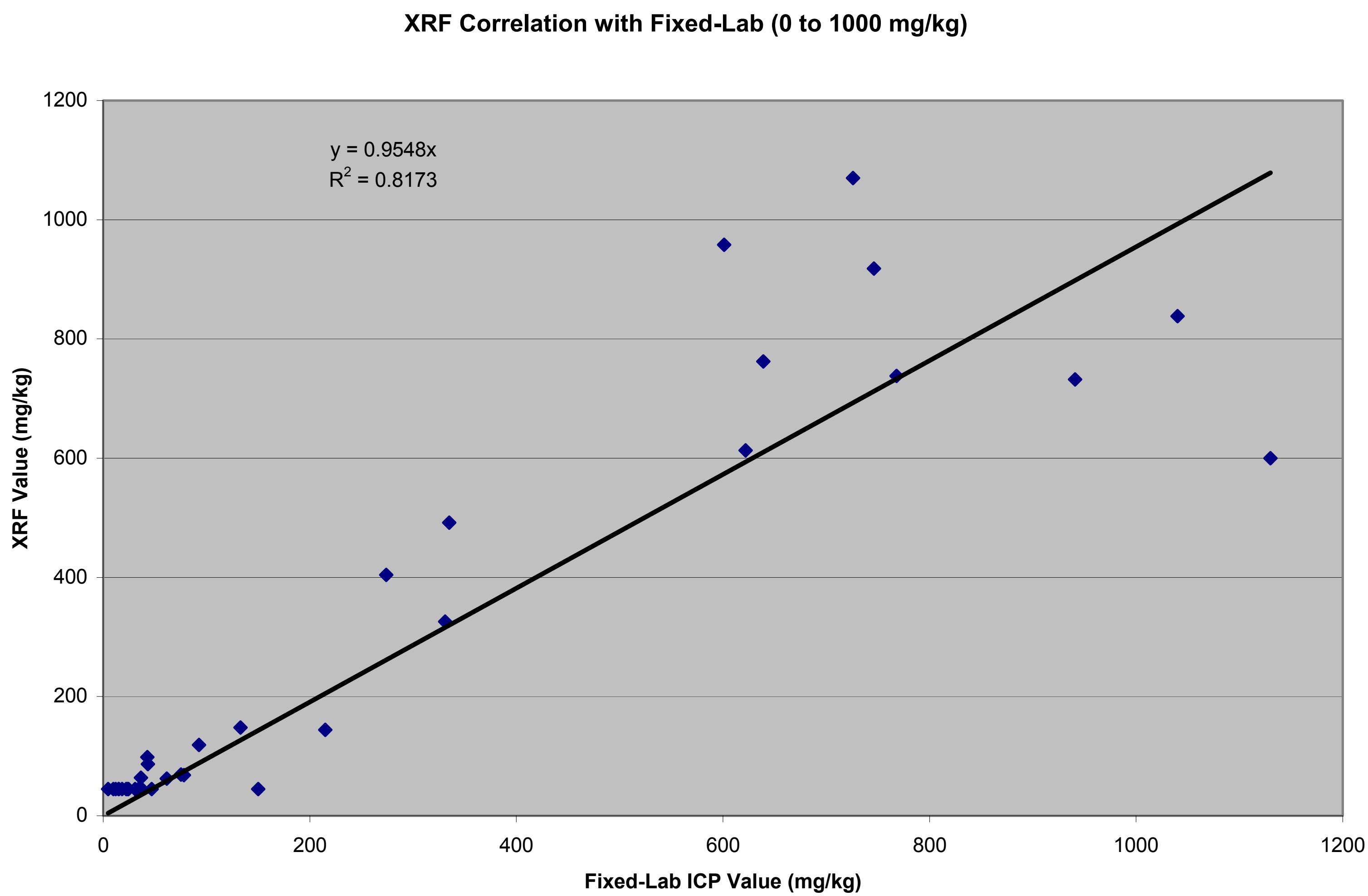

Figure 3. XRF Correlation within the 0 to 1000 mg/kg data subset (updated to include new data)

APPENDIX C
DATA SUMMARY TABLES

Table 1. DMA XRF Primary Samples and Collaborative Lab Analyses Data

Sample ID	XRF (mg/kg)	Fixed-lab (mg/kg)	Depth In Inches	Location on Berm
EB31S-1	613	622	0-12	Bottom
EB31S-2	**45**	150	12-24	Bottom
EB32S-1	11600	12300	0-12	Middle
EB32S-2	2940	1750	12-24	Middle
EB33S-1	18200	21600	0-12	Impact
EB33S-2	3170	6770	12-24	Impact
EB34S-1	492	335	0-12	Bottom
EB34S-2	148	133	12-24	Bottom
EB35S-1	2490	2610	0-12	Middle
EB35S-2	630	2410	12-24	Middle
EB36S-1	13300	21500	0-12	Impact
EB36S-2	2180	2870	12-24	Impact
EB37S-1	404	274	0-12	Bottom
EB37S-2	**45**	23.4	12-24	Bottom
EB38S-1	25400	31600	0-12	Middle
EB38S-2	6590	7960	12-24	Middle
EB39S-1	5830	6940	0-12	Impact
EB39S-2	600	1130	12-24	Impact
EB40S-1	918	746	0-12	Bottom
EB40S-2	326	331	12-24	Bottom
EB41S-1	2060	1870	0-12	Middle
EB41S-2	738	768	12-24	Middle
EB42S-1	31600	37100	0-12	Impact
EB42S-2	5680	7290	12-24	Impact
EB43S-1	762	639	0-12	Bottom
EB43S-2	958	601	12-24	Bottom
EB44S-1	1070	726	0-12	Middle
EB44S-2	732	941	12-24	Middle
EB45S-1	29300	33500	0-12	Impact
EB45S-2	7420	13900	12-24	Impact
EB46S-1	144	215	0-12	Bottom
EB46S-2	62.2	61.5	12-24	Bottom
EB47S-1	20500	24400	0-12	Middle
EB47S-2	650	1250	12-24	Middle
EB48S-1	41600	50800	0-12	Impact
EB48S-2	19000	19400	12-24	Impact
EB50S-1	838	1040	0-12	Middle
EB50S-2	**45**	36.6	12-24	Middle
EB51S-1	38400	62500	0-12	Impact
EB51S-2	8380	15600	12-24	Impact

Note: A bold value indicated a reading below the detection level.

Table 2. Fixed Laboratory ICP Analyses Results for DMA

Parameter	Antimony		Copper	Iron	Lead	Tin		Zinc	Arsenic
Method A/B	32		2960	na	250	48000		24000	20
EB31S1	8.85 U	U	45.6	16400	**622**	8.85	U	33.1	6.35
EB31S2	9.16	U	24.8	16700	150	9.16		30	4.1
EB32S1	207		309	16000	**12300**	13.6		63.6	5
EB32S2	**34.9**		66.6	15800	**1750**	9.77	U	35.8	3.56
EB33S1	**287**		454	14800	**21600**	5.09		85.3	4.65
EB33S2	**87.7**		139	16700	**6770**	8.58	U	66.2	3.59
EB34S1	9.85	U	40.9	14000	**335**	9.85	U	32.4	4.24
EB34S2	10	U	30.2	17000	133	10	U	30.9	4.52
EB35S1	**46.4**		91.4	16000	**2610**	10.1	U	35.2	3.54
EB35S2	31.9		46.6	16700	**2410**	9.56	U	33.5	3.99
EB36S1	**369**		358	16500	**21500**	20.9		59.3	6.69
EB36S2	**58.4**		76	15400	**2870**	9.56	U	31.2	3.83
EB37S1	9.3	U	33.9	14300	**274**	9.3	U	26.6	3.83
EB37S2	9.29	U	21.2	16400	23.4	9.29	U	26.9	3.01
EB38S1	**634**		916	18000	**31600**	47.7		110	10.8
EB38S2	**192**		242	17800	**7960**	7.01		58.1	5.68
EB39S1	**149**		155	19500	**6940**	7.22	J	48.1	5.27
EB39S2	29.7		47.2	16300	**1130**	9.15	U	29.8	3.39
EB40S1	8.18		56.3	15700	**746**	9.85	U	31.7	4.92
EB40S2	9.28	U	44.7	17600	**331**	9.28	U	32	4.13
EB41S1	**42.1**		78.4	15500	**1870**	9.34	U	37.1	4.37
EB41S2	16.4		39.3	16900	**768**	10.2	U	31.3	3.87
EB42S1	**673**		1330	18600	**37100**	40.5		176	10.8
EB42S2	**140**		233	15400	**7290**	7.76		70.2	4.61
EB43S1	8.89	U	57.7	14700	**639**	8.89	U	31	4.8
EB43S2	10.2	U	48.1	14100	**601**	10.2	U	30.2	4.43
EB44S1	18.4		39.8	15900	**726**	9.41	U	34.2	3.99
EB44S2	21.8		51.8	16800	**941**	10.2	U	30.3	3.67
EB45S1	**727**		997	16800	**33500**	34.8		139	11.5
EB45S2	**213**		273	15400	**13900**	10		57.4	4.42
EB46S1	10.1	U	35.5	15400	215	10.1	U	28.2	4.46
EB46S2	9.98	U	28.5	16300	61.5	9.98	U	30.1	3.97
EB47S1	**427**		**25100**	17100	**24400**	15.8		2560	9.33
EB47S2	23.8		217	16300	**1250**	9.55	U	33.9	4.24

Parameter	Antimony		Copper	Iron	Lead	Tin		Zinc	Arsenic
Method A/B	32		2960	na	250	48000		24000	20
EB48S2	**269**		527	17500	**19400**	6.11		109	6.79
EB50S1	16.1		107	16100	**1040**	8.78	U	32.2	3.95
EB50S2	9.25	U	69.6	16700	36.6	ND		28	3.41
EB51S1	**879**		804	15100	**62500**	42.2		117	15.3
EB51S2	**217**		308	14800	**15600**	6.48		76.3	4.12

Table 3. XRF Non-detects and Fixed-Lab Analyses for Evergreen Berm

Sample ID	XRF Cup Value (mg/kg)	Prec (±)	Fixed-Lab Value (mg/kg)	Depth (in)
EB31S2	**45**	53	150	12-24
EB37S2	**45**	53	23.4	12-24
EB50S2	**45**	51	36.6	12-24
EB87S2	**45**	51	12.2	12-24
EB88S1	**45**	57	34	0-12
EB88S2	**45**	56	4.77	12-24
EB91S1	**45**	56	47	0-12
EB91S2	**45**	56	35.7	12-24
EB92S2	**45**	55	9.8	12-24
EB93S2	**45**	55	18.3	12-24
EB94S1	**45**	54	22.2	0-12
EB94S2	**45**	56	14.9	12-24
EB96S1	**45**	53	37.5	0-12
EB96S2	**45**	53	15.1	12-24
EB97S1	**45**	52	30.8	0-12
EB97S2	**45**	53	24.5	12-24

Table 4. Precision Sample XRF Results (in mg/kg) and RSD (includes all data from Evergreen Berm)

Sample ID	XRF Value 1	XRF Value 2	XRF Value 3	XRF Value 4	XRF Value 5	XRF Value 6	XRF Value 7	Mean	SD	RSD	Location
EB1S1	290	269.2	150.1	158.5	418	191.7	256.2	248	93	38	Toe
EB1S1D	79.8	261.4	169.9	182.4	144.9	199.5	270.6	187	66	35	Toe
EB1S2	**45**	**45**	**45**	**45**	**45**	**45**	114	55	26	48	Toe
EB2S2	136.4	68.1	76.5	56.5	76.9	149.2	120.4	98	37	38	Middle
EB4S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB7S1	109.3	45	77.5	98	86.2	72.8	68.6	80	21	26	Toe
EB7S2	**45**	**45**	**45**	71.2	**45**	**45**	**45**	49	10	20	Toe
EB10S1	61.2	**45**	79.5	**45**	71.1	**45**	**45**	56	15	26	Toe
EB10S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB13S1	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB13S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB16S2	172.6	144.5	186.5	104.4	163.4	159.8	169.2	157	27	17	Toe
EB19S2	**45**	72.6	**45**	74.7	**45**	**45**	**45**	53	14	26	Toe
EB20S1	1040	1080	971.2	1040	1020	1089.6	1140	1054	54	5	Middle
EB22S1	233.2	301	401.8	382.6	308.4	390	422	348	69	20	Toe
EB22S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB25S1	234.4	238.6	316	222	216	284.6	197.7	244	42	17	Toe
EB25S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB28S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB31S1	700	526	598	599	407	454	477	537	101	19	Toe
EB31S2	45	45	45	45	45	57	45	47	5	10	Toe
EB33S1	11700	13800	12800	13800	15100	15900	18400	14500	2208	15	Toe
EB33S2	1780	2190	2380	2550	2670	2400	2290	2323	287	12	Toe
EB33S1D	911	892	1120	1480	1430	1690	1930	1350	394	29	Middle
EB33S2D	339	572	355	560	532	287	556	457	124	27	Middle
EB34S1	486	455	436	278	331	500	496	426	87	21	Impact
EB34S1D	345	318	421	316	314	255	371	334	52	16	Impact

EB34S2	71.4	141	132	122	109	54.2	80.6	101	33	33	Toe
EB34S2D	**45**	68.7	**45**	**45**	**45**	**45**	**45**	48	9	19	Toe
EB35S1	2620	2080	4740	2020	2040	1630	2920	2579	1044	40	Middle
EB35S2	522	576	556	509	488	557	636	549	49	9	Middle
EB36S1	10100	10400	9140	11600	8930	9960	9890	10003	878	9	Impact
EB36S2	1450	770	1070	1290	1570	1560	1380	1299	290	22	Impact
EB40S1	834	604	571	546	684	621	568	633	100	16	Toe
EB40S2	276	148	288	185	299	219	202	231	58	25	Toe
EB41S1	1290	1390	1300	1630	1210	1310	1670	1400	179	13	Middle
EB41S2	813	575	683	765	514	496	491	620	134	22	Middle
EB42S1	26700	25700	26500	27500	28000	26200	28300	26986	967	4	Middle
EB42S2	5570	5600	5720	5460	6870	4210	5250	5526	781	14	Middle
EB43S1	973	608	700	573	1040	695	651	749	183	24	Toe
EB43S2	300	331	294	271	333	405	364	328	46	14	Toe
EB44S1	671	538	450	905	683	696	769	673	148	22	Toe
EB44S1D	1530	1490	1370	1080	1310	1590	1180	1364	188	14	Toe
EB44S2	708	772	577	736	606	734	781	702	80	11	Toe
EB44S2D	95.6	257	120	189	134	159	82.1	148	60	41	Toe
EB46S1	295	233	278	349	233	251	220	266	45	17	Toe
EB46S2	**45**	**45**	89.8	**45**	98.2	**45**	75.2	63	24	38	Toe
EB52S1	238.2	221	224.2	260.2	358.6	247.4	193.8	249	53	21	Toe
EB52S2	**45**	**45**	102.1	74.5	**45**	134.3	129.4	82	40	49	Toe
EB55S1	302.4	218.4	239.2	367	298.4	500.8	241	310	98	32	Middle
EB55S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB58S2	**45**	82.2	**45**	111.1	102.9	**45**	**45**	68	30	44	Toe
EB61S1	405	363.8	426	398.2	244.8	398.2	318.8	365	63	17	Toe
EB61S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Middle
EB64S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB65S2	265.6	250.2	324.6	293.8	281.8	236.8	276.6	276	29	10	Toe
EB67S1	108.2	**45**	110	82	**45**	**45**	112.5	78	33	42	Toe
EB70S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe

EB73S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Toe
EB74S2	192.1	197.7	214.6	201.9	273.2	287.4	217.2	226	38	17	Middle
EB76S1	**45**	**45**	70.2	59.2	**45**	**45**	**45**	51	10	20	Impact
EB76S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	Side of Berm
EB79S1	**45**	92.3	76.6	116.1	61.3	98.7	55	78	26	33	Side of Berm
EB79S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	In front of Berm
EB82S1	199	194.4	250	196.4	191.2	158.8	165.5	194	30	15	In front of Berm
EB83S2	121.9	146.1	112.8	106.5	111.3	166.4	145.3	130	23	17	In front of Berm
EB84S2	**45**	97.9	**45**	**45**	**45**	**45**	**45**	53	20	38	In front of Berm
EB87S1	**45**	71.3	**45**	64.3	56.8	**45**	54.1	55	10	19	NE arm of Berm
EB87S2	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	NE arm of Berm
EB90S1	**45**	115.2	83.7	144.8	99.1	105.1	**45**	91	37	40	In front of Berm
EB92S1	83.6	85.7	78.4	78.4	180.2	87.8	108.7	100	37	37	In front of Berm
EB92S2	**45**	**45**	**45**	**45**	60.8	**45**	**45**	47	6	13	In front of Berm
EB94S1	**45**	**45**	**45**	**45**	**45**	**45**	**45**	45	0	0	In front of Berm

Note: A bold value indicated a reading below the detection level.

Table 5. Primary Sample and Field Duplicate Comparison (updated to include all data from Evergreen Berm)

Sample ID	XRF Value 1	XRF Value 2	XRF Value 3	XRF Value 4	XRF Value 5	XRF Value 6	XRF Value 7	Mean	Primary/Dup Mean	SD	RPD
EB33S1	11700	13800	12800	13800	15100	15900	18400	14500	7925	2208	165.92
EB33S1D	911	892	1120	1480	1430	1690	1930	1350		394	
EB33S2	1780	2190	2380	2550	2670	2400	2290	2323	1390	287	134.21
EB33S2D	339	572	355	560	532	287	556	457		124	
EB34S-1	486	455	436	278	331	500	496	426	380	87	24.13
EB34S-1D	345	318	421	316	314	255	371	334		52	
EB34S-2	71.4	141	132	122	109	54.2	80.6	101	75	33	70.84
EB34S-2D	**45**	68.7	**45**	**45**	**45**	**45**	**45**	48		9	
EB44S-1	671	538	450	905	683	696	769	673	1019	148	67.84
EB44S-1D	1530	1490	1370	1080	1310	1590	1180	1364		188	
EB44S-2	708	772	577	736	606	734	781	702	425	80	130.31
EB44S-2D	95.6	257	120	189	134	159	82.1	148		60	
EB1S-1	290	134	150.1	158.5	418	191.7	256.2	228	208	101	19.36
EB1S-1D	79.8	269.2	169.9	182.4	144.9	199.5	270.6	188		68	

Note: A bold value indicated a reading below the detection level.

APPENDIX C

PATHFORWARD MEMO

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CENWS-EC-TB-ET **23 October 2003**

Memorandum for: Rich Wilson, Fort Lewis Public Works

From: Gwyn Puckett, CENWS-EC-TB-ET

Subject: Soil Sampling – Path Forward at Former Ranges

This memorandum describes additional soil sampling to be performed at the former pistol range at Miller Hill, the berm at the former infiltration range on Evergreen Avenue and the former skeet range at Fort Lewis, Washington based on review of the initial sampling data. It is estimated that the additional sampling will take three days to complete. A backhoe will be required to assist in collecting the samples to help expedite the fieldwork.

Miller Hill Former Pistol Range

Lead contamination was observed at concentration above 250 mg/kg in the majority of sampled berm (Figure 1). Maximum observed concentration was 1780 mg/kg. In almost all cases, exceedences of 250 mg/kg were also observed in the 1-2 foot interval. Since no bullets were observed during sampling, it is not clear if the lead contamination is derived from use as a range or if the contamination was derived from the berm source material used (e.g. graded material from Miller Hill Main ranges).

In order to establish boundaries of the lead contamination in this area, additional sample locations will be placed within the trench behind the main berm, in the area directly before the berm, and at the smaller “berm” close to the road (Figure1). Initially, there will be four sample location per area in a row (approximately 50 feet apart), filling in with additional samples as needed to minimize uncertainty. Additionally, two sample locations will be placed at either end of main berm to establish boundaries of contamination. All locations will be excavated to 1-foot depth below ground surface (bgs). This translates into, initially, 14 locations with one sample per location.

To cost effectively evaluate depth of contamination at this small range, additional depth samples (1-2 feet bgs or deeper as needed) will be collected at locations MH4, MH9, and MH16. These locations were selected to establish depth of contamination likely expected from a concentration range of surface contamination. This information will then be used to assume a reasonable estimate of depth of contamination for use in the Feasibility Study.

As the original sample locations were spaced 10 feet apart on the main berm, no co-located duplicates will be collected.

To determine potential field variability, three of the previously collected samples (MH 1, 8, and 17) will be analyzed as precision samples. These samples were selected because the initial results were near 250 mg/kg; therefore, these locations will be examined further to determine influence of field variability on potential decisions.

Evergreen Former Infiltration Range

As previously presented, lead contamination was detected throughout the majority of the Evergreen Infiltration Range berm. Based on our statistical evaluation of the data from the impact side of the berm, no additional sampling is needed for evaluating cleanup alternatives. However, the sample collected from the backside of the berm indicated lead contamination might also be present on this unused portion of the berm.

In order to establish the extent of contamination on the backside of the berm, additional samples will be collected from this side of the berm. Areas to be sampled include the trench (toe of the berm) and at the same height of the impact zone. Initially six sample locations from each area will be collected (approximately 50 ft. apart), filling in with additional samples as necessary to minimize uncertainty. Samples will be collected from both the 0” to12” and 12” to 24” depth intervals. This translates into initially 12 locations, two samples per location, for a total of 24 additional samples. If contamination is found and additional samples are required, an additional row of sample will be collected for an initial maximum of 18 sample locations, two samples per location, for a total of 36 additional samples.

If both levels of this side of the berm indicate contamination is present, this information will be used to assume soil volumes for the Feasibility Study. If the trench samples do not contain lead concentrations above 250 mg/kg, an additional row of sample midway between the trench and the upper row of samples will be collected to refine soil volume assumptions.

Former Skeet Range

Initial sample results from the Skeet range sampling indicate that the majority of lead contamination at this site is limited to an area roughly 450 feet away from the firing points, extending to the gravel road to northwest in some areas (Figure 2).

Additional samples need to be collected to fill in areas of uncertainty of the extent of contamination. Thirteen new locations will be sampled, including from sample locations across the gravel road (if possible without encountering utilities) to the northwest of the former skeet range. New samples will be collected from three depth intervals (0-1, 0-3, and 0-6 inches bgs; Figure 4). If the surface samples areas contaminated, the location will also be sampled at the subsurface (12 to 24 inches). Additionally, sample locations ST32, ST35, and ST46 will be revisited and resampled at the three depth intervals. These sample locations were selected to provide a range of lead concentrations to evaluate concentration gradients with depth.

Co-located field duplicates will be collected at sample locations ST34 and ST65. These samples were selected because they represent potential outliers in the contamination distribution patterns. These locations will be examined further to determine influence of field variability on potential decisions. In order to determine if particle size should be considered, prior to the new field sampling, archived soil samples from the following sample locations (0 to 6 in. depth interval) will be sieved with a No. 60 sieve and reanalyzed with the XRF: ST33, ST35, ST36, ST37, ST38, ST44, ST45, ST46, ST48 (Figure 4).

Although initial sampling data indicates lead contamination extends to the 2-foot interval at four of the sampled locations, we do not recommend additional sampling past this interval for the purposes of refining soil volumes for the Feasibility study. Based on the dispersed lead contamination pattern and isolated exceedences with depth, we recommend assuming contamination extends to one foot for the FS. Uncertainty of depth of contamination could then be addressed during remediation. As an example of this, refinement of actual depth of contamination could be delineated during a removal action by collecting confirmation samples following removal.

Existing data indicates impact to groundwater from lead is not likely. Lead concentrations are seen to decrease with depth, and all detected soil concentrations are below the 3-phase action level of 3000 mg/kg. Therefore, additional delineation of contamination with depth for lead is not required to determine potential impact to groundwater.

PAHs were detected in several of the samples delivered to the laboratory; Figure 3 provides the cPAH TEF values for these sample locations. In general exceedances of the MTCA Method A unrestricted land use cleanup level for cPAH TEF as benzo(a)pyrene were limited to an area roughly 100 feet from the shooting area. Five additional samples will be collected in order to delineate the horizontal extent of PAH contamination (Figure 3). In addition, two sample locations, ST11 and ST16, will be sampled from the 12" to 24" depth interval to determine the vertical extent of the PAH contamination.

Reporting

The information from this next round of sampling will be provided to Fort Lewis Public Works for review as a technical memorandum similar to previous site investigation report formats. It is anticipated that this report will be provided for review roughly 6 weeks from completion of field activities.

cc: Kym Takasaki
Kira Lynch
File

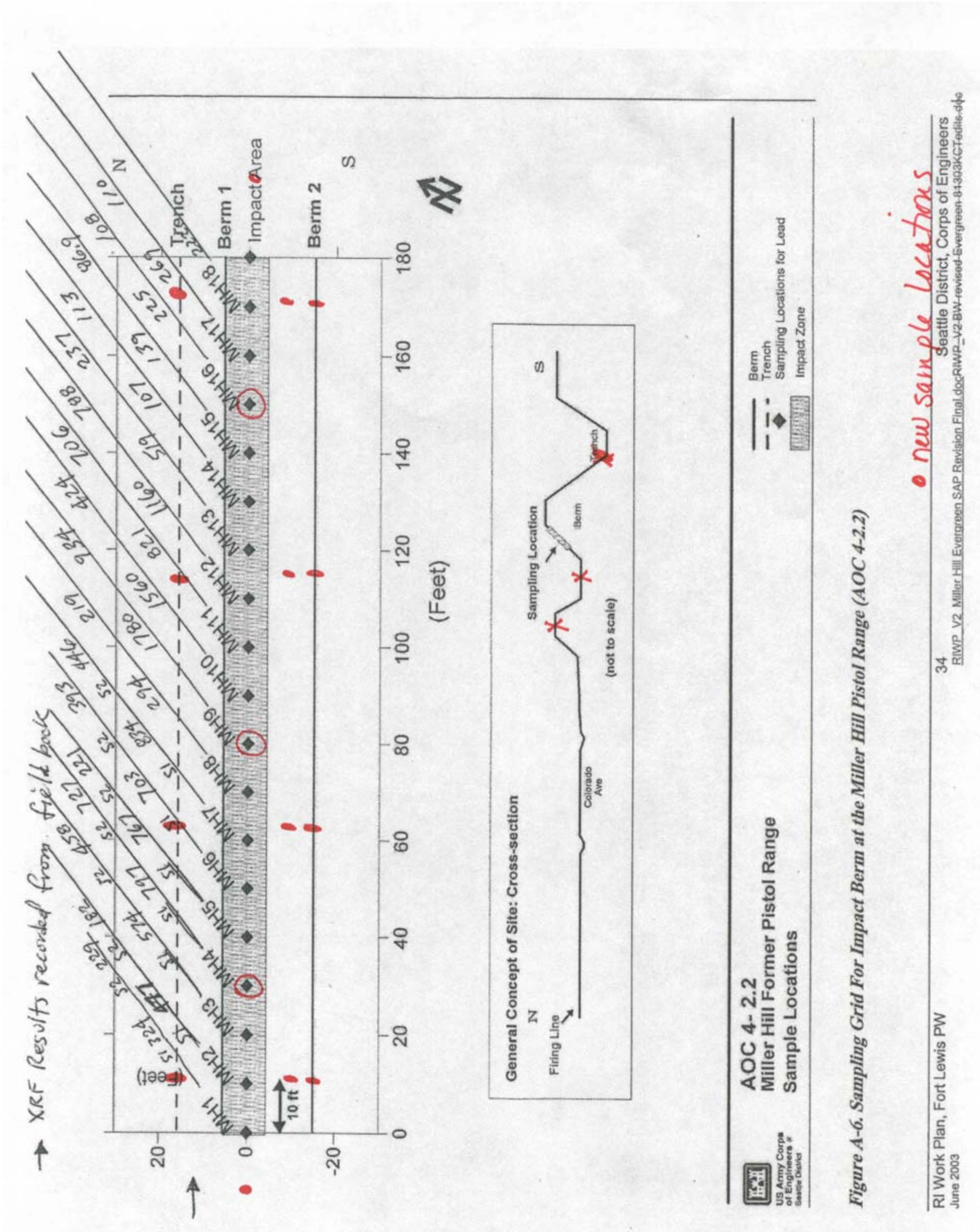

Figure 1. New sample locations at the Former Pistol Range at Miller Hill

Figure 2. New Sample Locations for Lead at the Former Skeet Range

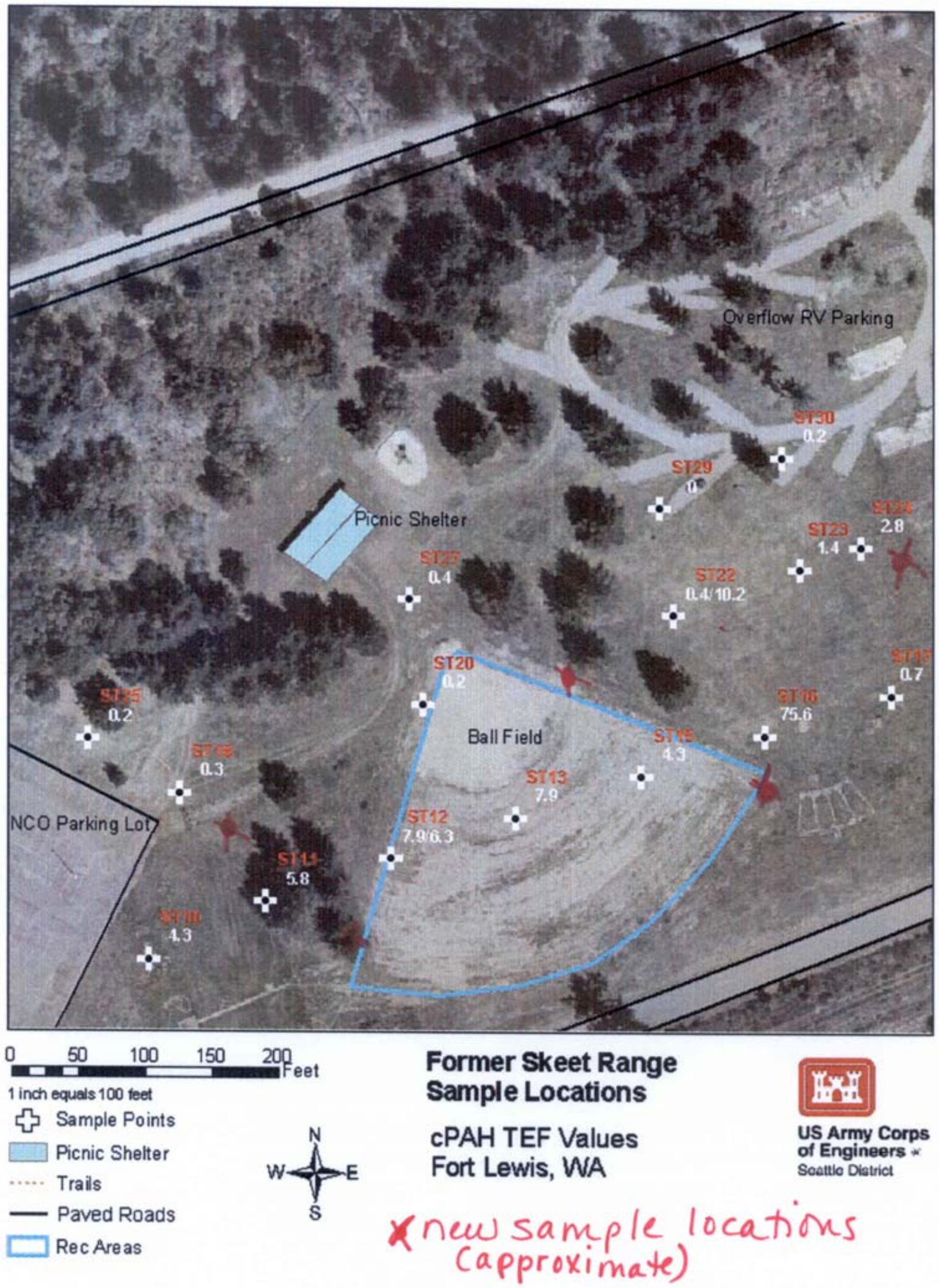

Figure 3. Additional Samples for PAHs at the Former Skeet Range

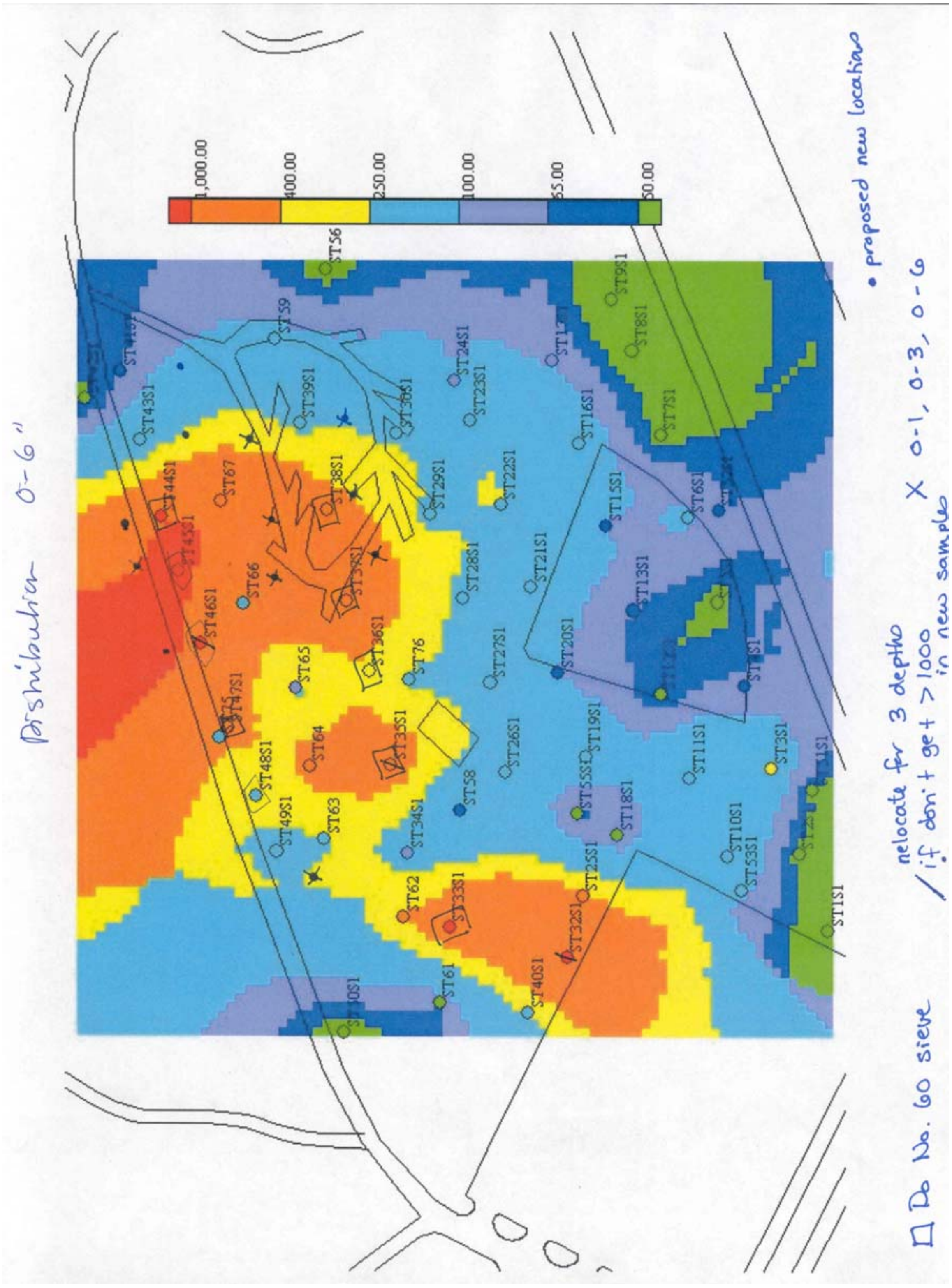

Figure 4. Additional Samples at the Former Skeet Range

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APPENDIX D

DATA QUALITY REVIEW

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APPENDIX D
DATA QUALITY REVIEW

In total, 566 soil samples, including 130 collaborative, field, and laboratory duplicates were collected for the Fort Lewis Agreed Order Remedial Investigation/Feasibility Study during September and December 2003. Prepped (dried and/or sieved) aliquots of each sample were screened using a field portable NITON Series 300 x-ray fluorescence (XRF) spectrometer. Fixed-laboratory samples were submitted to Severn Trent Laboratories of Tacoma, Washington, for analysis of total metals (EPA Method 6010/6020) and explosive residues (EPA Method 8330) and to Analytical Resources, Incorporated of Seattle, Washington for PAHs for soils (EPA Method 8270C).

The following criteria were evaluated in the data quality review process:
- Holding times;
- Method blanks;
- Initial and continuing calibration;
- ICP Interference Check results;
- ICP Serial Dilution Results;
- Laboratory control sample (LCS) recoveries;
- Matrix spike (MS) recoveries; and
- Laboratory and field duplicates relative percent differences (RPDs).

Overall Data Quality

The overall data quality objectives (DQOs), as set forth in the Sampling Plan Addenda (Corps, 2003), the RIWP, and the Corps Shell document (Corps, 2001) are met. The data for this project are acceptable for use as qualified. XRF lead results near the reporting limit should be considered variable based on the precision sample and XRF duplicate RPDs for this compound. The completeness for the associated data is 100%. Detailed discussions are presented below.

Data Quality Indicators

Data quality indicators were used to quantitatively evaluate the data quality objectives. Detailed discussions are presented below.

Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values.

Field XRF Precision

Precision Samples. For XRF samples, precision was measured by collecting a precision sample at a frequency of 50% during the DMA and at a frequency of 20% for the rest of the characterization. The precision sample was a project-specific sample that has been analyzed five to seven times in replicate.

Thirty-six percent (39 out of 108) of the relative standard deviations (RSDs) for precision samples collected were above the specified 20 percent, indicating within sample variability (see Table D-1). Of the 39 precision samples, 30 had sample means less than 250 mg/kg, 6 had means above 250 mg/kg but below 1000 mg/kg, and 3 had means above 1000 mg/kg. Variability appears to be most common at concentrations less than 250 mg/kg, however, as the precision samples were not randomly selected this data set may be biased towards the lower concentrations.

XRF Co-Located Field Duplicates. Field precision was also measured by collecting XRF co-located field duplicate samples. Field duplicate samples were collected as separate samples from co-located 2-3 feet from the original and treated as separate samples throughout the preparation process.

Sixty-two percent (8 out of 13) of the RPDs for the co-located field duplicates were above 50% criteria set in the SAP Addendums (see Table D-2). Results were not qualified based on RPDs.

Analytical Laboratory Precision

Precision. Analytical precision is measured through LCS/LCSD and MS/MSD samples for organic analysis and through laboratory duplicate samples for inorganic analyses. Analytical precision is qualitatively expressed as the RPD between the LCS/LCSD, MS/MSD, or duplicated. Analytical precision measurements were carried out at a minimum frequency of one per laboratory analysis group or one in 20 samples, whichever was more frequent, per matrix analyzed. All LCS/LCSD and MS/MSD RPDs were within control limits for all sample delivery groups.

Accuracy. Accuracy measures the closeness of the measured value to the true value. In general, samples used to quantitate accuracy were within the range specified in the SAPs.

Field XRF Accuracy

To evaluate field accuracy, an XRF calibration check sample was initially run at the beginning and end of each day and one approximately every two hours. The percent differences for the calibration samples were below 20 percent. All XRF blanks were below the detection limit.

Analytical Laboratory Accuracy

Analytical accuracy of chemical test results is assessed by "spiking" samples with known standards (surrogates LCSs, or matrix spikes) and establishing the average recovery. Accuracy measurements on matrix spike (MS) samples were carried out at a minimum frequency of one in 20 project-specific samples per matrix analyzed. Laboratory control samples (LCSs) were also carried out at a minimum frequency of one in 20 samples per matrix analyzed. Surrogate recoveries were determined for every sample analyzed for organics. LCS/LCSD and surrogate recoveries were within control limits for all sample delivery groups.

Five of MS recoveries were above the control limits as a result of the high analyte concentration in the original sample [with the exception of Tin in sample 116603-01 (see Table below)]. No qualifiers were assigned, as the result was greater than four times the spike result. One tin MS result was also above acceptance limits. No qualifiers were assigned. Matrix interferences were indicated based on acceptable recoveries of the associated blank spikes. All other quality control was within acceptance limits.

Sample No.	Analyte	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	% Recovery
116603-01	Iron	19000	4970	25550	127%
116603-01	Tin	0	1130	2320	205%
115861-01	Iron	14000	4480	21200	161%
116312-01	Iron	17000	4030	23600	176%
116312-13	Iron	18000	4690	26000	180%
118788-01	Lead	490	5	547	1210

The relative percent difference value for lead in the duplicate for sample 118431-01 exceeded the quality control limits (36%). The sample was reanalyzed with similar results. As all other quality control was within acceptance limits in the sample delivery group, no samples were qualified.

Recoveries of matrix spikes for PAHs in sample delivery group FW13 were not attainable due to high levels of target analytes in the original sample. Percent recovery of chrysene was above control limits in the matrix spike for sample delivery group GC18. As all other quality control was within acceptance limits, no samples were qualified.

Low-level mercury was present in the method blank associated with sample delivery group ZL970. As the reported value was above the MDL, but below the PQL, the data have been flagged. No other occurrence were encountered.

Initial and Continuing Calibration. Initial and continuing calibrations were performed at the appropriate frequency. Acceptable recoveries were obtained for analytes of concern.

Representativeness. Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The sampling plan design, sampling techniques, and sampling handling protocols (e.g., storage, preservation, and transportation) were developed to assure representative samples. All soil samples were properly preserved.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make the data collected comparable to both internal and other data generated.
Results from the demonstration of method applicability study were evaluated for adequacy and appropriateness of XRF field technology for comparison with fixed-laboratory analyses. The linear regression correlation coefficient factor (r^2) for the data set was 0.96, well above the 0.75 required by the SAP Addendums. Discussion of fixed-laboratory analytical results and XRF comparison is presented in Appendix B.

Completeness. Completeness is defined as the percentage of measurements made which are judged to be valid measurements. Results were considered valid since all the precision, accuracy, and representativeness objectives were determined to have been met and reporting limits were sufficient for the intended uses of the data. The completeness for the associated data is 100 percent.

Table 2 – All XRF Precision Samples (Lead Concentrations in mg/kg)

Sample ID	1	2	3	4	5	6	7	Mean	SD	RSD
EB1S1	290	269.2	150.1	158.5	418	191.7	256.2	247.7	93.1	38
EB1S1D	79.8	261.4	169.9	182.4	144.9	199.5	270.6	186.9	66.1	35
EB1S2	45	45	45	45	45	45	114	54.9	26.1	48
EB2S2	136.4	68.1	76.5	56.5	76.9	149.2	120.4	97.7	36.8	38
EB4S2	45	45	45	45	45	45	45	45	0.00	0
EB7S1	109.3	45	77.5	98	86.2	72.8	68.6	79.6	20.9	26
EB7S2	45	45	45	71.2	45	45	45	48.7	9.90	20
EB10S1	61.2	45	79.5	45	71.1	45	45	56	14.7	26
EB10S2	45	45	45	45	45	45	45	45	0.00	0
EB13S1	45	45	45	45	45	45	45	45	0.00	0
EB13S2	45	45	45	45	45	45	45	45	0.00	0
EB16S2	172.6	144.5	186.5	104.4	163.4	159.8	169.2	157	26.6	17
EB19S2	45	72.6	45	74.7	45	45	45	53	14	26
EB20S1	1040	1080	971.2	1040	1020	1089.6	1140	1054	54.4	5
EB22S1	233.2	301	401.8	382.6	308.4	390	422	348.4	68.7	20
EB22S2	45	45	45	45	45	45	45	45	0.0	0
EB25S1	234.4	238.6	316	222	216	284.6	197.7	244.2	41.6	17
EB25S2	45	45	45	45	45	45	45	45	0.0	0
EB28S2	45	45	45	45	45	45	45	45	0.0	0
EB31S1	700	526	598	599	407	454	477	537.3	101.4	19
EB31S2	45	45	45	45	45	57	45	46.7	4.5	10
EB33S1	11700	13800	12800	13800	15100	15900	18400	14500	2207.6	15
EB33S2	1780	2190	2380	2550	2670	2400	2290	2322.9	287.2	12
EB33S1D	911	892	1120	1480	1430	1690	1930	1350.4	393.8	29
EB33S2D	339	572	355	560	532	287	556	457.3	124.2	27
EB34S1	486	455	436	278	331	500	496	426.0	87.4	21
EB34S1D	345	318	421	316	314	255	371	334.29	52.1	16
EB34S2	71.4	141	132	122	109	54.2	80.6	101.46	33.0	33
EB34S2D	45	68.7	45	45	45	45	45	48.39	9	19
EB35S1	2620	2080	4740	2020	2040	1630	2920	2578.57	1044.1	41
EB35S2	522	576	556	509	488	557	636	549.14	49.1	9
EB36S1	10100	10400	9140	11600	8930	9960	9890	10002.86	878.3	9
EB36S2	1450	770	1070	1290	1570	1560	1380	1298.57	289.6	22
EB40S1	834	604	571	546	684	621	568	632.57	99.7	16
EB40S2	276	148	288	185	299	219	202	231.00	57.6	25
EB41S1	1290	1390	1300	1630	1210	1310	1670	1400.00	179	13
EB41S2	813	575	683	765	514	496	491	619.57	133.9	22
EB42S1	26700	25700	26500	27500	28000	26200	28300	26985.71	966.8	4
EB42S2	5570	5600	5720	5460	6870	4210	5250	5525.71	781.4	14
EB43S1	973	608	700	573	1040	695	651	748.57	182.9	24
EB43S2	300	331	294	271	333	405	364	328.29	45.6	14

Sample ID	1	2	3	4	5	6	7	Mean	SD	RSD
EB44S1	671	538	450	905	683	696	769	673.14	148.1	22
EB44S1D	1530	1490	1370	1080	1310	1590	1180	1364.29	188	14
EB44S2	708	772	577	736	606	734	781	702.00	79.8	11
EB44S2D	95.6	257	120	189	134	159	82.1	148.10	60.2	41
EB46S1	295	233	278	349	233	251	220	265.57	45.5	17
EB46S2	45	45	89.8	45	98.2	45	75.2	63.31	23.8	38
EB52S1	238.2	221	224.2	260.2	358.6	247.4	193.8	249.06	52.8	21
EB52S2	45	45	102.1	74.5	45	134.3	129.4	82.19	39.9	49
EB55S1	302.4	218.4	239.2	367	298.4	500.8	241	309.60	98.3	32
EB55S2	45	45	45	45	45	45	45	45.00	0	0
EB58S2	45	82.2	45	111.1	102.9	45	45	68.03	30	44
EB61S1	405	363.8	426	398.2	244.8	398.2	318.8	364.97	63.4	17
EB61S2	45	45	45	45	45	45	45	45.00	0	0
EB64S2	45	45	45	45	45	45	45	45.00	0	0
EB65S2	265.6	250.2	324.6	293.8	281.8	236.8	276.6	275.63	28.9	11
EB67S1	108.2	45	110	82	45	45	112.5	78.24	32.7	42
EB67S2	45	45	45	45	45	45	45	45.00	0	0
EB70S2	45	45	45	45	45	45	45	45.00	0	0
EB73S2	45	45	45	45	45	45	45	45.00	0	0
EB74S2	192.1	197.7	214.6	201.9	273.2	287.4	217.2	226.30	38.2	17
EB76S1	45	45	70.2	59.2	45	45	45	50.63	10.1	20
EB76S2	45	45	45	45	45	45	45	45.00	0	0
EB79S1	55	92.3	76.6	116.1	61.3	98.7	45	77.86	25.8	33
EB79S2	45	45	45	45	45	45	45	45.00	0	0
EB82S1	199	194.4	250	196.4	191.2	158.8	165.5	193.61	29.5	15
EB83S2	121.9	146.1	112.8	106.5	111.3	166.4	145.3	130.04	22.7	17
EB84S2	45	97.9	45	45	45	45	45	52.6	20	38
EB87S1	54.1	71.3	45	64.3	56.8	45	45	54.5	10.4	19
EB87S2	45	45	45	45	45	45	45	45.0	0	0
EB90S1	45	115.2	83.7	144.8	99.1	105.1	45	91.1	36.6	40
EB92S1	83.6	85.7	78.4	78.4	180.2	87.8	108.7	100.4	36.7	36
EB92S2	45	45	45	45	60.8	45	45	47.3	6	13
EB94S1	45	45	45	45	45	45	45	45.0	0	0
EB107S1	226	217	188	280	216			225.4	33.7	15
EB108S1	267	206	233	239	281			245.2	29.5	12
EB113S1	343	351	318	304	281			319.4	28.6	9
EB115S1	158	261	215	162	229			205.0	44.4	22
EB119S1	130	138	142	251	210			174.2	53.6	31
MH1S1	193	259	253	275	243	214	183	231.4	35.1	15
MH1S2	257	246	246	262	245	220	207	240.4	19.8	8
MH8S1	511	494	374	357	324			412.0	84.8	21
MH8S2	295	269	261	301	265			278.2	18.4	7
MH17S1	376	348	280	418	342			352.8	50.6	14

Sample ID	1	2	3	4	5	6	7	Mean	SD	RSD
MH17S2	120	192	92.8	146	162			142.6	38.1	27
MH24S1	181	157	194	216	204			190.4	22.7	12
MH25S1	123	127	125	74.2	94.4	91.3	98.8	104.8	20.4	20
MH30S1	244	280	294	296	268			276.4	21.4	8
MH31S1	215	184	234	213	218			212.8	18.1	9
ST2S1	45	45	45	45	45	45	45	45.0	0	0
ST3S1a	318	256	288	300	348	310	338	308.3	31.0	10
ST6S1a	117	183	98.9	127	130	174	136	138	30.2	22
ST22S1	130	134	145	182	148	182	123	149.1	24.0	16
ST22DS1	460	419	581	411	392	411	474	449.7	64.8	14
ST38S1	443	426	525	363	352	430	427	423.7	57.0	14
ST39S1	151	127	138	212	203	209	165	172.1	35.6	21
ST40S1	88.5	91.5	96.8	91.1	83.1	110	153	102.0	24.0	24
ST41S1	45	45	111	64.7	73.6	45	45	61.3	24.8	40
ST42S1a	83.4	45	65.6	82.5	68.4	100	45	70	20.4	29
ST42S1b	136	119	100	107	172	166	142	134.6	27.8	21
ST49S1	117	158	201	140	165	142	153	153.7	26	17
ST50S1	45	87	77	62.6	86.8	90.6	93.3	77.5	17.7	23
ST84(0-1)	45	45	45	45	45			45.0	0	0
ST84(0-3)	438	582	398	353	384			431.0	89.8	21
ST84S1	185	166	234	225	253			212.6	36	17
ST93S1(0-1)	191	263	242	220	250			233.2	28.3	12
ST93S1(0-3)	430	470	561	401	449			462.2	60.8	13
ST93S1(0-6)	1280	1330	1280	1260	1280			1286.0	26.1	2

Table 4. Duplicates

Sample ID	XRF Value	Mean	RPD
EB33S1	11700	6306	171.10
EB33S1D	911		
EB33S2	1780	1060	136.01
EB33S2D	339		
EB34S-1	486	416	33.94
EB34S-1D	345		
EB34S-2	71.4	58	45.36
EB34S-2D	45		
EB44S-1	671	1101	78.06
EB44S-1D	1530		
EB44S-2	708	402	152.41
EB44S-2D	95.6		
EB1S-1	290	185	113.68
EB1S-1D	79.8		
ST12S1	45	45	0.00
ST12DS1	45		
ST22S1	246	346	57.80
ST22DS1	446		
ST34S1	72.7	59	47.07
ST34S1D	347		
ST34S2	45	61	51.24
ST34S2D	76		
ST65S1	93.5	80	33.02
ST65S1D	67		
ST65S2	96.1	71	72.43
ST65S2D	45		

APPENDIX E

FIELD NOTEBOOK

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EVERGREEN INFILTRATION RANGE

IMPACT BERM Demonstration of Method Applicability

DATES: 2, TEAM: MARSH, TERUI, PUCKETT SCOTT, KERWIN

WEATHER: (2 Sep) clear, warm

XRF XL-309 DATA: Src strength 10 mci, Res. 724 eV, Serial NO. XL309-U390NR4976

Dosimeter: ArrowTech Model 138, SN 084097 (Baseline 22 mr.)

FIXED + FIELD SAMPLE ID

XRF CALIBRATION CHECK (Start of day)

	HIGH Pb (Scr)			MED. Pb (Scr)			Low Pb (SCREEN)			Blank		
Test Start 0942 120 Sec. (instrument) reading time	5490	±190	4	1170	±77	5	<	±58	Screen 6	<	±37	Screen 7

MEASUREMENTS

SAMPLE ID	XRF-1	PREC.	XRF-2	Prec.	XRF3	Prec.	XRF-4	Prec.
EB34S-1 screen	486 [8]	± 55	455 [9]	± 75	436 [10]	± 54	278 [11]	± 47
	XRF-5	±	XRF-6	±	XRF-7	±		
EB 34-S-1	331 [12]	49	500 [13]	56	496 [14]	[15] 72		
EB34S1 (CUP)	492 [16]	54	SAMPLE DATE: TIME:	9-2-03 0905				
EB34S1 (Dup Bag)	① 367 ±62 [17]	② ~~2018~~	③ -Redo-	④	⑤	⑥	⑦	
EB34S1 DUP Cup	①							
EB34S2 BAG	①	②	③	④	⑤	⑥	⑦	

No Further testing today — battery failure — re-run EB34S1 Dup

9-3-03 XRF calibration check — start of day 0743 hrs.

Screen	High Pb [22]	Med Pb [23]	Low Pb [24]	Blank [25]	(all values in ppm)		
	5450 ±190	1080 ±74	< ±59	< ±34			

0803 hrs.							
EB 34S1 (Bag Dupe)	① 345 ±49 [26]	② 318 ±48 [27]	③ 421 ±54 [28]	④ 316 ±49 [29]	⑤ 314 ±49 [30]	⑥ 255 ±49 [31]	⑦ 371 ± 49 [32]
EB 34S1 Dupe cup	346 ±49 [33]	NOT Sent	to Lab				
EB34S2 Bag	① 71.4 ±36 [34]	② 141 ±49 [35]	③ 132 ±32 [36]	④ 122 ±44 [37] Date: 9-2-03 Time: 0925	⑤ 109 ±39 [38]	⑥ 54.2 ±35 [39]	⑦ 80.6 ±41 [40]
EB34S2 Cup	148 ±43 [41]	SAMPLE DATA					
0920 EB34S2 (Dupe Bag)	① < ±55 [42]	② 68.7 ±43 [43]	③ < ±65 [44]	④ < ±61 [45]	⑤ < ±57 [46]	⑥ < ±59 [47]	⑦ < ±68 [48]
EB31S1 ~~EB34S2~~ CUP ~~Dupe Cup~~	613 ±55 [49]	SAMPLE DATA		DATE: 9-2-03 TIME: ~~1010~~ 1030			
EB31S2 cup	< ±53 [50]	SAMPLE DATA		DATE: 9-2-03 TIME: 1055			

XRF calibration Check at 1000 hrs.

HIGH [51]	MED [52]	Low [53]	BLANK [54]
5540 ±180	1030 ±74	< ±61	< ±37

< = Below detection limit.

1018 hrs.

EB32S1
EB32S2
EB33S1
EB33S2
EB35S1
EB35S2
EB36S1
EB36S2
EB37S1
EB37S2
EB38S1
EB38S2
EB39S1
EB39S2
EB40S1
EB40S2
EB41S1
EB41S2
EB42S1
EB42S2

9-3-03 Cont

BAG/CUP MEASUREM

EB43S1
EB43S
EB44S
EB44S

All readings in ppm

Sample collection Dates + Times

1018 hrs.	Screen MEASUREMENTS CONT.		Sample Data		
EB32S1 cup	55 11,600 ±290		Sample	Data	Date: 9-2-03 Time: 1014
EB32S2 cup	56 2,940 ±120		"	"	Date: 9-2-03 Time: 1054
EB33S1 cup	57 18,200 ±500		"	"	Date: 9-2-03 Time 0930
EB33S2 cup	58 3,170 ±130		"	"	Date: 9-2-03 Time 0953
EB35S1 cup	59 2,490 ±110		"	"	Date: 9-2-03 Time 1320
EB35S2 cup	60 630 ±56		"	"	Date: 9-2-03 Time: 1338
EB36S1 cup	61 13,300 ±370		"	"	Date: 9-2-03 Time: 0945
EB36S2 cup	62 2,180 ±100		"	"	Date: 9-2-03 Time: 0946
EB37S1 cup	63 404 ±50		"	"	Date: 9-2-03 Time: 1115
EB37S2 cup	64 < ±53		"	"	Date: 9-2-03 Time: 1135
EB38S1 cup	65 25,400 ±720		"	"	Date 9-2-03 Time: 0935
EB38S2 cup	66 6,590 ±210		"	"	Date: 9-2-03 Time: 1000
EB39S1 cup	67 5,830 ±180		"	"	Date: 9-2-03 Time: 1037
EB39S2 cup	68 600 ±57		"	"	Date: 9-2-03 Time: 1053
EB40S1 cup	69 918 ±67		"	"	Date: 9-2-03 Time: 1118
EB40S2 cup	70 326 ±48		"	"	Date: 9-2-03 Time: 1130
EB41S1 cup	71 2,060 ±95		"	"	Date: 9-2-03 Time: 1009
EB41S2 cup	72 738 ±60		"	"	Date: 9-2-03 Time: 1020
EB42S1 cup	73 31,600 ±930		"	"	Date: 9-2-03 Time: 1114
EB42S2 cup	74 5,680 ±190		"	"	Date: 9-2-03 Time: 1121

9-3-03 continued	XRF CALIBRATION CHECK Test				
	76 HIGH 5670 ±200	77 ~~Lo~~ MED 1120 ±76	78 LOW < ±62	79 BLANK < ±36	Date 9-3-03 Time 1215

BAG/CUP MEASUREMENTS		SAMPLING DATE / SAMPLING TIME BELOW
EB43S1 cup	80 762 ±62	9-2-03 1149
EB43S2 cup	81 958 ±67	9-2-03 1308
EB44S1 cup	82 1,070 ±70	9-2-03 1022
EB44S2 cup	83 732 ±61	9-2-03 1042

< = Below detection limit

[signature]

A

9-3-03 continued

DMA - Evergreen Berm continued

Cup Samples

		Results in PPM	Reading #	Sample Date	Time			
EB45S1	cup	29,300 ± 890	84	9-2-03	1148			
EB45S2	cup	7,420 ± 220	85	9-2-03	1220			
EB46S1	cup	144 ± 42	86	9-2-03	1300			
EB46S2	cup	622 ± 38	87	9-2-03	1324			
EB47S1	cup	20,500 ± 570	88	9-2-03	1125			
EB47S2	cup	650 ± 57	89	9-2-03	1138			
~~EB48S1~~	~~cup~~	41,600 ± 1300	~~89~~ 91	9-2-03	1200	Note: Sample	No reading re-run by	No. 90 mistake. qm
~~EB48S2~~	~~cup~~	19,000 ± 530	92	9-2-03	1220			
EB49S1	cup	235 ± 45	93	9-2-03	1326	Not	sent to	Lab
EB49S2	cup	151 ± 42	94	9-2-03	1353	Not	sent to	Lab
EB50S1	cup	838 ± 63	95	9-2-03	1340			
EB50S2	cup	< ± 51	96	9-2-03	1400			
EB51S1	cup	38,406 ± 1200	97	9-2-03	14~~25~~ 08			
EB51S2	cup	8380 ± 250	98	9-2-03	1425			

9-4-03 XRF Calibration Check - start of day 0739 hrs

Screen	High Pb 101	Med Pb 102	Low Pb 103	Blank 104	(all values in ppm)			
Work done in District Lab	5640 ± 200	1120 ± 75	< ± 61	< ± 37				
0802 EB35S1 Bag	(1) 105 2620 ± 140	(2) 106 2080 ± 150	(3) 107 4740 ± 200	(4) 108 2020 ± 99	(5) 109 2040 ± 100	(6) 110 1630 ± 99	(7) 111 2920 ± 140	
EB35S2 Bag	(1) 112 522 ± 60	(2) 113 576 ± 57	(3) 114 436 ± 65	(4) 115 556 ± 55	(5) 116 509 ± 56	(6) 117 488 ± 53	(7) 118 557 ± 60	(8) 119 636 ± 58
			125 s - do not use	#114 q/p				
EB36S1 Bag	(1) 120 10,100 ± 440	(2) 121 10,400 ± 340	(3) 122 9140 ± 340	(4) 123 11,600 ± 370	(5) 124 8930 ± 290	(6) 125 9960 ± 300	(7) 126 9890 ± 330	
EB36S2 Bag	(1) 127 1450 ± 91	(2) 128 770 ± 73	(3) 129 1070 ± 81	(4) 130 1290 ± 110	(5) 131 1570 ± 89	(6) 132 1560 ± 98	(7) 133 1380 ± 98	
EB40S1 Bag	(1) 134 834 ± 70	(2) 135 604 ± 110	(3) 136 1140 ± 82	(4) 137 571 ± 60	(5) 138 546 ± 63	(6) 139 684 ± 60	(7) 141 621 ± 58	(8) 142 568 ± 58
EB40S2 Bag	(1) 143 276 ± 65	(2) 144 148 ± 54	(3) 145 288 ± 52	(4) 146 185 ± 49	(5) q/p ~~148~~ 149 299 ± 48	(6) 150 219 ± 54	(7) 151 202 ± 55	
		no readings for	147 & 148 q/p					
EB41S1 Bag	(1) 152 1290 ± 160	(2) 153 1390 ± 140	(3) 154 1300 ± 87	(4) 155 1630 ± 130	(5) 156 1210 ± 76	(6) q/p 157 1310 ± 82	(7) 158 1670 ± 87	
EB41S2 Bag	(1) 159 813 ± 99	(2) 160 525 ± 85	(3) 161 683 ± 62	(4) 162 765 ± 76	(5) 163 514 ± 66	(6) 164 496 ± 77	(7) 165 491 ± 55	
EB42S1 Bag	(1) 166 26,700 ± 1100	(2) 167 25,700 ± 940	(3) 168 26,500 ± 840	(4) 169 27,500 ± 1100	(5) 170 28,000 ± 1900	(6) 171 26,200 ± 1400	(7) 172 28,300 ± 980	

~~1022~~

0

Reading

Readin

No Re

9-4-03

EB42S2

EB43S1

~~EB43S~~

~~EB44S~~

~~EB44S2~~

9-4-03

Scree

140

EB43S

EB44S

EB44S

44S1

EB ~~46~~ 51

q/p 44S2

EB ~~46~~ S2

q/p

A

FIELD NOTES for 9-2-03

~~1022~~ – Setup at Evergreen Berm for DMA

0940 – sampling begins for DMA, 0-12" then 12-24"

EB-38-S2 – Bullet found in sample matrix sieved out

Battery low warning shuts down XRF 2 times by 1048 – No other equipment issues.

Reading 114 was run for 125 sec - EB35S2 reading no. 3 do not use 9/p 9-4-03

Reading 136 run for 117 sec - EB40S1 reading no. 3 do not use - 9/p 9-4-03

No Readings for 140, 147, 148 - 9/p 9-4-03
- not enough weight on XRF to hold window open

9-4-03 Continued Bag Samples for DMA Evergreen Berm

EB42S2 Bag	1 173 5570 ± 460	2 174 5600 ± 200	3 175 6300 ± 200	4 176 5720 ± 190	5 177 5460 ± 180	6 178 6870 ± 230	7 179 4210 ± 160	8 180 5250 ± 180	175 ⟹ 126 sec Do not use
EB43S1	1 181 973 ± 130	2 182 567 ± 58	3 183 608 ± 62	4 184 700 ± 70	5 185 573 ± 61	6 186 1040 ± 87	7 187 695 ± 61	8 188 651 ± 40	
~~EB43S2~~	1	2 stopped	3 for	4 calibration	5	6 check	7 9/p	Do not use #182 130 sec	
~~EB44S1~~	1	2	3	4	5	6	7 9/p		
~~EB44S2~~	1	2	3	4	5	6	7 9/p		

9-4-03 XRF Calibration Check ~~1~~350 hrs

	High Pb	Med Pb	Low Pb	Blank	(all values in ppm)			
Screen	190 5530 ± 200	191 1060 ± 75	192 < ± 62	193 < ± 39				
1404 EB43S2 Bag	1 194 300 ± 52	2 195 331 ± 52	3 196 294 ± 50	4 197 271 ± 47	5 198 333 ± 69	6 199 405 ± 75	7 200 364 ± 51	
EB44S1 Bag	1 201 671 ± 97	2 202 538 ± 63	3 203 450 ± 64	4 204 602 ± 58	5 205 905 ± 68	6 206 483 ± 75	7 207 696 ± 61	#204 118 sec 8 208 769 ± 76
EB44S2 Bag	1 209 708 ± 97	2 210 772 ± 84	3 211 577 ± 57	4 212 736 ± 68	5 213 606 ± 56	6 214 734 ± 60	7 215 781 ± 63	
44S1 Dup EB ~~45S1~~ Bag 9/p	1 216 1530 ± 110	2 217 1490 ± 100	3 218 1370 ± 110	4 219 1080 ± 90	5 220 1310 ± 80	6 221 1590 ± 100	7 222 1180 ± 110	
44S2 Dup EB ~~46S2~~ Bag 9/p	1 223 95.6 ± 52	2 224 257 ± 64	3 225 120 ± 49	4 226 189 ± 68	5 227 134 ± 52	6 228 159 ± 67	7 229 82.1 ± 42	

9-04-03 continued Bag Samples DMA Evergreen Berm

EB46S1 Bag	① 230 295 ± 61	② 231 253 ± 60	③ 232 278 ± 69	④ 233 349 ± 64	⑤ 234 233 ± 49	⑥ 235 251 ± 56	⑦ 236 220 ± 48
EB46S2 Bag	① 237 < ~~$~~ 96 ± 93	② 238 < ± 130	③ 239 89.8 ± 50	④ 240 < ± 62	⑤ 241 98.2 ± 41	⑥ 242 < ± 73	⑦ 243 75.2 ± 39 124 sec
~~EB46S1 (Dup)~~ Bag q/p	final	Calibration check - end of COB 9-4-03					
~~EB46S2 (Dup)~~ Bag q/p	screen	High Pb 244	Med Pb 245	Low Pb 246	Blank 247	1720 hrs	
~~EB33S1 (Dup)~~ Bag q/p		q/p ~~244~~ 5630 ± 200	1110 ± 75	< ± 62	< ± 37		
~~EB33S2 (Dup)~~ Bag q/p							

B

9-8-03

Evergreen Demo Pits

0900 – Arrive on site
Prepare for Demo pit sampling
–Begin sampling using picks + shovels, encountering Loose, sandy soil.

✓ for review and chain of custody

DEMO PITS SAMPLING TABLE

SAMPLE ID	Sample Point	SAMPLE DATE	SAMPLE TIME	ANALYSES for all EXPLOSIVES (Method 8330)
✓ED151	ED1 0-6"	9-8-03	1132	1
✓ED152	ED1 6-12"		1138	1
✓ED251	ED2 0-6"		1131	1
✓ED252	ED2 6-12"		1142	1
✓ED351	ED3 0-6		1215	1
✓ED352	ED3 6-12		1220	1
✓ED451	ED4 0-6		1100	1
✓ED452	ED4 6-12		1105	1
✓ED551	ED5 0-6		1019	1
✓ED552	ED5 6-12		1030	1
✓ED651	ED6 0-6		1100	1
✓ED652	ED6 6-12		1110	1
✓ED751	ED7 0-6		1040	1
✓ED752	ED7 6-12		1048	1
✓ED851	ED8 0-6		0945	1
✓ED852	ED8 6-12		1005	1
✓ED951	ED9 0-6		0948	1
✓ED952	ED9 6-12		0955	1
ED1151 (ED551 QC) ED11	ED5 QC 0-6"		1028	1
ED1152 (ED552 QC)	ED5 QC 6-12"		1038	1
ED1051 (ED851 QC) ED10	ED8 QC 0-6"		0840	1
ED1052 (ED852 QC)	ED8 QC 6-12"		0905	1

B

GPS MEASUREMENTS @ DEMOLITION PITS

~~ED1~~ 8S ~~LAT/LON~~ SP DATE: 9/8/03

SAMPLE POINTS	LOCATION (LAT/LON.)	PDOP
ED1	47° 05' 44.29" 122° 33' 41.30"	3.5
ED2	47° 05' 43.84" 122° 33' 42.15"	3.6
ED3	47° 05' 42.85" 122° 33' 42.45"	2.7
ED4	47° 05' 42.42" 122° 33' 41.76"	2.7
ED5	47° 05' 42.99" 122° 33' 41.23"	3.6
ED6	47° 05' 42.14" 122° 33' 40.91"	2.8
ED7	47° 05' 42.61" 122° 33' 39.90"	3.7
ED8	47° 05' 43.30" 122° 33' 39.39"	3.7
ED9	47° 05' 43.58" 122° 33' 39.88"	3.6

DEC 2003

0

9-9-03 Field Work
Evergreen Infiltration Range Firing Points
XRF Bagged Analysis

0930 - Arrive on site, Firing pads measured at 6"x6" square
- Sampling 4 points around EF1, EE2, EF3 and EF4. 4 points 0-12" sampled at each of 4 Firing points. - composited

Soils Log: EF1 - 0-12" GP, Sandy Gravel, EF2 GP, EF3 GP-GM, EF4 GP

Dosimeter: Arrowtech 138 SN: 084097
Dosimeter Reading: Approx. 27 milliroentgens

XRF CALIBRATION CHECK with Screen (Scr) readings

	High Pb (Scr)	Med. Pb (Scr)	Low Pb (Scr)	Blank (Scr)
1124	5730 ±200 249	1130 ±76 250	< ±63 251	< ±37 252
	NIST 2710	NIST 2711	NIST 2709	NIST SiO_2 99.5%

SAMPLE ID	BAGGED READING	SAMPLES MEASUREMENTS PRECISION	SCREEN	TIME MEASURED
EF1S1	<	±59	~~250~~ 253	1143
EF2S1	<	±52	254	1148
EF3S1	<	±52	255	1152
EF4S1	<	±55	256	1156

< = Below detection limit

Sample collection times:

EF1S1 1010
EF2S1 1023
EF3S1 1100
EF4S1 1110

1157 XRF FINAL CALIBRATION CHECK POST-SAMPLING

High Pb	Screen	Low Pb	Screen
5630 ±200	257	< ±62	258

All samples in bags Placed in 5 gallon Archive bucket and returned to District Lab.

120
123
SAM

B

1200-1230-Lunch

1236 - GPS Receiver setup for sample point coordinate measurements

Coordinates from GPS Receiver Screen
Measurements made from Near Center of each Firing Pad

SAMPLE POINT	Geographic coordinates	PDOP
EF1	LAT. 47° 05' 44.73" LONG. 122° 33' 42.54"	3.3
EF2	LAT. 47° 05' 44.36" LONG. 122° 33' 42.62"	3.3
EF3	LAT. 47° 05' ~~43~~.94" LONG. 122° 33' 43.02"	3.3
EF4	LAT. 47° 05' 43.38" LONG. 122° 33' 43.62	3.3

DEC 2003

9-10-03 Fieldwork

MARSH, TERUI

0845 - Arrive at EVERGREEN BERM. PERSONNEL ON SITE PUCKETT, KERWIN

Plan + Safety briefed - prep for digging along toe of berm.

Air Monitor Background 0.08 mg/m³ at work site

XRF Start TIME: 0911
↳ 15 min. warmup
CAL CHECK Time: 0926

XRF CALIBRATION CHECK (AFTER 15 MIN. WARMUP)

HIGH Pb	±	Screen	MED. Pb	±	Screen	LOW Pb	±	Screen	BLANK	Screen
5580	190	260	1080	75	261	<	61	262	< 38	263

DOSIMETER: Arrowtech 138 SN: 084097
READING: Approx. 27 milliroentgens

XRF Resolution ≈ 719 eV
Src. Strength: 10 micro curies

BAGGED SAMPLES MEASUREMENTS (Archives of Previous Work and New bags)

SAMPLE ID	Sample Date SAMPLE TIME	XRF READING (Pb)	Precision ±	Screen	TIME MEASURED
EB55S1	9-10-03 0928	276	51	264	0943
EB61S1	9-10-03 0935	430	52	265	0948
EB49S1	(9-2-03) 1326	193	52	266	0953
EB55S2	9-10-03 0950	< Below Det. Limits	~~53~~ 57	267	0958
EB61S2	9-10-03 0955	<	57	268	1002
EB49S2	9-2-03 1353	115	41	269	1006
EB1S1	9-10-03 0935	231	46	270	1011
EB4S1	9-10-03 1000	138	46	271	1015
~~EB61 S1~~ EB64S1 alp	9-10-03 1010	77.5	41	272	1020
EB67S1	9-10-03 1020	80.9	42	273	1024
EB52S1	9-2-03 1421	~~80~~ 269	48	274	1030
EB52S2	9-2-03 1452	75	40	275	1034
EB64S2	9-10-03 1030	<	55	276	1038
EB58S1	9-2-03 1425	565	57	277	1045
EB58S2	9-2-03 1447	<	52	278	1049
EB67S2	9-10-03 1038	<	52	279	1053
EB73S1	9-10-03 1051	104	40	280	1057

SAMPLE
EB 54
EB 54 S
EB 70
* EB 73
EB 57
EB 57
EB 70 S
EB 1 S
EB 4 S
EB 76 S
EB 79 S
XRF CALI
CHECK -
EB 79 S1
EB 79 S1
EB 79 S1
EB 79 S
EB 79 S1
EB 79 S
EB 76 S
EB 82
EB 53
EB 53
EB 79

B

9-10-03 cont.
Bagged Samples Continued...

SAMPLE ID	SAMPLE DATE SAMPLE TIME	XRF READING (Pb)	Precision ±	Screen	Time Measured
EB 54 S1	9-2-03 1450	33,100	1000	281	1102
EB 54 S2	9-2-03 1504	15,900	500	282	1106
EB 70 S1	9-10-03 1104	130	42	283	1109
X EB 73 S2	9-10-03 1100	<	56	284	1113
EB 57 S1	9-2-03 1430	43,200	1400	285	1117
EB 57 S2	9-2-03 1443	3140	130	286	1121
EB 70 S2	9-10-03 1114	<	54	287	1125
EB 1 S2	9-10-03 1055	<	57	288	1129
EB 4 S2	9-10-03 1122	<	54	289	1134
EB 76 S1	9-10-03 1116	<	54	290	1138
EB 79 S1 (1)	9-10-03 1134	<	56	291	1134
XRF CALIBRATION CHECK →	HIGH Pb ± screen 5770 200 292 Time: 1146	Med. Pb ± screen 1070 76 293 Time: 1150	Low Pb ± screen < 60 294 Time: 1153		
EB 79 S1 (2)	9-10-03 1134	92.3	37	296	1222
EB 79 S1 (3)		76.6	37	297	1225
EB 79 S1 (4)		116	37	298	1228
EB 79 S1 (5)		61.3	35	299	1232
EB 79 S1 (6)		98.7	38	300	1236
EB 79 S1 (7)		55.0	37	301	1239
EB 76 S2	9-10-03 1130	<	54	302	1243
EB 82 S1	9-10-03 1230	218	45	303	1247
EB 53 S1	9-2-03 1424	8920	260	304	~~1234~~ 1251
EB 53 S2	9-2-03 1449	574	56	305	~~12~~ 1255
EB 79 S2	9-10-03 1350	55.9	36	306	1259

201
ewn
)
JK screen
3 263
)
5
RED
5

9-10-03 Field Activity Notes

0915 – Digging begins along toe of berm. ~~Gwyn~~ Pockett, Glen Tervi + Jennifer Kerwin Digging.
Tools used – shovels, picks, steel breakerbar.
Weather: overcast with breeze and occasional rain (Light)
Temp. approx. 65-68°F

SAMPLE
EB7 S1
EB7 S
EB82S
~~EB83~~
~~EB 0 S~~
(EB1-S1
EB 0 S
EB10S2
EB10S1
EB13S
EB10S
"
"
"
"
"
EB22S
EB16
EB16
EB13
EB25
XRF c
EB22
EB19S
EB19
EB28
EB25
EB28

9-10-03 Evergreen Berm

Bagged Sample Analysis continued...

SAMPLE ID	Sample Date and Time	XRF Reading	Precision ±	Screen	Time measured
EB 7 S1	9-10-03 1233	<	59	307	~~13~~04
EB 7 S2	9-10-03 1243	<	54	308	1308
EB82S2 ~~EB 83 S2~~ glp	9-10-03 1212	<	53	309	1315
~~EB 0 S1~~ glp (EB1-S1 DUP)	9-10-03 1303	90.3	42	310	1319
EB 0 S1	9-10-03 1245	166.0	42	311	1323
EB10S2 (1)	9-10-03 1322	<	53	312	1344
EB10S1	9-10-03 1309	73.9	39	(VOID 313) 314 OK	1352
EB13S1	9-10-03 1339	77	40	~~314~~ 315	1357
EB10S2 (2)	9-10-03 1322 Precision Samples for non-detect	<	53	316	1401
" (3)		<	53	317	1404
" (4)	"	<	55	318	1408
" (5)	"	<	55	319	1411
" (6)	"	<	53	320	1415
" (7)	"	<	54	321	1418
EB22S1	9-10-03 1345	267	46	322	1421
EB16S1	9-10-03 1330	615	58	323	1425
EB16S2	9-10-03 1340	232	48	324	1430
EB13S2	9-10-03 1359	< *	53	325	1434
EB25S1	9-10-03 1420	266	49	326	1438
XRF CALIBRATION CHECK 1440 Hrs		High Pb 5700 Screen 327	±200	Med. Pb. 1070 ±74 328	Low Pb < ±60 329
EB22S2	9-10-03 1415	< *	55	330	1454
EB19S1	9-10-03 1410	184	44	331	1459
EB19S2	9-10-03 1437	< *	53	332	1503
EB20S1	9-10-03 1445	631	59	333	1507
EB25S2	9-10-03 1445	< *	53	334	1511
EB28S2	9-10-03 1510	< *	55	335	

* = run precision samples

9-10-03 Evergreen Berm Bagged Samples, continued...

SAMPLE ID	Sample Date and Time	XRF Reading	Precision ±	Screen	Time Measured	NOTES
XRF FINAL DAILY CALIBRATION Check 1518 Hrs.	High Pb 5680 ± 200 Screen 336 Med. Pb 1150 ± 77 Screen 337		Low Pb. < ±59 Screen 338 Blank < 38 339		1531	end of day

9-11-03 -> Evergreen Berm Samples.

SAMPLE ID	Sample Date	XRF Reading	Precision +-	Screen	Time measured	Notes
0943 XRF CAL CHECK ->	High	Pb = 5790 ±200 Screen 341	Med Pb = 1050 ±72 342		Low < ±60 343	Blank < ±37 344

BEGIN BAGGED SAMPLE ANALYSIS from Berm

SAMPLE ID	Sample Date	XRF READING	Precision +-	Screen	Time Measured	NOTES
EB74S1	9-11-03 0925	1620	83	345	1000	GP, Dark ~~tor~~ Brown
EB74S2	9-11-03 0951	239	42	346	1004	GP-GM Dark brown
EB65S1	9-11-03 0924	412	49	347	1010	Dark Brown GP-GM
EB65S2	9-11-03 0932	260	45	348	1015	Dark Brown GP-GM
EB56S1	9-11-03 0915	13,700	450	349	1018	GP, Bullet fragments sieved
EB56S2	9-11-03 0935	165	41	350	1024	GP Dark Brown
EB2S1	9-11-03 0905	352	47	351	1028	GP-GM Brown
EB2S2	9-11-03 0925	94.6	38	352	1032	GP-GM
EB83S1	9-11-03 1005	1140	71	353	1037	GP-GM Brown
EB83S2	9-11-03 1022	98.7	35	354	1042	GP-GM
BB11S1	9-11-03 0955	1600	83	355	1052	Dark Brown
EB20S1	9-11-03 1013	1150	74	356	1101	Brown
EB20S2	9-11-03 1036	128	43	357	1109	Brown
EB11S2	9-11-03 1006	1800	100	358	1116	Brown
EB84S1	9-11-03 1055	365	52	~~359~~ 360 g/p	1124	Brown
no measurement g/p				359		
EB84S2	9-11-03 1105	<	69	361	1130	Brown
EB75S1	9-11-03 1103	25,800	960	362	1133	Bullet fragmen[ts]

084
09
09
0900 - 13
14

Weather: Overcast, 65°F
Light rain at times

9-11-03 Field Activity Notes

0845 - Arrive on site at Berm - Plan briefed
Marsh, Bates, Kerwin, and Puckett on site.
0904 - XRF started for 15 min. warmup period
Middle + upper berm samples collected today
0943 - XRF calibration check
0900 - 1340 hrs. XRF Analysis and sample pora digging
Bullet fragments sieved out of EB5651 (and seen in pit)
and other locations on berm

1430 Depart site approx. time

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
XRF Check	High Pb = 363 screen	5680	200			
1144	Med Pb = 364 screen	1170	76			
calibration	Low Pb = 365 screen	<	62			
Bag Samples	from Evergreen Berm					
EB 75 S2	9-11-03 1114	5180	180	366	1214	GP Bullet fragments
EB 66 S1	9-11-03 1115	32,900	1000	367	1219	bullet fragments
EB 66 S2	9-11-03 1128	2960	120	368	1225	
EB 21-S1	9-11-03 1221	51,000	2000	369	1232	bullet fragment
EB 12 S1	9-11-03 1218	14,700	460	371 ~~370~~ glp	1239	GP-GM bullet fragm
EB 12 S2	9-11-03 1224	4160	170	372	1245	GP
no measurement				370		
EB 21 S2	9-11-03 1235	36,500	1300	373	1250	bullet frag
EB 3 S1	9-11-03 1216	12,200	350	374	1255	rust pockets
EB 3 S2	9-11-03 1227	893	78	375	1300	~~bullet frag~~ glp
EB 30-S1	9-11-03 1254	2460	110	376	1307	no S-2 sample no wallstrength Bullet fragment
EB 85 S1	9-11-03 1257	3420	130	377	1320	GP-GM
EB 85 S2	9-11-03 1306	1960	92.0	378	1325	GP GM
EB 86 S1	9-11-03 1256	154	40	379	1332	
EB 86 S2	9-11-03 1314	181	47	380	1336	
EB 87 S1 ①	9-11-03 1340	<	56	381	1345	
EB 87 S1 ②	9-11-03 1340	71.3	36	382	1349	
EB 87 S1 ③	"	<	55	383	1351	
EB 87 S2	9-11-03 1351	<	62	384	1359	
XRF Calibration	High Pb = 5750		200	385		
Final check	Med Pb = 1170		76	386		
1400 hrs	Low Pb = <		62	387		
	Blank = <		37	388		

1300hrs Sample location EB30-S2
unable to sample at 12"-24" depth
location too rocky - no wall strength

1257hrs J Marsh collected sample location
EB85 ca 20' N of EB3.

1300hrs S Bates collected sample location
EB86 ca. 20' S of EB84.

1340hrs J Marsh collected sample location
EB87 ca 37' N of ~~SB5~~ glp EB5 and 25'
N of EB3

9-11-03 continued

Work in District Lab

1606 Start up XRF

			Precision ±	Screen	Time
XRF Calibration Check @ 1613	High Pb	5610 →	±200 →	390	1615
	Med. Pb	1060 →	±73 →	391	1618
	Low Pb	< →	±62 →	~~1622~~ 392	1622
	Blank —	< →	±35 →	~~1625~~ 393	1625

Precision Samples

SAMPLE ID		SAMPLE DATE + TIME	XRF READING	Precision +−	Screen	Time measured	NOTES
EB87S1	1	9-11-03 1340	<	Previously run	—	—	Precision Started in field
"	2	"	73		—	—	
"	3	"	<		—	—	
"	4	"	64.3	39	394	1632	
"	5	"	56.8	35	395	1636	
"	6	"	<	62	396	1639	
"	7	"	54.1	35	397	1643	
EB87S2	1	9-11-03 1351	<	50	398	1648	
"	2	"	<	47	399	1652	
"	3	"	<	48	400	1655	Precision Samples
"	4	"	<	48	401	1658	
"	5	"	<	50	402	1701	
"	6	"	<	51	403	1705	
"	7	"	<	58	404	1709	(*Reading 405 VOID)
←EB87S1 ~~EB87S2~~ (cup)		"	98.5	38	* 406	1714	
EB65S2	1	9-11-03 0932	266	45	407	1718	
	2	"	250	44	408	1720	
	3	"	325	46	409	1725	Break taken after this run
	4	"	294	45	410	1754	
	5	"	282	45	411	1758	
	6	"	237	43	412	1801	
	7	"	277	46	413	1805	
			259	56	414	1808	

SAMPLE

XRF Fina[l] Calibrat[ion] Check

9-12-03

XRF (

Precison Samp[les]

Sample I[D]

EB20S1

EB84S2

9-11-03 District Lab work continued

SAMPLE ID	Sample Date + Time	(ppm) XRF READING	Precision ±	Screen	Time measured	NOTES
XRF Final Calibration check	Calibration Time	High 5720 Med. 1130 Low <	200 74 60	415 416 417	1812 1815 1818	Last check of day prior to shutting down instrument

NOTES

9-12-03 Work in District Lab 0845 startup XRF

XRF calibration check

Precision started in field

High Pb ⇒	5620	200	419	0950	
Med Pb ⇒	1090	75	420	0954	
Low Pb ⇒	<	62	421	0958	
Blank ⇒	<	37	422	0901	

Precision Samples

Sample ID	Sample Date & Time	XRF Reading	~~Precision~~ 91F Precision ±	Screen	Time Measured	Notes
EB2051 ①	9-11-03 1013	1040	71	423	0906	
②	"	1080	73	424	0910	
③	"	971	74	425	0917	
④	"	1040	74	426	0920	
⑤	"	1020	71	427	0924	
⑥	"	1090	72	428	0928	
⑦	"	1140	75	429	0930	
EB84S2 ①	9-11-03 1105	<	59	430	0936	
②	"	97.9	40	431	0941	
③	"	<	52	432	0946	
④	"	<	53	433	0949	
⑤	"	<	55	434	0954	
⑥	"	<	55	435	0958	
⑦	"	<	56	436	1000	

recision samples

ding VOID)

ank taken r this run

9-12-03 District Lab work continued

Sample ID	Sample Date/Time	XRF Reading (ppm)	+- Precision	Screen	Time Measurement	Notes
9/12/03 Precison Samples						
EB74 S2 ①	9/11/03-0951	192	46	437	1006	
" ②	"	198	44	438	1009	
" ③	"	215	45	439	1014	
" ④	"	202	42	440	1017	
" ⑤	"	273	47	441	1021	
" ⑥	"	287	48	442	1025	
" ⑦	"	217	43	443	1029	
EB83 S2 ①	9-11-03 1022	122	38	444	1032	
" ②	"	146	42	445	1036	
" ③	"	113	43	446	1040	
" ④	"	107	38	447	1044	
" ⑤	"	111	39	448	1047	
" ⑥	"	166	38	449	1051	
" ⑦	"	145	38	450	1054	
XRF Calibration Check						
	High Pb	5480	190	451	1059	
1100hrs	Med Pb	1110	76	452	1102	
	Low Pb	<	61	453	1105	
Precision Samples	Blank	<	39	454	1109	
EB2 S2 ①	9/4/03-0925	136	40	455	1112	
" ②	"	68.1	38	456	1116	
" ③	"	76.5	39	457	1119	
" ④	"	56.5	37	458	1123	
" ⑤	"	76.9	38	459	1127	
" ⑥	"	149	40	460	1131	
" ⑦	"	120	39	461	1134	

Sample
precision
EB1_S2
"
"
"
"
"
"
EB151
EB151(
XRF Cal
1251 h

9-12-03 District Lab work continued

Sample ID	Sample Date/Time	XRF Reading	Precision +/-	Screen	Time Measurement	Notes
precision samples XRF'd		9/12/03				
EB1_S2 ①	9/10/03-1055	<	59	462	1139	
" ②	"	<	61	463	1142	
" ③	"	<	65	464	1145	
" ④	"	<	63	465	1149	
" ⑤	"	<	68	466	1153	
" ⑥	"	<	64	467	1156	
" ⑦	"	114	43	468	1200	
EB1S1 ①	9-10-03 0935	290	77	469	1205	
②		269	52	470	1207	
③	"	150	50	471	1211	
④	"	159	62	472	1215	
⑤	"	418	70	473	1219	
⑥	"	192	63	474	1222	
⑦	"	256	53	475	1225	
EB1S1(Dup) ①	9-10-03 1303	79.8	51	476	1229	
②	"	261	71	477	1232 ~~1233~~ glp	
③	"	170	49	478	1235	
④	"	182	54	479	1239	
⑤	"	145	50	480	1243	
⑥	"	200	48	481	1246	
⑦	"	271	51	482	1250	
XRF Calibration check				~~483~~ glp		
1251 hrs	High Pb	5920	210	483	1254	
	Med Pb	1170	78	484	1258	
	Low Pb	<	62	485	1300	
	Blank	<	39	486	1304	

9-12-03 District Lab work Continued

precision samples 9/12/03

Sample ID		Sample Date + Time	XRF Reading (ppm)	Precision +/-	Screen	Time Measured	Notes
EB4S2	①	9-10-03 1122	<	59	487	1312	
	②	"	<	66	488	1315	
	③	"	<	55	489	1318	
	④	"	<	62	490	1320	
	⑤	"	<	56	491	1327	
	⑥	"	<	56	492	1331	
	⑦	"	<	55	493	1335	
EB7S1	①	9-10-03 1233	109	45	494	1345	
	②	"	<	89	495	1348	
	③	"	77.5	45	496	1351	
	④	"	98	46	497	1355	
	⑤	"	86.2	41	498	1358	
	⑥	"	72.8	41	499	1402	
	⑦	"	68.6	44	500	1407	
EB7S2	①	9-10-03 1243	<	55	501	1414	
"	②	"	<	59	502	1416	
"	③	"	<	60	503	1419	
"	④	"	71.2	40	504	1424	
"	⑤	"	<	56	505	1427	
"	⑥	"	<	57	506	1430	
"	⑦	"	<	55	507	1433	
EB10S1	①	9-10-03 1309	61.2	40	508	1437	
"	②	"	<	58	509	1442	
"	③	"	79.5	41	510	1446	
"	④	"	<	60	511	1448	
"	⑤	"	71.1	41	512	1453	
"	⑥	"	<	59	513	1456	
M	⑦	"	<	56	514	1500	

Sample

XR

1500

Precision Sa

EB13 S

EB13S

EB16S2

Sample ID	Sample Date & Time	XRF Reading (ppm)	Precision +/-	Screen	Time Measured	Notes
XRF Calibration Check						
1500 hrs	High Pb	5620	200	515	1503	
	Med Pb	1100	76	516	1507	
	Low Pb	<	62	517	1511	
Precision Samples	Blank Pb	<	37	518	1515	
EB13S2 ①	9-10-03 1359	<	94	519	1522	
②	"	<	72	520	1525	
③	"	<	61	521	1529	
④	"	<	80	522	1531	
⑤	"	<	58	523	1535	
⑥	"	<	57	524	1539	
⑦	"	<	59	525	1543	
EB13S1 ①	9-10-03 1339	<	77	526	1547	
②	"	<	71	527	~~1556~~ glp 1552	
③	"	<	73	528	1556	
④	"	<	67	529	1600	
⑤	"	<	66	530	1602	
⑥	"	<	68	531	1605	
⑦	"	<	62	532	1608	
EB16S2 ①	9-10-03 1340	173	60	533	1614	
②	"	145	43	534	1617	
③	"	187	47	535	1620	
④	"	104	46	536	1624	
⑤	"	163	47	537	1627	
⑥	"	160	44	538	1630	
⑦	"	169	44	539	1634	

9-12-03 District Lab Work Continued

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB1952 ①	9-10-03 1437	<	62	540	1638	539 = no reading
②	"	72.6	47	541	1641	
③	"	<	64	542	1645	Break taken after this run
④	"	74.7	39	543	1648	~~Break~~ glp ↓
⑤	"	<	62	544	1700	
⑥	"	<	61	545	1703	
⑦	"	<	60	546	1707	
Final XRF	Calibration check of the day				1708 hrs	
	High Pb	5680	200	547	~~1712~~ glp	1712
	Med Pb	1140	77	548	1715	
	Low Pb	<	62	549	1720	
	Blank	<	38	550	1723	
9-13-03 District Lab work continued						
initial XRF calibration check					1225 hrs	no reading for #551
	High Pb	5760	200	552		
	Med Pb	1140	77	553		
	Low Pb	<	62	554		
	Blank	<	37	555		

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB22S1 ①	9-10-03 1345	233	59	556	1248	
②	"	301	64	557	1252	
③	"	402	57	558	1255	
④	"	383	55	559	1259	
⑤	"	308	61	560	1301	
⑥	"	390	60	561	1305	
⑦	"	422	68	562	1308	

9-13-03 District Lab work Continued

Sample ID		Sample Date & Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB22S2	1	9-10-03 1415	<	120	563	1315	
	2	"	<	79	564	1319	
	3	"	<	170	565	1321	
	4	"	<	84	~~567~~ 566 alp	1325	
	5	"	<	79	~~568~~ 567 alp	1328	
	6	"	<	74	568	1331	
	7	"	<	89	569	1335	
EB26S1	1	9-10-03 1420	234	54	570	1340	
	2	"	239	73	571	1343	
	3	"	316	52	572	1346	
	4	"	222	47	573	1350	
	5	"	216	58	574	1355	
	6	"	285	49	575	1359	
	7	"	198	56	576	1401	break after this run
EB25S2	1	9-10-03 1445	<	66	577	1412	
	2	"	<	69	578	1415	
	3	"	<	60	579	1419	
	4	"	<	57	580	1422	
	5	"	<	59	581	1425	
	6	"	<	62	582	1429	
	7	"	<	60	583	1433	
EB28S2	1	9-10-03 1510	<	110	584	1436	skipped #7 ran sample later
	2	"	<	65	585	1440	
	3	"	<	73	586	1443	
	4	"	<	67	587	1446	
	5	"	<	78	588	1450	
	6	"	<	74	589	1453	break after this run
	7	"	<	66	608	1607	

otes
= no reading
taken this run
K alp ↓
eading #557
tes

9-13-02 District labwork continued

	Sample Date + Time	XRF Reading	Precision +/-	Screen			Sampl
XRF Calibration Check 1500 hrs							EB61
	High Pb	5670	200	590			
	Med Pb	1100	76	591			
	Low Pb	<	62	592			
	Blank	<	37	593			

Sample ID		Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes	
EB 55-S1	1	9-10-03 0928	302	61	594	1520		
	2	"	218	56	595	1524		XRF
	3	"	239	54	596	1526		
	4	"	367	62	597	1530		
	5	"	298	57	598	1534		
	6	"	501	79	599	1536		
	7	"	241	51	600	1540		Samp
EB 55 S2	1	9-10-03 0950	<	75	601	1544		EB64
	2	"	<	63	602	1547		
	3	"	<	64	603	1550		
	4	"	<	59	604	1554		
	5	"	<	64	605	1556		
	6	"	<	80	606	1600		
	7	"	<	58	607	1604	break after run	
EB61S1	1	9-10-03 0935	405	66	609	1618		EB67
	2	"	364	55	610	1621		
	3	"	426	58	611	1625		
	4	"	398	50	612	1629		
	5	"	245	47	613	16032		
	6	"	398	58	614	1635		
	7	"	319	51	615	1640		

9-13-02 District Lab work continued

Sample ID		Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB6152	1	9-10-03 0955	<	55	616	1643	
	2		<	59	617	1646	
	3		<	57	618	1650	
	4		<	57	619	1654	
	5		<	63	620	1657	
	6		<	56	621	1700	
	7		<	56	622	1703	
XRF Calibration check				1704 hrs			
		High Pb	5560	190	623		
		Med Pb	1150	77	624		
		Low Pb	<	60	625		
		Blank	<	37	626		
Sample ID		Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB6452	1	9-10-03 1030	<	65	627	1721	
	2		<	70	628	1725	
	3		<	66	629	1728	
	4		<	65	630	1731	
	5		<	60	631	1735	
	6		<	54	632	~~1740~~ 9/p	1737
	7		<	62	633	1742	
EB6751	1	9-10-03 1020	108	45	634	1745	
	2	"	<	57	635	1749	
	3	"	110	40	636	1752	
	4	"	82	42	637	1756	
	5	"	<	59	638	1800	
	6	"	<	57	639	1802	
	7	"	113	39	640	1805	break after this run

9-13-02 District Lab Work Continued

Sample ID		Sample Date + Time	XRF Read	Precision +/-	screen	Time measured	Notes
EB73S2	1	9-10-03 1100	<	61	641	1815	
	2	"	<	74	642	1819	
	3	"	<	60	643	1822	
	4	"	<	56	644	1825	
	5	"	<	59	645	1829	
	6	"	<	57	646	1832	
	7	"	<	62	647	1835	
EB67S2	1	9-10-03 1038	<	71	648	1839	
	2	"	<	57	649	1841	
	3	"	<	69	650	1845	
	4	"	<	55	651	1849	
	5	"	<	93	652	1852	
	6	"	<	93	653	1855	
	7	"	<	57	654	1859	
EB70S2	1	9-10-03 1114	<	70	655	1903	
	2	"	<	65	656	1906	
	3	"	<	57	657	~~1908~~	1910 9/p
	4	"	<	54	658	1914	
	5	"	<	55	659	1918	
	6	"	<	65	660	1921	
	7	"	<	55	661	1925	
XRF Calibration check				1925 hrs			
		High Pb	5980	210	662		
		Med Pb	1100	76	663		
		Low Pb	<	63	664		
		Blank	<	37	665		

XRF

Sample

XRF

Sample

EB52

EB52

EB58

XRF was downloaded @ 1945 hrs to 2000 hrs

Sample ID	Sample Date+Time	XRF Reading	Precision +/-	Screen	Time Measured	
XRF Calibration		check	2010 hrs		after download	
	High Pb	5500	200	2		
	Med Pb	1190	77	3		
	Low Pb	<	61	4		
	Blank	<	38	5		

Sample ID	Sample Date+Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB5251	~~9-2-03 9lp~~ ~~9-2-03 1421 9lp~~					
1	9-2-03 1421	238	49	6	2030	
2	"	221	77	7	2034	
3	"	224	65	8	2036	
4	"	260	48	9	2040	
5	"	359	56	10	2044	
6	"	247	50	11	2046	
7	"	194	46	12	2050	
EB5252 1	9-2-03 1452	<	98	13	2055	no reading
2	"	<	98	9lp ~~+4~~ 15	2059	for No. 14
3	"	102	51	9lp ~~+5~~ 16	2101	
4	"	74.5	47	9lp ~~+6~~ 17	2105	
5	"	<	78	9lp ~~+7~~ 18	2107	
6	"	134	49	9lp ~~+8~~ 19	2112	
7	"	129	49	9lp ~~+9~~ 20	2115	
EB5852 1	9-2-03 1447	<	63	21	2120	
2	"	82.2	49	22	2123	
3	"	<	57	23	2125	
4	"	111	43	24	2130	
5	"	103	42	25	2132	
6	"	<	56	26	2135	
7	"	<	61	27	2140	

9-13-02 District Lab Work
continued

Sample ID		Sample Date+Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB76-S1	1	9-10-03 1116	<	90	28	~~213~~ 2142	
	2	"	<	72	29	2146	
	3	"	70.2	45	30	2150	
	4	"	59.2	38	31	2155	
	5	"	<	74	32	2157	
	6	"	<	56	33	2159	
	7	"	<	66	34	2202	

XRF Calibration check 2203 hrs

	Reading	Precision	Screen
High	5390	190	35
Med	1070	77	36
Low	<	63	37

Sample ID		Sample Date+Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB76S2	1	9-10-03 1130	<	72	38	2215	
	2	"	<	71	39	2220	
	3	"	<	86	40	2223	
	4	"	<	72	41	2225	
	5	"	<	65	42	2230	
	6	"	<	55	43	2235	
	7	"	<	53	44	2237	
EB79S2	1	9-10-03	<	51	45	2240	
	2	"	<	56	46	2243	
	3	"	<	56	47	2246	
	4	"	<	58	48	2250	
	5	"	<	53	49	2253	
	6	"	<	54	50	2255	
	7	"	<	53	51	2300	

9-13-02 District Lab Work continued

Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB82S1 1	9-10-03 1230	199	51	52	2302	
2	"	194	44	53	2305	
3	"	250	46	54	2307	
4	"	196	49	55	2312	
5	"	191	46	56	2315	
6	"	159	43	57	2319	
7	"	166	45	58	2323	
final XRF calibration check				@ 2324		for 9-13-02
	High Pb	5710	200	59		
	Med Pb	1150	78	60		
	Low Pb	<	60	61		
	Blank	<	39	62		
9-15-03 initial calibration check				1045 hrs		@ Evergreen Berm
	High Pb	5490	200	64		
	Med Pb	1030	75	65		
	Low Pb	<	61	66		
	Blank	<	37	67		
EB90S1	9-15-03 1012	90.7	55	68	1108	
EB90S2	9-15-03 1035	<	60	69	1115	
EB88S1	9-15-03 1016	<	88	70	1123	
EB88S2	9-15-03 1046	<	78	71	1127	
EB90S1 1	9-15-03 1012	<	110	72	1131	
2	"	115	49	73	1135	
3	"	83.7	55	74	~~1138~~	1138
4	"	145	50	75	1142	
5	"	99.1	41	76	1146	
6	"	105	47	77	1150	
7	"	<	85	78	1154	break after this scan

9-15-03 Field Inspection Notes
0840 arrive at Evergreen Berm
V Henzi, L Scott, G Puckett
Weather: Overcast ca 52°F
Placed stakes for new samples
to determine extent of lead
contamination.
0946 started digging samples.
1045 started XRF initial calibration

Field crew departed Fort Lewis @ 1615 hrs

XRF
Sample
EB9
EB9
EB
EB
EB9
EB9
EB9

9-15-03 fieldwork continued

XRF Calibration check at			1305hrs			
	High Pb	5740	+/- 200	Screen No. 80		
	Med Pb	1090	75	81		
	Low Pb	<	62	82		
	Blank	<	37	83		
Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time measured	Notes
EB94S1	9-15-03 1130	<	69	84	1331	
EB94S2	9-15-03 1140	<	91	85	1335	
EB92S1	9-15-03 1116	<	86	86	1340	
EB92S2	9-15-03 1145	<	58	87	1345	
EB92S1 1	9-15-03 1116	83.6	42	88	1350	
2	"	85.7	38	89	1354	
3	"	78.4	48	90	1358	
4	"	78.4	40	91	1401	
5	"	180	51	92	1405	
6	"	87.8	49	93	1407	
7	"	109	40	94	1411	
EB92S2 1	9-15-03 1145	<	39	95	1416	
2	"	<	36	96	1420	
3	"	<	52	97	1423	
4	"	<	59	98	~~1432~~ g/p	1427
5	"	60.8	39	99	1431	
6	"	<	67	100	1435	
7	"	<	67	101	1438	
EB94S1 1	9-15-03 1130	<	71	102	1445	
2	"	<	79	103	1448	
3	"	<	67	104	1451	
4	"	<	76	105	1455	

Sample ID		Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB94S1	5	9-15-03 1130	<	70	106	1500	
	6	"	<	57	107	1502	
	7	"	<	65	108	1505	
Calibration check @ 1507 hrs							
		High Pb	5710	200	109		
		~~Low~~ Med	1170	77	110		
		Low Pb	<	62	111		
		Blank	<	38	112		
Sample ID		Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB96S1		9-15-03 1315	<	56	113	1525	
EB96S2		9-15-03 1400	<	66	114	1529	
EB98S1		9-15-03 1355	<	70	115	1532	
EB98S2		9-15-03 1430	<	75	116	1538	
EB97S2		9-15-03 1535	<	55	~~117~~	1542	
EB97S1		9-15-03	<	56	118	1545	
Final XRF Calibration				@ 1546	1		
		High	5820	190	119		
		Med	1030	76	120		
		Low	<	62	121		
		Blank	<	38	122		

Field Activities 9-18-03

0840 Arrived Fort Lewis 0840 hrs; proceeded to PW to give SAPs to Rich Wilson.
Arrived @ Evergreen Berm at 0855 hrs
soldiers Training in immediate area
∴ went to Skeet Range. Arrive
0910 Skeet Range approx. ~~0920~~ 0910 9/18 hrs
Weather overcast with light rain
Temp approx 60°F. Staked sample locations.

1436 Arrived at Evergreen Berm at 1436 hrs.
Digging at sample point locations
began at 1445 hrs.

Collected samples from the far side of
the berm, EB91S1 & S2, EB93S1 & S2.
Brought samples to District Lab
for XRF analysis

1450 Departed Evergreen Berm

9-20-03 District Lab Work for Evergreen Bern

Initial XRF Calibration Check 1320hrs

High Pb	5480 ± 200	124 (screen)
Med Pb	1050 ± 77	125
Low Pb	< ± 66	126
Blank	< ± 38	127

Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EF1S1 (cup)	9-9-03 1010hrs	69.4	38	128	1339	
EF2S1 "	9-9-03 1023	<	55	129	1342	
EF3S1 "	9-9-03 1100	<	55	130	1346	
EF4S1 "	9-9-03 1110	<	55	131	1349	
EB87S2 (cup) "	9-11-03 1351	<	51	132	1354	
EB88S1 "	9-15-03 1016	<	57	133	1358	
EB88S2 "	9-15-03 1046	<	56	134	~~13~~ 9P 1402	
EB90S1 "	9-15-03 1012	119	40	135	1406	
EB90S2 "	9-15-03 1035	86.8	38	136	1410	
EB92S1 "	9-15-03 1116	69.1	40	137	1414	
EB ~~94~~ 92 S ~~2~~ 9P "	9-15-03 ~~1130~~ 1145 9P	<	55	138	1417	
EB94S ~~2~~ 1 9P "	9-15-03 ~~1140~~ 1130 9P	<	54	139	1421	
EB94S2 "	9-15-03 1140	<	56	140	1425	
EB96S1 "	9-15-03 1315	<	53	141	1429	
EB96S2 "	9-15-03 1400	<	53	142	1433	
EB97S1 "	9-15-03 1515	<	52	143	1436	
EB97S2 "	9-15-03 1535	<	53	144	1439	
EB98S1 "	9-15-03 1355	68.4	37	145	1443	
EB98S2 "	9-15-03 1430	63.8	36	146	1446	break after this run
EB91S1 Bag	9-18-03 1455	<	65	147	1500	
EB91S2 "	9-18-03 1459	<	77	148	1504	
EB93S1 "	9-18-03 1459	70.6	43	149	1518	

9-20-03 District Lab Work continued

Sample ID	Sample Date+Time	XRF Reading	Precision +/-	Screen	Time Meas.	Notes
EB93S2 Bag	9-18-03 1515	<	80	150	1522	
XRF Calibration Check @			1525	~~151~~	91P	
	High Pb	5490	190	151		
	Med Pb	1130	77	152		
	Low Pb	<	62	153		
	Blank	<	39	154		
EB99S1 Bag	9-18-03 1530	1110	76	155	1540	
EB99S2 Bag	9-18-03 1545	386	58	156	1544	
EB91S1 Cup	9-18-03 1455	<	56	157	1606	
EB91S2 Cup	9-18-03 1459	<	56	158	1610	
EB93S2	9-18-03 1515	<	55	159	1613	
XRF Calibration Check final of day @					1614	
	High Pb	5520	200	160		
	Med Pb	1080	76	161		
	Low Pb	<	63	162		
	Blank	<	39	163		

DEC 2003

9-22-03 field Work - Skeet Range, North Ft Lewis

Team: Joseph Marsh, Glen Terri, Gwyn Puckett

0855 - Arrive on site - meet backhoe operator

0920 - Startup XRF - Niton XL
Resolution: 698 eV Sorce Strength 10 mci
weather: sunny, clear, mild, 60°F
Backhoe Operator: John Jenkins, General Equipment (J+B)

XRF calibration check start of day →

Time: 0956 High 5636 ± 200 Screen 165 Med. 1050 ± 27 Screen 166 Low 71.6 ± 43 Screen 167
Blank < ± 39 Screen 168

Dosimeter Reading: 31 mRoentgens < = Below detection Limit

SKEET RANGE SAMPLE ID	Sample Date + Time	XRF READING	PRECISON ±	SCREEN	Time measured (Start)
ST1S1	9-22-03 0953	<	53	169	1010
ST2S1	9-22-03 0935	<	51	170	1014
→ ST3S1	9-22-03 0940	295	45	171	1018
→ ST4S1	9-22-03 0955	57.2	34	172	1030
ST5S1 (0-6")	9-22-03 0945	<	55	173	1036
→ ST6S1 (0-6")	9-22-03 1005	154	39	174	1040
ST7S1 (0-6")	9-22-03 1010	<	51	175	1055
ST8S1 (0-6")	9-22-03 1025	<	48	176	1059
ST9S1 (0-6")	9-22-03 1033	<	50	177	1103
OUT OF SEQUENCE → ST17S1 (0-6")	9-22-03 1000	82.5	34	178	1108
→ ST16S1 (0-6")	9-22-03 1010	179	39	179	1111
→ ST39S1 0-6"	9-22-03 1058	149	39	180	1128
→ ST38S1 0-6"	9-22-03 1050	401	45	181	1131
→ ST37S1 0-6"	9-22-03 1043	918	60	182	1134
→ ST36S1 0-6"	9-22-03 1035	375	41	183	1139
→ ST35S1 0-6"	9-22-03 1025	978	58	184	1144
ST12S1 0-6"	9-22-03 1105	<	50	185	1148

T Lewis 9-22-03 cont.

*NOTE: Digging permit was not obtained for This site due to mis-communication with FL Public Works - Digging 0-6" approved, but dig permit will still be processed per Troy Bussey.
* Digging Equipment: FERMEC 710 B Backhoe
* Dig permit ready by wednesday.

Soil observations so far...

ST1 → GM silty sandy gravel 0-12" ST2 → GM 0-12"

ST3 → GM 0-12" ST4 → GM 0-12"

ST5 → GM 0-6" ST6 → 0-6" GM

(J+B) ST7 → 0-6" GM, silty sandy gravel ST8 → 0-6" GM

ST9 → GM, ST17 → GM, ST16 → GM, ST39 → GM,

ST38, ST37, ST36, ST35, ST12 = all GM

Sreen 167

SKEET RANGE SOIL ANALYSIS CONTINUED

Skeet Range SAMPLE ID	SAMPLE DATE AND TIME	XRF READING	PRECISION +-	SCREEN	TIME MEASURED	Soil NOTES
~~ST12~~ 14 S1 Dupe 0-6"	9-22-03 1125	<	48	186	1153	

XRF calibration check after Lunch Break

Time: ~~1250~~ 1306 High 5810 ±200 Screen 188 Med. 1120 ±77 Screen 189 Low ± Scr. < ±63 190

Sample ID	Sample date and time	XRF Reading	Precision +-	Screen	Time Measured	
ST10 S1 0-6"	9-22-03 1126	229	40	191	1320	~~GP~~ GM
ST11 S1 0-6"	9-22-03 1119	232	40	192	1323	GM
ST13 S1 0-6"	9-22-03 1056	51.6	34 ~~34~~	193	1327	GM
ST15 S1 0-6"	9-22-03 1058	58.2	34	194	1331	GM
ST19 S1 0-6"	9-22-03 1145	228	40	195	1338	GM
ST20 S1 0-6"	9-22-03 1156	54.6	32	196	1343	GM
ST21 S1 0-6"	9-22-03 1105	143	35	197	1347	GM
ST22 S1 0-6"	9-22-03 1140	246	41	198	1351	GM
ST23 S1 0-6"	9-22-03 1128	179	37	199	1354	GM
ST ~~22~~ 31 DUP S1 0-6"	9-22-03 1150	446	45	200	~~1402~~ 1402	GM
ST18 S1 0-6"	9-23-03 1140	<	51	201	1407	GM
ST3 S2 6-12" ~~0-6"~~	9-23-03 1300	312	44	202	1411	GM
ST4 S2 6-12 ~~0-6"~~	9-23-03 1310	<	51	203	1415	GM
ST6 S2 6-12 ~~0-6"~~	9-23-03 1316	84.9	35	204	1419	GM

9-22-03 SKEET RANGE NOTES cont

1215-1245 - Lunch Break

1245 - resume work → 0-6" holes dug on North side of project to define contamination boundary.

1252 - XRF restarted for 15 min. warmup prior to running Calibration check and resuming analysis.

ST14 and ST31 not staked or sampled

Two Duplicate samples were collected at sample points ST12 (1105 Hrs) and ST22 (1140 Hrs). Fictitious I.D's & times were assigned to the dups as follows for ST12, ST14 (1125 Hrs) was assigned. For ST22, ST31 (1150 Hrs) was assigned.

9-22-03

SKEET RANGE ANALYSIS CONTINUED

SAMPLE ID	Sample Date and Time	XRF Reading	Precision + -	SCREEN	Time Measured	Soil Notes
ST24S1 0-6"	9-22-03 1120	65.1	33	205	1425	GM
ST25S1 0-6"	9-22-03 1319	623	61	206	1430	GP-GM
ST26S1 0-6"	9-22-03 1312	169	37	207	1433	GM
ST27S1 0-6"	9-22-03 1306	193	38	208	1437	GM
ST28S1 0-6"	9-22-03 1326	162	37	209	1441	GM
ST29S1 0-6"	9-22-03 1258	131	35	210	1444	GM
ST30S1 0-6"	9-22-03 1020	205	39	211	1449	GM
ST32S1 0-6"	9-22-03 1348	1750	84	212	1453	GM *(No reading 213)
ST40S1 0-6"	9-22-03 1355	159	40	*214	1457	GM → Faulty data
ST43S1 0-6"	9-22-03 1429	109	34	215	1501	GM
ST41S1 0-6"	9-22-03 1400	53.3	35	216	1504	GM
ST42S1 0-6"	9-22-03 1350	<	40	217	1508	GM
ST42S2 6-12"	9-22-03 1355	126	36	218	1512	GM
ST44S1 0-6"	9-22-03	1170	71	222 ~~219~~	1528	GM
XRF CALIBRATION CHECK	9-22-03 1516 ~~9-22-03~~	High Pb 5660 ±	200	Screen 219	Med Pb 1190 ± 80	Screen 220
		Low Pb < ±	62	Screen 221		

SAMPLE ID	Sample Date and Time	XRF Reading	Precision + -	Screen	Time Measured	Soil Notes
ST45S1 0-6"	9-22-03 1437	1010	67	223	1533	GM
ST46S1 0-6"	9-22-03 1422	1010	66	224	1537	GM
ST47S1 0-6"	9-22-03 1458	669	54	225	1541	GM
ST48S1 0-6"	9-22-03 1445	242	41	226	1545	GM
ST49S1 0-6"	9-22-03 1505	123	37	227	1549	GM
ST33S1 0-6"	9-22-03 1505	1180	64	228	1554	GM
ST50S1 0-6"	9-22-03 1450	<	55	229	1558	GM

END OF DAY CALIBRATION CHECK

High Pb 5690 ± 200 Screen 230 Low Pb < ± 61 Screen 231

9-22-03 [signature]

9-23-03 Field Activities

1230 - Terri and Marsh on site - Miller Hill
for staking Pistol range and Picnic Area
Sample Points

(★ 1115★ Note: samples delivered to ARI for Skeet Range
PAH sample analysis - soil from S1 depths)

1325 - set up at Evergreen Berm for additional Sample
point,

Sample Point EB100 20' West of EB88.
EB100S1 collected 1345 (0-12" interval)
EB100S2 collected 1400 (12-24" interval)

End of field work, return to District office.

9-23-03
[signature]

9-23-03 Lab Work for extra Evergreen Berm Data

XRF initial Calibration 1538 hrs

High Pb	5840	210±	Screen	233
Med Pb	1100	77±		234
Low Pb	<	64±		235
Blank	<	39		236

Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time measured
EB10051	9-23-03 1345	100	41	238 *	1602
EB10052	9-23-03 1400	<	63	239	1606

*no screen 237 time error

Final XRF Calibration and Shut down 1607hrs

High Pb	5790	210±	~~239~~ 240 glp Screen
Med Pb	1110	77±	241
Low Pb	<	63±	242
Blank	<	37±	~~242~~ 243 glp

9-23-03 glp

DEC 2003

GPS READINGS FOR
MILLER HILL FORMER PISTOL RANGE, FT. LEWIS, WA.
DATE: 9/24/03 TIME: 1400 - 1426 HRS.

SAMPLE POINT	COORDINATES	PDOP	
MH1	LAT. 47° 05' 38.72" LONG. 122° 34' 13.66"	3.2	(6 satellites)
MH2	LAT. 47° 05' 38.83" LONG. 122° 34' 13.47"	3.2	6 Sat.
MH3	LAT. 47° 05' 38.47" LONG. 122° 34' 13.49"	4.5	5 Sat.
MH4	LAT. 47° 05' 38.94" LONG. 122° 34' 13.12"	2.3	6 Sat.
MH5	LAT. 47° 05' 38.76" LONG. 122° 34' 13.15"	2.5	7 Sat.
MH6	LAT. 47° 05' 38.66" LONG. 122° 34' 12.98'	3.3	6 Sat.
MH7	LAT. 47° 05' 38.80' LONG. 122° 34' 12.87'	3.3	5 Sat.
MH8	LAT. 47° 05' 38.86' LONG. 122° 34' 12.58'	2.5'	6 Sat.
MH9	LAT. 47° 05' 38.86' LONG. 122° 34' 12.41'	2.5	6 Sat.
MH10	LAT. 47° 05' 38.83' LONG. 122° 34' 12.33'	3.6'	6 Sat.
MH11	LAT. 47° 05' 38.83' LONG. 122° 34' 12.22	3.9'	5 Sat.
MH12	LAT. 47° 05' 38.62' LONG. 122° 34' 12.15'	4.0	5 Sat.
MH13	LAT. 47° 05' 38.84' LONG. 122° 34' 11.91'	2.6	6 Sat.
MH14	LAT. 47° 05' 38.84' LONG. 122° 34' 11.79'	2.6	6 Sat.
MH15	LAT. 47° 05' 38.81' LONG. 122° 34' 11.53'	2.5	7 Sat
MH16	LAT. 47° 05' 38.31' LONG. 122° 34' 11.73'	2.6	7 Sat.
MH17	LAT. 47° 05' 38.78' LONG. 122° 34' 11.49'	2.6	7 Sat.
MH18	LAT. 47° 05' 38.62' LONG. 122° 34' 11.32'	2.6	7 Sat.
MH19	LAT. 47° 05' 38.75' LONG. 122° 34' 11.09'	2.7	7 Sat.

9-25-03 Skeet Range additional sampling

0820 ~ Arrive onsite Marsh + contractor John Jenkins
Jenkins provided with new map and Plan briefing

0840 — Veronica Henzi and Sarah Bates arrive
~ Sampling begins after briefing of safety + Plan
- Sample log.

Sample ID	Date collected	time
ST53S1	9-25-03	0840
ST53S2	"	0850
ST55S1	"	0905
ST55S2	"	0910
ST3S2	"	0855
ST52S1	"	0900
ST52S2	"	0858
ST38S2		0925

9-25-03 Skeet Range Continued

XRF Calibration check at 1250

			Reading
High Pb	5750	±200	245
Med Pb	1190	±79	246
Low Pb	<	±63	~~277~~ 247
Blank	<	±36	248

Dosimeter approx 31 milli roentgens reading
Model: Arrowtech 138. SN 084097.

Skeet Range Playground composite sample Measurement - (4 points)

Sample ID	Date + Time	XRF Reading	+- Precision	Screen	Time Measured
ST77COMP	9-25-03 1155	53.7	±34	249	1305
Center of Play area under wood chips - ST76S1	9-25-03 1130 ~~115~~	~~53.7~~ 103	~~±34~~ 30	~~249~~ 250	~~1305~~ 1310
Gravel Road ST75S1	9-25-03 1130	212	46	251	1314

C

O8

Picn.
Samp
PA
PA
~~PA~~
PA
PA
PA
PA
PA
PA2
PA2
PA1
PA1

9-26-03 Field Work at "Picnic Area"
~~Paxton~~ Miller Hill

0880 - Puckett and Menzi arrive on site
John Jenkins backfills pistol range pits
0845 - Marsh + Terri arrive
Sampling begins.
0930 - sampling ends - contractor backfills holes
0932 - XRF startup and self calibration - Perimeter samples First

XRF Calibration Check at 0950

	Results	Precision	Reading
High Pb	5860	± 210	253
Med. Pb	1080	± 75	254
Low Pb	<	± 61	255
Blank	<	± 38	256

Picnic Area Sample ID	Sample Date and Time	XRF READING	Precision ±	Screen	Time Measured
PA1S1	9-26-03 0850	<	± 56	257	1001
PA2S1	9-26-03 0853	57.1	± 35	258	1007
~~PA13S1~~ PA3S1	0854 ~~0843~~	130	± 38	259	1011
PA13S1	9-26-03 0843	<	±56	260	1015
PA8S1	9-26-03 0849	59	34	261	1019
PA4S1	9-26-03 0919	136	35	262	1023
PA14S1	9-26-03 0843	<	55	263	1027
PA9S1	9-26-03 0915	282	42	264 → 266	1031
PA20S1	9-26-03 0903	53.7	33	(265-FAULT)	1040
PA21S1 (New)	9-26-03 1030	280	42	267	1044
PA15S1	9-26-03 0911	87.1	36	268	1047
PA18S1	9-26-03	68.3	33	269	1051

XRF instrument powered down
and sampling team / contractor depart site
at approx. 1115 Hrs.

* Yellow barricades returned to Public Works.

9-26-03
XRF Analysis in District Lab. *Dosimeter at Approx. 31 mR

1326 XRF Niton XL Powered up for self-calibration
-Start XRF cup Standards calibration check

	Reading	Precision	Screen	Time measured
High Pb	5500	±200	271	1343
Med Pb	1070	±77	272	1347
Low Pb	<	±62	273	1352
Blank Pb	<	±38	274	1355

Miller Hill Pistol Range Sample analysis all samples from 0-12" (S1) and 12"-~~12~~24" (S2) depths.

SAMPLE ID	Date and Time collected	XRF Measurement	Precision +\-	Screen	Reading Time	Soil notes
MH1S1	9-25-03 1623	324	43	275	1401	GM
MH1S2	9-25-03 1626	229	41	276	1406	GM
MH2S1	9-25-03 1621	477	50	277	1410	GM
MH2S2	9-25-03 1624	182	37	278	1414	GM
MH3S1	9-25-03 1615	574	51	279	1418	GM
MH3S2	9-25-03 1619	458	46	280	1423	GM
MH4S1	9-25-03 1615	797	56	281	1427	GM
MH4S2	9-25-03 1620	727	57	282	1431	GM
MH5S1	9-25-03 1611	767	58	283	1435	GM
MH5S2	9-25-03 1615	221	41	284	1439	GM
MH6S1	9-25-03 1606	703	58	285	1442	GP-GM
MH6S2	9-25-03 1609	~~396~~ 393	46	286	1446	GP-GM
MH7S1	9-25-03 1605	834	66	287	1451	GP-GM
MH7S2	9-25-03 1610	446	51	288	1455	GP-GM
MH8S1	9-25-03 1601	294	47	289	1500	GP-GM
MH8S2	9-25-03 1604	219	42	290	1506	GP-GM
MH9S1	9-25-03 1354	1780	90	291	1510	GP-GM
MH9S2	9-25-03 1353	934	68	292	1514	GP-GM
MH10S1	9-25-03 1555	1560	84	293	1517	GP-G

*XRF Calibration Check at 1528 High Pb 5560 ± 200 Screen 296 Med. Pb 1140 ± 78 Screen 297
Low Pb ± Screen

9-26-03 continued...

XRF Analysis in District Lab

SAMPLE ID	Date and Time Collected	XRF Measurement	Precision +/−	Screen	Read Time	Soil Notes
MH10S2	9-25-03 1600	424	49	294	1521	GP-GM
MH11S1	9-25-03 1552	821	61	295	1525	GP-GM
MH11S2	9-25-03 1549	706	60	*299	1544	GP-GM
MH12S1	9-25-03 1542	1160	72	300	1548	GP-GM
MH12S2	9-25-03 1544	788	58	301	1552	GP-GM
MH13S1	9-25-03 1538	519	55	302	1555	GP-GM
MH13S2	9-25-03 1540	237	44	303	1559	GP-GM
MH14S1	9-25-03 1545	107	39	304	1604	GP-G[redacted]
MH14S2	9-25-03 1550	113	38	305	1608	GP-GM
MH15S1	9-25-03 1542	139	39	306	1612	GP-GM
MH15S2	9-25-03 1537	86.9	37	307	1615	GP-GM
MH16S1	9-25-03 1534	255	45	308	1619	GP-GM
MH16S2	9-25-03 1530	108	39	309	1622	GP-GM
MH17S1	9-25-03 1535	269	41	310	1626	GM
MH17S2	9-25-03 1545	110	39	311	1630	GM
MH18S1	9-25-03 1530	222	42	312	1633	GM
MH18S2	9-25-03 1535	85.5	38	313	1637	GM
	Final XRF Calibration Check – end of Day					
	High Pb	5600	200	314	1641	
	Med Pb	1110	78	315	1644	
	Low Pb	<	63	316	1647	
	Blank	<	39	317	1651	

1652 – Instrument Power down
1655 – end of day – XRF locked in Geology Lab storeroom

9-27-03 District Lab Work

Initial XRF Calibration Check 0945

			Screen
High Pb	5680	± 200	319
Med Pb	1140	± 79	320
Low Pb	<	± 63	321
Blank	<	± 38	322

Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
ST 62S1	9-25-03 1000	534	72	323	1015	
ST 62S2	9-25-03 1005	157	45	324	1019	
ST 63S1	9-25-03 0945	184	53	325	1024	
ST 63S2	9-25-03 0955	172	40	326	1028	
ST 64S1	9-25-03 0943	409	61	327	1033	
ST 64S2	9-25-03 0947	325	52	328	1037	
ST 65S1	9-25-03 0944	93.5	37	329	1042	
ST 65S2	9-25-03 0947	96.1	38	330	1046	
ST 66S1	9-25-03 0930	205	57	332	1052	331 no reading
ST 44S2	9-25-03 1049	142	40	333	1058	
ST 43S2	9-25-03 1045	373	61	334	1103	
ST 45S2	9-25-03 1100	262	60	335	1108	
ST 47S2	9-25-03 1105	101	39	336	1112	
ST 25S2	9-25-03 1025	162	49	337	1117	
ST 3 S2	9-25-03 0855	127	41	338	1121	
ST 46S2	9-25-03 1058	55.3	35	339	1125	break after run
	XRF Calibration Check			1145		
	High	5710	200	340		
	Med	1100	78	341		
	Low	<	62	342		

9-27-03 District Lab Work

Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
ST34S2	9-25-03 0959	<	53	343	1200	
ST35S2	9-25-03 0920	54.2	33	344	1205	
ST36S2	9-25-03 0923	62.4	35	345	1210	
ST37S2	9-25-03 0927	116	39	346	1215	
ST32S2	9-25-03 1013	698	72	347	1220	
ST38S2	9-25-03 0925	144	42	348	1224	
ST34S1	9-25-03 0954	72.7	45	349	1228	
ST33S2	9-25-03 1013	221	43	350	1234	
ST67S1	9-25-03 0930	886	74	351	1238	
ST67S2	9-25-03 0935	106	42	352	1243	
ST66S2	9-25-03 0935	<	76	353	1256	
ST65S2	9-25-03 910	<	54	354	1300	
ST55S1	9-25-03 905	<	53	355	1305	
ST53S2	9-25-03 0850	<	71	356	1310	
ST53S1	9-25-03 0840	104	45	357	1315	
ST55S2	9-25-03 0858	<	59	358	1319	
ST51 ~~S2~~ glp	9-25-03 1040	<	65	359	1324	ST51S2
ST51S1 glp	9-25-03 1038	<	57	360	1328	ST51S1
ST52S1	9-25-03 0900	50.9	32	361	1333	
ST56S2	9-25-03 1112	83.2	46	362	1338	
ST56S1	9-25-03 1108	<	62	363	~~1333~~ glp	1343
ST58S1	9-25-03 0912	63.6	40	364	1348	
ST58S2	09-25-03 0915	77	35	365	1352	
	XRF Calibration Check			1354		
	High	~~5970~~ 5870	~~200~~ 210	~~366~~ 367	glp	no reading #366
	Med	1130	79	368		
	Low	<	62			

9-27-03 District Lab Work continued

Sample ID	Sample Date+Time	XRF Reading	Precision +/-	Screen	Time measured	Notes
ST61S2	9-25-03 1010	<	58	370	1412	
ST61S1	9-25-03 1000	<	51	371	1416	
ST59S2	9-25-03 1059	156	54	372	1420	
ST59S1	9-25-03 1055	112	46	373	1425	
EB31S1 ①	9-2-03 1030	700	68	374	1445	
②	"	526	63	375	1448	
③	"	598	79	376	1452	
④	"	599	64	377	1455	
⑤	"	407	55	378	1458	
⑥	"	454	66	379	1502	
⑦	"	477	55	380	1507	
EB31S2 ①	9-2-03 1055	<	98	381	1510	
②	"	<	100	382	1513	
③	"	<	130	383	1516	
④	"	<	89	384	1520	
⑤	"	<	58	385	1524	
⑥	"	57	37	386	1527	
⑦	"	<	57	387	1530	Calibrat after run
EB33S1 ①	9-2-03 0930	11,700	560	391	1544	
②		13,800	690	392	1548	
③		12,800	370	393	1552	
④		13,800	390	394	1555	
⑤		15,100	480	395	1559	
⑥		15,900	490	~~396~~ gp 397	1605	no reading #396
⑦		18,400	530	398	1610	
XRF Calibration @ 1530 hrs		High Pb	5800	210	388	
		Med Pb	1110[illegible]	78	389	
		Low Pb	<	63	390	

9-27-03

Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
EB3351D 1	9-2-03 1304	911	97	399	1620	
2	"	892	80	400	1624	
3	"	1120	95	401	1628	
4	"	1480	120	~~402~~	1631	
5	"	1430	100	403	1634	
6	"	1690	120	404	1637	
7	"	1930	210	405	1641	
EB3352 1	9-2-03 0953	1780	120	406	1645	
2	"	2190	140	407	1648	
3	"	2380	130	408	1652	
4	"	2550	140	409	1655	
5	"	2670	140	410	1659	
6	"	2400	110	411	1703	
7	"	2290	130	412	1706	
EB3352D 1	9-2-03 1313	339	84	413	1710	
2	"	572	80	415 ~~414~~ glp	1717	no reading #414
3	"	355	54	416	1721	
4	"	560	69	418	1726	no #417
5	"	532	61	419	1730	
6	"	287	62	420	1733	
7	"	556	58	421	1736	
~~Final Calibration check~~ glp						
~~ST5252~~	glp					
ST5252	9-25-03	119	51	422	1742	
Final Calibration Check				2 ~~423~~ glp	1748	
	High Pb	5860 ± 210		423		
	Med Pb	1210 ± 80		424		
	Low Pb	< 43		425		
	Blank	< 38		426		

9-29-03

District Lab XRF Soil Analysis for Lead

No field work today. Analysis performed by Joseph Marsh

0800 XRF Startup - powerup, self calibration check

Initial Calibration Check. Dosimeter Approx. 32 MR.

	Reading	Precision	Screen
NIST 2710 High Pb	5810	± 210	428
NIST 2711 Medium Pb	1120	± 77	429
Nist 2709 Low Pb	<	± 64	430
SiO2 99.5% BLANK	<	± 39	431

PicnicArea Sample Analysis Continued from 9-27-03

Sample ID	Sample Date and Time	XRF Reading	Precision +-	Screen	Time measured	Soil NOTES
ST452	9-22-03 1310	<	± 53	432	0910	
ST652	9-22-03 1316	85.6	± 37	433	0914	
ST951	9-22-03 1033	<	± 50	434	0918	Testing By Glen Terui
PA551	9-26-03 0845	<	± 53	435	0922	
PA1151	9-26-03 0857	<	± 57	436	0927	
PA651	9-26-03 0850	<	± 53	437	0931	
PA751	9-26-03 0845	<	± 54	438	0935	
PA1051	9-26-03 0905	86.5	± 38	439	~~0939~~ 0939	
PA1251	9-26-03 0855	<	± 55	440	0943	
PA1651	9-26-03 0920	59.2	± 33	441	0947	
PA1751	9-26-03 0922	<	± 48	442	0951	
PA1951 (ST2281 DUPE)	9-26-03 0930	50.6	± 31	443	0955	
ST3151 1)	9-22-03 1150	460	± 47	444	1025	Testing By Joseph Marsh
" 2)	" "	419	±47	445	1028	
Precision 3)	" "	581	± 51	446	1031	
" Sample 4)	" "	411	±44	447	1036	
" 5)	" "	392	±44	448	1039	

9-29-03
District Lab XRF Soil Analysis continued

ST3151 Precision sample	6)	" "	411	±44	449	1043	
	7)	" "	474	±49	450	1046	
Sample ID		Sample Date and Time	XRF Reading	Precision +-	Screen	Time Measured	NOTES
Precision ST22S1	1)	9-22-03 1140	130	±36	451	1050	By J. Marsh
	2)	" "	134	±39	452	1053	
	3)	" "	145	±38	453	1057	
	4)	" "	182	±39	454	1100	
	5)	" "	148	±39	455	1103	
	6)	" "	182	±38	456	1106	
	7)	" "	123	±37	457	1110	
Precision ST38S1	1)	9-22-03 1050	443	±46	458	1114	
"	2)	" "	426	±45	459	1118	
"	3)	" "	525	±49	~~56~~ 460	1122	
"	4)	" "	~~360~~ 363	~~±36~~ ±34	461	1128	
*	5)	" "	352	±44	466	1240	
	6)	" "	430	±46	467	1243	
	7)	" "	427	±50	468	1248	

→ XRF calibration check after lunch - Power up at 1210

* begin - 1226 High Pb = 6030 ±220 scr 463 Med Pb = 1140 ±79 scr 464 Low Pb < ±62 Scr. 465

Resume Precision samples at 1236 → ST38S1 Precision Number 5 - see above

ST39S1	1)	9-22-03 1058	151	±38	469	1252	
	2)	" "	127	±45	470	1258	
	3)	" "	138	±45	471	1302	
	4)	" "	212	±41	472	1305	
	5)	" "	203	±39	473	1308	
	6)	" "	209	±41	474	1311	
	7)	" "	165	±41	475	1315	
					NOT USED 476	continued →	

9-29-03
District Lab Analysis continued...

Precision ~~ST4051~~ ~~Sample ID~~		Sample Date and Time	XRF Results	Precision +-	Screen	Time Measured	NOTES
ST4051	1)	9-22-03 1355	88.5	±36	477	1324	Testing by Joe Marsh
	2)	" "	91.5	±35	478	1328	
	3)	" "	96.8	±43	479	1334	
	4)	" "	91.1	±36	480	1339	Testing by Glen Terui
	5)	" "	83.1	±35	481	1343	
	6)	" "	110	±37	482	1347	
	7)	" "	153	±39	483	1351	
Precision ST5051	1)	9-22-03 1450	<	±56	484	1354	
	2)	" "	87	±40	485	1358	
	3)	" "	77	±39	486	1402	
	4)	" "	62.6	±39	487 (void) 488	1407	
	5)	" "	86.8	±37	489	1410	
	6)	" "	90.6	±38	490	1413	
	7)	" "	93.3	±45	491	1416	
Precision ST4951	1)	9-22-03 1505	117	±38	492 (void) 493	1420	
	2)	" "	158	±36	494	1423	
	3)	" "	201	±38	495	1428	
	4)	" "	140	±34	496 (void) 497	1431	
	5)	" "	165	±36	498	1435	
	6)	" "	142	±36	499	1438	
	7)	" "	153	±37	500	1442	

~~Precision~~

1)
2) XRF CALIBRATION CHECK @ 1444 Hrs.
3) High Pb = 5820 ± 210 screen: 501
4) Med Pb = 1100 ± 78 screen: 502
5) Low Pb = < ± 61 screen: 503
6) completed Calibration check @ 1455 Hrs.

SAMPLE ID		SAMPLE DATE and TIME	XRF RESULTS	PRECISION + −	SCREEN	TIME MEASURED	NOTES
Precision ST251	1)	9-22-03 0935	<	±49	504	1501	
"	2)	" "	<	±48	505	1505	
"	3)	" "	<	±47	506	1508	
"	4)	" "	<	±48	507	1511	
"	5)	" "	<	±46	508	1514	
"	6)	" "	<	±49	509	1518	
"	7)	" "	<	±48	510	1521	
ST351	1)	9-22-03 0940	318	±43	511	1526	
"	2)	" "	256	±41	512	1529	
"	3)	" "	288	±43	513	1532	
"	4)	" "	300	±43	514	1536	
"	5)	" "	348	±44	515	1539	
"	6)	" "	310	±44	516	1542	
"	7)	" "	338	±44	517	1545	

NOTES

Testing by ?oe Marsh

Testing ?y Glen ?ervel

XRF final calibration check at 1546 Hrs.

High Pb.	5750	± 200	518
Med. Pb.	1130	± 79	519
Low Pb.	<	± 61	520
Blank	<	± 38	521

1600 XRF Powered down and secured in locked closet in Locked District Lab. End of day.

[signature]

DEC. 2003

9-30-03 District Lab Work

Initial XRF Calibration @ 0740 start

		screen
High Pb	5660 ± 200	523
Med Pb	1130 ± 70	524
Low Pb	< ± 65	525
Blank	< ± 39	526

	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time measured	Notes
ST41S1 (0-6) 1	9-22-03 1400	<	61	527	0800	
2		<	58	528	0803	
3		111	39	529	0807	
4		64.7	38	~~530~~ glp 531	0815	no reading # 530
5		73.6	39	532	0820	
6		<	54	533	0823	
7		<	55	534	0827	
ST6S1 (0-6) 1	9-22-03 1005	117	62	535	0832	
2		183	44	536	~~0840~~ TP 0835	
3		98.9	41	537	0839	
4		127	43	538	0845	
5		130	44	539	0848	no #540 reading
6		174	41	541	0856	
7		136	44	542	0900	
ST2S1 (0-6)	9-22-03 0935	55	34	543	0914	
ST3S1 (0-6)	9-22-03 0940	311	45	544	0920	
ST49 S1 0-6	9-22-03 1505	314	43	545	0923	
ST41S1 (0-6)	9-22-03 1400	<	52	546	0927	
ST 50 S1 (0-6)	9-22-03 1450	82	38	547	0930	
ST40-S1 (0-6)	9-22-03 1355	164	40	548	0934	
ST39 S1	9-22-03 1058	178	42	549	0937	
ST81S1 (ST22S1Dup)	9-22-03 1150	471	48	550	0941	

9-30-03 District Lab Work

Sample ID ~~ST22S1~~ ap	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
ST22S1	9-22-03 1140	192	39	551	0944	
ST6S1	9-22-03 1005	140	40	552	0947	
ST38S1	9-22-03 1050	409	46	553	0952	
XRF Calibration Check				0953 hrs		
	High Pb	5440	190	554		
	Med Pb	1120	78	555		
	Low Pb	<	65	556		
Sample ID	Sample Date + Time	XRF Reading	Precision +/-	Screen	Time Measured	Notes
ST42S2 (6-12) 1	9-22-03 1355	136	38	557	1007	
2		119	36	558	1011	
3		100	37	559	1015	
4		107	35	560	1017	
5		172	36	561	1021	
6		166	37	562	1025	
7		142	44	563	1028	
ST42S1 (0-6) 1	9-22-03 1350	83.4	34	564	1032	
2		<	52	565 90 ~~564~~	1035	
3		65.6	35	566 90 ~~565~~	1038	
4		82.5	34	567 9P ~~566~~	1042	
5		68.4	33	568 9P	1045	
6		100	34	569	1050	
7		<	51	570	1053	
Final XRF Calibration Check					1054 hrs	
	High	5600	200	571		
	Med	1130	79	572		
	Low	<	62	573		
	Blank	<	37	574		

slp

DEC 2003

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12-2-03 SKEET RANGE RESAMPLING

0830 - Arrive on site Marsh, Henzi.
Meet with John Jenkins of J+B Excavating.
Utility locators performing final site clearance
0840 - Gwyn Puckett arrives with digging permits.
All sample points clear of underground utilities.
Soil sampling begins. No XRF analysis in the field.

M

DEC 2003

Miller Hill Resampling

12-3-03 weather:

0830- Arrive at Miller Hill Picnic Area Parking Lot (Marsh, Puckett)
XRF NITON XL serial NO. U390NR4976 Assay 8-1-03
0838 XRF switched on - self calibration mode performed. Resolution 737 eV Source strength 10 mCi
Dosimeter placed on clothing: Arrow tech
Model 138 Range 0-200 mR
SN 085973 Reading: 20 m Roentgens
Initial XRF cup calibration with NIST standards.

	Reading	Precision ±	Screen	Time measured
High Pb	5860	230	2	0851
Med. Pb	1820	83	3	0855
Low Pb.	<	68	4	0859
Blank (NOT AVAILABLE)				

*- Contractor John Jenkins briefed on project and safety. He begins excavating test pits. Joseph Marsh and Gwyn Puckett prepare for sampling activities. XRF Left on for 15 min. warmup.
0954- finished collecting the MH 19 Through MH 28 0-6" soil samples. Will run MH 19, 24, 26, and 27 Through XRF analysis to Locate hot spots. Only MH 24 sieved with No. 10 mesh due to moist soil conditions. Soil classification is GP - ~~Sand wit~~ an Gravel with sand, with occasional cobbles, loose moist, dark brown.

Firing Range Pit Notes (Trench):
<u>MH29</u> Gravelly- Sandy soil (GP) with organic matter, rusted metal debris spent .45 cal. bullets, 55 gal drum fragments, paint cans with dried paint sheet metal with bullet holes, wire, wood debris. obvious garbage pit.

12-3-03 Miller Hill continued XRF Testing by Joseph Marsh

(Pb in PPM)

Sample ID	SAMPLE Date + Time	XRF Reading	Precision ±	Screen	Time measured
MH24 (~~0-6"~~ 0-12")	12-3-03 / 0905	185	±35	5	1002
MH 19 (~~0-12"~~ 0-12")	12-3-03 / 0948	363	±44	6	1007
MH 27 (0-12")	12-3-03 / 0909	1150	±67	7	1011
MH 26 (0-12")	12-3-03 / 0940	68.8	±33	8	1016
MH 29 (0-12")	12-3-03 / 1644	884	±65	9	1059
MH 30 (0-12")	12-3-03 / 1040	313	±42	10	1103
MH 31 (0-12")	12-3-03 / 1051	142	±28	11	1107

Firing Range Pit (Trench) observations continued...

MH30 - GP soils, moist, ~~paint can debris,~~ ~~&~~ some metal scrap.

MH31 - GP soils, moist, paint can debris seen, 0.45 cal spent bullet found.

MH32 - GP soils, metal debris (Rusted sheet metal) Live ammunition found - badly corroded from bottom of pit (12") Looks like 7.62mm or .30 cal. rifle ammo.

Central berm Pits (Old sample Points revisited)

Sample ID	Date/time	Pb in PPM XRF Reading	Precision ±	Screen	Time measured
MH4 24-36"	12-3-03 / 1143	Below Det. Lim. <	±56	12	1158
MH4 36-48"	12-3-03 / 1149	131	±34	13	1201
MH9 24-36"	12-3-03 / 1135	67.4	±43	14	1206
MH9 36-48"	12-3-03 / 1140	56.7	±37	15	1210
MH16 24-36"	12-3-03 / 1120	61.2	±31	16	1214
MH16 36-48"	12-3-03 / 1130	72.6	±35	17	1218
MH33 6-12"	12-3-03 / 1113	72.5	±30	18	1222

Continued →

12-3-03 Miller Hill continued
XRF Testing by Joseph Marsh

Sample ID	Date/Time	(Pb in PPM) XRF Reading	Precision ±	Screen	Time Measured
MH25 (0-12")	12-3-03/0936	119	±34	19	1230
MH28 (0-12")	12-3-03/0923	64.9	±32	20	1234
1235 - QC TEST		Reading	Precision ±	Screen	Time
High Pb		6,040	±230 ~~240~~	21	1238
Med. Pb		1,150	±86	22	1242
Low Pb		<	±70	23	1245

New Sample Point XRF Analysis

Sample ID	Date/Time	XRF Reading	Precision +−	Screen	Time Measured	
MH20 0-12"	12-3-03 / 0924	894	±65	24	1253	
MH21 0-12"	12-3-03/0918	248	±37	25	1257	
MH22 0-12"	12-3-03/0930	<43.8 (Below Det Limit)	±30	26	1301	
MH23 0-12"	12-3-03/0916	311	±46	27	1305	
MH34 0-12"	12-3-03/1300	56.8	±34	28	1309	New
MH35 0-12"	12-3-03/1303	< Below Det. Limit	±42	29	1313	New
MH36 0-12"	12-3-03/1311	860	±62	30	1318	New

NOTE: MH36 PIT — Metal - rusted debris - small fragments seen.

MH-32 (0-12")	12-3-03/1105	5,410	±230	31	1326	

NOTE: MH-32 Metal fragments seen in pit

MH38 (0-12")	12-3-03/1333	75.4	±32	32	1340	New
MH37 (0-12")	12-3-03/1339	490	±44	33	1344	New

Field work concluded. All test pits backfilled.
All personnel depart site. Return to District Office
1430 - after Evergreen Berm site inspection.

12-4-03 Evergreen Berm Sampling

0830 G. Puckett arrived OF30.
John Jenkins JE Bexcavations
Weather: Overcast
0838 S. Bates and V. Henzi arrive

Discussed safety issues and sampling strategy w/ J. Jenkins, S. Bates, & V. Henzi

0900 XRF switched on - self calibration mode performed. Resolution 729

Initial Niton XRF Cup Calibration

	Reading	Precision	Screen #	Time
High Pb	6110	± 240	~~121~~ 36	0910
Med Pb	1180	± 86	~~122~~ 37	0914
Low Pb	<	± 68	38	0917

Blank (not available)

Sample ID	Sample Date & Time		XRF Reading	Precision	Screen	Time
EB117 (0-12)	12-4-03	0857	<	± 61	39	0923
EB117 (12-24)	12-4-03	0905	<	± 62	40	0927
EB110 (0-12)	12-4-03	1007	1250	± 110	41 ?	1034
EB 110 (12-24)	12-4-03	1011	312	50	42 ?	1040
EB 108 (0-12)	12-4-03	1024	208	56	43 ?	1043
EB 108 (12-24)	12-4-03	1013	<	79	45	1052
EB101 (12-24)	12-4-03	1035	162	43	46	1056
EB101 (0-12)	12-4-03	1015	923	69	47	1100
EB104 (0-12)	12-4-03	0943	275	58	48	1104
EB104 (12-24)	12-4-03	0952	102	53	49	1109
EB107 (0-12)	12-4-03	1003	230	48	50	1113
EB107 (12-24)	12-4-03	0955	<	62	51	1117

Calibration Check @ 11:18

~~52~~ 96

	Reading	Precision ±	Screen	Time
High Pb	5910	± 230	52	1122
Med Pb	1200	± 87	53	1125
Low Pb	<	± 65	54	1129

Sa.
EB1
EB1
EB1
EB1
EB.
*EB1
EB
EB1.
*EB11.
*EB 11.
*EB 115
*EB 115
*EB11.
EB11
EB 11(
*EB1(
*EB1(
*EB105
EB11
EB1
*EB1.
*EB1(
XR.
*

12-4-03 Evergreen Cont.

Sample ID	Sample Date	& Time	XRF Readings	Precision	Screen	Time
EB102(0-12)	12-4-03	1050	4870	± 180	55	1134
EB102(12-24)	12-4-03	1100	135	± 44	56	1139
EB103(12-24)	12-4-03	1125 ~~795~~	795	± 73	57	1144
EB103(0-12)	12-4-03	1115	767	± 72	58	1149
EB109(0-12)	12-4-03	1058	500	± 58	59	1153
*EB109(12-24)	12-4-03	1041	<	± 69	60	1157
EB111(0-12)	12-4-03	1121	1000	± —	61	1203
EB111(12-24)	12-4-03	1112	135	± 47	62	1206
*EB113(0-12)	12-4-03	0955	259	± 52	63	1215
*EB113(12-24)	12-4-03	1005	<	± 58	64	1233
*EB115(0-12)	12-4-03	0915	116	± 43	65	1239
*EB115(12-24)	12-4-03	0925	<	± 71	66	1243
*EB114(12-24)	12-4-03	0935	84.6	± 45	67	1247
EB114(0-12)	12-4-03	0930	142	± 44	68	1251
EB116(0-12)	12-4-03	0937	<	± 66	69	1256
*EB116(12-24)	12-4-03	0919	<	± 63	~~7470~~ 9P	1316
*EB105(0-12)	12-4-03	1245	746	± 84	70	1300
*EB105(12-24)	12-4-03	1255	140	± 45	71	1305
EB112(0-12)	12-4-03	1247	834	± 69	72	1309
EB112(12-24)	12-4-03	1238	495	± 59	73	1313
*EB106(0-12)	12-4-03	1300	1640	± 100	75	1321
*EB106(12-24)	12-4-03	1305	<	± 65	76	1325

XRF Calibration check

	Reading	±	screen	Time
High Pb	6070	230	~~78~~	1350
Med Pb	1200	87	79	1354
Low Pb	<	69	80	1357

* coarse sieve only

Time
0923
0927
1034
1040
1043
052
56
100
4
9
3
7

12-4-03 Evergreen Cont.

Sample ID	Date & Time	Reading	Precision +/-	Screen	Time
E123 (0-12)	12-4-03 1359	<	55	81	1412
*EB122 (0-12)	12-4-03 1400	681.0	64	82	1416

* coarse sieve only

XRF shut down 1417 final calibration

	Reading	Precision	Screen	Time
High Pb	6000	± 230	83	1420
Low Pb	<	± 70	84	1423

RAIN! All test pits backfilled.

J. Senkens departs 1415

Corps employees depart 1430

Arrive at District Office & unload van 1549

Work continued at District Lab..

1550 Calibrate XRF to finish Evergreen Berm (Darkside) samples

	Reading	± Precision	Screen	Time
High Pb	5870	220	86	1556
Med Pb	1170	85	87	1559
Low Pb	<	68	88	1603
Blank	<	41	89	1607

Sample ID	Sample Date & Time		Reading	Precision +/-	Screen	Time
EB123 (12-24)	12-4-03	1351	<	67	90	1610
*EB120 (0-12) coarse	12-4-03	1315	686	74	91	1614
*EB120 (12-24) coarse	12-4-03	1320	108	47	92	1618
*EB 121 (12-24 ~~0-12~~) gp coarse	12-4-03	1320	191	51	93	1621
EB 121 (0-12 ~~12-24~~) gp	12-4-03	1345	1420	88	94	1625
EB 119 (0-12)	12-4-03	1336	152	50	95	1629
EB119 (12-24)	12-4-03	1330	649	61	96	1633

12-4-03 Evergreen cont.

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time
EB118 (0-12)	12-4-03 1316	588	69	97	1637
EB118 (12-24)	12-4-03 1303	<	50	98	1640
*EB 122 (12-24)	12-4-03 1410	92.2	42	99	1645

*Coarse sieve only

1646 XRF final calibration & shut down

Std	Reading	Precision +/-	Screen	Time
High Pb	6060	230	100	1649
Med Pb	1180	110	101	1651
Low Pb	<	86	102	1654
Blank	<	50	103	1656

12-8-03 Range Work Continued in District lab
Samples airdried over weekend - exceptionally wet samples oven dried.

0810 XRF turned on - initial calibration

	Reading	Precision	Screen	Time
High Pb	5990	230	105	816
Med Pb	1250	89	106	820
Low Pb	<	70	107	823
Blank	<	41	108	827

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time
ST33 SI (#60)		1520	72	114	0830
ST36 SI (#60)	11	328	41	109	0833
ST37 SI (#60)		1270	70	113	0846
ST 38 SI (#60)		477	46	112	0842
ST 44 SI (#60)		1600	85	111	0839
ST 45 SI (#60)		1270	78	115	0854
ST 46 SI (#60)		1470	79	116	0857
ST 48 SI (#60)		295	40	117	0901
ST 35 SI (#60)		642	51	110	0834
— — —	— — —	—	—	—	—
ST90 (0-6)	12-2-03 1150	363	46	118	910
ST89 (0-6)	12-2-03 1130	503	54	119	914
ST65 (12-24)	12-2-03 1156	<	54	120	918
ST95 (0-6)	12-2-03 1055	310	39	121	922
ST65 (0-3)	12-2-03 1152	261	47	122	926
ST89 (0-1)	12-2-03 1115	863	60	123	929
ST90 (0-1)	12-2-03 1140	470 ~~470~~ 98	44	124	933
ST65 (0-1)	12-2-03 1150	978	76	125	936
ST36 (0-1)	12-2-03 1200	603	57	126	940

12-8-03 Lab Work cont.

	Sample ID	Sample Date & Time		Reading	Precision +/-	Screen	Time
	ST94 (0-3)	12-2-03	1306	642	60	127	944
	ST93 (0-3)	12-2-03	1340	445	52	128	948
	ST93 (12-24)	12-2-03	1350	<	61	129	952
	ST93 (0-1)	12-2-03	1335	398	46	130	955
	ST34D (0-3)	12-2-03	1134	639	61	131	959
	ST35 (0-3)	12-2-03	1305	1080	70	132	1002
7	ST34D (0-6)	12-2-03	1128	347	50	133	1005
	ST34D (0-1)	12-2-03	1140	902	57	134	1010
Time	ST34D (12-24)	12-2-03	1150	76.4	37	135	1013
0850	ST36 (0-3)	12-2-03	1202	190	36	136	1017
0831	ST36 (0-6)	12-2-03	1204	161	37	137	1020
0846	—	—	—	—	—	—	—

		XRF Calibration Check	Reading	+/-	Screen	Time
0842	X033					
0839		High Pb	6100	230	138	1036
0854		Med Pb	1150	87	139	1040
0857		Low Pb	<	68	140	1043
0901		Blank Pb	<	41	141	1047
0834	—	—	—	—	—	—

—	Sample ID	Sample Date & Time		Reading	Precision +/-	Screen	Time
910	ST46 (0-6)	12-2-03	1304	78.9	40	142	1050
914	ST46 (0-1)	12-2-03	1300	590	62	143	1054
918	ST35 (0-1)	12-2-03	1315	1530	83	144	1058
922	ST92 (0-6)	12-2-03	1320	339	56	145	1101
926	ST87 (0-6)	12-2-03	1034	195	39	146	1105
929	ST65 (0-6)	12-2-03	1154	66.6	43	147	1108
933	ST35 (0-6)	12-2-03	1325	528	54	148	1112
936	ST92 (0-1)	12-2-03	1300	404	50	149	1115
940	ST90 (0-3)	12-2-03	1145	689	54	150	1119

 12-8-08 Lab work Cont.

Sample ID	Date & Time		Reading	Precision +/-	Screen	Time
ST94 (12-24)	12-2-03	1310	<	51	151	1124
ST95 (0-1)	12-2-03	1034	477	49	152	1128
ST46 (0-3)	12-2-03	1302	1000	70	153	1131
ST89 (12-24)	12-2-03	1135	<	87	154	1135
ST89 (0-3)	12-2-03	1120	783	73	155	1140
ST92 (12-24)	12-2-03	1330	<	56	156	1143
~~ST86 (0-1)~~	~~12-2-03~~	~~1116~~	~~210~~	~~43~~	~~157~~	~~1147~~
ST86 (0-6)	12-2-03	1120	<	61	no 158 159	1152
*ST88 (0-1)	12-2-03	1035	790	66	160	1156
ST87 (0-1)	12-2-03	1030	902	66	161	1159
ST90 (12-24)	12-2-03	1155	<	64	162	1203
ST86 (12-24)	12-2-03	1122	<	72	163	1206
ST85 (0-3)	12-2-03	1000	678	56	164	1210
*ST88 (0-3)	12-2-03	1040	687	63	165	1214
ST85 (0-6)	12-2-03	1015	439.9	47	166	1218
ST85 (12-24)	12-2-03	1030	<	49	167	1222
ST84 (12-24)	12-2-03	0956	98.4 ~~99.84~~ ap	47	168	1225
ST85 (0-1)	12-2-03	0950	1970	85	169	1230

1232 XRF Calibration Check

	Reading	+/-	Screen	Time
High Pb	6260	240	170	1235
Med Pb	1150	86	171	1238
Low Pb	<	67	172	1242
Blank	<	42	173	1245

12-8-03 Lab Work Cont.

	Sample ID	Date & Time		Reading	Precision ±	Screen	Time
	ST46 (12-24)	12-2-03	1308	74.4	35	174	1307
	ST84 (0-1)	12-2-03	0953	<	83	175	1311
	ST84 (0-6)	12-2-03	0955	259	45	176	1315
5	ST84 (0-3)	12-2-03	0954	468	81	177	1319
10	ST83 (0-1)	12-2-03	1100	1430	74	178	1322
13	*ST88 (0-6)	12-2-03	1045	6760	61	179	1326
7	ST91 (0-1)	12-2-03	1223	809	63	180	1329
52	ST83 (0-3)	12-2-03	1102	84	42	no 181 182	1334
56	*ST88 (12-24)	12-2-03	1050	78	38	183	1337
59	ST91 (0-3) ~~*ST88 (0-6)~~	12-2-03	1218 ~~1045~~	708	62	184	1341
03	ST91 (0-6)	12-2-03	1200	343	46	185	1347
206	ST87 (0-3)	12-2-03	1032	141	43	186	1350
1210	ST87 (12-24)	12-2-03	1036	840	44	187	1354
1214	ST91 (12-24)	12-2-03	1230	<	78	188	1358
1218	ST95 (12-24)	12-2-03	1105	64	34	189	1402
1222	ST94 (0-1) ~~12-24~~	12-2-03	1324	505	66	190	[illegible]
1225	ST92 (0-3)	12-2-03	1310	213	59	191	1409
230	ST83 (0-6)	12-2-03	1104	<	54	192	1412
	ST93 (0-6)	12-2-03	1345	1280	82	193	1415
	ST94 (0-6)	12-2-03	1308	166	52	194	1419
	ST95 (0-3)	12-2-03	1045	431	49	no 195 196 197	1427
	ST83 (12-24)	12-2-03	1106	<	57	198	1431

1438 XRF Calibration check

	Reading	+/-	Screen	Time
High	6300	240	199	1442
Med	1150	87	no 200 ~~201~~ 202	1453
Low	<	69	201	1449
Blank	<	41	203	1456

12-8-03 Lab Work Cont.

Sample ID	Date & Time	Reading	Precision +/-	Screen	Time	Sar
EB120 (12-24)	12-4-03 1320	177	66	204	1500	M
EB120 (0-12)	12-4-03 1315	1080	73	205	1504	
EB116 (12-24)	12-4-03 0919	<	65	206	1508	M
EB109 (12-24)	12-4-03 1041	88.6	46	207	1511	M
EB105 (0-12)	12-4-03 1245	805	73	208	1515	-
EB113 (12-24)	12-4-03 1005	73.6	45	209	1519	1e
EB114 (12-24)	12-4-03 935	94.4	45	210	1523	
EB106 (12-24)	12-4-03 1305	<	81	211	1526	
EB115 (12-24)	12-4-03 925	68.2	45	212	1535	
EB115 (0-12)	12-4-03 915	329	57	213	1539	
EB113 (0-12)	12-4-03 955	304	55	214	1543	
EB122 (12-24)	12-4-03 1410	<	100	215	1547	-
EB106 (0-12)	12-4-03 1300	1490	99	216	1551	
~~EB122 (0-12)~~				~~218~~	~~98~~	
MH22 (0-12)	12-3-03 0930 ~~71.5~~	71.5	29	217	1555	
—	—	—	—	—	—	
EB122 (0-12)	12-4-03 1400	799	78	218	1559	
EB105 (12-24)	12-4-03 1255	<	81	219	1602	
—	—	—	—	—	—	
MH28 (0-12)	12-3-03 0923	71.9	37	220	1606	
MH25 (0-12)	12-3-03 0936	124	39	221	1610	
MH33 (0-12)	12-3-03 1113	73	31	222	1613	
MH4 (36-48)	12-3-03 1149	158	38	223	1617	
MH32 (0-12)	12-3-03 1105	6500	260	224	1621	
sample taken from area w/numerous metal rubbish						
MH20 (0-12)	12-3-03 0924	1250	74	225	1624	

Time	Sample ID	Date & Time	Reading	Precision +/-	Screen	Time
1500	MH ~~36~~ 26 (0-12)	12-3-03 1311	1060	100	226	1628
15 1504	- Sample collected in area w/ metal fragments					
16 1508	MH 31 (0-12)	12-3-03 1057	180	44	227	1631
7 1511	MH16 (~~3~~6-48)	12-3-03 1130	101	43	228	163~~2~~

08 1515

9 1519 1640 Final Calibration

	Reading	+/-	Screen	Time
High Pb	6310	250	229	1643
Med Pb	1170	88	230	1646
Low Pb	<	68	231	1650
Blank	<	41	232	1653

0 1523
1 1526
12 1535
3 1539
4 1543
5 1547
6 1557
~~18~~
17 1555
8 1559
9 1602
20 1606
21 1610
22 1613
23 1617
24 1621
18h
5 1624

12-9-03 District Lab Work

0810 XRF initial calibration

	Screen	Reading	+/-	Time
High Pb	234	6070	240	0824
Med Pb	235	1140	85	0827
Low Pb	236	<	70	0830
Blank	237	<	43	0834

Sample ID	Sample Date & Time		XRF Reading	Precision +/-	Screen	Time
MH35 (0-12)	12-3-03	1303	<	46	238	0838
MH19 (0-12)	12-3-03	0948	291	42	239	0842
MH38 (0-12)	12-3-03	1333	104	35	240	0845
MH34 (0-12)	12-3-03	1300	96.9	58	241	0849
MH 26 (0-12)	12-3-03	0940	<	47	242	0853
MH 9 (36-48)	12-3-03	1140	57.1	34	243	0857
MH 23 (0-12)	12-3-03	0916	321	52	244	0900
MH 30 (0-12)	12-3-03	1040	242	38	245	0904
MH29 (0-12)	12-3-03	1044	699	55	246	0908
MH 24 (0-12)	12-3-03	0905	206	39	247	0911
MH 4 (24-36)	12-3-03	1143	<	60	248	0915
MH 37 (0-12)	12-3-03	1339	508	65	249	0919
MH 9 (24-36)	12-3-03	1135	<	76	250	0922
MH 21 (0-12)	12-3-03	0918	275	55	257	~~0924~~ 0927
MH 27 (0-12)	12-3-03	0909	1500	74	252	0937
MH 16 (24-36)	12-3-03	1120	<	52	253	0941
EB 121 (0-12)	12-4-03	1320	1240	84	254	0945
EB 104 (0-12)	12-4-03	0943	291	53	255	0949
EB 119 (12-24)	12-4-03	1330	568	77	256	0953

12-9-03

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time
EB118(0-12)	12-4-03 1316	586	62	257	0957
EB107(0-12)	12-4-03 1003	214	49	258	1001
EB102(0-12)	12-4-03 1050	4020	160	259	1005
EB123(12-24)	12-4-03 1357	<	75	260	1009
EB104(12-24)	12-4-03 952	67.9	44	261	1012

1014 XRF calibration check

	Screen	Reading	+/-	Time
High Pb	262	5940	230	1017
Med Pb	263	1190	88	1020
Low Pb	264	<	70	1023

Sample ID	Sample Date & Time	Reading	+/-	Screen	Time
EB110(12-24)	12-4-03 1021	375	51	265	1038
EB107(12-24)	12-4-03 955	84.6	46	266	1041
EB119(0-12)	12-4-03 1336	197	56	267	1045
EB117(0-12)	12-4-03 0887	<	67	268	1049
EB103(0-12)	12-4-03 1115	929	92	269	1053
EB103(12-24)	12-4-03 1125	725	89	270	1056
EB101(12-24)	12-4-03 1035	120	51	271	1100
EB108(12-24)	12-4-03 1013	<	69	272	1103
EB110(0-12)	12-4-03 1007	1550	110	273	1107
EB114(0-12)	12-4-03 0930	159	53	274	1111
EB111(12-24)	12-4-03 1112	161	47	275	1117
EB123(0-12)	12-4-03 1359	<	66	276	1121
EB112(12-24)	12-4-03 1238	407	70	277	1125
EB102(12-24)	12-4-03 1100	99.7	41	278	1128
EB116(0-12)	12-4-03 937	<	71	279	1132

Sample ID	Sample Date & Time		Reading	+/-	Screen	Time
EB109(0-12)	12-4-03	1058	538	55	280	1136
EB111(0-12)	12-4-03	1127	957	70	281	1144
EB118(12-24)	12-4-03	1303	<	60	282	1148
EB121(12-24)	12-4-03	1345	287	49	283	1152
EB112(0-12)	12-4-03	1247	829	84	284	1156
EB108(0-12)	12-4-03	1024	205	51	285	1159
EB101(0-12)	12-4-03	1015	827	69	286	1207
EB117(12-24)	12-4-03	0905	<	77	287	1210

1211 Final XRF Calibration

	Screen	Reading	+/-	Time
High Pb	288	5810	220	1214
Med Pb	289	1160	83	1217
Low Pb	290	<	69	1221
Blank	291	<	42	1224

Time 12-11-03 District Lab Work

1136 0815 XRF turned on - initial calibration

1144

	Screen	Reading	+/-	Time
1148 High Pb	293	5860	230	822
1152 Med Pb	294	1210	88	826
1156 Low Pb	295	<	69	829
1159 Blank	296	<	42	833

1207

1210

Sample ID	Sample Date & Time	XRF Reading	Precision +/-	Screen	Time
ST86(0-3)	12-2-03 1118	68.5	34	297	837
ST91(0-3)	12-2-03 1212	802	67	298	840
Precision Samples					
MH25(0-12) ①	12-3-03 0936	123	35	299	846
②		127	37	300	849
③		125	35	301	852
④		74.2	44	302	856
⑤		94.4	32	303	859
~~MH1~~ ⑥		91.3	39	304	903
⑦		98.8	41	305	907
MH151 ①	9-25-03 1623	193	51	306	911
②		259	44	307	914
③		253	45	308	917
④		275	49	309	921
⑤		243	42	310	924
⑥		214	44	311	927
⑦		183	47	312	931

12-11-03

Sample ID		Sample Date & Time	Reading	+/-	Screen	Time
MH152	1	9-25-03 1626	257	44	313	935
	2		246	45	314	938
	3		246	45	315	942
	4		262	46	316	945
	5		245	46	317	948
	6		220	47	318	952
	7		207	43	319	955

1005 XRF Calibration Check

	Screen	Reading	+/-	Time
High Pb	320	6346	246	1009
Med Pb	321	1210	89	1013
Low Pb	322	<	71	1016

Sample ID		Date & Time	Reading	+/-	Screen	Time
MH1751	1	9-25-03 ~~1~~535	396	49	323 (No 324)	1020
	2		348	55	325	1027
	3		280	54	326	1030
	4		418	54	327	1033
	5		342	57	328	1036
	~~6~~				~~329~~	gp
	~~7~~				~~330~~	gp
MH1752	1	9-25-03 345	120	40	329	1041
	2		192	42	330	1044
	3		92.8	41	331	1047
	4		146	50	332	1050
	5		162	43	333	1054
MH851	1 ~~6~~	9-25-03 1601	511	62	334	1058
	2 ~~7~~		494	66	335	1101
	3		374	58	336	1104
	4		357	59	337	1108
	5		324	54	338	1111

12-11-03

Sample ID		Date & Time		Reading	+/-	Screen	Time
MH852	1	9-25-03	1604	295	47	339	1115
	2			269	45	340	1118
	3			261	45	341	1121
	4			301	49	342	1125
	5			265	48	343	1128
MH31 (0-12)	1	12-3-03	1051	215	40	344	1132
	2			184	30	345	1135
	3			234	40	346	1138
	4			213	39	347	1141
	5			218	46	348	1145

Break - 1212 XRF Calibration check

	Reading	+/-	Screen	Time
High Pb	6270	240	349	1215
Med Pb	1160	88	350	1219
Low Pb	<	69	351	1222

Sample ID		Date & Time		Reading	+/-	Screen	Time
MH24 (0-12)	1	12-3-03	0905	181	38	352	1226
	2			157	45	353	1229
	3			194	37	354	1232
	4			216	39	355	1236
	5			204	36	356	1239
MH30 (0-12)	1	12-3-03	1040	244	49	357	1243
	2			280	40	358	1246
	3			294	43	359	1250
	4			296	41	360	1253
	5			268	40	361	1256

 12-11-03

Sample ID	Date & Time	Reading	+/-	Screen	Time
EB115(0-12) ①	12-4-03 915	158	47	362	1301
②		261	49	363	1304
③		215	47	365 No 364	1311
④					
⑤					

1315 XRF shut down due to plunger sticking - called Niton & solved problem

1320 XRF recalibration

	Reading	+/-	Screen	Time
High Pb	6270	240	367	1325
Med Pb	1150	86	368	1329
Low Pb	<	72	369	1332
Blank	<	43	370	1336

Sample ID	Date & Time	Reading	+/-	Screen	Time
EB115 (0-12) ④	12-4-03 915	162	68	371	1340
⑤		229	48	372	1343
EB108 (0-12) ①	12-4-03 1024	267	48	373	1347
②		206	46	374	1350
③		233	57	375	1353
④		239	48	376	1357
⑤		281	53	377	1400
EB1A (0-12) ①	12-4-03 1336	130	48	378	1405
②		138	54	379	1408
③		142	52	380	1411
④		251	49	381	1415
⑤		210	49	382	1418

12-11-03

Sample ID		Date & Time		Reading	+/-	Screen	Time
EB107 (0-12)	①	12-4-03	1003	226	59	383	1428
	②	|		217	57	384	1431
	③			188	46	385	1435
	④			280	53	386	1438
	⑤			216	63	387	1441
EB113 (0-12)	①	12-4-03	955	343	67	388	1446
	②			351	56	389	1449
	③			318	52	391 no 390	1458
	④			304	53	392	1459 ~~1455~~ ap
	⑤			281	52	393	1503

1503 Final XRF Calibration & shutdown

	Reading	+/-	Screen	Time
High Pb	6500	250	394	1506
Med Pb	1150	86	395	1510
Low Pb	<	71	396	1513
Blank	<	42	397	1516

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12-12-03

1048 Initial XRF startup and calibration

	Reading	+/-	Screen	Time
High Pb	6020	230	399	1053
Med Pb	1190	88	400	1056
Low Pb	<	69	401	1100
Blank	<	42	402	1103

Sample ID		Sample Date & Time		XRF Reading	Precision +/-	Screen	Time
EB123SI		12-4-03	1359	<	56	403	1107
EB107SI		12-4-03	1003	263	47	404	1111
EB108SI		12-4-03	1024	274	84	405	1114
EB116SI		12-4-03	0937	<	60	406	1118
EB117SI		12-4-03	0857	<	57	407	1122
ST64SI		9-25-03	943	552	56	408	1125
ST66SI		9-25-03	930	191	39	409	1129
MH33SI		12-3-03	1113	71.6	28	410	1132
MH34SI		12-3-03	1300	96.1	29	411	1135
MH35SI		12-3-03	1303	<	46	~~412~~	1140
ST93(0-1)	1	12-2-03	1335	191	36	413	1144
	2			263	37	414	1148
	3			242	38	415	1152
	4			220	40	416	1155
	5			250	36	417	1158
ST93(0-3)	1	12-2-03	1340	430	50	418	1202
	2			470	49	419	1206
	3			561	53	420	1209
	4			401	57	421	1212
	5			449	51	422	1216

Sample ID		Date & Time	Reading	+/-	Screen	Time
ST93(0-6)	1	12-2-03 1345	1280	90	423	1220
	2		1330	77	424	1223
	3		1280	83	425	1226
	4		1260	95	426	1230
	5		1280	80	427	1233
ST84(0-1)	1	12-2-03 0953	<	76	428	1237
	2		<	76	429	1240
	3		<	83	430	1243
	4		<	85	433*	1246
	5		<	83	434	1257
ST84(0-3)	1	12-2-03 0954	438	73	436	1258 ~~1254~~
	2		582	68	437	1300
	3		398	64	438	1304
	4		353	66	439	1308
	5		384	68	gp ~~439~~ 440	1311
ST84(0-6)	1	12-2-03 0955	185	50	441	1315
	2		166	38	442	1318
	3		234	50	443	1322
	4		225	43	444	1325
	5		253	39	445	1328

Final XRF Calibration Check & shutdown 1333

	Reading	+/-	Screen	Time
High Pb	6200	230	446	1336
Med Pb	1160	87	447	1340
Low Pb	<	73	448	1343
Blank	<	43	449	1347

* 431-432 lost

APPENDIX F

LABORATORY REPORTS

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SEVERN TRENT STL

STL Seattle
5755 8th Street East
Tacoma, WA 98424

Tel: 253 922 2310
Fax: 253 922 5047
www.stl-inc.com

ANALYTICAL NARRATIVE

Client: Hart Crowser

Date: September 5, 2003

Project: FT Lewis Rangers

Lab No.: 115861

Delivered By: Submitter

Condition of samples upon receipt: Samples were received in good condition. Chain of custody was in order.

Sample Identification:

Lab. No.	Client ID	Date Sampled	Matrix
115861-1	EB3451	09-02-03	filter
115861-2	EB3452	09-02-03	filter
115861-3	EB3151	09-02-03	filter
115861-4	EB3152	09-02-03	filter
115861-5	EB3251	09-02-03	filter
115861-6	EB3252	09-02-03	filter
115861-7	EB3351	09-03-03	filter
115861-8	EB3352	09-02-03	filter
115861-9	EB3551	09-02-03	filter
115861-10	EB3552	09-02-03	filter
115861-11	EB3651	09-02-03	filter
115861-12	EB3652	09-02-03	filter
115861-13	EB3751	09-02-03	filter
115861-14	EB3752	09-02-03	filter
115861-15	EB3851	09-02-03	filter
115861-16	EB3852	09-02-03	filter
115861-17	EB3951	09-02-03	filter
115861-18	EB3952	09-02-03	filter
115861-19	EB4051	09-02-03	filter
115861-20	EB4052	09-02-03	filter
115861-21	EB4151	09-02-03	filter
115861-22	EB4152	09-02-03	filter
115861-23	EB4251	09-02-03	filter
115861-24	EB4252	09-02-03	filter
115861-25	EB4351	09-02-03	filter
115861-26	EB4352	09-02-03	filter
115861-27	EB4451	09-02-03	filter

STL Seattle

Client: Hart Crowser

Project: FT Lewis Rangers

Date: September 5, 2003

Lab No.: 115861

Lab. No.	Client ID	Date Sampled	Matrix
115861-28	EB4452	09-02-03	filter
115861-29	EB4551	09-02-03	filter
115861-30	EB4552	09-02-03	filter
115861-31	EB4651	09-02-03	filter
115861-32	EB4652	09-02-03	filter
~~115861-33~~	~~EB4751~~	~~09-02-03~~	~~filter~~
115861-34	EB4752	09-02-03	filter
115861-35	EB4851	09-02-03	filter
115861-36	EB4852	09-02-03	filter
115861-37	EB5051	09-02-03	filter
115861-38	EB5052	09-02-03	filter
115861-39	EB5151	09-02-03	filter
115861-40	EB5152	09-02-03	filter

SAMPLE EXTRACTION AND ANALYSIS

TOTAL METALS

Samples 115861-1 through 115861-40 were analyzed for total metals in accordance with EPA Methods 6010B/6020. The samples were digested and analyzed on 08-04-03. The samples were analyzed within the required holding time.

The recovery value for Iron in the matrix spike of sample 115861-1 associated with batch SP003 was outside advisory QC limits. Interference due to high analyte concentrations may be indicated based on acceptable blank spike recovery.

All quality control parameters were within the acceptance limits.

No difficulties were encountered during the total metals analyses.

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3451
Lab ID:	115861-01
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.26

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.85	4.93	
Copper	40.9	9.85	4.93	
Iron	14000	19.7	9.85	
Lead	335	9.85	4.93	
Tin	ND	9.85	4.93	
Zinc	32.4	1.97	0.985	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3451
Lab ID:	115861-01
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.26

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.24	2.96	0.296	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3452
Lab ID:	115861-02
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.07

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10	5.01	
Copper	30.2	10	5.01	
Iron	17000	20	10	
Lead	133	10	5.01	
Tin	ND	10	5.01	
Zinc	30.9	2	1	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3452
Lab ID:	115861-02
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.07

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.52	3	0.3	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3151
Lab ID:	115861-03
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.07

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	8.85	4.43	
Copper	45.6	8.85	4.43	
Iron	16400	17.7	8.85	
Lead	622	8.85	4.43	
Tin	ND	8.85	4.43	
Zinc	33.1	1.77	0.885	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3151
Lab ID:	115861-03
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.07

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.35	2.66	0.266	

00

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3152
Lab ID:	115861-04
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.69

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.16	4.58	
Copper	24.8	9.16	4.58	
Iron	16700	18.3	9.16	
Lead	150	9.16	4.58	
Tin	ND	9.16	4.58	
Zinc	30	1.83	0.916	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3152
Lab ID:	115861-04
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.69

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.1	2.75	0.275	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB3251
Lab ID:	115861-05
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.42

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	207	9.4	4.7	
Copper	309	9.4	4.7	
Iron	16000	18.8	9.4	
Lead	12300	9.4	4.7	
Tin	13.6	9.4	4.7	
Zinc	63.6	1.88	0.94	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3251
Lab ID:	115861-05
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.42

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5	2.82	0.282	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3252
Lab ID:	115861-06
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.29

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MRL**	**Flags**
Antimony	34.9	9.77	4.89	
Copper	66.6	9.77	4.89	
Iron	15800	19.5	9.77	
Lead	1750	9.77	4.89	
Tin	ND	9.77	4.89	
Zinc	35.8	1.95	0.977	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3252
Lab ID:	115861-06
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.29

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.56	2.93	0.293	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3351
Lab ID:	115861-07
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	98.04

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	287	8.91	4.45	
Copper	454	8.91	4.45	
Iron	14800	17.8	8.91	
Lead	21600	8.91	4.45	
Tin	5.09	8.91	4.45	J
Zinc	85.3	1.78	0.891	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3351
Lab ID:	115861-07
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	98.04

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.65	2.67	0.267	

000

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3352
Lab ID:	115861-08
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.83

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	87.7	8.58	4.29	
Copper	139	8.58	4.29	
Iron	16700	17.2	8.58	
Lead	6770	8.58	4.29	
Tin	ND	8.58	4.29	
Zinc	66.2	1.72	0.858	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3352
Lab ID:	115861-08
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.83

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.59	2.57	0.257	

008

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3551
Lab ID:	115861-09
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.17

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	46.4	10.1	5.04	
Copper	91.4	10.1	5.04	
Iron	16000	20.1	10.1	
Lead	2610	10.1	5.04	
Tin	ND	10.1	5.04	
Zinc	35.2	2.01	1.01	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3551
Lab ID:	115861-09
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.17

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.54	3.02	0.302	

000

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3552
Lab ID:	115861-10
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.26

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	31.9	9.56	4.78	
Copper	46.6	9.56	4.78	
Iron	16700	19.1	9.56	
Lead	2410	9.56	4.78	
Tin	ND	9.56	4.78	
Zinc	33.5	1.91	0.956	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3552
Lab ID:	115861-10
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.26

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.99	2.87	0.287	

300

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3651
Lab ID:	115861-11
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	98

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	369	9.32	4.66	
Copper	358	9.32	4.66	
Iron	16500	18.6	9.32	
Lead	21500	9.32	4.66	
Tin	20.9	9.32	4.66	
Zinc	59.3	1.86	0.932	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3651
Lab ID:	115861-11
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	98

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.69	2.8	0.28	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3652
Lab ID:	115861-12
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	98.01

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	58.4	9.56	4.78	
Copper	76	9.56	4.78	
Iron	15400	19.1	9.56	
Lead	2870	9.56	4.78	
Tin	ND	9.56	4.78	
Zinc	31.2	1.91	0.956	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3652
Lab ID:	115861-12
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	98.01

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.83	2.87	0.287	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3751
Lab ID:	115861-13
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.79

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.3	4.65	
Copper	33.9	9.3	4.65	
Iron	14300	18.6	9.3	
Lead	274	9.3	4.65	
Tin	ND	9.3	4.65	
Zinc	26.6	1.86	0.93	

300

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3751
Lab ID:	115861-13
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.79

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.83	2.79	0.279	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3752
Lab ID:	115861-14
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.47

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.29	4.64	
Copper	21.2	9.29	4.64	
Iron	16400	18.6	9.29	
Lead	23.4	9.29	4.64	
Tin	ND	9.29	4.64	
Zinc	26.9	1.86	0.929	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3752
Lab ID:	115861-14
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.47

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.01	2.79	0.279	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB3851
Lab ID:	115861-15
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.72

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	634	8.78	4.39	
Copper	916	8.78	4.39	
Iron	18000	17.6	8.78	
Lead	31600	8.78	4.39	
Tin	47.7	8.78	4.39	
Zinc	110	1.76	0.878	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3851
Lab ID:	115861-15
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.72

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	10.8	2.63	0.263	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3852
Lab ID:	115861-16
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	94.88

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	192	9.67	4.83	
Copper	242	9.67	4.83	
Iron	17800	19.3	9.67	
Lead	7960	9.67	4.83	
Tin	7.01	9.67	4.83	J
Zinc	58.1	1.93	0.967	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3852
Lab ID:	115861-16
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	94.88

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.68	2.9	0.29	

10

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3951
Lab ID:	115861-17
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.65

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	149	10.2	5.11	
Copper	155	10.2	5.11	
Iron	19500	20.4	10.2	
Lead	6940	10.2	5.11	
Tin	7.22	10.2	5.11	J
Zinc	48.1	2.04	1.02	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB3951
Lab ID:	115861-17
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.65

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.27	3.07	0.307	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3952
Lab ID:	115861-18
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.28

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		29.7	9.15	4.58	
Copper		47.2	9.15	4.58	
Iron		16300	18.3	9.15	
Lead		1130	9.15	4.58	
Tin	ND		9.15	4.58	
Zinc		29.8	1.83	0.915	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB3952
Lab ID:	115861-18
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.28

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.39	2.75	0.275	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4051
Lab ID:	115861-19
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.67

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	8.18	9.85	4.93	J
Copper	56.3	9.85	4.93	
Iron	15700	19.7	9.85	
Lead	746	9.85	4.93	
Tin	ND	9.85	4.93	
Zinc	31.7	1.97	0.985	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4051
Lab ID:	115861-19
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.67

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.92	2.96	0.296	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4052
Lab ID:	115861-20
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.15

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.28	4.64	
Copper		44.7	9.28	4.64	
Iron		17600	18.6	9.28	
Lead		331	9.28	4.64	
Tin	ND		9.28	4.64	
Zinc		32	1.86	0.928	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4052
Lab ID:	115861-20
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.15

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.13	2.79	0.279	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4151
Lab ID:	115861-21
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.37

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		42.1	9.34	4.67	
Copper		78.4	1.87	0.934	
Iron		15500	18.7	9.34	
Lead		1870	1.87	0.934	
Tin	ND		9.34	4.67	
Zinc		37.1	1.87	0.934	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4151
Lab ID:	115861-21
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.37

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.37	2.87	0.287	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4152
Lab ID:	115861-22
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.87

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		16.4	10.2	5.08	
Copper		39.3	2.03	1.02	
Iron		16900	20.3	10.2	
Lead		768	2.03	1.02	
Tin	ND		10.2	5.08	
Zinc		31.3	2.03	1.02	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4152
Lab ID:	115861-22
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.87

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.87	3.05	0.305	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4251
Lab ID:	115861-23
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	94.57

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	673	8.92	4.46	
Copper	1330	1.78	0.892	
Iron	18600	17.8	8.92	
Lead	37100	1.78	0.892	
Tin	40.5	8.92	4.46	
Zinc	176	1.78	0.892	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4251
Lab ID:	115861-23
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	94.57

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	10.8	2.67	0.267	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4252
Lab ID:	115861-24
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.86

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	140	9.43	4.71	
Copper	233	1.89	0.943	
Iron	15400	18.9	9.43	
Lead	7290	1.89	0.943	
Tin	7.76	9.43	4.71	J
Zinc	70.2	1.89	0.943	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4252
Lab ID:	115861-24
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.86

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.61	2.83	0.283	

1001

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4351
Lab ID:	115861-25
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.32

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	8.89	4.45	
Copper	57.7	1.78	0.889	
Iron	14700	17.8	8.89	
Lead	639	1.78	0.889	
Tin	ND	8.89	4.45	
Zinc	31	1.78	0.889	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4351
Lab ID:	115861-25
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.32

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.8	2.67	0.267	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4352
Lab ID:	115861-26
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.39

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.2	5.1	
Copper		48.1	2.04	1.02	
Iron		14100	20.4	10.2	
Lead		601	2.04	1.02	
Tin	ND		10.2	5.1	
Zinc		30.2	2.04	1.02	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4352
Lab ID:	115861-26
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.39

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.43	3.06	0.306	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4451
Lab ID:	115861-27
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.67

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		18.4	9.41	4.7	
Copper		39.8	1.88	0.941	
Iron		15900	18.8	9.41	
Lead		726	1.88	0.941	
Tin	ND		9.41	4.7	
Zinc		34.2	1.88	0.941	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4451
Lab ID:	115861-27
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.67

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.99	2.82	0.282	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4452
Lab ID:	115861-28
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.14

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		21.8	10.2	5.1	
Copper		51.8	2.04	1.02	
Iron		16800	20.4	10.2	
Lead		941	2.04	1.02	
Tin	ND		10.2	5.1	
Zinc		30.3	2.04	1.02	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4452
Lab ID:	115861-28
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.14

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.67	3.06	0.306	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4551
Lab ID:	115861-29
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.35

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	727	9.97	4.99	
Copper	997	1.99	0.997	
Iron	16800	19.9	9.97	
Lead	33500	1.99	0.997	
Tin	34.8	9.97	4.99	
Zinc	139	1.99	0.997	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4551
Lab ID:	115861-29
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.35

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	11.5	2.99	0.299	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4552
Lab ID:	115861-30
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.65

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	213	9.38	4.69	
Copper	273	1.88	0.938	
Iron	15400	18.8	9.38	
Lead	13900	1.88	0.938	
Tin	10	9.38	4.69	
Zinc	57.4	1.88	0.938	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4552
Lab ID:	115861-30
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.65

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.42	2.81	0.281	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4651
Lab ID:	115861-31
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.75

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.1	5.05	
Copper	35.5	2.02	1.01	
Iron	15400	20.2	10.1	
Lead	215	2.02	1.01	
Tin	ND	10.1	5.05	
Zinc	28.2	2.02	1.01	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4651
Lab ID:	115861-31
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.75

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.46	3.03	0.303	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4652
Lab ID:	115861-32
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.83

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.98	4.99	
Copper	28.5	2	0.998	
Iron	16300	20	9.98	
Lead	61.5	2	0.998	
Tin	ND	9.98	4.99	
Zinc	30.1	2	0.998	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4652
Lab ID:	115861-32
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.83

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.97	3	0.3	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4751
Lab ID:	115861-33
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.28

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	427	9.43	4.71	
Copper	25100	1.89	0.943	
Iron	17100	18.9	9.43	
Lead	24400	1.89	0.943	
Tin	15.8	9.43	4.71	
Zinc	2560	1.89	0.943	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4751
Lab ID:	115861-33
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.28

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	9.33	2.83	0.283	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4752
Lab ID:	115861-34
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.69

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		23.8	9.55	4.77	
Copper		217	1.91	0.955	
Iron		16300	19.1	9.55	
Lead		1250	1.91	0.955	
Tin	ND		9.55	4.77	
Zinc		33.9	1.91	0.955	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4752
Lab ID:	115861-34
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.69

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.24	2.86	0.286	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4851
Lab ID:	115861-35
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	96.06

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	831	9.75	4.87	
Copper	985	1.95	0.975	
Iron	16700	19.5	9.75	
Lead	50800	1.95	0.975	
Tin	44.2	9.75	4.87	
Zinc	146	1.95	0.975	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB4851
Lab ID:	115861-35
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	96.06

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MRL**	**Flags**
Arsenic	10.7	2.92	0.292	

300

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4852
Lab ID:	115861-36
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.62

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	269	9.82	4.91	
Copper	527	1.96	0.982	
Iron	17500	19.6	9.82	
Lead	19400	1.96	0.982	
Tin	6.11	9.82	4.91	J
Zinc	109	1.96	0.982	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB4852
Lab ID:	115861-36
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.62

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.79	2.95	0.295	

0007

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5051
Lab ID:	115861-37
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	95.46

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony		16.1	8.78	4.39	
Copper		107	1.76	0.878	
Iron		16100	17.6	8.78	
Lead		1040	1.76	0.878	
Tin	ND		8.78	4.39	
Zinc		32.2	1.76	0.878	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5051
Lab ID:	115861-37
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	95.46

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.95	2.63	0.263	

1000

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5052
Lab ID:	115861-38
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	91.55

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.25	4.63	
Copper	69.6	1.85	0.925	
Iron	16700	18.5	9.25	
Lead	36.6	1.85	0.925	
Tin	ND	9.25	4.63	
Zinc	28	1.85	0.925	

0007

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5052
Lab ID:	115861-38
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	91.55

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.41	2.78	0.278	

0001

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5151
Lab ID:	115861-39
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.92

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	879	9.24	4.62	
Copper	804	1.85	0.924	
Iron	15100	18.5	9.24	
Lead	62500	1.85	0.924	
Tin	42.2	9.24	4.62	
Zinc	117	1.85	0.924	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5151
Lab ID:	115861-39
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.92

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	15.3	2.77	0.277	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5152
Lab ID:	115861-40
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1
% Solids	97.19

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	217	8.81	4.4	
Copper	308	1.76	0.881	
Iron	14800	17.6	8.81	
Lead	15600	1.76	0.881	
Tin	6.48	8.81	4.4	J
Zinc	76.3	1.76	0.881	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB5152
Lab ID:	115861-40
Date Received:	9/3/03
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	5
% Solids	97.19

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.12	2.64	0.264	

3000

STL Seattle

Lab ID:	Method Blank - SP003
Date Received:	-
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10	5	
Copper	ND	10	5	
Iron	ND	20	10	
Lead	ND	10	5	
Tin	ND	10	5	
Zinc	ND	2	1	

STL Seattle

Lab ID:	Method Blank - SP004
Date Received:	-
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10	5	
Copper	ND	2	1	
Iron	ND	20	10	
Lead	ND	2	1	
Tin	ND	10	5	
Zinc	ND	2	1	

STL Seattle

Matrix Spike Report

Client Sample ID:	EB3451
Lab ID:	115861-01
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Antimony	0	612	584	96	
Copper	41	102	141	99	
Iron	14000	4480	21200	161	X7
Lead	340	204	507	85	
Tin	0	1020	1030	101	
Zinc	32	204	213	89	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP003
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Iron	0	4400	4600	104	4610	105	0.96	

STL Seattle

Matrix Spike Report

Client Sample ID:	EB4151
Lab ID:	115861-21
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Antimony	42	615	604	91	
Copper	78	103	173	92	
Iron	16000	4510	20800	118	
Lead	1900	205	2080	104	
Tin	0	1030	1020	100	
Zinc	37	205	216	87	

0008

STL Seattle

Duplicate Report

Client Sample ID:	EB3451
Lab ID:	115861-01
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Antimony	0	0	NC	
Copper	41	40	2.5	
Iron	14000	13000	7.4	
Lead	340	330	3.0	
Tin	0	0	NC	
Zinc	32	27	17.0	

0009

STL Seattle

Duplicate Report

Client Sample ID:	EB4151
Lab ID:	115861-21
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP - USEPA Method 6010

Parameter Name	**Sample Result (mg/kg)**	**Duplicate Result (mg/kg)**	**RPD %**	**Flag**
Antimony	42	37	13.0	
Copper	78	72	8.0	
Iron	16000	16000	0.0	
Lead	1900	2000	-5.1	
Tin	0	0	NC	
Zinc	37	36	2.7	

0009

STL Seattle

Laboratory Control Sample

Lab ID:	RSP003
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Antimony	120	152	0	329	Pass
Copper	120	112	90.4	134	Pass
Iron	11000	11300	5280	17400	Pass
Lead	110	104	81.8	126	Pass
Tin	260	232	128	336	Pass
Zinc	180	194	155	233	Pass

STL Seattle

Laboratory Control Sample

Lab ID:	RSP004
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Antimony	120	152	0	329	Pass
Copper	110	112	90.4	134	Pass
Iron	10000	11300	5280	17400	Pass
Lead	100	104	81.8	126	Pass
Tin	240	232	128	336	Pass
Zinc	180	194	155	233	Pass

STL Seattle

Lab ID:	Method Blank - SP003
Date Received:	-
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1

Metals by ICP-MS - USEPA Method 6020

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	ND	0.6	0.06	

STL Seattle

Lab ID:	Method Blank - SP004
Date Received:	-
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
Dilution Factor	1

Metals by ICP-MS - USEPA Method 6020

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	ND	0.6	0.06	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP003
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP-MS - USEPA Method 6020

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Arsenic	0	800	874	109	882	110	0.91	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP004
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP-MS - USEPA Method 6020

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Arsenic	0	800	886	111	893	112	0.9	

STL Seattle

Matrix Spike Report

Client Sample ID:	EB3451
Lab ID:	115861-01
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Arsenic	4.24	753	810	107	

STL Seattle

Matrix Spike Report

Client Sample ID:	EB4151
Lab ID:	115861-21
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Arsenic	4.37	779	832	106	

STL Seattle

Duplicate Report

Client Sample ID:	EB3451
Lab ID:	115861-01
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Arsenic	4.2	4	4.9	

STL Seattle

Duplicate Report

Client Sample ID:	EB4151
Lab ID:	115861-21
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Arsenic	4.4	4.4	0.0	

STL Seattle

Laboratory Control Sample

Lab ID:	RSP003
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP003

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Arsenic	110	114	81.5	145	Pass

STL Seattle

Laboratory Control Sample

Lab ID:	RSP004
Date Prepared:	9/4/03
Date Analyzed:	9/4/03
QC Batch ID:	SP004

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Arsenic	110	114	81.5	145	Pass

0010

SEVERN TRENT STL

STL Seattle
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ANALYTICAL NARRATIVE

Client: Hart Crowser

Date: September 18, 2003

Project: Evergreen Filteration Range Fort Lewis , WA

Lab No.: 115954

Delivered By: Submitter

Condition of samples upon receipt: Samples were received in good condition. Chain of custody was in order.

Sample Identification:

Lab. No.	Client ID	Date Sampled	Matrix
115954-1	ED1S1	09-08-03	solid
115954-2	ED1S2	09-08-03	solid
115954-3	ED2S1	09-08-03	solid
115954-4	ED2S2	09-08-03	solid
115954-5	ED3S1	09-08-03	solid
115954-6	ED3S2	09-08-03	solid
115954-7	ED4S1	09-08-03	solid
115954-8	ED4S2	09-08-03	solid
115954-9	ED5S1	09-08-03	solid
115954-10	ED5S2	09-08-03	solid
115954-11	ED6S1	09-08-03	solid
115954-12	ED6S2	09-08-03	solid
115954-13	ED7S1	09-08-03	solid
115954-14	ED7S2	09-08-03	solid
115954-15	ED8S1	09-08-03	solid
115954-16	ED8S2	09-08-03	solid
115954-17	ED9S1	09-08-03	solid
115954-18	ED9S2	09-08-03	solid
115954-19	ED10S1	09-08-03	solid
115954-20	ED10S2	09-08-03	solid
115954-21	ED11S1	09-08-03	solid
115954-22	ED11S2	09-08-03	solid

STL Seattle

Client: Hart Crowser

Date: September 18, 2003

Project: Evergreen Filteration Range Fort Lewis , WA

Lab No.: 115954

SAMPLE EXTRACTION AND ANALYSIS

NITROAMINE AND NITROAROMATIC COMPOUNDS

Samples 115954-1 through 115954-22 were analyzed for nitroamine and nitroaromatic compounds in accordance with EPA Method 8330. The samples were extracted and analyzed on 9-10-03, which was within the required holding time.

All quality control was within the acceptance limits.

No difficulties were encountered during the nitroamine and nitroaromatic compounds analyses.

STL Seattle

Client Name	Hart Crowser
Client ID:	ED1S1
Lab ID:	115954-01
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0498	0.00981	
RDX	ND	0.0498	0.0106	
1,3,5-Trinitrobenzene	ND	0.0498	0.0104	
1,3-Dinitrobenzene	ND	0.0498	0.00808	
Tetryl	ND	0.0498	0.0122	
2,4,6-Trinitrotoluene	ND	0.0498	0.0107	
Nitrobenzene	ND	0.0498	0.0105	
2-Aminodinitrotoluene	ND	0.0498	0.0104	
4-Aminodinitrotoluene	ND	0.0498	0.0137	
2,4-Dinitrotoluene	ND	0.0498	0.00557	
2,6-Dinitrotoluene	ND	0.0498	0.0082	
2-Nitrotoluene	ND	0.0996	0.0127	
4-Nitrotoluene	ND	0.0996	0.0173	
3-Nitrotoluene	ND	0.0996	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED1S2
Lab ID:	115954-02
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	100		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0495	0.00974	
RDX	ND	0.0495	0.0105	
1,3,5-Trinitrobenzene	ND	0.0495	0.0103	
1,3-Dinitrobenzene	ND	0.0495	0.00802	
Tetryl	ND	0.0495	0.0121	
2,4,6-Trinitrotoluene	ND	0.0495	0.0106	
Nitrobenzene	ND	0.0495	0.0104	
2-Aminodinitrotoluene	ND	0.0495	0.0103	
4-Aminodinitrotoluene	ND	0.0495	0.0136	
2,4-Dinitrotoluene	ND	0.0495	0.00553	
2,6-Dinitrotoluene	ND	0.0495	0.00814	
2-Nitrotoluene	ND	0.099	0.0126	
4-Nitrotoluene	ND	0.099	0.0172	
3-Nitrotoluene	ND	0.099	0.0145	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED2S1
Lab ID:	115954-03
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	99		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0499	0.00982	
RDX	ND	0.0499	0.0106	
1,3,5-Trinitrobenzene	ND	0.0499	0.0104	
1,3-Dinitrobenzene	ND	0.0499	0.00808	
Tetryl	ND	0.0499	0.0122	
2,4,6-Trinitrotoluene	ND	0.0499	0.0107	
Nitrobenzene	ND	0.0499	0.0105	
2-Aminodinitrotoluene	ND	0.0499	0.0104	
4-Aminodinitrotoluene	ND	0.0499	0.0137	
2,4-Dinitrotoluene	ND	0.0499	0.00557	
2,6-Dinitrotoluene	ND	0.0499	0.0082	
2-Nitrotoluene	ND	0.0997	0.0127	
4-Nitrotoluene	ND	0.0997	0.0173	
3-Nitrotoluene	ND	0.0997	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED2S2
Lab ID:	115954-04
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	101		78	122

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MDL	Flags
HMX	ND		0.0495	0.00975	
RDX	ND		0.0495	0.0105	
1,3,5-Trinitrobenzene	ND		0.0495	0.0103	
1,3-Dinitrobenzene	ND		0.0495	0.00803	
Tetryl	ND		0.0495	0.0121	
2,4,6-Trinitrotoluene	ND		0.0495	0.0106	
Nitrobenzene	ND		0.0495	0.0104	
2-Aminodinitrotoluene	ND		0.0495	0.0103	
4-Aminodinitrotoluene	ND		0.0495	0.0137	
2,4-Dinitrotoluene	ND		0.0495	0.00553	
2,6-Dinitrotoluene	ND		0.0495	0.00815	
2-Nitrotoluene	ND		0.099	0.0126	
4-Nitrotoluene	ND		0.099	0.0172	
3-Nitrotoluene	ND		0.099	0.0145	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED3S1
Lab ID:	115954-05
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0497	0.00978	
RDX	ND	0.0497	0.0106	
1,3,5-Trinitrobenzene	ND	0.0497	0.0104	
1,3-Dinitrobenzene	ND	0.0497	0.00806	
Tetryl	ND	0.0497	0.0121	
2,4,6-Trinitrotoluene	ND	0.0497	0.0107	
Nitrobenzene	ND	0.0497	0.0105	
2-Aminodinitrotoluene	ND	0.0497	0.0103	
4-Aminodinitrotoluene	ND	0.0497	0.0137	
2,4-Dinitrotoluene	ND	0.0497	0.00555	
2,6-Dinitrotoluene	ND	0.0497	0.00818	
2-Nitrotoluene	ND	0.0994	0.0127	
4-Nitrotoluene	ND	0.0994	0.0172	
3-Nitrotoluene	ND	0.0994	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED3S2
Lab ID:	115954-06
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0494	0.00973	
RDX	ND	0.0494	0.0105	
1,3,5-Trinitrobenzene	ND	0.0494	0.0103	
1,3-Dinitrobenzene	ND	0.0494	0.00801	
Tetryl	ND	0.0494	0.0121	
2,4,6-Trinitrotoluene	ND	0.0494	0.0106	
Nitrobenzene	ND	0.0494	0.0104	
2-Aminodinitrotoluene	ND	0.0494	0.0103	
4-Aminodinitrotoluene	ND	0.0494	0.0136	
2,4-Dinitrotoluene	ND	0.0494	0.00552	
2,6-Dinitrotoluene	ND	0.0494	0.00813	
2-Nitrotoluene	ND	0.0988	0.0126	
4-Nitrotoluene	ND	0.0988	0.0171	
3-Nitrotoluene	ND	0.0988	0.0145	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED4S1
Lab ID:	115954-07
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	**% Recovery**	**Flags**	**Recovery Limits Low**	**Recovery Limits High**
3,4-Dinitrotoluene	103		78	122

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
HMX	ND	0.0495	0.00975	
RDX	ND	0.0495	0.0105	
1,3,5-Trinitrobenzene	ND	0.0495	0.0103	
1,3-Dinitrobenzene	ND	0.0495	0.00803	
Tetryl	ND	0.0495	0.0121	
2,4,6-Trinitrotoluene	ND	0.0495	0.0106	
Nitrobenzene	ND	0.0495	0.0104	
2-Aminodinitrotoluene	ND	0.0495	0.0103	
4-Aminodinitrotoluene	ND	0.0495	0.0136	
2,4-Dinitrotoluene	ND	0.0495	0.00553	
2,6-Dinitrotoluene	ND	0.0495	0.00815	
2-Nitrotoluene	ND	0.099	0.0126	
4-Nitrotoluene	ND	0.099	0.0172	
3-Nitrotoluene	ND	0.099	0.0145	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED4S2
Lab ID:	115954-08
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	99.7		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0498	0.00981	
RDX	ND	0.0498	0.0106	
1,3,5-Trinitrobenzene	ND	0.0498	0.0104	
1,3-Dinitrobenzene	ND	0.0498	0.00808	
Tetryl	ND	0.0498	0.0122	
2,4,6-Trinitrotoluene	ND	0.0498	0.0107	
Nitrobenzene	ND	0.0498	0.0105	
2-Aminodinitrotoluene	ND	0.0498	0.0104	
4-Aminodinitrotoluene	ND	0.0498	0.0137	
2,4-Dinitrotoluene	ND	0.0498	0.00557	
2,6-Dinitrotoluene	ND	0.0498	0.0082	
2-Nitrotoluene	ND	0.0997	0.0127	
4-Nitrotoluene	ND	0.0997	0.0173	
3-Nitrotoluene	ND	0.0997	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED5S1
Lab ID:	115954-09
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	101		78	122

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MDL	Flags
HMX	ND		0.0498	0.00981	
RDX	ND		0.0498	0.0106	
1,3,5-Trinitrobenzene	ND		0.0498	0.0104	
1,3-Dinitrobenzene	ND		0.0498	0.00808	
Tetryl	ND		0.0498	0.0122	
2,4,6-Trinitrotoluene	ND		0.0498	0.0107	
Nitrobenzene	ND		0.0498	0.0105	
2-Aminodinitrotoluene	ND		0.0498	0.0104	
4-Aminodinitrotoluene	ND		0.0498	0.0137	
2,4-Dinitrotoluene	ND		0.0498	0.00557	
2,6-Dinitrotoluene	ND		0.0498	0.0082	
2-Nitrotoluene	ND		0.0997	0.0127	
4-Nitrotoluene	ND		0.0997	0.0173	
3-Nitrotoluene	ND		0.0997	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED5S2
Lab ID:	115954-10
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	101		78	122

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MDL	Flags
HMX	ND		0.0497	0.00979	
RDX	ND		0.0497	0.0106	
1,3,5-Trinitrobenzene	ND		0.0497	0.0104	
1,3-Dinitrobenzene	ND		0.0497	0.00806	
Tetryl	ND		0.0497	0.0121	
2,4,6-Trinitrotoluene	ND		0.0497	0.0107	
Nitrobenzene	ND		0.0497	0.0105	
2-Aminodinitrotoluene	ND		0.0497	0.0104	
4-Aminodinitrotoluene	ND		0.0497	0.0137	
2,4-Dinitrotoluene	ND		0.0497	0.00556	
2,6-Dinitrotoluene	ND		0.0497	0.00818	
2-Nitrotoluene	ND		0.0995	0.0127	
4-Nitrotoluene	ND		0.0995	0.0173	
3-Nitrotoluene	ND		0.0995	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED6S1
Lab ID:	115954-11
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

			Recovery Limits	
Surrogate	% Recovery	Flags	Low	High
3,4-Dinitrotoluene	103		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.05	0.00984	
RDX	ND	0.05	0.0106	
1,3,5-Trinitrobenzene	ND	0.05	0.0104	
1,3-Dinitrobenzene	ND	0.05	0.0081	
Tetryl	ND	0.05	0.0122	
2,4,6-Trinitrotoluene	ND	0.05	0.0107	
Nitrobenzene	ND	0.05	0.0105	
2-Aminodinitrotoluene	ND	0.05	0.0104	
4-Aminodinitrotoluene	ND	0.05	0.0138	
2,4-Dinitrotoluene	ND	0.05	0.00558	
2,6-Dinitrotoluene	ND	0.05	0.00822	
2-Nitrotoluene	ND	0.0999	0.0127	
4-Nitrotoluene	ND	0.0999	0.0173	
3-Nitrotoluene	ND	0.0999	0.0147	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED6S2
Lab ID:	115954-12
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	104		78	122

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MDL	Flags
HMX	ND		0.0496	0.00976	
RDX	ND		0.0496	0.0105	
1,3,5-Trinitrobenzene	ND		0.0496	0.0103	
1,3-Dinitrobenzene	ND		0.0496	0.00804	
Tetryl	ND		0.0496	0.0121	
2,4,6-Trinitrotoluene	ND		0.0496	0.0106	
Nitrobenzene	ND		0.0496	0.0104	
2-Aminodinitrotoluene	ND		0.0496	0.0103	
4-Aminodinitrotoluene	ND		0.0496	0.0137	
2,4-Dinitrotoluene	ND		0.0496	0.00554	
2,6-Dinitrotoluene	ND		0.0496	0.00816	
2-Nitrotoluene	ND		0.0992	0.0126	
4-Nitrotoluene	ND		0.0992	0.0172	
3-Nitrotoluene	ND		0.0992	0.0146	

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STL Seattle

Client Name	Hart Crowser
Client ID:	ED7S1
Lab ID:	115954-13
Date Received:	9/8/03
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0497	0.00979	
RDX	ND	0.0497	0.0106	
1,3,5-Trinitrobenzene	ND	0.0497	0.0104	
1,3-Dinitrobenzene	ND	0.0497	0.00806	
Tetryl	ND	0.0497	0.0121	
2,4,6-Trinitrotoluene	ND	0.0497	0.0107	
Nitrobenzene	ND	0.0497	0.0105	
2-Aminodinitrotoluene	ND	0.0497	0.0104	
4-Aminodinitrotoluene	ND	0.0497	0.0137	
2,4-Dinitrotoluene	ND	0.0497	0.00555	
2,6-Dinitrotoluene	ND	0.0497	0.00818	
2-Nitrotoluene	ND	0.0994	0.0127	
4-Nitrotoluene	ND	0.0994	0.0173	
3-Nitrotoluene	ND	0.0994	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED7S2
Lab ID:	115954-14
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0495	0.00975	
RDX	ND	0.0495	0.0105	
1,3,5-Trinitrobenzene	ND	0.0495	0.0103	
1,3-Dinitrobenzene	ND	0.0495	0.00803	
Tetryl	ND	0.0495	0.0121	
2,4,6-Trinitrotoluene	ND	0.0495	0.0106	
Nitrobenzene	ND	0.0495	0.0104	
2-Aminodinitrotoluene	ND	0.0495	0.0103	
4-Aminodinitrotoluene	ND	0.0495	0.0137	
2,4-Dinitrotoluene	ND	0.0495	0.00553	
2,6-Dinitrotoluene	ND	0.0495	0.00815	
2-Nitrotoluene	ND	0.0991	0.0126	
4-Nitrotoluene	ND	0.0991	0.0172	
3-Nitrotoluene	ND	0.0991	0.0145	

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STL Seattle

Client Name	Hart Crowser
Client ID:	ED8S1
Lab ID:	115954-15
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	101		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.05	0.00984	
RDX	ND	0.05	0.0106	
1,3,5-Trinitrobenzene	ND	0.05	0.0104	
1,3-Dinitrobenzene	ND	0.05	0.0081	
Tetryl	ND	0.05	0.0122	
2,4,6-Trinitrotoluene	ND	0.05	0.0107	
Nitrobenzene	ND	0.05	0.0105	
2-Aminodinitrotoluene	ND	0.05	0.0104	
4-Aminodinitrotoluene	ND	0.05	0.0138	
2,4-Dinitrotoluene	ND	0.05	0.00558	
2,6-Dinitrotoluene	ND	0.05	0.00822	
2-Nitrotoluene	ND	0.0999	0.0127	
4-Nitrotoluene	ND	0.0999	0.0173	
3-Nitrotoluene	ND	0.0999	0.0147	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED8S2
Lab ID:	115954-16
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

			Recovery Limits	
Surrogate	% Recovery	Flags	Low	High
3,4-Dinitrotoluene	103		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0496	0.00976	
RDX	ND	0.0496	0.0106	
1,3,5-Trinitrobenzene	ND	0.0496	0.0104	
1,3-Dinitrobenzene	ND	0.0496	0.00804	
Tetryl	ND	0.0496	0.0121	
2,4,6-Trinitrotoluene	ND	0.0496	0.0106	
Nitrobenzene	ND	0.0496	0.0104	
2-Aminodinitrotoluene	ND	0.0496	0.0103	
4-Aminodinitrotoluene	ND	0.0496	0.0137	
2,4-Dinitrotoluene	ND	0.0496	0.00554	
2,6-Dinitrotoluene	ND	0.0496	0.00816	
2-Nitrotoluene	ND	0.0992	0.0126	
4-Nitrotoluene	ND	0.0992	0.0172	
3-Nitrotoluene	ND	0.0992	0.0146	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED9S1
Lab ID:	115954-17
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0492	0.00968	
RDX	ND	0.0492	0.0105	
1,3,5-Trinitrobenzene	ND	0.0492	0.0103	
1,3-Dinitrobenzene	ND	0.0492	0.00797	
Tetryl	ND	0.0492	0.012	
2,4,6-Trinitrotoluene	ND	0.0492	0.0105	
Nitrobenzene	ND	0.0492	0.0104	
2-Aminodinitrotoluene	ND	0.0492	0.0102	
4-Aminodinitrotoluene	ND	0.0492	0.0136	
2,4-Dinitrotoluene	ND	0.0492	0.00549	
2,6-Dinitrotoluene	ND	0.0492	0.00809	
2-Nitrotoluene	ND	0.0983	0.0125	
4-Nitrotoluene	ND	0.0983	0.0171	
3-Nitrotoluene	ND	0.0983	0.0144	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED9S2
Lab ID:	115954-18
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	103		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0499	0.00983	
RDX	ND	0.0499	0.0106	
1,3,5-Trinitrobenzene	ND	0.0499	0.0104	
1,3-Dinitrobenzene	ND	0.0499	0.0081	
Tetryl	ND	0.0499	0.0122	
2,4,6-Trinitrotoluene	ND	0.0499	0.0107	
Nitrobenzene	ND	0.0499	0.0105	
2-Aminodinitrotoluene	ND	0.0499	0.0104	
4-Aminodinitrotoluene	ND	0.0499	0.0138	
2,4-Dinitrotoluene	ND	0.0499	0.00558	
2,6-Dinitrotoluene	ND	0.0499	0.00822	
2-Nitrotoluene	ND	0.0999	0.0127	
4-Nitrotoluene	ND	0.0999	0.0173	
3-Nitrotoluene	ND	0.0999	0.0147	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED10S1
Lab ID:	115954-19
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0494	0.00972	
RDX	ND	0.0494	0.0105	
1,3,5-Trinitrobenzene	ND	0.0494	0.0103	
1,3-Dinitrobenzene	ND	0.0494	0.00801	
Tetryl	ND	0.0494	0.0121	
2,4,6-Trinitrotoluene	ND	0.0494	0.0106	
Nitrobenzene	ND	0.0494	0.0104	
2-Aminodinitrotoluene	ND	0.0494	0.0103	
4-Aminodinitrotoluene	ND	0.0494	0.0136	
2,4-Dinitrotoluene	ND	0.0494	0.00552	
2,6-Dinitrotoluene	ND	0.0494	0.00813	
2-Nitrotoluene	ND	0.0988	0.0126	
4-Nitrotoluene	ND	0.0988	0.0171	
3-Nitrotoluene	ND	0.0988	0.0145	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED10S2
Lab ID:	115954-20
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	103		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0494	0.00972	
RDX	ND	0.0494	0.0105	
1,3,5-Trinitrobenzene	ND	0.0494	0.0103	
1,3-Dinitrobenzene	ND	0.0494	0.008	
Tetryl	ND	0.0494	0.0121	
2,4,6-Trinitrotoluene	ND	0.0494	0.0106	
Nitrobenzene	ND	0.0494	0.0104	
2-Aminodinitrotoluene	ND	0.0494	0.0103	
4-Aminodinitrotoluene	ND	0.0494	0.0136	
2,4-Dinitrotoluene	ND	0.0494	0.00552	
2,6-Dinitrotoluene	ND	0.0494	0.00812	
2-Nitrotoluene	ND	0.0987	0.0126	
4-Nitrotoluene	ND	0.0987	0.0171	
3-Nitrotoluene	ND	0.0987	0.0145	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED11S1
Lab ID:	115954-21
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.0492	0.00968	
RDX	ND	0.0492	0.0105	
1,3,5-Trinitrobenzene	ND	0.0492	0.0103	
1,3-Dinitrobenzene	ND	0.0492	0.00797	
Tetryl	ND	0.0492	0.012	
2,4,6-Trinitrotoluene	ND	0.0492	0.0105	
Nitrobenzene	ND	0.0492	0.0104	
2-Aminodinitrotoluene	ND	0.0492	0.0102	
4-Aminodinitrotoluene	ND	0.0492	0.0136	
2,4-Dinitrotoluene	ND	0.0492	0.00549	
2,6-Dinitrotoluene	ND	0.0492	0.00809	
2-Nitrotoluene	ND	0.0983	0.0125	
4-Nitrotoluene	ND	0.0983	0.0171	
3-Nitrotoluene	ND	0.0983	0.0144	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED11S2
Lab ID:	115954-22
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	102		78	122

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MDL	Flags
HMX	ND		0.0493	0.0097	
RDX	ND		0.0493	0.0105	
1,3,5-Trinitrobenzene	ND		0.0493	0.0103	
1,3-Dinitrobenzene	ND		0.0493	0.00799	
Tetryl	ND		0.0493	0.012	
2,4,6-Trinitrotoluene	ND		0.0493	0.0106	
Nitrobenzene	ND		0.0493	0.0104	
2-Aminodinitrotoluene	ND		0.0493	0.0103	
4-Aminodinitrotoluene	ND		0.0493	0.0136	
2,4-Dinitrotoluene	ND		0.0493	0.00551	
2,6-Dinitrotoluene	ND		0.0493	0.00811	
2-Nitrotoluene	ND		0.0986	0.0126	
4-Nitrotoluene	ND		0.0986	0.0171	
3-Nitrotoluene	ND		0.0986	0.0145	

STL Seattle

Lab ID:	Method Blank - LC824
Date Received:	-
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	102		78	122

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.05	0.00984	
RDX	ND	0.05	0.0106	
1,3,5-Trinitrobenzene	ND	0.05	0.0104	
1,3-Dinitrobenzene	ND	0.05	0.00811	
Tetryl	ND	0.05	0.0122	
2,4,6-Trinitrotoluene	ND	0.05	0.0107	
Nitrobenzene	ND	0.05	0.0105	
2-Aminodinitrotoluene	ND	0.05	0.0104	
4-Aminodinitrotoluene	ND	0.05	0.0138	
2,4-Dinitrotoluene	ND	0.05	0.00559	
2,6-Dinitrotoluene	ND	0.05	0.00823	
2-Nitrotoluene	ND	0.1	0.0127	
4-Nitrotoluene	ND	0.1	0.0174	
3-Nitrotoluene	ND	0.1	0.0147	

0002

STL Seattle

Lab ID:	Method Blank - LC825
Date Received:	-
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	104		78	122

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	ND	0.05	0.00984	
RDX	ND	0.05	0.0106	
1,3,5-Trinitrobenzene	ND	0.05	0.0104	
1,3-Dinitrobenzene	ND	0.05	0.00811	
Tetryl	ND	0.05	0.0122	
2,4,6-Trinitrotoluene	ND	0.05	0.0107	
Nitrobenzene	ND	0.05	0.0105	
2-Aminodinitrotoluene	ND	0.05	0.0104	
4-Aminodinitrotoluene	ND	0.05	0.0138	
2,4-Dinitrotoluene	ND	0.05	0.00559	
2,6-Dinitrotoluene	ND	0.05	0.00823	
2-Nitrotoluene	ND	0.1	0.0127	
4-Nitrotoluene	ND	0.1	0.0174	
3-Nitrotoluene	ND	0.1	0.0147	

0002

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	LC824
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
QC Batch ID:	LC824

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
HMX	0	1	0.928	92.8	0.912	91.2	-1.7	
RDX	0	1	0.913	91.3	0.9	90	-1.4	
1,3,5-Trinitrobenzene	0	1	0.926	92.6	0.92	92	-0.65	
1,3-Dinitrobenzene	0	1	0.952	95.2	0.941	94.1	-1.2	
Tetryl	0	1	0.892	89.2	0.894	89.4	0.22	
2,4,6-Trinitrotoluene	0	1	0.894	89.4	0.886	88.6	-0.9	
Nitrobenzene	0	1	0.908	90.8	0.9	90	-0.88	
2-Aminodinitrotoluene	0	1	0.939	93.9	0.927	92.7	-1.3	
4-Aminodinitrotoluene	0	1	0.891	89.1	0.941	94.1	5.5	
2,4-Dinitrotoluene	0	1	0.911	91.1	0.904	90.4	-0.77	
2,6-Dinitrotoluene	0	1	0.961	96.1	0.956	95.6	-0.52	
2-Nitrotoluene	0	1	0.91	91	0.903	90.3	-0.77	
4-Nitrotoluene	0	1	0.905	90.5	0.904	90.4	-0.11	
3-Nitrotoluene	0	1	0.877	87.7	0.863	86.3	-1.6	

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STL Seattle

Client Name	0
Client ID:	
Lab ID:	SLC824
Date Received:	-
Date Prepared:	9/10/2003
Date Analyzed:	9/10/2003
% Solids	
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	98.7		78	122

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.928	0.05	0.00984	C1
RDX	0.913	0.05	0.0106	C1
1,3,5-Trinitrobenzene	0.926	0.05	0.0104	C1
1,3-Dinitrobenzene	0.952	0.05	0.00811	C1
Tetryl	0.892	0.05	0.0122	C1
2,4,6-Trinitrotoluene	0.894	0.05	0.0107	C1
Nitrobenzene	0.908	0.05	0.0105	C1
2,4-Dinitrotoluene	0.911	0.05	0.00559	C1
2,6-Dinitrotoluene	0.961	0.05	0.00823	C1
2-Nitrotoluene	0.91	0.1	0.0127	C1
4-Nitrotoluene	0.905	0.1	0.0174	C1
3-Nitrotoluene	0.877	0.1	0.0147	C1

STL Seattle

Client Name	0
Client ID:	
Lab ID:	DLC824
Date Received:	-
Date Prepared:	9/10/2003
Date Analyzed:	9/10/2003
% Solids	
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	90.8		78	122

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.912	0.05	0.00984	C1
RDX	0.9	0.05	0.0106	C1
1,3,5-Trinitrobenzene	0.92	0.05	0.0104	C1
1,3-Dinitrobenzene	0.941	0.05	0.00811	C1
Tetryl	0.894	0.05	0.0122	C1
2,4,6-Trinitrotoluene	0.886	0.05	0.0107	C1
Nitrobenzene	0.9	0.05	0.0105	C1
2,4-Dinitrotoluene	0.904	0.05	0.00559	C1
2,6-Dinitrotoluene	0.956	0.05	0.00823	C1
2-Nitrotoluene	0.903	0.1	0.0127	C1
4-Nitrotoluene	0.904	0.1	0.0174	C1
3-Nitrotoluene	0.863	0.1	0.0147	C1

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	LC825
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
QC Batch ID:	LC825

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
HMX	0	1	0.963	96.3	0.973	97.3	1	
RDX	0	1	0.936	93.6	0.927	92.7	-0.97	
1,3,5-Trinitrobenzene	0	1	0.864	86.4	0.921	92.1	6.4	
1,3-Dinitrobenzene	0	1	1.08	108	1.07	107	-0.93	
Tetryl	0	1	0.522	52.2	0.877	87.7	51	
2,4,6-Trinitrotoluene	0	1	0.888	88.8	0.873	87.3	-1.7	
Nitrobenzene	0	1	0.894	89.4	0.874	87.4	-2.3	
2-Aminodinitrotoluene	0	1	0.955	95.5	0.941	94.1	-1.5	
4-Aminodinitrotoluene	0	1	0.85	85	0.895	89.5	5.2	
2,4-Dinitrotoluene	0	1	0.884	88.4	0.875	87.5	-1	
2,6-Dinitrotoluene	0	1	0.986	98.6	0.977	97.7	-0.92	
2-Nitrotoluene	0	1	0.934	93.4	0.931	93.1	-0.32	
4-Nitrotoluene	0	1	0.928	92.8	0.908	90.8	-2.2	
3-Nitrotoluene	0	1	0.858	85.8	0.848	84.8	-1.2	

STL Seattle

Client Name	0
Client ID:	
Lab ID:	DLC825
Date Received:	-
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	94.3		78	122

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.973	0.05	0.00984	C1
RDX	0.927	0.05	0.0106	C1
1,3,5-Trinitrobenzene	0.921	0.05	0.0104	C1
1,3-Dinitrobenzene	1.07	0.05	0.00811	C1
Tetryl	0.877	0.05	0.0122	C1
2,4,6-Trinitrotoluene	0.873	0.05	0.0107	C1
Nitrobenzene	0.874	0.05	0.0105	C1
2-Aminodinitrotoluene	0.941	0.05	0.0104	C1
4-Aminodinitrotoluene	0.895	0.05	0.0138	C1
2,4-Dinitrotoluene	0.875	0.05	0.00559	C1
2,6-Dinitrotoluene	0.977	0.05	0.00823	C1
2-Nitrotoluene	0.931	0.1	0.0127	C1
4-Nitrotoluene	0.908	0.1	0.0174	C1
3-Nitrotoluene	0.848	0.1	0.0147	C1

STL Seattle

Client Name	0
Client ID:	
Lab ID:	SLC825
Date Received:	-
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	107		78	122

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.963	0.05	0.00984	C1
RDX	0.936	0.05	0.0106	C1
1,3,5-Trinitrobenzene	0.864	0.05	0.0104	C1
1,3-Dinitrobenzene	1.08	0.05	0.00811	C1
Tetryl	0.522	0.05	0.0122	C1
2,4,6-Trinitrotoluene	0.888	0.05	0.0107	C1
Nitrobenzene	0.894	0.05	0.0105	C1
2-Aminodinitrotoluene	0.955	0.05	0.0104	C1
4-Aminodinitrotoluene	0.85	0.05	0.0138	C1
2,4-Dinitrotoluene	0.884	0.05	0.00559	C1
2,6-Dinitrotoluene	0.986	0.05	0.00823	C1
2-Nitrotoluene	0.934	0.1	0.0127	C1
4-Nitrotoluene	0.928	0.1	0.0174	C1
3-Nitrotoluene	0.858	0.1	0.0147	C1

STL Seattle

Matrix Spike/Matrix Spike Duplicate Report

Client Sample ID:	ED1S1
Lab ID:	115954-01
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
QC Batch ID:	LC824

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Compound Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	MSD Result (mg/kg)	MSD % Rec.	RPD	Flag
HMX	0	0.989	0.878	88.8	0.884	89.1	0.34	
RDX	0	0.989	0.874	88.4	0.882	88.9	0.56	
1,3,5-Trinitrobenzene	0	0.989	0.896	90.7	0.912	91.9	1.3	
1,3-Dinitrobenzene	0	0.989	0.903	91.4	0.927	93.4	2.2	
Tetryl	0	0.989	0.877	88.7	0.93	93.7	5.5	
2,4,6-Trinitrotoluene	0	0.989	0.868	87.7	0.884	89.1	1.6	
Nitrobenzene	0	0.989	0.923	93.3	0.932	94	0.75	
2-Aminodinitrotoluene	0	0.989	0.92	93	0.934	94.2	1.3	
4-Aminodinitrotoluene	0	0.989	0.853	86.3	0.885	89.2	3.3	
2,4-Dinitrotoluene	0	0.989	0.871	88.1	0.894	90.1	2.2	
2,6-Dinitrotoluene	0	0.989	0.936	94.6	0.956	96.4	1.9	
2-Nitrotoluene	0	0.989	0.884	89.4	0.908	91.5	2.3	
4-Nitrotoluene	0	0.989	0.881	89.1	0.904	91.1	2.2	
3-Nitrotoluene	0	0.989	0.819	82.8	0.864	87	4.9	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED1S1 - ms
Lab ID:	115954S01
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/10/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	98.3		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.878	0.0494	0.00973	C1
RDX	0.874	0.0494	0.0105	C1
1,3,5-Trinitrobenzene	0.896	0.0494	0.0103	C1
1,3-Dinitrobenzene	0.903	0.0494	0.00802	C1
Tetryl	0.877	0.0494	0.0121	C1
2,4,6-Trinitrotoluene	0.868	0.0494	0.0106	C1
Nitrobenzene	0.923	0.0494	0.0104	C1
2,4-Dinitrotoluene	0.871	0.0494	0.00552	C1
2,6-Dinitrotoluene	0.936	0.0494	0.00813	C1
2-Nitrotoluene	0.884	0.0989	0.0126	C1
4-Nitrotoluene	0.881	0.0989	0.0172	C1
3-Nitrotoluene	0.819	0.0989	0.0145	C1

STL Seattle

Client Name	Hart Crowser
Client ID:	ED1S1 - msd
Lab ID:	115954D01
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/10/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	92.3		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.884	0.0496	0.00977	C1
RDX	0.882	0.0496	0.0106	C1
1,3,5-Trinitrobenzene	0.912	0.0496	0.0104	C1
1,3-Dinitrobenzene	0.927	0.0496	0.00804	C1
Tetryl	0.93	0.0496	0.0121	C1
2,4,6-Trinitrotoluene	0.884	0.0496	0.0106	C1
Nitrobenzene	0.932	0.0496	0.0104	C1
2,4-Dinitrotoluene	0.894	0.0496	0.00554	C1
2,6-Dinitrotoluene	0.956	0.0496	0.00816	C1
2-Nitrotoluene	0.908	0.0992	0.0126	C1
4-Nitrotoluene	0.904	0.0992	0.0172	C1
3-Nitrotoluene	0.864	0.0992	0.0146	C1

STL Seattle

Matrix Spike/Matrix Spike Duplicate Report

Client Sample ID:	ED8S1
Lab ID:	115954-15
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
QC Batch ID:	LC825

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Compound Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	MSD Result (mg/kg)	MSD % Rec.	RPD	Flag
HMX	0	0.99	0.922	93.2	0.896	89.9	-3.6	
RDX	0	0.99	0.879	88.8	0.861	86.3	-2.9	
1,3,5-Trinitrobenzene	0	0.99	0.89	89.9	0.892	89.5	-0.45	
1,3-Dinitrobenzene	0	0.99	0.92	92.9	0.923	92.5	-0.43	
Tetryl	0	0.99	0.815	82.3	0.827	82.9	0.73	
2,4,6-Trinitrotoluene	0	0.99	0.873	88.2	0.869	87.1	-1.3	
Nitrobenzene	0	0.99	0.902	91.1	0.9	90.3	-0.88	
2-Aminodinitrotoluene	0	0.99	0.939	94.9	0.936	93.9	-1.1	
4-Aminodinitrotoluene	0	0.99	0.909	91.8	0.942	94.4	2.8	
2,4-Dinitrotoluene	0	0.99	0.889	89.8	0.883	88.6	-1.3	
2,6-Dinitrotoluene	0	0.99	0.966	97.6	0.966	96.8	-0.82	
2-Nitrotoluene	0	0.99	0.945	95.5	0.933	93.5	-2.1	
4-Nitrotoluene	0	0.99	0.897	90.7	0.897	89.9	-0.89	
3-Nitrotoluene	0	0.99	0.868	87.7	0.857	85.9	-2.1	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED8S1 - ms
Lab ID:	115954S15
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	High
3,4-Dinitrotoluene	91.2		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.922	0.0495	0.00974	C1
RDX	0.879	0.0495	0.0105	C1
1,3,5-Trinitrobenzene	0.89	0.0495	0.0103	C1
1,3-Dinitrobenzene	0.92	0.0495	0.00802	C1
Tetryl	0.815	0.0495	0.0121	C1
2,4,6-Trinitrotoluene	0.873	0.0495	0.0106	C1
Nitrobenzene	0.902	0.0495	0.0104	C1
2-Aminodinitrotoluene	0.939	0.0495	0.0103	C1
4-Aminodinitrotoluene	0.909	0.0495	0.0136	C1
2,4-Dinitrotoluene	0.889	0.0495	0.00553	C1
2,6-Dinitrotoluene	0.966	0.0495	0.00814	C1
2-Nitrotoluene	0.945	0.099	0.0126	C1
4-Nitrotoluene	0.897	0.099	0.0172	C1
3-Nitrotoluene	0.868	0.099	0.0145	C1

STL Seattle

Client Name	Hart Crowser
Client ID:	ED8S1 - msd
Lab ID:	115954D15
Date Received:	9/8/2003
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	92.5		78	122

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
HMX	0.896	0.0499	0.00982	C1
RDX	0.861	0.0499	0.0106	C1
1,3,5-Trinitrobenzene	0.892	0.0499	0.0104	C1
1,3-Dinitrobenzene	0.923	0.0499	0.00809	C1
Tetryl	0.827	0.0499	0.0122	C1
2,4,6-Trinitrotoluene	0.869	0.0499	0.0107	C1
Nitrobenzene	0.9	0.0499	0.0105	C1
2-Aminodinitrotoluene	0.936	0.0499	0.0104	C1
4-Aminodinitrotoluene	0.942	0.0499	0.0137	C1
2,4-Dinitrotoluene	0.883	0.0499	0.00557	C1
2,6-Dinitrotoluene	0.966	0.0499	0.00821	C1
2-Nitrotoluene	0.933	0.0997	0.0127	C1
4-Nitrotoluene	0.897	0.0997	0.0173	C1
3-Nitrotoluene	0.857	0.0997	0.0146	C1

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STL Seattle

Duplicate Report

Client Sample ID:	ED1S1
Lab ID:	115954-01
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
QC Batch ID:	LC824

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
HMX	0	0	NC	
RDX	0	0	NC	
1,3,5-Trinitrobenzene	0	0	NC	
1,3-Dinitrobenzene	0	0	NC	
Tetryl	0	0	NC	
2,4,6-Trinitrotoluene	0	0	NC	
Nitrobenzene	0	0	NC	
2-Aminodinitrotoluene	0	0	NC	
4-Aminodinitrotoluene	0	0	NC	
2,4-Dinitrotoluene	0	0	NC	
2,6-Dinitrotoluene	0	0	NC	
2-Nitrotoluene	0	0	NC	
4-Nitrotoluene	0	0	NC	
3-Nitrotoluene	0	0	NC	

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STL Seattle

Client Name	Hart Crowser
Client ID:	ED1S1 - dup
Lab ID:	115954R01
Date Received:	-
Date Prepared:	9/10/03
Date Analyzed:	9/10/03
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
3,4-Dinitrotoluene	103		78	122

Sample results are on a dry weight basis.

Analyte		**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
HMX	ND		0.0499	0.00982	
RDX	ND		0.0499	0.0106	
1,3,5-Trinitrobenzene	ND		0.0499	0.0104	
1,3-Dinitrobenzene	ND		0.0499	0.00809	
Tetryl	ND		0.0499	0.0122	
2,4,6-Trinitrotoluene	ND		0.0499	0.0107	
Nitrobenzene	ND		0.0499	0.0105	
2-Aminodinitrotoluene	ND		0.0499	0.0104	
4-Aminodinitrotoluene	ND		0.0499	0.0138	
2,4-Dinitrotoluene	ND		0.0499	0.00558	
2,6-Dinitrotoluene	ND		0.0499	0.00821	
2-Nitrotoluene	ND		0.0998	0.0127	
4-Nitrotoluene	ND		0.0998	0.0173	
3-Nitrotoluene	ND		0.0998	0.0147	

STL Seattle

Duplicate Report

Client Sample ID:	ED8S1
Lab ID:	115954-15
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
QC Batch ID:	LC825

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
HMX	0	0	NC	
RDX	0	0	NC	
1,3,5-Trinitrobenzene	0	0	NC	
1,3-Dinitrobenzene	0	0	NC	
Tetryl	0	0	NC	
2,4,6-Trinitrotoluene	0	0	NC	
Nitrobenzene	0	0	NC	
2-Aminodinitrotoluene	0	0	NC	
4-Aminodinitrotoluene	0	0	NC	
2,4-Dinitrotoluene	0	0	NC	
2,6-Dinitrotoluene	0	0	NC	
2-Nitrotoluene	0	0	NC	
4-Nitrotoluene	0	0	NC	
3-Nitrotoluene	0	0	NC	

STL Seattle

Client Name	Hart Crowser
Client ID:	ED8S1 - dup
Lab ID:	115954R15
Date Received:	-
Date Prepared:	9/10/2003
Date Analyzed:	9/11/2003
% Solids	100
Dilution Factor	1

Nitroamine & Nitroaromatic Compounds by USEPA Method 8330

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
3,4-Dinitrotoluene	104		78	122

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MDL	Flags
HMX	ND		0.0499	0.00983	
RDX	ND		0.0499	0.0106	
1,3,5-Trinitrobenzene	ND		0.0499	0.0104	
1,3-Dinitrobenzene	ND		0.0499	0.0081	
Tetryl	ND		0.0499	0.0122	
2,4,6-Trinitrotoluene	ND		0.0499	0.0107	
Nitrobenzene	ND		0.0499	0.0105	
2-Aminodinitrotoluene	ND		0.0499	0.0104	
4-Aminodinitrotoluene	ND		0.0499	0.0138	
2,4-Dinitrotoluene	ND		0.0499	0.00558	
2,6-Dinitrotoluene	ND		0.0499	0.00822	
2-Nitrotoluene	ND		0.0999	0.0127	
4-Nitrotoluene	ND		0.0999	0.0173	
3-Nitrotoluene	ND		0.0999	0.0147	

SEVERN TRENT STL

STL Seattle
5755 8th Street East
Tacoma, WA 98424

Tel: 253 922 2310
Fax: 253 922 5047
www.stl-inc.com

ANALYTICAL NARRATIVE

Client: Hart Crowser

Date: September 25, 2003

Project: Fort Lewis Agreed Order Former Ranges

Lab No.: 116312

Delivered By: Submitter

Condition of samples upon receipt: Samples were received in good condition. Cooler temperatures have been recorded on the cooler receipt form included in the chain of custody section of this report. Chain of custody was in order.

Sample Identification:

Lab. No.	Client ID	Date Sampled	Matrix
116312-1	EF1-S1	09-09-03	solid
116312-2	EF2-S1	09-09-03	solid
116312-3	EF3-S1	09-09-03	solid
116312-4	EF4-S1	09-09-03	solid
116312-5	EB87-S1	09-11-03	solid
116312-6	EB87-S2	09-11-03	solid
116312-7	EB88-S1	09-15-03	solid
116312-8	EB88-S2	09-15-03	solid
116312-9	EB90-S1	09-15-03	solid
116312-10	EB90-S2	09-15-03	solid
116312-11	EB91-S1	09-18-03	solid
116312-12	EB91-S2	09-18-03	solid
116312-13	EB~~8~~92-S1	09-15-03	solid
116312-14	EB92-S2	09-15-03	solid
116312-15	EB93-S2	09-18-03	solid
116312-16	EB94-S1	09-15-03	solid
116312-17	EB94-S2	09-15-03	solid
116312-18	EB96-S1	09-15-03	solid
116312-19	EB96-S2	09-15-03	solid
116312-20	EB97-S1	09-15-03	solid
116312-21	EB97-S2	09-15-03	solid
116312-22	EB98-S1	09-15-03	solid
116312-23	EB98-S2	09-15-03	solid

STL Seattle

Sample Identification:

Lab. No.	Client ID	Date/Time Sampled	Matrix
116312-1	EF1-S1	09-09-03 10:10	solid
116312-2	EF2-S1	09-09-03 10:23	solid
116312-3	EF3-S1	09-09-03 11:00	solid
116312-4	EF4-S1	09-09-03 11:10	solid
116312-5	EB87-S1	09-11-03 13:40	solid
116312-6	EB87-S2	09-11-03 13:51	solid
116312-7	EB88-S1	09-15-03 10:16	solid
116312-8	EB88-S2	09-15-03 10:46	solid
116312-9	EB90-S1	09-15-03 10:12	solid
116312-10	EB90-S2	09-15-03 10:35	solid
116312-11	EB91-S1	09-18-03 14:55	solid
116312-12	EB91-S2	09-18-03 14:59	solid
116312-13	EB82-S1	09-15-03 11:16	solid
116312-14	EB92-S2	09-15-03 11:45	solid
116312-15	EB93-S2	09-18-03 15:15	solid
116312-16	EB94-S1	09-15-03 11:30	solid
116312-17	EB94-S2	09-15-03 11:40	solid
116312-18	EB96-S1	09-15-03 13:15	solid
116312-19	EB96-S2	09-15-03 14:00	solid
116312-20	EB97-S1	09-15-03 15:15	solid
116312-21	EB97-S2	09-15-03 15:35	solid
116312-22	EB98-S1	09-15-03 13:55	solid
116312-23	EB98-S2	09-15-03 14:30	solid

STL Seattle

Client: Hart Crowser

Date: September 25, 2003

Project: Fort Lewis Agreed Order Former Ranges

Lab No.: 116312

SAMPLE EXTRACTION AND ANALYSIS

TOTAL METALS

Samples 116312-1 through 116312-23 were analyzed for total metals in accordance with EPA Methods 6010/6020. The samples were digested and analyzed on 9-23-03, which was within the required holding time.

The percent recovery of Iron in the matrix spike analysis of sample 116312-1 exceeded the quality control limits due to high levels of target analyte in the original sample.

The percent recovery of Iron in the matrix spike analysis of sample 116312-13 exceeded the quality control limits. Matrix interferences are indicated based on acceptable recoveries of the associated blank spike (SP052).

All other quality control was within the acceptance limits.

No other difficulties were encountered during the total metals analyses.

STL Seattle

Client Name	Hart Crowser
Client ID:	EF1-S1
Lab ID:	116312-01
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	95.03

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		8.85	4.42	
Copper		54	1.77	0.885	
Iron		16500	17.7	8.85	
Tin	ND		8.85	4.42	
Zinc		45.5	1.77	0.885	

STL Seattle

Client Name	Hart Crowser
Client ID:	EF1-S1
Lab ID:	116312-01
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	95.03

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.11	0.885	0.442	
Lead	19.2	0.442	0.221	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EF2-S1
Lab ID:	116312-02
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	95.38

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.82	4.91	
Copper	52.2	1.96	0.982	
Iron	16300	19.6	9.82	
Tin	ND	9.82	4.91	
Zinc	36.3	1.96	0.982	

STL Seattle

Client Name	Hart Crowser
Client ID:	EF2-S1
Lab ID:	116312-02
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	95.38

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.71	0.982	0.491	
Lead	17.4	0.491	0.245	

STL Seattle

Client Name	Hart Crowser
Client ID:	EF3-S1
Lab ID:	116312-03
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	95.2

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.24	4.62	
Copper		45.7	1.85	0.924	
Iron		18800	18.5	9.24	
Tin	ND		9.24	4.62	
Zinc		49.7	1.85	0.924	

STL Seattle

Client Name	Hart Crowser
Client ID:	EF3-S1
Lab ID:	116312-03
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	95.2

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.19	0.924	0.462	
Lead	17.8	0.462	0.231	

STL Seattle

Client Name	Hart Crowser
Client ID:	EF4-S1
Lab ID:	116312-04
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	94.53

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.47	4.73	
Copper		45.5	1.89	0.947	
Iron		18500	18.9	9.47	
Tin	ND		9.47	4.73	
Zinc		44.3	1.89	0.947	

STL Seattle

Client Name	Hart Crowser
Client ID:	EF4-S1
Lab ID:	116312-04
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	94.53

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.99	0.947	0.473	
Lead	20.9	0.473	0.237	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB87-S1
Lab ID:	116312-05
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	94.7

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.5	5.24	
Copper		20.5	2.09	1.05	
Iron		17900	20.9	10.5	
Tin	ND		10.5	5.24	
Zinc		34.4	2.09	1.05	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB87-S1
Lab ID:	116312-05
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	94.7

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.17	1.05	0.524	
Lead	42.6	0.524	0.262	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB87-S2
Lab ID:	116312-06
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	91.72

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.99	5	
Copper		22.1	2	0.999	
Iron		20100	20	9.99	
Tin	ND		9.99	5	
Zinc		36.3	2	0.999	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB87-S2
Lab ID:	116312-06
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	91.72

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.07	0.999	0.5	
Lead	12.2	0.5	0.25	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB88-S1
Lab ID:	116312-07
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	97.78

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.31	4.66	
Copper		19.2	1.86	0.931	
Iron		15700	18.6	9.31	
Tin	ND		9.31	4.66	
Zinc		27.6	1.86	0.931	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB88-S1
Lab ID:	116312-07
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	97.78

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.51	0.931	0.466	
Lead	34	0.466	0.233	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB88-S2
Lab ID:	116312-08
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	98.16

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.68	4.84	
Copper		21.2	1.94	0.968	
Iron		17100	19.4	9.68	
Tin	ND		9.68	4.84	
Zinc		28.8	1.94	0.968	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB88-S2
Lab ID:	116312-08
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	98.16

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry-weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.26	0.968	0.484	
Lead	4.77	0.484	0.242	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB90-S1
Lab ID:	116312-09
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	94.23

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.52	4.76	
Copper		28.5	1.9	0.952	
Iron		17300	19	9.52	
Tin	ND		9.52	4.76	
Zinc		36.2	1.9	0.952	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB90-S1
Lab ID:	116312-09
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	94.23

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.88	0.952	0.476	
Lead	92.6	0.476	0.238	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB90-S2
Lab ID:	116312-10
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	95.31

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.11	4.56	
Copper		23.3	1.82	0.911	
Iron		19800	18.2	9.11	
Tin	ND		9.11	4.56	
Zinc		39.1	1.82	0.911	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB90-S2
Lab ID:	116312-10
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	95.31

Metals by ICP-MS - USEPA Method 6020

~~Sample results are on a dry weight basis.~~

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.3	0.911	0.456	
Lead	43.4	0.456	0.228	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB91-S1
Lab ID:	116312-11
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	93.95

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		8.97	4.48	
Copper		19.8	1.79	0.897	
Iron		18000	17.9	8.97	
Tin	ND		8.97	4.48	
Zinc		33.1	1.79	0.897	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB91-S1
Lab ID:	116312-11
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	93.95

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.27	0.897	0.448	
Lead	47	0.448	0.224	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB91-S2
Lab ID:	116312-12
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	96.65

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		8.89	4.45	
Copper		18.6	1.78	0.889	
Iron		16800	17.8	8.89	
Tin	ND		8.89	4.45	
Zinc		29.7	1.78	0.889	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB91-S2
Lab ID:	116312-12
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	96.65

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.25	0.889	0.445	
Lead	35.7	0.445	0.222	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB82-S1
Lab ID:	116312-13
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	93.4

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.4	5.19	
Copper	32	2.07	1.04	
Iron	17600	20.7	10.4	
Tin	ND	10.4	5.19	
Zinc	37.3	2.07	1.04	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB82-S1
Lab ID:	116312-13
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	93.4

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.8	1.04	0.519	
Lead	75.2	0.519	0.259	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB92-S2
Lab ID:	116312-14
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	95.21

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.54	4.77	
Copper		18.7	1.91	0.954	
Iron		18200	19.1	9.54	
Tin	ND		9.54	4.77	
Zinc		31.8	1.91	0.954	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB92-S2
Lab ID:	116312-14
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	95.21

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.45	0.954	0.477	
Lead	9.8	0.477	0.238	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB93-S2
Lab ID:	116312-15
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	97.11

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.1	5.05	
Copper	21.8	2.02	1.01	
Iron	16400	20.2	10.1	
Tin	ND	10.1	5.05	
Zinc	31.5	2.02	1.01	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB93-S2
Lab ID:	116312-15
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	97.11

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.27	1.01	0.505	
Lead	18.3	0.505	0.252	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB94-S1
Lab ID:	116312-16
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	96.83

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	9.01	4.5	
Copper	20	1.8	0.901	
Iron	15800	18	9.01	
Tin	ND	9.01	4.5	
Zinc	29.1	1.8	0.901	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB94-S1
Lab ID:	116312-16
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	96.83

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.63	0.901	0.45	
Lead	22.2	0.45	0.225	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB94-S2
Lab ID:	116312-17
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	96.52

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		9.09	4.54	
Copper		18.8	1.82	0.909	
Iron		17200	18.2	9.09	
Tin	ND		9.09	4.54	
Zinc		29.9	1.82	0.909	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB94-S2
Lab ID:	116312-17
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	96.52

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	3.7	0.909	0.454	
Lead	14.9	0.454	0.227	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB96-S1
Lab ID:	116312-18
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	90.84

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.4	5.21	
Copper		22.3	2.08	1.04	
Iron		19600	20.8	10.4	
Tin	ND		10.4	5.21	
Zinc		39.6	2.08	1.04	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB96-S1
Lab ID:	116312-18
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	90.84

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.35	1.04	0.521	
Lead	37.5	0.521	0.261	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB96-S2
Lab ID:	116312-19
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	91.59

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		**Result (mg/kg)**	**PQL**	**MRL**	**Flags**
Antimony	ND		10.3	5.14	
Copper		17	2.06	1.03	
Iron		16500	20.6	10.3	
Tin	ND		10.3	5.14	
Zinc		30.8	2.06	1.03	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB96-S2
Lab ID:	116312-19
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	91.59

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.57	1.03	0.514	
Lead	15.1	0.514	0.257	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB97-S1
Lab ID:	116312-20
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	93.26

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.4	5.18	
Copper		21.7	2.07	1.04	
Iron		17300	20.7	10.4	
Tin	ND		10.4	5.18	
Zinc		37	2.07	1.04	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB97-S1
Lab ID:	116312-20
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	93.26

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	8.31	1.04	0.518	
Lead	30.8	0.518	0.259	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB97-S2
Lab ID:	116312-21
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	92.62

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.4	5.21	
Copper	18	2.08	1.04	
Iron	18800	20.8	10.4	
Tin	ND	10.4	5.21	
Zinc	33.6	2.08	1.04	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB97-S2
Lab ID:	116312-21
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	92.62

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.74	1.04	0.521	
Lead	24.5	0.521	0.261	

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STL Seattle

Client Name	Hart Crowser
Client ID:	EB98-S1
Lab ID:	116312-22
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	93

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.6	5.28	
Copper	34.4	2.11	1.06	
Iron	17800	21.1	10.6	
Tin	ND	10.6	5.28	
Zinc	36.2	2.11	1.06	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB98-S1
Lab ID:	116312-22
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	93

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.83	1.06	0.528	
Lead	78.1	0.528	0.264	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB98-S2
Lab ID:	116312-23
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1
% Solids	93.09

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.5	5.27	
Copper		27.1	2.11	1.05	
Iron		17800	21.1	10.5	
Tin	ND		10.5	5.27	
Zinc		34.8	2.11	1.05	

STL Seattle

Client Name	Hart Crowser
Client ID:	EB98-S2
Lab ID:	116312-23
Date Received:	9/22/03
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	5
% Solids	93.09

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.82	1.05	0.527	
Lead	36.5	0.527	0.264	

STL Seattle

Lab ID:	Method Blank - SP051
Date Received:	-
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10	5	
Copper	ND	2	1	
Iron	ND	20	10	
Tin	ND	10	5	
Zinc	ND	2	1	

STL Seattle

Lab ID:	Method Blank - SP052
Date Received:	-
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10	5	
Copper	ND	2	1	
Iron	ND	20	10	
Tin	ND	10	5	
Zinc	ND	2	1	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP051
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Iron	0	4400	4800	109	4740	108	-0.92	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP052
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Iron	0	4400	4650	106	4530	103	-2.9	

STL Seattle

Matrix Spike Report

Client Sample ID:	EF1-S1
Lab ID:	116312-01
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Antimony	0	550	522	95	
Copper	54	91.7	144	99	
Iron	17000	4030	23600	176	X7a
Tin	0	917	909	99	
Zinc	45	183	219	95	

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STL Seattle

Matrix Spike Report

Client Sample ID:	EB82-S1
Lab ID:	116312-13
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Antimony	0	639	605	95	
Copper	32	107	137	99	
Iron	18000	4690	26000	180	X7
Tin	0	1070	1090	102	
Zinc	37	213	236	93	

STL Seattle

Duplicate Report

Client Sample ID:	EF1-S1
Lab ID:	116312-01
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Antimony	0	0	NC	
Copper	54	52	3.8	
Iron	17000	17000	0.0	
Tin	0	0	NC	
Zinc	45	46	-2.2	

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STL Seattle

Duplicate Report

Client Sample ID:	EB82-S1
Lab ID:	116312-13
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Antimony	0	0	NC	
Copper	32	26	21.0	
Iron	18000	18000	0.0	
Tin	0	0	NC	
Zinc	37	36	2.7	

STL Seattle

Laboratory Control Sample

Lab ID:	RSP051
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Antimony	100	152	0	329	Pass
Copper	120	112	90.4	134	Pass
Iron	11000	11300	5280	17400	Pass
Tin	260	232	128	336	Pass
Zinc	200	194	155	233	Pass

STL Seattle

Laboratory Control Sample

Lab ID:	RSP052
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Antimony	110	152	0	329	Pass
Copper	110	112	90.4	134	Pass
Iron	10000	11300	5280	17400	Pass
Tin	240	232	128	336	Pass
Zinc	200	194	155	233	Pass

STL Seattle

Lab ID:	Method Blank - SP051
Date Received:	-
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1

Metals by ICP-MS - USEPA Method 6020

Sample results are on an as-received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	ND	0.2	0.1	
Lead	ND	0.1	0.05	

STL Seattle

Lab ID:	Method Blank - SP052
Date Received:	-
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
Dilution Factor	1

Metals by ICP-MS - USEPA Method 6020

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	ND	0.2	0.1	
Lead	ND	0.1	0.05	

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STL Seattle

Matrix Spike Report

Client Sample ID:	EF1-S1
Lab ID:	116312-01
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Arsenic	4.11	714	694	97	
Lead	19	178	196	99	

STL Seattle

Matrix Spike Report

Client Sample ID:	EB82-S1
Lab ID:	116312-13
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Arsenic	3.8	807	774	96	
Lead	75	202	267	95	

STL Seattle

Duplicate Report

Client Sample ID:	EF1-S1
Lab ID:	116312-01
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Arsenic	4.1	4.2	-2.4	
Lead	19	18	5.4	

STL Seattle

Duplicate Report

Client Sample ID:	EB82-S1
Lab ID:	116312-13
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Arsenic	3.8	3.8	0.0	
Lead	75	80	-6.5	

STL Seattle

Laboratory Control Sample

Lab ID:	RSP051
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP051

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Arsenic	110	114	81.5	145	Pass
Lead	99	104	81.8	126	Pass

STL Seattle

Laboratory Control Sample

Lab ID:	RSP052
Date Prepared:	9/23/03
Date Analyzed:	9/23/03
QC Batch ID:	SP052

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Arsenic	110	114	81.5	145	Pass
Lead	100	104	81.8	126	Pass

SEVERN TRENT STL

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ANALYTICAL NARRATIVE

Client: U.S. Army Corps of Engineers, Seattle District — Date: October 14, 2003

Project: Fort Lewis Agreed Order Skeet Range — Lab No.: 116603

Delivered By: Submitter

Condition of samples upon receipt: Samples were received in good condition. Receipt information has been recorded on the cooler receipt form included in the chain of custody section of this report. Chain of custody was in order.

Sample Identification:

Lab. No.	Client ID	Date Sampled	Matrix	Description
116603-1	ST2SI	09-22-03	solid	Dry, brown silt
116603-2	ST3SI	09-22-03	solid	Dry, brown silt
116603-3	ST49SI	09-22-03	solid	Dry, brown silt
116603-4	ST39SI	09-22-03	solid	Dry, brown silt
116603-5	ST31SI	09-22-03	solid	Dry, brown silt
116603-6	ST41SI	09-22-03	solid	Dry, brown silt
116603-7	ST50SI	09-22-03	solid	Dry, brown silt
116603-8	ST22SI	09-22-03	solid	Dry, brown silt
116603-9	ST38SI	09-22-03	solid	Dry, brown silt
116603-10	ST40SI	09-22-03	solid	Dry, brown silt
116603-11	ST6SI	09-22-03	solid	Dry, brown silt

SAMPLE EXTRACTION AND ANALYSIS

TOTAL METALS

Samples 116603-1 through 116603-11 were analyzed for total metals in accordance with EPA Methods 6010/6020. The samples were digested and analyzed on 10-6-03, which was within the required holding time.

The percent recovery of iron in the matrix spike analysis of sample 116003-1 exceeded the quality control limits due to high levels of target analyte in the original sample.

STL Seattle

Client: U.S. Army Corps of Engineers, Seattle District   Date: October 14, 2003

Project: Fort Lewis Agreed Order Skeet Range   Lab No.: 116603

TOTAL METALS CONTINUED

The percent recovery of tin in the matrix spike analysis of sample 116003-1 exceeded the quality control limits. Matrix interferences are indicated based on acceptable recoveries of the associated blank spike (SP089).

All quality control was within the acceptance limits.

No difficulties were encountered during the total metals analyses.

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST2SI
Lab ID:	116603-01
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	85.98

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	11.4	5.71	
Copper	26.5	2.28	1.14	
Iron	19100	22.8	11.4	
Tin	ND	11.4	5.71	
Zinc	36	2.28	1.14	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST2SI
Lab ID:	116603-01
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	85.98

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.22	1.14	0.571	
Lead	14.1	0.571	0.286	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST3SI
Lab ID:	116603-02
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	88.65

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	11.3	5.63	
Copper	31.2	2.25	1.13	
Iron	17800	22.5	11.3	
Tin	ND	11.3	5.63	
Zinc	51.6	2.25	1.13	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST3SI
Lab ID:	116603-02
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	88.65

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	12.1	1.13	0.563	
Lead	283	0.563	0.281	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST49SI
Lab ID:	116603-03
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	86.99

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.9	5.46	
Copper	27.1	2.18	1.09	
Iron	17100	21.8	10.9	
Tin	ND	10.9	5.46	
Zinc	64	2.18	1.09	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST49SI
Lab ID:	116603-03
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	86.99

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	12.5	1.09	0.546	
Lead	258	0.546	0.273	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST39SI
Lab ID:	116603-04
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	92.87

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.7	5.36	
Copper		35.3	2.14	1.07	
Iron		17600	21.4	10.7	
Tin	ND		10.7	5.36	
Zinc		58.3	2.14	1.07	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST39SI
Lab ID:	116603-04
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	92.87

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	12.6	1.07	0.536	
Lead	134	0.536	0.268	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST31SI
Lab ID:	116603-05
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	86.09

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.8	5.41	
Copper	36.3	2.16	1.08	
Iron	18100	21.6	10.8	
Tin	ND	10.8	5.41	
Zinc	68.2	2.16	1.08	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST31SI
Lab ID:	116603-05
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	86.09

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	14.7	1.08	0.541	
Lead	444	0.541	0.27	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST41SI
Lab ID:	116603-06
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	92.32

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Antimony	ND		10.8	5.38	
Copper		21.5	2.15	1.08	
Iron		19400	21.5	10.8	
Tin	ND		10.8	5.38	
Zinc		38	2.15	1.08	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST41SI
Lab ID:	116603-06
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	92.32

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	5.37	1.08	0.538	
Lead	48.7	0.538	0.269	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST50SI
Lab ID:	116603-07
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	92.11

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.7	5.36	
Copper	29	2.14	1.07	
Iron	18000	21.4	10.7	
Tin	ND	10.7	5.36	
Zinc	49.3	2.14	1.07	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST50SI
Lab ID:	116603-07
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	92.11

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	11.2	1.07	0.536	
Lead	74.5	0.536	0.268	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST22SI
Lab ID:	116603-08
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	90.43

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.6	5.32	
Copper	27.1	2.13	1.06	
Iron	18700	21.3	10.6	
Tin	ND	10.6	5.32	
Zinc	47.5	2.13	1.06	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST22SI
Lab ID:	116603-08
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	90.43

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	9.65	1.06	0.532	
Lead	155	0.532	0.266	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST38SI
Lab ID:	116603-09
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	88.83

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	7.94	10.7	5.37	J
Copper	35.3	2.15	1.07	
Iron	19500	21.5	10.7	
Tin	ND	10.7	5.37	
Zinc	64.9	2.15	1.07	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST38SI
Lab ID:	116603-09
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	88.83

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	11.9	1.07	0.537	
Lead	436	0.537	0.268	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST40SI
Lab ID:	116603-10
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	90.46

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.9	5.46	
Copper	22.9	2.19	1.09	
Iron	18300	21.9	10.9	
Tin	ND	10.9	5.46	
Zinc	39.8	2.19	1.09	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST40SI
Lab ID:	116603-10
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	90.46

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	6.6	1.09	0.546	
Lead	113	0.546	0.273	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST6SI
Lab ID:	116603-11
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1
% Solids	90.9

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10.9	5.44	
Copper	37.8	2.18	1.09	
Iron	17900	21.8	10.9	
Tin	ND	10.9	5.44	
Zinc	330	2.18	1.09	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST6SI
Lab ID:	116603-11
Date Received:	10/2/03
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	5
% Solids	90.9

Metals by ICP-MS - USEPA Method 6020

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	13.5	1.09	0.544	
Lead	206	0.544	0.272	

STL Seattle

Lab ID:	Method Blank - SP089
Date Received:	-
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Antimony	ND	10	5	
Copper	ND	2	1	
Iron	ND	20	10	
Tin	ND	10	5	
Zinc	ND	2	1	

STL Seattle

Matrix Spike Report

Client Sample ID:	ST2SI
Lab ID:	116603-01
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
QC Batch ID:	SP089

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Antimony	0	678	644	95	
Copper	27	113	146	105	
Iron	19000	4970	25500	127	X7
Tin	0	1130	2320	205	X7
Zinc	36	226	262	100	

STL Seattle

Duplicate Report

Client Sample ID:	ST2SI
Lab ID:	116603-01
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
QC Batch ID:	SP089

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Antimony	0	0	NC	
Copper	27	26	3.8	
Iron	19000	19000	0.0	
Tin	0	0	NC	
Zinc	36	36	0.0	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID: SP089
Date Prepared: 10/6/03
Date Analyzed: 10/6/03
QC Batch ID: SP089

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Iron	0	4400	4600	105	4590	104	-0.96	
Tin	0	1000	1100	110	1090	109	-0.91	

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STL Seattle

Laboratory Control Sample

Lab ID:	RSP089
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
QC Batch ID:	SP089

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Antimony	97	152	0	329	Pass
Copper	120	112	90.4	134	Pass
Iron	11000	11300	5280	17400	Pass
Tin	260	232	128	336	Pass
Zinc	240	194	157	240	Pass

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STL Seattle

Lab ID:	Method Blank - SP089
Date Received:	-
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
Dilution Factor	1

Metals by ICP-MS - USEPA Method 6020

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	ND	0.2	0.1	
Lead	ND	0.1	0.05	

STL Seattle

Matrix Spike Report

Client Sample ID:	ST2SI
Lab ID:	116603-01
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
QC Batch ID:	SP089

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Arsenic	5.22	904	899	99	
Lead	14	226	229	95	

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STL Seattle

Duplicate Report

Client Sample ID:	ST2SI
Lab ID:	116603-01
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
QC Batch ID:	SP089

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Arsenic	5.2	5.4	-3.8	
Lead	14	14	0.0	

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STL Seattle

Laboratory Control Sample

Lab ID:	RSP089
Date Prepared:	10/6/03
Date Analyzed:	10/6/03
QC Batch ID:	SP089

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Arsenic	110	114	81.5	145	Pass
Lead	97	104	81.8	126	Pass

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ANALYTICAL NARRATIVE

Client: U.S. Army Corps of Engineers, Seattle District — Date: December 22, 2003

Project: Fort Lewis Agreed Order - Former Ranges — Lab No.: 118431

Delivered By: Federal Express

Condition of samples upon receipt: Samples were received in good condition. Cooler temperatures and receipt information has been included on the cooler receipt form included in the chain of custody section of this report. Chain of custody was in order.

Sample Identification:

Lab. No.	Client ID	Date Sampled	Matrix
118431-1	ST66SI	09-25-03	solid
118431-2	ST66SI	09-25-03	solid
118431-3	MH33SI	12-03-03	solid
118431-4	MH34SI	12-03-03	solid
118431-5	MH35SI	12-03-03	solid
118431-6	EB117SI	12-04-03	solid
118431-7	EB116SI	12-04-03	solid
118431-8	EB107SI	12-04-03	solid
118431-9	EB108SI	12-04-03	solid
118431-10	EB123SI	12-04-03	solid

SAMPLE EXTRACTION AND ANALYSIS

TOTAL METALS
Samples 118431-1 through 118431-10 were analyzed for total metals in accordance with EPA Method 6010. The samples were digested and analyzed on 12-18-03, which was within the required holding time.

The relative percent difference value for lead in the duplicate analysis of sample 118431-1 exceeded the quality control limits. The sample was reanalyzed with similar results.

All other quality control was within the acceptance limits.

No other difficulties were encountered during the total metals analyses.

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST66SI
Lab ID:	118431-01
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
Dilution Factor	1
% Solids	87.56

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	9.48	2.18	1.09	
Antimony	ND	10.9	5.45	
Copper	23.6	2.18	1.09	
Iron	17300	21.8	10.9	
Lead	165	2.18	1.09	
Tin	ND	10.9	5.45	
Zinc	40.8	2.18	1.09	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST64SI
Lab ID:	118431-02
Date Received:	12/17/2003
Date Prepared:	12/18/2003
Date Analyzed:	12/18/2003
Dilution Factor	1
% Solids	86.04

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	21.6	2.25	1.12	
Antimony	5.97	11.2	5.62	J
Copper	34.3	2.25	1.12	
Iron	17500	22.5	11.2	
Lead	529	2.25	1.12	
Tin	6.76	11.2	5.62	J
Zinc	70	2.25	1.12	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH33SI
Lab ID:	118431-03
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
Dilution Factor	1
% Solids	60.53

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Arsenic		12.3	3.12	1.56	
Antimony	ND		15.6	7.79	
Copper		29.2	3.12	1.56	
Iron		18200	31.2	15.6	
Lead		78.1	3.12	1.56	
Tin	ND		15.6	7.79	
Zinc		62.6	3.12	1.56	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH34SI
Lab ID:	118431-04
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
Dilution Factor	1
% Solids	69.1

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Arsenic		8.89	2.72	1.36	
Antimony	ND		13.6	6.79	
Copper		34.7	2.72	1.36	
Iron		16500	27.2	13.6	
Lead		105	2.72	1.36	
Tin	ND		13.6	6.79	
Zinc		53.4	2.72	1.36	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH35SI
Lab ID:	118431-05
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
Dilution Factor	1
% Solids	71.57

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Arsenic		6.46	2.56	1.28	
Antimony	ND		12.8	6.4	
Copper		24.4	2.56	1.28	
Iron		19400	25.6	12.8	
Lead		13.1	2.56	1.28	
Tin	ND		12.8	6.4	
Zinc		45.3	2.56	1.28	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB117SI
Lab ID:	118431-06
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
Dilution Factor	1
% Solids	93.71

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Arsenic		5.11	1.91	0.955	
Antimony	ND		9.55	4.78	
Copper		16.1	1.91	0.955	
Iron		16300	19.1	9.55	
Lead		20.3	1.91	0.955	
Tin	ND		9.55	4.78	
Zinc		30.3	1.91	0.955	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB116SI
Lab ID:	118431-07
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/19/03
Dilution Factor	1
% Solids	92.71

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Arsenic		4.62	2.07	1.03	
Antimony	ND		10.3	5.17	
Copper		14.3	2.07	1.03	
Iron		15200	20.7	10.3	
Lead		9.05	2.07	1.03	
Tin	ND		10.3	5.17	
Zinc		25	2.07	1.03	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB107SI
Lab ID:	118431-08
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/19/03
Dilution Factor	1
% Solids	89.15

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	4.44	1.89	0.946	
Antimony	ND	9.46	4.73	
Copper	24.4	1.89	0.946	
Iron	15500	18.9	9.46	
Lead	202	1.89	0.946	
Tin	ND	9.46	4.73	
Zinc	29.5	1.89	0.946	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB108SI
Lab ID:	118431-09
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/19/03
Dilution Factor	1
% Solids	90.1

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte		Result (mg/kg)	PQL	MRL	Flags
Arsenic		4.42	2.06	1.03	
Antimony	ND		10.3	5.16	
Copper		22.5	2.06	1.03	
Iron		16500	20.6	10.3	
Lead		197	2.06	1.03	
Tin	ND		10.3	5.16	
Zinc		33.5	2.06	1.03	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB123SI
Lab ID:	118431-10
Date Received:	12/17/03
Date Prepared:	12/18/03
Date Analyzed:	12/19/03
Dilution Factor	1
% Solids	88.11

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	2.58	2.22	1.11	
Antimony	ND	11.1	5.54	
Copper	17.8	2.22	1.11	
Iron	15400	22.2	11.1	
Lead	48.2	2.22	1.11	
Tin	ND	11.1	5.54	
Zinc	28.6	2.22	1.11	

STL Seattle

Lab ID:	Method Blank - SP499
Date Received:	-
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MRL	Flags
Arsenic	ND	2	1	
Antimony	ND	10	5	
Copper	ND	2	1	
Iron	ND	20	10	
Lead	ND	2	1	
Tin	ND	10	5	
Zinc	ND	2	1	

STL Seattle

Matrix Spike Report

Client Sample ID:	ST66SI
Lab ID:	118431-01
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
QC Batch ID:	SP499

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Arsenic	9.48	890	835	93	
Antimony	0	667	602	90	
Copper	24	111	135	100	
Iron	17000	4890	22700	110	
Lead	160	222	419	115	
Tin	0	1110	994	89	
Zinc	41	222	259	98	

STL Seattle

Duplicate Report

Client Sample ID:	ST66SI
Lab ID:	118431-01
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
QC Batch ID:	SP499

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Arsenic	9.5	9.6	-1.0	
Antimony	0	0	NC	
Copper	24	24	0.0	
Iron	17000	17000	0.0	
Lead	160	230	-36.0	X4
Tin	0	0	NC	
Zinc	41	41	0.0	

STL Seattle

Laboratory Control Sample

Lab ID:	RSP499
Date Prepared:	12/18/03
Date Analyzed:	12/18/03
QC Batch ID:	SP499

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	True Value (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Flag
Arsenic	100	114	81.5	145	Pass
Antimony	120	152	0	329	Pass
Copper	100	112	90.4	134	Pass
Iron	10000	11300	5280	17400	Pass
Lead	99	104	81.8	126	Pass
Tin	220	232	128	336	Pass
Zinc	180	194	155	233	Pass

SEVERN TRENT STL

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ANALYTICAL NARRATIVE

Client: U.S. Army Corps of Engineers, Seattle District | Date: January 26, 2004

Project: Fort Lewis Agreed Order - Former Ranges | Lab No.: 118788

Delivered By: STL Courier

Condition of samples upon receipt: Samples were received in good condition. Chain of custody was in order.

Sample Identification:

Lab. No.	Client ID	Date Sampled	Matrix
118788-1	EB42S2	09-02-03	solid
118788-2	EB51S1	09-02-03	solid
118788-3	EB46S1	09-02-03	solid
118788-4	EB39S2	09-02-03	solid
118788-5	EB96S1	09-15-03	solid
118788-6	MH3S1	09-25-03	solid
118788-7	MH17S1	09-25-03	solid
118788-8	MH11S2	09-25-03	solid
118788-9	MH26S1	12-03-03	solid
118788-10	MH32S1	12-03-03	solid
118788-11	ST41S1	09-22-03	solid
118788-12	ST47S1	09-22-03	solid
118788-13	ST35S1	12-02-03	solid
118788-14	ST84S1	12-02-03	solid
118788-15	ST85S1	12-02-03	solid

SAMPLE EXTRACTION AND ANALYSIS

TCLP METALS

Samples 118788-1 through 118788-15 were analyzed for TCLP Metals in accordance with EPA Methods 1311/6010/7470. The samples underwent TCLP extraction on 1-19-04. The samples were digested and analyzed on 1-20-04 and 1-21-04, which was within the required holding time.

STL Seattle

Client: U.S. Army Corps of Engineers, Seattle District — Date: January 26, 2004

Project: Fort Lewis Agreed Order - Former Ranges — Lab No.: 118788

TCLP METALS CONTINUED

The reported values for lead in samples 118788-1 through 118788-4 are based on secondary dilution analyses.

The percent recovery of lead in the matrix spike analysis of sample 118788-1 exceeded the quality control limits due to high levels of target analyte in the original sample.

Low-level mercury contamination was present in the method blank associated with sample batch ZL970. The reported value is above the MDL, but below the PQL. The data have been flagged "B1" or "B2" as appropriate.

All other quality control was within the acceptance limits.

No other difficulties were encountered during the TCLP metals analyses.

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	EB42S2
Lab ID	118788-01

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB42S2
Lab ID:	118788-01
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	1.7	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	487	0.1	0.05	D
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB42S2
Lab ID:	118788-01
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	EB51S1
Lab ID	118788-02

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB51S1
Lab ID:	118788-02
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	0.588	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	1030	0.1	0.05	D
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB51S1
Lab ID:	118788-02
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.0014	0.002	0.001	J B1

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	EB46S1
Lab ID	118788-03

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB46S1
Lab ID:	118788-03
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.426	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead		4.62	0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB46S1
Lab ID:	118788-03
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	EB39S2
Lab ID	118788-04

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB39S2
Lab ID:	118788-04
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	0.679	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	38.9	0.1	0.05	D
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB39S2
Lab ID:	118788-04
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	EB96S1
Lab ID	118788-05

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB96S1
Lab ID:	118788-05
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.332	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead		0.301	0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	EB96S1
Lab ID:	118788-05
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00189	0.002	0.001	J B1

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	MH3S1
Lab ID	118788-06

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH3S1
Lab ID:	118788-06
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.317	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead		0.492	0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH3S1
Lab ID:	118788-06
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00157	0.002	0.001	J B1

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	MH17S1
Lab ID	118788-07

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH17S1
Lab ID:	118788-07
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.472	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead		0.395	0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH17S1
Lab ID:	118788-07
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00115	0.002	0.001	J B1

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	MH11S2
Lab ID	118788-08

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH11S2
Lab ID:	118788-08
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	1.22	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	3.35	0.1	0.05	
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH11S2
Lab ID:	118788-08
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	MH26S1
Lab ID	118788-09

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH26S1
Lab ID:	118788-09
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.356	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead	ND		0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH26S1
Lab ID:	118788-09
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	MH32S1
Lab ID	118788-10

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH32S1
Lab ID:	118788-10
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.954	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead		10.7	0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	MH32S1
Lab ID:	118788-10
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00114	0.002	0.001	J B1

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	ST41S1
Lab ID	118788-11

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST41S1
Lab ID:	118788-11
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic	ND		0.1	0.05	
Barium		0.279	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead	ND		0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST41S1
Lab ID:	118788-11
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00235	0.002	0.001	B1

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	ST47S1
Lab ID	118788-12

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST47S1
Lab ID:	118788-12
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	0.563	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	1.21	0.1	0.05	
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST47S1
Lab ID:	118788-12
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	ST35S1
Lab ID	118788-13

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST35S1
Lab ID:	118788-13
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	0.401	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	0.47	0.1	0.05	
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST35S1
Lab ID:	118788-13
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	ND	0.002	0.001	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	ST84S1
Lab ID	118788-14

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST84S1
Lab ID:	118788-14
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	0.276	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	0.559	0.1	0.05	
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

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STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST84S1
Lab ID:	118788-14
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00203	0.002	0.001	B1

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Project Name	Fort Lewis Agreed Order - Former Ranges
Date Received	01-13-04

Sample Preparation Information for Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311

Client Sample ID	ST85S1
Lab ID	118788-15

% Solids:	100
No. of Extractions:	1
Type of Extraction(s):	Rotary
Extraction Fluid:	#1
Date Filtered:	01-20-04

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST85S1
Lab ID:	118788-15
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte		Result (mg/L)	PQL	MDL	Flags
Arsenic		0.127	0.1	0.05	
Barium		0.416	0.005	0.0025	
Cadmium	ND		0.05	0.025	
Chromium	ND		0.01	0.005	
Lead		3.74	0.1	0.05	
Selenium	ND		0.1	0.05	
Silver	ND		0.05	0.025	

STL Seattle

Client Name	U.S. Army Corps of Engineers, Seattle District
Client ID:	ST85S1
Lab ID:	118788-15
Date Received:	1/13/04
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00103	0.002	0.001	J B1

STL Seattle

Lab ID:	Method Blank - LP970
Date Received:	-
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
Dilution Factor	0.5

TCLP Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	MDL	Flags
Arsenic	ND	0.1	0.05	
Barium	ND	0.005	0.0025	
Cadmium	ND	0.05	0.025	
Chromium	ND	0.01	0.005	
Lead	ND	0.1	0.05	
Selenium	ND	0.1	0.05	
Silver	ND	0.05	0.025	

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STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	LP970
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
QC Batch ID:	LP970

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/L)	Spike Amount (mg/L)	BS Result (mg/L)	BS % Rec.	BSD Result (mg/L)	BSD % Rec.	RPD	Flag
Lead	0	5	4.91	98.2	4.86	97.2	-1	

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STL Seattle

Matrix Spike Report

Client Sample ID:	EB42S2
Lab ID:	118788-01
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
QC Batch ID:	LP970

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Arsenic	0	5	5.14	103	
Barium	1.7	1	2.61	91	
Cadmium	0	1	0.933	93	
Chromium	0	5	4.66	93	
Lead	490	5	547	1210	X7a
Selenium	0	1	1.04	104	
Silver	0	5	4.87	98	

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STL Seattle

Duplicate Report

Client Sample ID:	EB42S2
Lab ID:	118788-01
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
QC Batch ID:	LP970

Metals by ICP - USEPA Method 6010

Parameter Name	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	RPD %	Flag
Arsenic	0	0	NC	
Barium	1.7	1.7	0.0	
Cadmium	0	0	NC	
Chromium	0	0	NC	
Lead	490	500	-2.0	
Selenium	0	0	NC	
Silver	0	0	NC	

STL Seattle

Laboratory Control Sample

Lab ID:	RLP970
Date Prepared:	1/20/04
Date Analyzed:	1/20/04
QC Batch ID:	LP970

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/L)	True Value (mg/L)	Lower Limit (mg/L)	Upper Limit (mg/L)	Flag
Arsenic	4.3	5	4	6	Pass
Barium	0.94	1	0.8	1.2	Pass
Cadmium	0.92	1	0.8	1.2	Pass
Chromium	4.6	5	4	6	Pass
Lead	4.9	5	4	6	Pass
Selenium	0.94	1	0.8	1.2	Pass
Silver	4.7	5	4	6	Pass

STL Seattle

Lab ID:	Method Blank - ZL970
Date Received:	-
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
Dilution Factor	1

TCLP Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	MRL	Flags
Mercury	0.00107	0.002	0.001	J

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STL Seattle

Matrix Spike Report

Client Sample ID:	EB42S2
Lab ID:	118788-01
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
QC Batch ID:	ZL970

Mercury by CVAA - USEPA Method 7470

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Mercury	0	0.02	0.0209	105	

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STL Seattle

Duplicate Report

Client Sample ID:	EB42S2
Lab ID:	118788-01
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
QC Batch ID:	ZL970

Mercury by CVAA - USEPA Method 7470

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Mercury	0	0	NC	

STL Seattle

Laboratory Control Sample

Lab ID:	RZL970
Date Prepared:	1/20/04
Date Analyzed:	1/21/04
QC Batch ID:	ZL970

Mercury by CVAA - USEPA Method 7470

Parameter Name	Sample Result (mg/L)	True Value (mg/L)	Lower Limit (mg/L)	Upper Limit (mg/L)	Flag
Mercury	0.021	0.02	0.016	0.024	Pass

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ANALYTICAL RESOURCES INCORPORATED

Hart Crowser, Inc.
USACE Former Skeet Range
ARI Job No: FW13

Laboratory Case Narrative

Please find enclosed laboratory results for the project referenced above. Analytical Resources, Inc. (ARI) received eighteen soil samples for analysis on September 23, 2003. A cross-reference between the field identification and the laboratory tracking information is included on the SDG Cover Sheet.

PNA's (8270C)

Case Notes:

The samples were extracted for PNA's at the SIM level. All samples were spiked for matrix spikes, LCS's and surrogates at this lower level. The samples were analyzed on instrument NT4 and showed detectable amounts of PAH's. The SIM analyses had one to two internal standards outside control limits due to matrix background interference in each of the samples. The samples were re-analyzed using dilutions with little to no improvement for failing internal standards. The client was contacted and authorization to analyze by full scan was given.

All samples and their associated QC were re-analyzed using full scan 8270C methodology. The surrogates were quantitated from a single point continuing calibration since the SIM surrogates are not in the normal PNA calibration standard. The surrogates and spikes were spike at one-tenth the normal level (SIM level) and were detected in the samples.

Initial Calibration:

(FINN8, 9/26/03) Within the 15% RSD method criteria for all analytes.
Second Source:
(FINN8, 10/6/03, 12:14) Within the method criteria. (note – Dibenzo (a, h) anthracene-d14 a SIM surrogate single point calibration hence no %D reported).

Continuing Calibration (s):

(FINN8, 10/7/03, 10:40) Acenaphthene slightly high at 20.3%D (control limit is 20%D).

Method Blank (s): Within the method criteria, no detectable analytes.

Surrogates: All surrogates were within ARI designated control limits.

Samples:

Several samples have PAH's which have been "J" flagged to indicate the value reported is above the MDL but below the reporting limit.

Matrix Spikes:

Sample ST10-S1 was used for the matrix spikes for this project. The percent recoveries were not attainable due to the level of target analytes in the native sample and sample homogeneity of the matrix.

LCS:

The LCS recovery was within control limits for all spiked analytes.

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ORGANIC COMPOUND
DATA REPORTING QUALIFIERS

U	Indicates the compound was undetected at the reported concentration. (Same as ND).
J	Indicates an estimated concentration when the value is less than the calculated reporting limit.
D	Indicates the surrogate/spike(s) was not detected, due to dilution of extract.
NR	Indicates the surrogate recovery cannot be reported due to matrix interference.
E	Indicates a value above the linear range of the detector. Sample dilution required.
S	Indicates no value reported due to saturation of the detector. Sample dilution required.
NA	Indicates compound not analyzed for.
M	Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match.
B	Indicates possible/probable blank contamination. Flagged when the analyte is detected in the blank as well as the sample.
Y	Indicates raised reporting limit due to background interference or to activity on the instrument. Compound is still not detected at or above the raised level.

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SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Client ID	MNAP	DBA	TOT OUT
MB-092603	61.1%	72.9%	0
LCS-092603	58.9%	65.6%	0
ST10-S1	73.0%	106%	0
ST10-S1 MS	75.4%	83.4%	0
ST10-S1 MSD	80.1%	90.6%	0
ST11-S1	84.2%	114%	0
ST12-S1	78.8%	102%	0
ST13-S1	79.8%	109%	0
ST15-S1	72.8%	108%	0
ST16-S1	64.4%	86.3%	0
ST17-S1	64.4%	86.3%	0
ST18-S1	58.7%	60.5%	0
ST20-S1	69.2%	81.0%	0
ST22-S1	41.0%	52.5%	0
ST23-S1	56.4%	64.7%	0
ST24-S1	66.7%	80.1%	0
ST25-S1	57.4%	75.3%	0
ST27-S1	69.5%	79.6%	0
ST29-S1	56.6%	61.8%	0
ST30-S1	68.6%	77.9%	0
ST14-S1	61.8%	80.5%	0
ST31-S1	64.4%	79.8%	0

	LCS/MB LIMITS	QC LIMITS
(MNAP) = d10-2-Methylnaphthalene	(30-160)	(30-160)
(DBA) = d14-Dibenzo(a,h)anthracene	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 03-12885 to 03-12902

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: MB-092603
METHOD BLANK

Lab Sample ID: MB-092603
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 18:12
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 7.50 g
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	67 U
91-57-6	2-Methylnaphthalene	67 U
208-96-8	Acenaphthylene	67 U
83-32-9	Acenaphthene	67 U
86-73-7	Fluorene	67 U
85-01-8	Phenanthrene	67 U
120-12-7	Anthracene	67 U
206-44-0	Fluoranthene	67 U
129-00-0	Pyrene	67 U
56-55-3	Benzo(a)anthracene	67 U
218-01-9	Chrysene	67 U
205-99-2	Benzo(b)fluoranthene	67 U
207-08-9	Benzo(k)fluoranthene	67 U
50-32-8	Benzo(a)pyrene	67 U
193-39-5	Indeno(1,2,3-cd)pyrene	67 U
53-70-3	Dibenz(a,h)anthracene	67 U
191-24-2	Benzo(g,h,i)perylene	67 U
132-64-9	Dibenzofuran	67 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	61.1%
d14-Dibenzo(a,h)anthracen	72.9%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST10-S1
SAMPLE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 12:49
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.63 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	70 J
86-73-7	Fluorene	75 U
85-01-8	Phenanthrene	760
120-12-7	Anthracene	130
206-44-0	Fluoranthene	2,700
129-00-0	Pyrene	2,800
56-55-3	Benzo(a)anthracene	2,100
218-01-9	Chrysene	2,500
205-99-2	Benzo(b)fluoranthene	3,400
207-08-9	Benzo(k)fluoranthene	1,800
50-32-8	Benzo(a)pyrene	3,000
193-39-5	Indeno(1,2,3-cd)pyrene	2,300
53-70-3	Dibenz(a,h)anthracene	740
191-24-2	Benzo(g,h,i)perylene	1,900
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	73.0%
d14-Dibenzo(a,h)anthracen	106%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST10-S1
MATRIX SPIKE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 13:20
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.60 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	76 U
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	---
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,100
129-00-0	Pyrene	1,200
56-55-3	Benzo(a)anthracene	770
218-01-9	Chrysene	---
205-99-2	Benzo(b)fluoranthene	1,300
207-08-9	Benzo(k)fluoranthene	---
50-32-8	Benzo(a)pyrene	1,200
193-39-5	Indeno(1,2,3-cd)pyrene	890
53-70-3	Dibenz(a,h)anthracene	270
191-24-2	Benzo(g,h,i)perylene	800
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	75.4%
d14-Dibenzo(a,h)anthracen	83.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST10-S1
MATRIX SPIKE DUPLICATE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 13:52
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.61 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	76 U
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	---
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,400
129-00-0	Pyrene	1,500
56-55-3	Benzo(a)anthracene	860
218-01-9	Chrysene	---
205-99-2	Benzo(b)fluoranthene	1,700
207-08-9	Benzo(k)fluoranthene	---
50-32-8	Benzo(a)pyrene	1,600
193-39-5	Indeno(1,2,3-cd)pyrene	1,200
53-70-3	Dibenz(a,h)anthracene	380
191-24-2	Benzo(g,h,i)perylene	1,100
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	80.1%
d14-Dibenzo(a,h)anthracen	90.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST11-S1
SAMPLE

Lab Sample ID: FW13B
LIMS ID: 03-12886
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 14:25
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.42 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 14.5%
pH: 5.5

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	78 U
91-57-6	2-Methylnaphthalene	78 U
208-96-8	Acenaphthylene	78 U
83-32-9	Acenaphthene	170
86-73-7	Fluorene	78 U
85-01-8	Phenanthrene	690
120-12-7	Anthracene	150
206-44-0	Fluoranthene	3,200
129-00-0	Pyrene	3,200
56-55-3	Benzo(a)anthracene	3,000
218-01-9	Chrysene	3,000
205-99-2	Benzo(b)fluoranthene	4,300
207-08-9	Benzo(k)fluoranthene	3,200
50-32-8	Benzo(a)pyrene	3,800
193-39-5	Indeno(1,2,3-cd)pyrene	3,500
53-70-3	Dibenz(a,h)anthracene	1,300
191-24-2	Benzo(g,h,i)perylene	2,400
132-64-9	Dibenzofuran	78 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	84.2%
d14-Dibenzo(a,h)anthracen	114%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST12-S1
SAMPLE

Lab Sample ID: FW13C
LIMS ID: 03-12887
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 14:57
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
~~Alumina: NO~~

Sample Amount: 3.62 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.4%
~~pH: 5.9~~

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	140 U
91-57-6	2-Methylnaphthalene	140 U
208-96-8	Acenaphthylene	140 U
83-32-9	Acenaphthene	310
86-73-7	Fluorene	120 J
85-01-8	Phenanthrene	2,000
120-12-7	Anthracene	400
206-44-0	Fluoranthene	4,800
129-00-0	Pyrene	5,300
56-55-3	Benzo(a)anthracene	4,100
218-01-9	Chrysene	4,500
205-99-2	Benzo(b)fluoranthene	6,600
207-08-9	Benzo(k)fluoranthene	2,400
50-32-8	Benzo(a)pyrene	5,500
193-39-5	Indeno(1,2,3-cd)pyrene	4,800
53-70-3	Dibenz(a,h)anthracene	1,400
191-24-2	Benzo(g,h,i)perylene	3,600
132-64-9	Dibenzofuran	140 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	78.8%
d14-Dibenzo(a,h)anthracen	102%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST13-S1
SAMPLE

Lab Sample ID: FW13D
LIMS ID: 03-12888
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 15:30
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
~~Alumina: NO~~

Sample Amount: 3.60 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.1%
~~pH: 6.3~~

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	140 U
91-57-6	2-Methylnaphthalene	110 J
208-96-8	Acenaphthylene	140 U
83-32-9	Acenaphthene	370
86-73-7	Fluorene	200
85-01-8	Phenanthrene	2,400
120-12-7	Anthracene	520
206-44-0	Fluoranthene	4,600
129-00-0	Pyrene	5,400
56-55-3	Benzo(a)anthracene	3,800
218-01-9	Chrysene	4,600
205-99-2	Benzo(b)fluoranthene	5,900
207-08-9	Benzo(k)fluoranthene	3,200
50-32-8	Benzo(a)pyrene	5,600
193-39-5	Indeno(1,2,3-cd)pyrene	4,400
53-70-3	Dibenz(a,h)anthracene	1,300
191-24-2	Benzo(g,h,i)perylene	3,500
132-64-9	Dibenzofuran	140 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	79.8%
d14-Dibenzo(a,h)anthracen	109%

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ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: MB-092603
METHOD BLANK

Lab Sample ID: MB-092603
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 18:12
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 7.50 g
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	67 U
91-57-6	2-Methylnaphthalene	67 U
208-96-8	Acenaphthylene	67 U
83-32-9	Acenaphthene	67 U
86-73-7	Fluorene	67 U
85-01-8	Phenanthrene	67 U
120-12-7	Anthracene	67 U
206-44-0	Fluoranthene	67 U
129-00-0	Pyrene	67 U
56-55-3	Benzo(a)anthracene	67 U
218-01-9	Chrysene	67 U
205-99-2	Benzo(b)fluoranthene	67 U
207-08-9	Benzo(k)fluoranthene	67 U
50-32-8	Benzo(a)pyrene	67 U
193-39-5	Indeno(1,2,3-cd)pyrene	67 U
53-70-3	Dibenz(a,h)anthracene	67 U
191-24-2	Benzo(g,h,i)perylene	67 U
132-64-9	Dibenzofuran	67 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	61.1%
d14-Dibenzo(a,h)anthracen	72.9%

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Sample ID: ST10-S1
SAMPLE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 12:49
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.63 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	70 J
86-73-7	Fluorene	75 U
85-01-8	Phenanthrene	760
120-12-7	Anthracene	130
206-44-0	Fluoranthene	2,700
129-00-0	Pyrene	2,800
56-55-3	Benzo(a)anthracene	2,100
218-01-9	Chrysene	2,500
205-99-2	Benzo(b)fluoranthene	3,400
207-08-9	Benzo(k)fluoranthene	1,800
50-32-8	Benzo(a)pyrene	3,000
193-39-5	Indeno(1,2,3-cd)pyrene	2,300
53-70-3	Dibenz(a,h)anthracene	740
191-24-2	Benzo(g,h,i)perylene	1,900
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	73.0%
d14-Dibenzo(a,h)anthracen	106%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST10-S1
MATRIX SPIKE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 13:20
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.60 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	76 U
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	---
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,100
129-00-0	Pyrene	1,200
56-55-3	Benzo(a)anthracene	770
218-01-9	Chrysene	---
205-99-2	Benzo(b)fluoranthene	1,300
207-08-9	Benzo(k)fluoranthene	---
50-32-8	Benzo(a)pyrene	1,200
193-39-5	Indeno(1,2,3-cd)pyrene	890
53-70-3	Dibenz(a,h)anthracene	270
191-24-2	Benzo(g,h,i)perylene	800
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	75.4%
d14-Dibenzo(a,h)anthracen	83.4%

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Sample ID: ST10-S1
MATRIX SPIKE DUPLICATE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 13:52
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.61 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	76 U
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	---
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,400
129-00-0	Pyrene	1,500
56-55-3	Benzo(a)anthracene	860
218-01-9	Chrysene	---
205-99-2	Benzo(b)fluoranthene	1,700
207-08-9	Benzo(k)fluoranthene	---
50-32-8	Benzo(a)pyrene	1,600
193-39-5	Indeno(1,2,3-cd)pyrene	1,200
53-70-3	Dibenz(a,h)anthracene	380
191-24-2	Benzo(g,h,i)perylene	1,100
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	80.1%
d14-Dibenzo(a,h)anthracen	90.6%

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Sample ID: ST11-S1
SAMPLE

Lab Sample ID: FW13B
LIMS ID: 03-12886
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 14:25
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
~~Alumina: NO~~

Sample Amount: 6.42 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 14.5%
pH: 5.5

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	78 U
91-57-6	2-Methylnaphthalene	78 U
208-96-8	Acenaphthylene	78 U
83-32-9	Acenaphthene	170
86-73-7	Fluorene	78 U
85-01-8	Phenanthrene	690
120-12-7	Anthracene	150
206-44-0	Fluoranthene	3,200
129-00-0	Pyrene	3,200
56-55-3	Benzo(a)anthracene	3,000
218-01-9	Chrysene	3,000
205-99-2	Benzo(b)fluoranthene	4,300
207-08-9	Benzo(k)fluoranthene	3,200
50-32-8	Benzo(a)pyrene	3,800
193-39-5	Indeno(1,2,3-cd)pyrene	3,500
53-70-3	Dibenz(a,h)anthracene	1,300
191-24-2	Benzo(g,h,i)perylene	2,400
132-64-9	Dibenzofuran	78 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	84.2%
d14-Dibenzo(a,h)anthracen	114%

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PNAs by SW8270C GC/MS

Sample ID: ST12-S1
SAMPLE

Lab Sample ID: FW13C
LIMS ID: 03-12887
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 14:57
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 3.62 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.4%
pH: 5.9

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	140 U
91-57-6	2-Methylnaphthalene	140 U
208-96-8	Acenaphthylene	140 U
83-32-9	Acenaphthene	310
86-73-7	Fluorene	120 J
85-01-8	Phenanthrene	2,000
120-12-7	Anthracene	400
206-44-0	Fluoranthene	4,800
129-00-0	Pyrene	5,300
56-55-3	Benzo(a)anthracene	4,100
218-01-9	Chrysene	4,500
205-99-2	Benzo(b)fluoranthene	6,600
207-08-9	Benzo(k)fluoranthene	2,400
50-32-8	Benzo(a)pyrene	5,500
193-39-5	Indeno(1,2,3-cd)pyrene	4,800
53-70-3	Dibenz(a,h)anthracene	1,400
191-24-2	Benzo(g,h,i)perylene	3,600
132-64-9	Dibenzofuran	140 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	78.8%
d14-Dibenzo(a,h)anthracen	102%

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PNAs by SW8270C GC/MS
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Sample ID: ST13-S1
SAMPLE

Lab Sample ID: FW13D
LIMS ID: 03-12888
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 15:30
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 3.60 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.1%
pH: 6.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	140 U
91-57-6	2-Methylnaphthalene	110 J
208-96-8	Acenaphthylene	140 U
83-32-9	Acenaphthene	370
86-73-7	Fluorene	200
85-01-8	Phenanthrene	2,400
120-12-7	Anthracene	520
206-44-0	Fluoranthene	4,600
129-00-0	Pyrene	5,400
56-55-3	Benzo(a)anthracene	3,800
218-01-9	Chrysene	4,600
205-99-2	Benzo(b)fluoranthene	5,900
207-08-9	Benzo(k)fluoranthene	3,200
50-32-8	Benzo(a)pyrene	5,600
193-39-5	Indeno(1,2,3-cd)pyrene	4,400
53-70-3	Dibenz(a,h)anthracene	1,300
191-24-2	Benzo(g,h,i)perylene	3,500
132-64-9	Dibenzofuran	140 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	79.8%
d14-Dibenzo(a,h)anthracen	109%

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Sample ID: ST15-S1
SAMPLE

Lab Sample ID: FW13E
LIMS ID: 03-12889
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 16:04
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.66 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 11.7%
pH: 6.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	200
86-73-7	Fluorene	81
85-01-8	Phenanthrene	1,100
120-12-7	Anthracene	240
206-44-0	Fluoranthene	2,500
129-00-0	Pyrene	2,700
56-55-3	Benzo(a)anthracene	2,000
218-01-9	Chrysene	2,400
205-99-2	Benzo(b)fluoranthene	3,300
207-08-9	Benzo(k)fluoranthene	1,800
50-32-8	Benzo(a)pyrene	3,000
193-39-5	Indeno(1,2,3-cd)pyrene	2,400
53-70-3	Dibenz(a,h)anthracene	700
191-24-2	Benzo(g,h,i)perylene	1,900
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	72.8%
d14-Dibenzo(a,h)anthracen	108%

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PNAs by SW8270C GC/MS
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Sample ID: ST17-S1
SAMPLE

Lab Sample ID: FW13G
LIMS ID: 03-12891
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 17:39
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.69 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 11.1%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	75 U
86-73-7	Fluorene	75 U
85-01-8	Phenanthrene	75 U
120-12-7	Anthracene	75 U
206-44-0	Fluoranthene	370
129-00-0	Pyrene	330
56-55-3	Benzo(a)anthracene	320
218-01-9	Chrysene	380
205-99-2	Benzo(b)fluoranthene	560
207-08-9	Benzo(k)fluoranthene	370
50-32-8	Benzo(a)pyrene	470
193-39-5	Indeno(1,2,3-cd)pyrene	370
53-70-3	Dibenz(a,h)anthracene	110
191-24-2	Benzo(g,h,i)perylene	280
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	86.3%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C GC/MS

Sample ID: ST18-S1
SAMPLE

Lab Sample ID: FW13H
LIMS ID: 03-12892
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 12:57
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.81 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 9.7%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	73 U
91-57-6	2-Methylnaphthalene	73 U
208-96-8	Acenaphthylene	73 U
83-32-9	Acenaphthene	73 U
86-73-7	Fluorene	73 U
85-01-8	Phenanthrene	55 J
120-12-7	Anthracene	73 U
206-44-0	Fluoranthene	220
129-00-0	Pyrene	230
56-55-3	Benzo(a)anthracene	150
218-01-9	Chrysene	190
205-99-2	Benzo(b)fluoranthene	210
207-08-9	Benzo(k)fluoranthene	150
50-32-8	Benzo(a)pyrene	210
193-39-5	Indeno(1,2,3-cd)pyrene	150
53-70-3	Dibenz(a,h)anthracene	73 U
191-24-2	Benzo(g,h,i)perylene	130
132-64-9	Dibenzofuran	73 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	58.7%
d14-Dibenzo(a,h)anthracen	60.5%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C GC/MS
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Sample ID: ST20-S1
SAMPLE

Lab Sample ID: FW13I
LIMS ID: 03-12893
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 13:30
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
~~Alumina: NO~~

Sample Amount: 6.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 13.0%
~~pH: 5.2~~

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	77 U
91-57-6	2-Methylnaphthalene	77 U
208-96-8	Acenaphthylene	77 U
83-32-9	Acenaphthene	77 U
86-73-7	Fluorene	77 U
85-01-8	Phenanthrene	77 U
120-12-7	Anthracene	77 U
206-44-0	Fluoranthene	120
129-00-0	Pyrene	120
56-55-3	Benzo(a)anthracene	100
218-01-9	Chrysene	130
205-99-2	Benzo(b)fluoranthene	150
207-08-9	Benzo(k)fluoranthene	140
50-32-8	Benzo(a)pyrene	160
193-39-5	Indeno(1,2,3-cd)pyrene	130
53-70-3	Dibenz(a,h)anthracene	77 U
191-24-2	Benzo(g,h,i)perylene	110
132-64-9	Dibenzofuran	77 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	69.2%
d14-Dibenzo(a,h)anthracen	81.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST22-S1
SAMPLE

Lab Sample ID: FW13J
LIMS ID: 03-12894
Matrix: Soil
Data Release Authorized
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 21:59
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.76 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.0%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	180
129-00-0	Pyrene	180
56-55-3	Benzo(a)anthracene	170
218-01-9	Chrysene	210
205-99-2	Benzo(b)fluoranthene	320
207-08-9	Benzo(k)fluoranthene	260
50-32-8	Benzo(a)pyrene	320
193-39-5	Indeno(1,2,3-cd)pyrene	250
53-70-3	Dibenz(a,h)anthracene	67 J
191-24-2	Benzo(g,h,i)perylene	210
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	41.0%
d14-Dibenzo(a,h)anthracen	52.5%

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ANALYTICAL RESOURCES INCORPORATED

Sample ID: ST23-S1
SAMPLE

Lab Sample ID: FW13K
LIMS ID: 03-12895
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 16:34
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
~~Alumina: NO~~

Sample Amount: 6.75 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.6%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	120
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	640
129-00-0	Pyrene	660
56-55-3	Benzo(a)anthracene	580
218-01-9	Chrysene	690
205-99-2	Benzo(b)fluoranthene	990
207-08-9	Benzo(k)fluoranthene	760
50-32-8	Benzo(a)pyrene	980
193-39-5	Indeno(1,2,3-cd)pyrene	760
53-70-3	Dibenz(a,h)anthracene	220
191-24-2	Benzo(g,h,i)perylene	660
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	56.4%
d14-Dibenzo(a,h)anthracen	64.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST24-S1
SAMPLE

Lab Sample ID: FW13L
LIMS ID: 03-12896
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 17:07
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.58 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 5.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	65 J
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	130
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,300
129-00-0	Pyrene	1,200
56-55-3	Benzo(a)anthracene	1,400
218-01-9	Chrysene	1,500
205-99-2	Benzo(b)fluoranthene	2,300
207-08-9	Benzo(k)fluoranthene	1,200
50-32-8	Benzo(a)pyrene	1,900
193-39-5	Indeno(1,2,3-cd)pyrene	1,400
53-70-3	Dibenz(a,h)anthracene	520
191-24-2	Benzo(g,h,i)perylene	1,100
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	66.7%
d14-Dibenzo(a,h)anthracen	80.1%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C GC/MS
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Sample ID: ST25-S1
SAMPLE

Lab Sample ID: FW13M
LIMS ID: 03-12897
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 14:02
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 7.21 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 4.4%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	69 U
91-57-6	2-Methylnaphthalene	69 U
208-96-8	Acenaphthylene	69 U
83-32-9	Acenaphthene	69 U
86-73-7	Fluorene	69 U
85-01-8	Phenanthrene	69 U
120-12-7	Anthracene	69 U
206-44-0	Fluoranthene	100
129-00-0	Pyrene	100
56-55-3	Benzo(a)anthracene	82
218-01-9	Chrysene	98
205-99-2	Benzo(b)fluoranthene	140
207-08-9	Benzo(k)fluoranthene	100
50-32-8	Benzo(a)pyrene	120
193-39-5	Indeno(1,2,3-cd)pyrene	96
53-70-3	Dibenz(a,h)anthracene	69 U
191-24-2	Benzo(g,h,i)perylene	86
132-64-9	Dibenzofuran	69 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	57.4%
d14-Dibenzo(a,h)anthracen	75.3%

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Sample ID: ST27-S1
SAMPLE

Lab Sample ID: FW13N
LIMS ID: 03-12898
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 14:35
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.77 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.0%
pH: 5.3

CAS Number	Analyte	µg/kg	
91-20-3	Naphthalene	74	U
91-57-6	2-Methylnaphthalene	74	U
208-96-8	Acenaphthylene	74	U
83-32-9	Acenaphthene	74	U
86-73-7	Fluorene	74	U
85-01-8	Phenanthrene	74	U
120-12-7	Anthracene	74	U
206-44-0	Fluoranthene	230	
129-00-0	Pyrene	250	
56-55-3	Benzo(a)anthracene	190	
218-01-9	Chrysene	230	
205-99-2	Benzo(b)fluoranthene	360	
207-08-9	Benzo(k)fluoranthene	260	
50-32-8	Benzo(a)pyrene	290	
193-39-5	Indeno(1,2,3-cd)pyrene	250	
53-70-3	Dibenz(a,h)anthracene	67	J
191-24-2	Benzo(g,h,i)perylene	220	
132-64-9	Dibenzofuran	74	U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	69.5%
d14-Dibenzo(a,h)anthracen	79.6%

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Sample ID: ST29-S1
SAMPLE

Lab Sample ID: FW13O
LIMS ID: 03-12899
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 16:19
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
~~Alumina: NO~~

Sample Amount: 6.74 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.6%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	35 J
129-00-0	Pyrene	41 J
56-55-3	Benzo(a)anthracene	74 U
218-01-9	Chrysene	74 U
205-99-2	Benzo(b)fluoranthene	74 U
207-08-9	Benzo(k)fluoranthene	74 U
50-32-8	Benzo(a)pyrene	46 J
193-39-5	Indeno(1,2,3-cd)pyrene	39 J
53-70-3	Dibenz(a,h)anthracene	74 U
191-24-2	Benzo(g,h,i)perylene	40 J
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	56.6%
d14-Dibenzo(a,h)anthracen	61.8%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C GC/MS
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Sample ID: ST30-S1
SAMPLE

Lab Sample ID: FW13P
LIMS ID: 03-12900
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 15:40
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 13.1%
pH: 5.2

CAS Number	Analyte	µg/kg	
91-20-3	Naphthalene	77	U
91-57-6	2-Methylnaphthalene	77	U
208-96-8	Acenaphthylene	77	U
83-32-9	Acenaphthene	77	U
86-73-7	Fluorene	77	U
85-01-8	Phenanthrene	77	U
120-12-7	Anthracene	77	U
206-44-0	Fluoranthene	85	
129-00-0	Pyrene	96	
56-55-3	Benzo(a)anthracene	66	J
218-01-9	Chrysene	89	
205-99-2	Benzo(b)fluoranthene	110	
207-08-9	Benzo(k)fluoranthene	100	
50-32-8	Benzo(a)pyrene	120	
193-39-5	Indeno(1,2,3-cd)pyrene	110	
53-70-3	Dibenz(a,h)anthracene	77	U
191-24-2	Benzo(g,h,i)perylene	110	
132-64-9	Dibenzofuran	77	U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	68.6%
d14-Dibenzo(a,h)anthracen	77.9%

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PNAs by SW8270C GC/MS
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Sample ID: ST14-S1
SAMPLE

Lab Sample ID: FW13Q
LIMS ID: 03-12901
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 11:53
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.64 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 12.1%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	230 U
91-57-6	2-Methylnaphthalene	230 U
208-96-8	Acenaphthylene	230 U
83-32-9	Acenaphthene	230 U
86-73-7	Fluorene	230 U
85-01-8	Phenanthrene	1,200
120-12-7	Anthracene	220 J
206-44-0	Fluoranthene	4,000
129-00-0	Pyrene	4,000
56-55-3	Benzo(a)anthracene	2,900
218-01-9	Chrysene	3,400
205-99-2	Benzo(b)fluoranthene	4,700
207-08-9	Benzo(k)fluoranthene	2,700
50-32-8	Benzo(a)pyrene	4,500
193-39-5	Indeno(1,2,3-cd)pyrene	3,400
53-70-3	Dibenz(a,h)anthracene	1,000
191-24-2	Benzo(g,h,i)perylene	3,000
132-64-9	Dibenzofuran	230 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	61.8%
d14-Dibenzo(a,h)anthracen	80.5%

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PNAs by SW8270C GC/MS
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Sample ID: ST16-S1
SAMPLE

Lab Sample ID: FW13F
LIMS ID: 03-12890
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 11:21
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 0.92 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 12.1%
pH: 6.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	1,600 U
91-57-6	2-Methylnaphthalene	1,600 U
208-96-8	Acenaphthylene	1,600 U
83-32-9	Acenaphthene	2,800
86-73-7	Fluorene	1,600 U
85-01-8	Phenanthrene	15,000
120-12-7	Anthracene	2,800
206-44-0	Fluoranthene	47,000
129-00-0	Pyrene	46,000
56-55-3	Benzo(a)anthracene	34,000
218-01-9	Chrysene	39,000
205-99-2	Benzo(b)fluoranthene	56,000
207-08-9	Benzo(k)fluoranthene	32,000
50-32-8	Benzo(a)pyrene	54,000
193-39-5	Indeno(1,2,3-cd)pyrene	42,000
53-70-3	Dibenz(a,h)anthracene	12,000
191-24-2	Benzo(g,h,i)perylene	34,000
132-64-9	Dibenzofuran	1,600 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	86.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST31-S1
SAMPLE

Lab Sample ID: FW13R
LIMS ID: 03-12902
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 12:25
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.43 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 14.6%
pH: 5.3

CAS Number	Analyte	µg/kg	
91-20-3	Naphthalene	230	U
91-57-6	2-Methylnaphthalene	230	U
208-96-8	Acenaphthylene	230	U
83-32-9	Acenaphthene	170	J
86-73-7	Fluorene	230	U
85-01-8	Phenanthrene	420	
120-12-7	Anthracene	230	U
206-44-0	Fluoranthene	3,200	
129-00-0	Pyrene	3,300	
56-55-3	Benzo(a)anthracene	4,100	
218-01-9	Chrysene	4,500	
205-99-2	Benzo(b)fluoranthene	8,300	
207-08-9	Benzo(k)fluoranthene	4,200	
50-32-8	Benzo(a)pyrene	7,100	
193-39-5	Indeno(1,2,3-cd)pyrene	6,000	
53-70-3	Dibenz(a,h)anthracene	1,900	
191-24-2	Benzo(g,h,i)perylene	5,200	
132-64-9	Dibenzofuran	230	U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	79.8%

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PNAs by SW8270C GC/MS
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Sample ID: ST10-S1
MS/MSD

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted MS/MSD: 09/26/03

Sample Amount MS: 6.60 g-dry-wt
MSD: 6.61 g-dry-wt

Date Analyzed MS: 10/06/03 13:20
MSD: 10/06/03 13:52

Final Extract Volume MS: 0.5 mL
MSD: 0.5 mL

Instrument/Analyst MS: FINN8/PK
MSD: FINN8/PK

Dilution Factor MS: 1.00
MSD: 1.00

GPC Cleanup: NO

Alumina Cleanup: NO

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Phenanthrene	762	404	227	NA	461	227	NA	13.2%
Chrysene	2530	1080	227	NA	1390	227	NA	25.1%
Benzo(k)fluoranthene	1750	811	227	NA	1140	227	NA	33.7%

Results reported in µg/kg
NA-No recovery due to high concentration of analyte in original sample OR calculated negative recovery OR the reporting of an unspiked analyte.
.PD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
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Sample ID: LCS-092603
LAB CONTROL

Lab Sample ID: LCS-092603
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 18:44
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	110	200	55.0%
Chrysene	108	200	54.0%
Benzo(k)fluoranthene	95.3	200	47.6%

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	58.9%
d14-Dibenzo(a,h)anthracen	65.6%

Results reported in µg/kg

ANALYTICAL RESOURCES INCORPORATED

SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Client ID	MNAP	DBA	TOT OUT
MB-092603	61.1%	72.9%	0
LCS-092603	58.9%	65.6%	0
ST10-S1	73.0%	106%	0
ST10-S1 MS	75.4%	83.4%	0
ST10-S1 MSD	80.1%	90.6%	0
ST11-S1	84.2%	114%	0
ST12-S1	78.8%	102%	0
ST13-S1	79.8%	109%	0
ST15-S1	72.8%	108%	0
ST16-S1	64.4%	86.3%	0
ST17-S1	64.4%	86.3%	0
ST18-S1	58.7%	60.5%	0
ST20-S1	69.2%	81.0%	0
ST22-S1	41.0%	52.5%	0
ST23-S1	56.4%	64.7%	0
ST24-S1	66.7%	80.1%	0
ST25-S1	57.4%	75.3%	0
ST27-S1	69.5%	79.6%	0
ST29-S1	56.6%	61.8%	0
ST30-S1	68.6%	77.9%	0
ST14-S1	61.8%	80.5%	0
ST31-S1	64.4%	79.8%	0

	LCS/MB LIMITS	QC LIMITS
(MNAP) = d10-2-Methylnaphthalene	(30-160)	(30-160)
(DBA) = d14-Dibenzo(a,h)anthracene	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 03-12885 to 03-12902

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST15-S1
SAMPLE

Lab Sample ID: FW13E
LIMS ID: 03-12889
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 16:04
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.66 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 11.7%
pH: 6.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	200
86-73-7	Fluorene	81
85-01-8	Phenanthrene	1,100
120-12-7	Anthracene	240
206-44-0	Fluoranthene	2,500
129-00-0	Pyrene	2,700
56-55-3	Benzo(a)anthracene	2,000
218-01-9	Chrysene	2,400
205-99-2	Benzo(b)fluoranthene	3,300
207-08-9	Benzo(k)fluoranthene	1,800
50-32-8	Benzo(a)pyrene	3,000
193-39-5	Indeno(1,2,3-cd)pyrene	2,400
53-70-3	Dibenz(a,h)anthracene	700
191-24-2	Benzo(g,h,i)perylene	1,900
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	72.8%
d14-Dibenzo(a,h)anthracen	108%

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PNAs by SW8270C GC/MS
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Sample ID: ST16-S1
SAMPLE

Lab Sample ID: FW13F
LIMS ID: 03-12890
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 11:21
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 0.92 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 12.1%
pH: 6.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	1,600 U
91-57-6	2-Methylnaphthalene	1,600 U
208-96-8	Acenaphthylene	1,600 U
83-32-9	Acenaphthene	2,800
86-73-7	Fluorene	1,600 U
85-01-8	Phenanthrene	15,000
120-12-7	Anthracene	2,800
206-44-0	Fluoranthene	47,000
129-00-0	Pyrene	46,000
56-55-3	Benzo(a)anthracene	34,000
218-01-9	Chrysene	39,000
205-99-2	Benzo(b)fluoranthene	56,000
207-08-9	Benzo(k)fluoranthene	32,000
50-32-8	Benzo(a)pyrene	54,000
193-39-5	Indeno(1,2,3-cd)pyrene	42,000
53-70-3	Dibenz(a,h)anthracene	12,000
191-24-2	Benzo(g,h,i)perylene	34,000
132-64-9	Dibenzofuran	1,600 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	86.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST17-S1
SAMPLE

Lab Sample ID: FW13G
LIMS ID: 03-12891
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 17:39
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.69 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 11.1%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	75 U
86-73-7	Fluorene	75 U
85-01-8	Phenanthrene	75 U
120-12-7	Anthracene	75 U
206-44-0	Fluoranthene	370
129-00-0	Pyrene	330
56-55-3	Benzo(a)anthracene	320
218-01-9	Chrysene	380
205-99-2	Benzo(b)fluoranthene	560
207-08-9	Benzo(k)fluoranthene	370
50-32-8	Benzo(a)pyrene	470
193-39-5	Indeno(1,2,3-cd)pyrene	370
53-70-3	Dibenz(a,h)anthracene	110
191-24-2	Benzo(g,h,i)perylene	280
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	86.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST18-S1
SAMPLE

Lab Sample ID: FW13H
LIMS ID: 03-12892
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 12:57
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.81 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 9.7%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	73 U
91-57-6	2-Methylnaphthalene	73 U
208-96-8	Acenaphthylene	73 U
83-32-9	Acenaphthene	73 U
86-73-7	Fluorene	73 U
85-01-8	Phenanthrene	55 J
120-12-7	Anthracene	73 U
206-44-0	Fluoranthene	220
129-00-0	Pyrene	230
56-55-3	Benzo(a)anthracene	150
218-01-9	Chrysene	190
205-99-2	Benzo(b)fluoranthene	210
207-08-9	Benzo(k)fluoranthene	150
50-32-8	Benzo(a)pyrene	210
193-39-5	Indeno(1,2,3-cd)pyrene	150
53-70-3	Dibenz(a,h)anthracene	73 U
191-24-2	Benzo(g,h,i)perylene	130
132-64-9	Dibenzofuran	73 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	58.7%
d14-Dibenzo(a,h)anthracen	60.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST20-S1
SAMPLE

Lab Sample ID: FW13I
LIMS ID: 03-12893
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 13:30
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 13.0%
pH: 5.2

CAS Number	Analyte	µg/kg	
91-20-3	Naphthalene	77	U
91-57-6	2-Methylnaphthalene	77	U
208-96-8	Acenaphthylene	77	U
83-32-9	Acenaphthene	77	U
86-73-7	Fluorene	77	U
85-01-8	Phenanthrene	77	U
120-12-7	Anthracene	77	U
206-44-0	Fluoranthene	120	
129-00-0	Pyrene	120	
56-55-3	Benzo(a)anthracene	100	
218-01-9	Chrysene	130	
205-99-2	Benzo(b)fluoranthene	150	
207-08-9	Benzo(k)fluoranthene	140	
50-32-8	Benzo(a)pyrene	160	
193-39-5	Indeno(1,2,3-cd)pyrene	130	
53-70-3	Dibenz(a,h)anthracene	77	U
191-24-2	Benzo(g,h,i)perylene	110	
132-64-9	Dibenzofuran	77	U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	69.2%
d14-Dibenzo(a,h)anthracen	81.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST22-S1
SAMPLE

Lab Sample ID: FW13J
LIMS ID: 03-12894
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 21:59
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.76 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.0%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	180
129-00-0	Pyrene	180
56-55-3	Benzo(a)anthracene	170
218-01-9	Chrysene	210
205-99-2	Benzo(b)fluoranthene	320
207-08-9	Benzo(k)fluoranthene	260
50-32-8	Benzo(a)pyrene	320
193-39-5	Indeno(1,2,3-cd)pyrene	250
53-70-3	Dibenz(a,h)anthracene	67 J
191-24-2	Benzo(g,h,i)perylene	210
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	41.0%
d14-Dibenzo(a,h)anthracen	52.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST23-S1
SAMPLE

Lab Sample ID: FW13K
LIMS ID: 03-12895
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 16:34
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.75 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.6%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	120
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	640
129-00-0	Pyrene	660
56-55-3	Benzo(a)anthracene	580
218-01-9	Chrysene	690
205-99-2	Benzo(b)fluoranthene	990
207-08-9	Benzo(k)fluoranthene	760
50-32-8	Benzo(a)pyrene	980
193-39-5	Indeno(1,2,3-cd)pyrene	760
53-70-3	Dibenz(a,h)anthracene	220
191-24-2	Benzo(g,h,i)perylene	660
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	56.4%
d14-Dibenzo(a,h)anthracen	64.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST24-S1
SAMPLE

Lab Sample ID: FW13L
LIMS ID: 03-12896
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 17:07
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.58 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 5.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	65 J
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	130
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,300
129-00-0	Pyrene	1,200
56-55-3	Benzo(a)anthracene	1,400
218-01-9	Chrysene	1,500
205-99-2	Benzo(b)fluoranthene	2,300
207-08-9	Benzo(k)fluoranthene	1,200
50-32-8	Benzo(a)pyrene	1,900
193-39-5	Indeno(1,2,3-cd)pyrene	1,400
53-70-3	Dibenz(a,h)anthracene	520
191-24-2	Benzo(g,h,i)perylene	1,100
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	66.7%
d14-Dibenzo(a,h)anthracen	80.1%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST25-S1
SAMPLE

Lab Sample ID: FW13M
LIMS ID: 03-12897
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 14:02
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 7.21 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 4.4%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	69 U
91-57-6	2-Methylnaphthalene	69 U
208-96-8	Acenaphthylene	69 U
83-32-9	Acenaphthene	69 U
86-73-7	Fluorene	69 U
85-01-8	Phenanthrene	69 U
120-12-7	Anthracene	69 U
206-44-0	Fluoranthene	100
129-00-0	Pyrene	100
56-55-3	Benzo(a)anthracene	82
218-01-9	Chrysene	98
205-99-2	Benzo(b)fluoranthene	140
207-08-9	Benzo(k)fluoranthene	100
50-32-8	Benzo(a)pyrene	120
193-39-5	Indeno(1,2,3-cd)pyrene	96
53-70-3	Dibenz(a,h)anthracene	69 U
191-24-2	Benzo(g,h,i)perylene	86
132-64-9	Dibenzofuran	69 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	57.4%
d14-Dibenzo(a,h)anthracen	75.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST27-S1
SAMPLE

Lab Sample ID: FW13N
LIMS ID: 03-12898
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 14:35
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.77 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.0%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	230
129-00-0	Pyrene	250
56-55-3	Benzo(a)anthracene	190
218-01-9	Chrysene	230
205-99-2	Benzo(b)fluoranthene	360
207-08-9	Benzo(k)fluoranthene	260
50-32-8	Benzo(a)pyrene	290
193-39-5	Indeno(1,2,3-cd)pyrene	250
53-70-3	Dibenz(a,h)anthracene	67 J
191-24-2	Benzo(g,h,i)perylene	220
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	69.5%
d14-Dibenzo(a,h)anthracen	79.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST29-S1
SAMPLE

Lab Sample ID: FW13O
LIMS ID: 03-12899
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 16:19
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.74 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.6%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	35 J
129-00-0	Pyrene	41 J
56-55-3	Benzo(a)anthracene	74 U
218-01-9	Chrysene	74 U
205-99-2	Benzo(b)fluoranthene	74 U
207-08-9	Benzo(k)fluoranthene	74 U
50-32-8	Benzo(a)pyrene	46 J
193-39-5	Indeno(1,2,3-cd)pyrene	39 J
53-70-3	Dibenz(a,h)anthracene	74 U
191-24-2	Benzo(g,h,i)perylene	40 J
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	56.6%
d14-Dibenzo(a,h)anthracen	61.8%

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST30-S1
SAMPLE

Lab Sample ID: FW13P
LIMS ID: 03-12900
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 15:40
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 13.1%
pH: 5.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	77 U
91-57-6	2-Methylnaphthalene	77 U
208-96-8	Acenaphthylene	77 U
83-32-9	Acenaphthene	77 U
86-73-7	Fluorene	77 U
85-01-8	Phenanthrene	77 U
120-12-7	Anthracene	77 U
206-44-0	Fluoranthene	85
129-00-0	Pyrene	96
56-55-3	Benzo(a)anthracene	66 J
218-01-9	Chrysene	89
205-99-2	Benzo(b)fluoranthene	110
207-08-9	Benzo(k)fluoranthene	100
50-32-8	Benzo(a)pyrene	120
193-39-5	Indeno(1,2,3-cd)pyrene	110
53-70-3	Dibenz(a,h)anthracene	77 U
191-24-2	Benzo(g,h,i)perylene	110
132-64-9	Dibenzofuran	77 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	68.6%
d14-Dibenzo(a,h)anthracen	77.9%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST14-S1
SAMPLE

Lab Sample ID: FW13Q
LIMS ID: 03-12901
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 11:53
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.64 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 12.1%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	230 U
91-57-6	2-Methylnaphthalene	230 U
208-96-8	Acenaphthylene	230 U
83-32-9	Acenaphthene	230 U
86-73-7	Fluorene	230 U
85-01-8	Phenanthrene	1,200
120-12-7	Anthracene	220 J
206-44-0	Fluoranthene	4,000
129-00-0	Pyrene	4,000
56-55-3	Benzo(a)anthracene	2,900
218-01-9	Chrysene	3,400
205-99-2	Benzo(b)fluoranthene	4,700
207-08-9	Benzo(k)fluoranthene	2,700
50-32-8	Benzo(a)pyrene	4,500
193-39-5	Indeno(1,2,3-cd)pyrene	3,400
53-70-3	Dibenz(a,h)anthracene	1,000
191-24-2	Benzo(g,h,i)perylene	3,000
132-64-9	Dibenzofuran	230 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	61.8%
d14-Dibenzo(a,h)anthracen	80.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST31-S1
SAMPLE

Lab Sample ID: FW13R
LIMS ID: 03-12902
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 12:25
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.43 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 14.6%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	230 U
91-57-6	2-Methylnaphthalene	230 U
208-96-8	Acenaphthylene	230 U
83-32-9	Acenaphthene	170 J
86-73-7	Fluorene	230 U
85-01-8	Phenanthrene	420
120-12-7	Anthracene	230 U
206-44-0	Fluoranthene	3,200
129-00-0	Pyrene	3,300
56-55-3	Benzo(a)anthracene	4,100
218-01-9	Chrysene	4,500
205-99-2	Benzo(b)fluoranthene	8,300
207-08-9	Benzo(k)fluoranthene	4,200
50-32-8	Benzo(a)pyrene	7,100
193-39-5	Indeno(1,2,3-cd)pyrene	6,000
53-70-3	Dibenz(a,h)anthracene	1,900
191-24-2	Benzo(g,h,i)perylene	5,200
132-64-9	Dibenzofuran	230 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	79.8%

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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ANALYTICAL RESOURCES INCORPORATED

Sample ID: ST10-S1
MS/MSD

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted MS/MSD: 09/26/03

Date Analyzed MS: 10/06/03 13:20
MSD: 10/06/03 13:52
Instrument/Analyst MS: FINN8/PK
MSD: FINN8/PK
GPC Cleanup: NO

Sample Amount MS: 6.60 g-dry-wt
MSD: 6.61 g-dry-wt
Final Extract Volume MS: 0.5 mL
MSD: 0.5 mL
Dilution Factor MS: 1.00
MSD: 1.00
Alumina Cleanup: NO

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Phenanthrene	762	404	227	NA	461	227	NA	13.2%
Chrysene	2530	1080	227	NA	1390	227	NA	25.1%
Benzo(k)fluoranthene	1750	811	227	NA	1140	227	NA	33.7%

Results reported in µg/kg
NA-No recovery due to high concentration of analyte in original sample OR calculated negative recovery OR the reporting of an unspiked analyte.
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: LCS-092603
LAB CONTROL

Lab Sample ID: LCS-092603
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 18:44
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	110	200	55.0%
Chrysene	108	200	54.0%
Benzo(k)fluoranthene	95.3	200	47.6%

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	58.9%
d14-Dibenzo(a,h)anthracen	65.6%

Results reported in µg/kg

C.O. **CHAIN OF CUSTODY REC – US ARMY CORPS OF ENGINEERS** Page: of 2

USACE Project Number:

Project Name: FORMER SKEET RANGE

Location: FT. LEWIS, WA.

LABCODE / Lab: ARI

Lab Phone / Contact: (206) 695-6200 / SUSAN SYNDELL

Sampling Personnel: G. TERRY, MARSH, PUCKETT

Cooler No: 37 – LEXINGTON LAB

Report Results To: ~~[illegible]~~ GP GLYNN PUCKETT

Comments: (206) 764-6184

~~Please return foam VOA vial blocks, and ice gel packs.~~

Analytical Method ID and Preparation/Extraction

Additional Lab Instructions:

Please record sample temp. from 40 ml temperature blank included in cooler.

Matrix	(2003) Collect Date	Collect Time	Collect Method SMCCODE	Sample ID	# of containers	PAHs (None)	<--Preserv./Filtered NOTES
SO	9/22	1126	GB	ST 10 – S1	1	1	All samples iced to maintain
SO	9/22	1119	GB	ST 11 – S1	1	1	4 degrees C.
SO	9/22	1105	GB	ST 12 – S1	1	1	
SO	9/22	1056	GB	ST 13 – S1	1	1	
SO	9/22	1058	GB	ST 15 – S1	1	1	
SO	9/22	1010	GB	ST 16 – S1	1	1	
SO	9/22	1000	GB	ST 17 – S1	1	1	
SO	9/22	1140	GB	ST 18 – S1	1	1	
SO	9/22	1156	GB	ST 20 – S1	1	1	
SO	9/22	1140	GB	ST 22 – S1	1	1	
SO	9/22	1128	GB	ST 23 – S1	1	1	
SO	9/22	1120	GB	ST 24 – S1	1	1	
SO	9/22	1319	GB	ST 25 – S1	1	1	
SO	9/22	1306	GB	ST 27 – S1	1	1	
SO	9/22	1258	GB	ST 29 – S1	1	1	
SO	9/22	1020	GB	ST 30 – S1	1	1	

Relinquished By:	Date/Time:	Received By:	Date/Time:	Temp:	Condition:	Seals Intact (Y/N):	SMCCODEs:	Matrices:
[signature]	9/23/03 – 1115 hrs.						GB – GRAB Samples	SO = Soil/Surface Soil SW = Surface Water SG = Soil Gas GW = Groundwater SE = Sediment DC = Drill Cuttings

AIRBILL #:

Seattle District Environmental Sampling Team

372

°U.S. GPO: 2001-692-813/4002

CHAIN OF CUSTODY RECORD -- US ARMY CORPS OF ENGINEERS

C.O.C. ID:

USACE Project Number:

Project Name: FORMER SKEET RANGE

Location: FT. LEWIS, WA.

LABCODE / Lab: ARI

Lab Phone / Contact: (206) 695-6200 / SUSAN SNYDER

Sampling Personnel: TERRY, MARSH, PUCKETT

Cooler No: 37-LANCASTER LAB

Report Results To: GWYN PUCKETT / (206) 764-6184

Comments:

~~Please return foam VOA vial blocks, and ice gel packs.~~ Goodlaw

Analytical Method ID and Preparation/Extraction ID

Matrix	(2003) Collect Date	Collect Time	Collect Method SMCCODE	Sample ID	# of containers	PAHs								<--Preserv./Filtered NOTES
						None								
SO	9/22	1125 SP	GB	ST14-S1	1	1								All samples iced to maintain
SO	9/22	1150	GB	ST31-S1	1	1								4 degrees C.

Additional Lab Instructions:

Please record sample temp. from 40 ml temperature blank included in cooler.

Relinquished By:	Date/Time:	Received By:	Date/Time:	Temp:	Condition:	Seals Intact (Y/N):	SMCCODEs:
[signature]	9/23/03 - 1115 HRS.						
AIRBILL #:							

Matrices:
SO = Soil/Surface Soil
SW = Surface Water
SG = Soil Gas
GW = Groundwater
SE = Sediment
DC = Drill Cuttings

Seattle District Environmental Sampling Team

*U.S. GPO: 2001-692-813/400

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: MB-092603
METHOD BLANK

Lab Sample ID: MB-092603
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 18:12
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 7.50 g
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	67 U
91-57-6	2-Methylnaphthalene	67 U
208-96-8	Acenaphthylene	67 U
83-32-9	Acenaphthene	67 U
86-73-7	Fluorene	67 U
85-01-8	Phenanthrene	67 U
120-12-7	Anthracene	67 U
206-44-0	Fluoranthene	67 U
129-00-0	Pyrene	67 U
56-55-3	Benzo(a)anthracene	67 U
218-01-9	Chrysene	67 U
205-99-2	Benzo(b)fluoranthene	67 U
207-08-9	Benzo(k)fluoranthene	67 U
50-32-8	Benzo(a)pyrene	67 U
193-39-5	Indeno(1,2,3-cd)pyrene	67 U
53-70-3	Dibenz(a,h)anthracene	67 U
191-24-2	Benzo(g,h,i)perylene	67 U
132-64-9	Dibenzofuran	67 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	61.1%
d14-Dibenzo(a,h)anthracen	72.9%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST10-S1
SAMPLE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 12:49
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.63 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	70 J
86-73-7	Fluorene	75 U
85-01-8	Phenanthrene	760
120-12-7	Anthracene	130
206-44-0	Fluoranthene	2,700
129-00-0	Pyrene	2,800
56-55-3	Benzo(a)anthracene	2,100
218-01-9	Chrysene	2,500
205-99-2	Benzo(b)fluoranthene	3,400
207-08-9	Benzo(k)fluoranthene	1,800
50-32-8	Benzo(a)pyrene	3,000
193-39-5	Indeno(1,2,3-cd)pyrene	2,300
53-70-3	Dibenz(a,h)anthracene	740
191-24-2	Benzo(g,h,i)perylene	1,900
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	73.0%
d14-Dibenzo(a,h)anthracen	106%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST10-S1
MATRIX SPIKE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 13:20
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.60 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	76 U
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	---
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,100
129-00-0	Pyrene	1,200
56-55-3	Benzo(a)anthracene	770
218-01-9	Chrysene	---
205-99-2	Benzo(b)fluoranthene	1,300
207-08-9	Benzo(k)fluoranthene	---
50-32-8	Benzo(a)pyrene	1,200
193-39-5	Indeno(1,2,3-cd)pyrene	890
53-70-3	Dibenz(a,h)anthracene	270
191-24-2	Benzo(g,h,i)perylene	800
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	75.4%
d14-Dibenzo(a,h)anthracen	83.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST10-S1
MATRIX SPIKE DUPLICATE

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 13:52
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.61 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 6.1

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	76 U
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	---
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,400
129-00-0	Pyrene	1,500
56-55-3	Benzo(a)anthracene	860
218-01-9	Chrysene	---
205-99-2	Benzo(b)fluoranthene	1,700
207-08-9	Benzo(k)fluoranthene	---
50-32-8	Benzo(a)pyrene	1,600
193-39-5	Indeno(1,2,3-cd)pyrene	1,200
53-70-3	Dibenz(a,h)anthracene	380
191-24-2	Benzo(g,h,i)perylene	1,100
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	80.1%
d14-Dibenzo(a,h)anthracen	90.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST11-S1
SAMPLE

Lab Sample ID: FW13B
LIMS ID: 03-12886
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 14:25
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.42 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 14.5%
pH: 5.5

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	78 U
91-57-6	2-Methylnaphthalene	78 U
208-96-8	Acenaphthylene	78 U
83-32-9	Acenaphthene	170
86-73-7	Fluorene	78 U
85-01-8	Phenanthrene	690
120-12-7	Anthracene	150
206-44-0	Fluoranthene	3,200
129-00-0	Pyrene	3,200
56-55-3	Benzo(a)anthracene	3,000
218-01-9	Chrysene	3,000
205-99-2	Benzo(b)fluoranthene	4,300
207-08-9	Benzo(k)fluoranthene	3,200
50-32-8	Benzo(a)pyrene	3,800
193-39-5	Indeno(1,2,3-cd)pyrene	3,500
53-70-3	Dibenz(a,h)anthracene	1,300
191-24-2	Benzo(g,h,i)perylene	2,400
132-64-9	Dibenzofuran	78 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	84.2%
d14-Dibenzo(a,h)anthracen	114%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST12-S1
SAMPLE

Lab Sample ID: FW13C
LIMS ID: 03-12887
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 14:57
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 3.62 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.4%
pH: 5.9

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	140 U
91-57-6	2-Methylnaphthalene	140 U
208-96-8	Acenaphthylene	140 U
83-32-9	Acenaphthene	310
86-73-7	Fluorene	120 J
85-01-8	Phenanthrene	2,000
120-12-7	Anthracene	400
206-44-0	Fluoranthene	4,800
129-00-0	Pyrene	5,300
56-55-3	Benzo(a)anthracene	4,100
218-01-9	Chrysene	4,500
205-99-2	Benzo(b)fluoranthene	6,600
207-08-9	Benzo(k)fluoranthene	2,400
50-32-8	Benzo(a)pyrene	5,500
193-39-5	Indeno(1,2,3-cd)pyrene	4,800
53-70-3	Dibenz(a,h)anthracene	1,400
191-24-2	Benzo(g,h,i)perylene	3,600
132-64-9	Dibenzofuran	140 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	78.8%
d14-Dibenzo(a,h)anthracen	102%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST13-S1
SAMPLE

Lab Sample ID: FW13D
LIMS ID: 03-12888
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 15:30
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 3.60 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.1%
pH: 6.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	140 U
91-57-6	2-Methylnaphthalene	110 J
208-96-8	Acenaphthylene	140 U
83-32-9	Acenaphthene	370
86-73-7	Fluorene	200
85-01-8	Phenanthrene	2,400
120-12-7	Anthracene	520
206-44-0	Fluoranthene	4,600
129-00-0	Pyrene	5,400
56-55-3	Benzo(a)anthracene	3,800
218-01-9	Chrysene	4,600
205-99-2	Benzo(b)fluoranthene	5,900
207-08-9	Benzo(k)fluoranthene	3,200
50-32-8	Benzo(a)pyrene	5,600
193-39-5	Indeno(1,2,3-cd)pyrene	4,400
53-70-3	Dibenz(a,h)anthracene	1,300
191-24-2	Benzo(g,h,i)perylene	3,500
132-64-9	Dibenzofuran	140 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	79.8%
d14-Dibenzo(a,h)anthracen	109%

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

Sample ID: ST15-S1
SAMPLE

Lab Sample ID: FW13E
LIMS ID: 03-12889
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 16:04
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.66 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 11.7%
pH: 6.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	200
86-73-7	Fluorene	81
85-01-8	Phenanthrene	1,100
120-12-7	Anthracene	240
206-44-0	Fluoranthene	2,500
129-00-0	Pyrene	2,700
56-55-3	Benzo(a)anthracene	2,000
218-01-9	Chrysene	2,400
205-99-2	Benzo(b)fluoranthene	3,300
207-08-9	Benzo(k)fluoranthene	1,800
50-32-8	Benzo(a)pyrene	3,000
193-39-5	Indeno(1,2,3-cd)pyrene	2,400
53-70-3	Dibenz(a,h)anthracene	700
191-24-2	Benzo(g,h,i)perylene	1,900
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	72.8%
d14-Dibenzo(a,h)anthracen	108%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST16-S1
SAMPLE

Lab Sample ID: FW13F
LIMS ID: 03-12890
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 11:21
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 0.92 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 12.1%
pH: 6.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	1,600 U
91-57-6	2-Methylnaphthalene	1,600 U
208-96-8	Acenaphthylene	1,600 U
83-32-9	Acenaphthene	2,800
86-73-7	Fluorene	1,600 U
85-01-8	Phenanthrene	15,000
120-12-7	Anthracene	2,800
206-44-0	Fluoranthene	47,000
129-00-0	Pyrene	46,000
56-55-3	Benzo(a)anthracene	34,000
218-01-9	Chrysene	39,000
205-99-2	Benzo(b)fluoranthene	56,000
207-08-9	Benzo(k)fluoranthene	32,000
50-32-8	Benzo(a)pyrene	54,000
193-39-5	Indeno(1,2,3-cd)pyrene	42,000
53-70-3	Dibenz(a,h)anthracene	12,000
191-24-2	Benzo(g,h,i)perylene	34,000
132-64-9	Dibenzofuran	1,600 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	86.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST17-S1
SAMPLE

Lab Sample ID: FW13G
LIMS ID: 03-12891
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 17:39
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.69 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 11.1%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	75 U
91-57-6	2-Methylnaphthalene	75 U
208-96-8	Acenaphthylene	75 U
83-32-9	Acenaphthene	75 U
86-73-7	Fluorene	75 U
85-01-8	Phenanthrene	75 U
120-12-7	Anthracene	75 U
206-44-0	Fluoranthene	370
129-00-0	Pyrene	330
56-55-3	Benzo(a)anthracene	320
218-01-9	Chrysene	380
205-99-2	Benzo(b)fluoranthene	560
207-08-9	Benzo(k)fluoranthene	370
50-32-8	Benzo(a)pyrene	470
193-39-5	Indeno(1,2,3-cd)pyrene	370
53-70-3	Dibenz(a,h)anthracene	110
191-24-2	Benzo(g,h,i)perylene	280
132-64-9	Dibenzofuran	75 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	86.3%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST18-S1
SAMPLE

Lab Sample ID: FW13H
LIMS ID: 03-12892
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 12:57
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.81 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 9.7%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	73 U
91-57-6	2-Methylnaphthalene	73 U
208-96-8	Acenaphthylene	73 U
83-32-9	Acenaphthene	73 U
86-73-7	Fluorene	73 U
85-01-8	Phenanthrene	55 J
120-12-7	Anthracene	73 U
206-44-0	Fluoranthene	220
129-00-0	Pyrene	230
56-55-3	Benzo(a)anthracene	150
218-01-9	Chrysene	190
205-99-2	Benzo(b)fluoranthene	210
207-08-9	Benzo(k)fluoranthene	150
50-32-8	Benzo(a)pyrene	210
193-39-5	Indeno(1,2,3-cd)pyrene	150
53-70-3	Dibenz(a,h)anthracene	73 U
191-24-2	Benzo(g,h,i)perylene	130
132-64-9	Dibenzofuran	73 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	58.7%
d14-Dibenzo(a,h)anthracen	60.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST20-S1
SAMPLE

Lab Sample ID: FW13I
LIMS ID: 03-12893
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 13:30
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 13.0%
pH: 5.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	77 U
91-57-6	2-Methylnaphthalene	77 U
208-96-8	Acenaphthylene	77 U
83-32-9	Acenaphthene	77 U
86-73-7	Fluorene	77 U
85-01-8	Phenanthrene	77 U
120-12-7	Anthracene	77 U
206-44-0	Fluoranthene	120
129-00-0	Pyrene	120
56-55-3	Benzo(a)anthracene	100
218-01-9	Chrysene	130
205-99-2	Benzo(b)fluoranthene	150
207-08-9	Benzo(k)fluoranthene	140
50-32-8	Benzo(a)pyrene	160
193-39-5	Indeno(1,2,3-cd)pyrene	130
53-70-3	Dibenz(a,h)anthracene	77 U
191-24-2	Benzo(g,h,i)perylene	110
132-64-9	Dibenzofuran	77 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	69.2%
d14-Dibenzo(a,h)anthracen	81.0%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: ST22-S1
SAMPLE

Lab Sample ID: FW13J
LIMS ID: 03-12894
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 21:59
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.76 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.0%
pH: 5.3

CAS Number	Analyte	µg/kg	
91-20-3	Naphthalene	74	U
91-57-6	2-Methylnaphthalene	74	U
208-96-8	Acenaphthylene	74	U
83-32-9	Acenaphthene	74	U
86-73-7	Fluorene	74	U
85-01-8	Phenanthrene	74	U
120-12-7	Anthracene	74	U
206-44-0	Fluoranthene	180	
129-00-0	Pyrene	180	
56-55-3	Benzo(a)anthracene	170	
218-01-9	Chrysene	210	
205-99-2	Benzo(b)fluoranthene	320	
207-08-9	Benzo(k)fluoranthene	260	
50-32-8	Benzo(a)pyrene	320	
193-39-5	Indeno(1,2,3-cd)pyrene	250	
53-70-3	Dibenz(a,h)anthracene	67	J
191-24-2	Benzo(g,h,i)perylene	210	
132-64-9	Dibenzofuran	74	U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	41.0%
d14-Dibenzo(a,h)anthracen	52.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST23-S1
SAMPLE

Lab Sample ID: FW13K
LIMS ID: 03-12895
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 16:34
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.75 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.6%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	120
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	640
129-00-0	Pyrene	660
56-55-3	Benzo(a)anthracene	580
218-01-9	Chrysene	690
205-99-2	Benzo(b)fluoranthene	990
207-08-9	Benzo(k)fluoranthene	760
50-32-8	Benzo(a)pyrene	980
193-39-5	Indeno(1,2,3-cd)pyrene	760
53-70-3	Dibenz(a,h)anthracene	220
191-24-2	Benzo(g,h,i)perylene	660
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	56.4%
d14-Dibenzo(a,h)anthracen	64.7%

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Sample ID: ST24-S1
SAMPLE

Lab Sample ID: FW13L
LIMS ID: 03-12896
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 17:07
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.58 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 12.2%
pH: 5.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	76 U
91-57-6	2-Methylnaphthalene	76 U
208-96-8	Acenaphthylene	76 U
83-32-9	Acenaphthene	65 J
86-73-7	Fluorene	76 U
85-01-8	Phenanthrene	130
120-12-7	Anthracene	76 U
206-44-0	Fluoranthene	1,300
129-00-0	Pyrene	1,200
56-55-3	Benzo(a)anthracene	1,400
218-01-9	Chrysene	1,500
205-99-2	Benzo(b)fluoranthene	2,300
207-08-9	Benzo(k)fluoranthene	1,200
50-32-8	Benzo(a)pyrene	1,900
193-39-5	Indeno(1,2,3-cd)pyrene	1,400
53-70-3	Dibenz(a,h)anthracene	520
191-24-2	Benzo(g,h,i)perylene	1,100
132-64-9	Dibenzofuran	76 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	66.7%
d14-Dibenzo(a,h)anthracen	80.1%

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Sample ID: ST25-S1
SAMPLE

Lab Sample ID: FW13M
LIMS ID: 03-12897
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 14:02
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 7.21 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 4.4%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	69 U
91-57-6	2-Methylnaphthalene	69 U
208-96-8	Acenaphthylene	69 U
83-32-9	Acenaphthene	69 U
86-73-7	Fluorene	69 U
85-01-8	Phenanthrene	69 U
120-12-7	Anthracene	69 U
206-44-0	Fluoranthene	100
129-00-0	Pyrene	100
56-55-3	Benzo(a)anthracene	82
218-01-9	Chrysene	98
205-99-2	Benzo(b)fluoranthene	140
207-08-9	Benzo(k)fluoranthene	100
50-32-8	Benzo(a)pyrene	120
193-39-5	Indeno(1,2,3-cd)pyrene	96
53-70-3	Dibenz(a,h)anthracene	69 U
191-24-2	Benzo(g,h,i)perylene	86
132-64-9	Dibenzofuran	69 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	57.4%
d14-Dibenzo(a,h)anthracen	75.3%

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ANALYTICAL RESOURCES INCORPORATED

Sample ID: ST27-S1
SAMPLE

Lab Sample ID: FW13N
LIMS ID: 03-12898
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 14:35
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.77 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.0%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	230
129-00-0	Pyrene	250
56-55-3	Benzo(a)anthracene	190
218-01-9	Chrysene	230
205-99-2	Benzo(b)fluoranthene	360
207-08-9	Benzo(k)fluoranthene	260
50-32-8	Benzo(a)pyrene	290
193-39-5	Indeno(1,2,3-cd)pyrene	250
53-70-3	Dibenz(a,h)anthracene	67 J
191-24-2	Benzo(g,h,i)perylene	220
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	69.5%
d14-Dibenzo(a,h)anthracen	79.6%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST29-S1
SAMPLE

Lab Sample ID: FW13O
LIMS ID: 03-12899
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 16:19
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.74 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.6%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	74 U
91-57-6	2-Methylnaphthalene	74 U
208-96-8	Acenaphthylene	74 U
83-32-9	Acenaphthene	74 U
86-73-7	Fluorene	74 U
85-01-8	Phenanthrene	74 U
120-12-7	Anthracene	74 U
206-44-0	Fluoranthene	35 J
129-00-0	Pyrene	41 J
56-55-3	Benzo(a)anthracene	74 U
218-01-9	Chrysene	74 U
205-99-2	Benzo(b)fluoranthene	74 U
207-08-9	Benzo(k)fluoranthene	74 U
50-32-8	Benzo(a)pyrene	46 J
193-39-5	Indeno(1,2,3-cd)pyrene	39 J
53-70-3	Dibenz(a,h)anthracene	74 U
191-24-2	Benzo(g,h,i)perylene	40 J
132-64-9	Dibenzofuran	74 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	56.6%
d14-Dibenzo(a,h)anthracen	61.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST30-S1
SAMPLE

Lab Sample ID: FW13P
LIMS ID: 03-12900
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 15:40
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 13.1%
pH: 5.2

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	77 U
91-57-6	2-Methylnaphthalene	77 U
208-96-8	Acenaphthylene	77 U
83-32-9	Acenaphthene	77 U
86-73-7	Fluorene	77 U
85-01-8	Phenanthrene	77 U
120-12-7	Anthracene	77 U
206-44-0	Fluoranthene	85
129-00-0	Pyrene	96
56-55-3	Benzo(a)anthracene	66 J
218-01-9	Chrysene	89
205-99-2	Benzo(b)fluoranthene	110
207-08-9	Benzo(k)fluoranthene	100
50-32-8	Benzo(a)pyrene	120
193-39-5	Indeno(1,2,3-cd)pyrene	110
53-70-3	Dibenz(a,h)anthracene	77 U
191-24-2	Benzo(g,h,i)perylene	110
132-64-9	Dibenzofuran	77 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	68.6%
d14-Dibenzo(a,h)anthracen	77.9%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST14-S1
SAMPLE

Lab Sample ID: FW13Q
LIMS ID: 03-12901
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 11:53
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.64 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 12.1%
pH: 5.4

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	230 U
91-57-6	2-Methylnaphthalene	230 U
208-96-8	Acenaphthylene	230 U
83-32-9	Acenaphthene	230 U
86-73-7	Fluorene	230 U
85-01-8	Phenanthrene	1,200
120-12-7	Anthracene	220 J
206-44-0	Fluoranthene	4,000
129-00-0	Pyrene	4,000
56-55-3	Benzo(a)anthracene	2,900
218-01-9	Chrysene	3,400
205-99-2	Benzo(b)fluoranthene	4,700
207-08-9	Benzo(k)fluoranthene	2,700
50-32-8	Benzo(a)pyrene	4,500
193-39-5	Indeno(1,2,3-cd)pyrene	3,400
53-70-3	Dibenz(a,h)anthracene	1,000
191-24-2	Benzo(g,h,i)perylene	3,000
132-64-9	Dibenzofuran	230 U

Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	61.8%
d14-Dibenzo(a,h)anthracen	80.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: ST31-S1
SAMPLE

Lab Sample ID: FW13R
LIMS ID: 03-12902
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/07/03 12:25
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO
Alumina: NO

Sample Amount: 6.43 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 14.6%
pH: 5.3

CAS Number	Analyte	µg/kg
91-20-3	Naphthalene	230 U
91-57-6	2-Methylnaphthalene	230 U
208-96-8	Acenaphthylene	230 U
83-32-9	Acenaphthene	170 J
86-73-7	Fluorene	230 U
85-01-8	Phenanthrene	420
120-12-7	Anthracene	230 U
206-44-0	Fluoranthene	3,200
129-00-0	Pyrene	3,300
56-55-3	Benzo(a)anthracene	4,100
218-01-9	Chrysene	4,500
205-99-2	Benzo(b)fluoranthene	8,300
207-08-9	Benzo(k)fluoranthene	4,200
50-32-8	Benzo(a)pyrene	7,100
193-39-5	Indeno(1,2,3-cd)pyrene	6,000
53-70-3	Dibenz(a,h)anthracene	1,900
191-24-2	Benzo(g,h,i)perylene	5,200
132-64-9	Dibenzofuran	230 U

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	64.4%
d14-Dibenzo(a,h)anthracen	79.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: ST10-S1
MS/MSD

Lab Sample ID: FW13A
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted MS/MSD: 09/26/03

Date Analyzed MS: 10/06/03 13:20
MSD: 10/06/03 13:52
Instrument/Analyst MS: FINN8/PK
MSD: FINN8/PK
GPC Cleanup: NO

Sample Amount MS: 6.60 g-dry-wt
MSD: 6.61 g-dry-wt
Final Extract Volume MS: 0.5 mL
MSD: 0.5 mL
Dilution Factor MS: 1.00
MSD: 1.00
Alumina Cleanup: NO

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Phenanthrene	762	404	227	NA	461	227	NA	13.2%
Chrysene	2530	1080	227	NA	1390	227	NA	25.1%
Benzo(k)fluoranthene	1750	811	227	NA	1140	227	NA	33.7%

Results reported in µg/kg
NA-No recovery due to high concentration of analyte in original sample OR calculated negative recovery OR the reporting of an unspiked analyte.
RPD calculated using sample concentrations per SW846.

FORM III

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: LCS-092603
LAB CONTROL

Lab Sample ID: LCS-092603
LIMS ID: 03-12885
Matrix: Soil
Data Release Authorized:
Reported: 10/09/03

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Date Sampled: 09/22/03
Date Received: 09/23/03

Date Extracted: 09/26/03
Date Analyzed: 10/06/03 18:44
Instrument/Analyst: FINN8/PK
GPC Cleanup: NO

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	110	200	55.0%
Chrysene	108	200	54.0%
Benzo(k)fluoranthene	95.3	200	47.6%

Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	58.9%
d14-Dibenzo(a,h)anthracen	65.6%

Results reported in µg/kg

ANALYTICAL RESOURCES INCORPORATED

SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: FW13-US Army Corps of Engineers
Project: Former Skeet Range

Client ID	MNAP	DBA	TOT OUT
MB-092603	61.1%	72.9%	0
LCS-092603	58.9%	65.6%	0
ST10-S1	73.0%	106%	0
ST10-S1 MS	75.4%	83.4%	0
ST10-S1 MSD	80.1%	90.6%	0
ST11-S1	84.2%	114%	0
ST12-S1	78.8%	102%	0
ST13-S1	79.8%	109%	0
ST15-S1	72.8%	108%	0
ST16-S1	64.4%	86.3%	0
ST17-S1	64.4%	86.3%	0
ST18-S1	58.7%	60.5%	0
ST20-S1	69.2%	81.0%	0
ST22-S1	41.0%	52.5%	0
ST23-S1	56.4%	64.7%	0
ST24-S1	66.7%	80.1%	0
ST25-S1	57.4%	75.3%	0
ST27-S1	69.5%	79.6%	0
ST29-S1	56.6%	61.8%	0
ST30-S1	68.6%	77.9%	0
ST14-S1	61.8%	80.5%	0
ST31-S1	64.4%	79.8%	0

	LCS/MB LIMITS	QC LIMITS
(MNAP) = d10-2-Methylnaphthalene	(30-160)	(30-160)
(DBA) = d14-Dibenzo(a,h)anthracene	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 03-12885 to 03-12902

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Hart Crowser, Inc.
USACE Former Skeet Range
ARI Job No: GC18

Laboratory Case Narrative

Please find enclosed laboratory results for the project referenced above. Analytical Resources, Inc. (ARI) received seven soil samples for analysis on December 2, 2003. A cross-reference between the field identification and the laboratory tracking information is included on the SDG Cover Sheet.

SIM PNA's (8270C)

Case Notes:

The samples were analyzed for PNA's at the SIM level.

Initial Calibration:

(NT1, 11/21/03) Within the 15% RSD method criteria for all analytes.

Continuing Calibration:
(NT1, 12/12/03, 1026) Within the method criteria.

Method Blank (s): Method blank associated with extraction of all samples except ST820-6 initially acidic. Extract was water washed and re-analyzed successfully, within the method criteria, no detectable analytes.

Surrogates: All surrogates were within ARI designated control limits.

Samples: Sample ST820-6 was extracted at a less concentrated level based upon the results of the sample's screen. Several samples required dilutions for PAH values beyond the linear range.

Matrix Spikes: Recovery of chrysene 2 % above ARI designated control limits in matrix spike duplicate.

LCS(s): The LCS recovery was within control limits for all spiked analytes.

ANALYTICAL RESOURCES INCORPORATED

SIM SW8270 SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Client ID	MNP	DBA	TOT OUT
MB-120903	85.0%	75.0%	0
LCS-120903	85.7%	91.0%	0
ST11 12-24	80.7%	89.0%	0
ST11 12-24 DL	78.3%	93.3%	0
ST16 12-24	85.7%	83.3%	0
ST16 12-24 DL	86.7%	86.7%	0
ST780-6	91.0%	92.0%	0
ST780-6 MS	68.0%	78.7%	0
ST780-6 MSD	93.0%	104%	0
ST790-6	89.0%	100%	0
ST790-6 DL	96.7%	110%	0
ST800-6	86.7%	87.0%	0
ST810-6	88.7%	103%	0
ST810-6 DL	73.3%	96.7%	0
MB-120903	75.3%	86.0%	0
LCS-120903	83.7%	87.7%	0
ST820-6	85.7%	91.0%	0

	LCS/MB LIMITS	QC LIMITS
(MNP) = d10-2-Methylnaphthalene	(35-113)	(11-127)
(DBA) = d14-Dibenzo(a,h)anthracene	(26-142)	(10-153)

Prep Method: SW3550B
Log Number Range: 03-16468 to 03-16474

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: MB-120903
METHOD BLANK

Lab Sample ID: MB-120903
LIMS ID: 03-16474
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: NA
Date Received: NA

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 15:18
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:2

Sample Amount: 15.0 g
Final Extract Volume: 2.0 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	13	< 13 U
91-57-6	2-Methylnaphthalene	13	< 13 U
208-96-8	Acenaphthylene	13	< 13 U
83-32-9	Acenaphthene	13	< 13 U
86-73-7	Fluorene	13	< 13 U
85-01-8	Phenanthrene	13	< 13 U
120-12-7	Anthracene	13	< 13 U
206-44-0	Fluoranthene	13	< 13 U
129-00-0	Pyrene	13	< 13 U
56-55-3	Benzo(a)anthracene	13	< 13 U
218-01-9	Chrysene	13	< 13 U
205-99-2	Benzo(b)fluoranthene	13	< 13 U
207-08-9	Benzo(k)fluoranthene	13	< 13 U
50-32-8	Benzo(a)pyrene	13	< 13 U
193-39-5	Indeno(1,2,3-cd)pyrene	13	< 13 U
53-70-3	Dibenz(a,h)anthracene	13	< 13 U
191-24-2	Benzo(g,h,i)perylene	13	< 13 U
132-64-9	Dibenzofuran	13	< 13 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	75.3%
d14-Dibenzo(a,h)anthracene	86.0%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: MB-120903
METHOD BLANK

Lab Sample ID: MB-120903
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: NA
Date Received: NA

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 20:07
Instrument/Analyst: NT1/Van
GPC Cleanup: No
~~Alumina: 1:1~~

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: NA
~~pH: NA~~

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	6.7	< 6.7 U
91-57-6	2-Methylnaphthalene	6.7	< 6.7 U
208-96-8	Acenaphthylene	6.7	< 6.7 U
83-32-9	Acenaphthene	6.7	< 6.7 U
86-73-7	Fluorene	6.7	< 6.7 U
85-01-8	Phenanthrene	6.7	< 6.7 U
120-12-7	Anthracene	6.7	< 6.7 U
206-44-0	Fluoranthene	6.7	< 6.7 U
129-00-0	Pyrene	6.7	< 6.7 U
56-55-3	Benzo(a)anthracene	6.7	< 6.7 U
218-01-9	Chrysene	6.7	< 6.7 U
205-99-2	Benzo(b)fluoranthene	6.7	< 6.7 U
207-08-9	Benzo(k)fluoranthene	6.7	< 6.7 U
50-32-8	Benzo(a)pyrene	6.7	< 6.7 U
193-39-5	Indeno(1,2,3-cd)pyrene	6.7	< 6.7 U
53-70-3	Dibenz(a,h)anthracene	6.7	< 6.7 U
191-24-2	Benzo(g,h,i)perylene	6.7	< 6.7 U
132-64-9	Dibenzofuran	6.7	< 6.7 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.0%
d14-Dibenzo(a,h)anthracene	75.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST11 12-24
SAMPLE

Lab Sample ID: GC18A
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 11:51
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.46 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 14.5 %
pH: 6.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	7.7	< 7.7 U
91-57-6	2-Methylnaphthalene	7.7	< 7.7 U
208-96-8	Acenaphthylene	7.7	< 7.7 U
83-32-9	Acenaphthene	7.7	41
86-73-7	Fluorene	7.7	12
85-01-8	Phenanthrene	7.7	400
120-12-7	Anthracene	7.7	62
206-44-0	Fluoranthene	7.7	1,600 E
129-00-0	Pyrene	7.7	2,000 E
56-55-3	Benzo(a)anthracene	7.7	1,000 E
218-01-9	Chrysene	7.7	1,500 E
205-99-2	Benzo(b)fluoranthene	7.7	1,300 E
207-08-9	Benzo(k)fluoranthene	7.7	1,100 E
50-32-8	Benzo(a)pyrene	7.7	1,600 E
193-39-5	Indeno(1,2,3-cd)pyrene	7.7	890 E
53-70-3	Dibenz(a,h)anthracene	7.7	320
191-24-2	Benzo(g,h,i)perylene	7.7	1,000 E
132-64-9	Dibenzofuran	7.7	< 7.7 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	80.7%
d14-Dibenzo(a,h)anthracene	89.0%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: ST11 12-24
DILUTION

Lab Sample ID: GC18A
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 18:24
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.46 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 5.00
Percent Moisture: 14.5 %
pH: 6.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	< 39 U
85-01-8	Phenanthrene	39	390
120-12-7	Anthracene	39	62
206-44-0	Fluoranthene	39	1,700
129-00-0	Pyrene	39	2,000
56-55-3	Benzo(a)anthracene	39	1,000
218-01-9	Chrysene	39	1,500
205-99-2	Benzo(b)fluoranthene	39	1,100
207-08-9	Benzo(k)fluoranthene	39	1,400
50-32-8	Benzo(a)pyrene	39	1,600
193-39-5	Indeno(1,2,3-cd)pyrene	39	850
53-70-3	Dibenz(a,h)anthracene	39	330
191-24-2	Benzo(g,h,i)perylene	39	940
132-64-9	Dibenzofuran	39	< 39 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	78.3%
d14-Dibenzo(a,h)anthracene	93.3%

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Sample ID: ST16 12-24
SAMPLE

Lab Sample ID: GC18B
LIMS ID: 03-16469
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 12:17
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 3.82 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 16.0 %
pH: 6.6

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	13	18
91-57-6	2-Methylnaphthalene	13	13 J
208-96-8	Acenaphthylene	13	< 13 U
83-32-9	Acenaphthene	13	150
86-73-7	Fluorene	13	30
85-01-8	Phenanthrene	13	800
120-12-7	Anthracene	13	140
206-44-0	Fluoranthene	13	3,600 E
129-00-0	Pyrene	13	4,100 E
56-55-3	Benzo(a)anthracene	13	2,700 E
218-01-9	Chrysene	13	3,600 E
205-99-2	Benzo(b)fluoranthene	13	3,800 E
207-08-9	Benzo(k)fluoranthene	13	2,800 E
50-32-8	Benzo(a)pyrene	13	4,000 E
193-39-5	Indeno(1,2,3-cd)pyrene	13	2,500 E
53-70-3	Dibenz(a,h)anthracene	13	950
191-24-2	Benzo(g,h,i)perylene	13	2,800 E
132-64-9	Dibenzofuran	13	< 13 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.7%
d14-Dibenzo(a,h)anthracene	83.3%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: ST16 12-24
DILUTION

Lab Sample ID: GC18B
LIMS ID: 03-16469
Matrix: Soil
Data Release Authorized: MB
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 18:50
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 3.82 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 5.00
Percent Moisture: 16.0 %
pH: 6.6

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	65	< 65 U
91-57-6	2-Methylnaphthalene	65	< 65 U
208-96-8	Acenaphthylene	65	< 65 U
83-32-9	Acenaphthene	65	130
86-73-7	Fluorene	65	< 65 U
85-01-8	Phenanthrene	65	820
120-12-7	Anthracene	65	160
206-44-0	Fluoranthene	65	3,700
129-00-0	Pyrene	65	4,300
56-55-3	Benzo(a)anthracene	65	2,800
218-01-9	Chrysene	65	3,800
205-99-2	Benzo(b)fluoranthene	65	3,500
207-08-9	Benzo(k)fluoranthene	65	3,200
50-32-8	Benzo(a)pyrene	65	4,000
193-39-5	Indeno(1,2,3-cd)pyrene	65	2,500
53-70-3	Dibenz(a,h)anthracene	65	820
191-24-2	Benzo(g,h,i)perylene	65	2,700
132-64-9	Dibenzofuran	65	< 65 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	86.7%
d14-Dibenzo(a,h)anthracene	86.7%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST780-6
SAMPLE

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 12:43
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.06 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	8.3	< 8.3 U
91-57-6	2-Methylnaphthalene	8.3	< 8.3 U
208-96-8	Acenaphthylene	8.3	< 8.3 U
83-32-9	Acenaphthene	8.3	< 8.3 U
86-73-7	Fluorene	8.3	< 8.3 U
85-01-8	Phenanthrene	8.3	22
120-12-7	Anthracene	8.3	< 8.3 U
206-44-0	Fluoranthene	8.3	78
129-00-0	Pyrene	8.3	96
56-55-3	Benzo(a)anthracene	8.3	62
218-01-9	Chrysene	8.3	89
205-99-2	Benzo(b)fluoranthene	8.3	90
207-08-9	Benzo(k)fluoranthene	8.3	79
50-32-8	Benzo(a)pyrene	8.3	96
193-39-5	Indeno(1,2,3-cd)pyrene	8.3	71
53-70-3	Dibenz(a,h)anthracene	8.3	25
191-24-2	Benzo(g,h,i)perylene	8.3	78
132-64-9	Dibenzofuran	8.3	< 8.3 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	91.0%
d14-Dibenzo(a,h)anthracene	92.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST780-6
MATRIX SPIKE

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 13:09
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.05 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	8.3	< 8.3 U
91-57-6	2-Methylnaphthalene	8.3	< 8.3 U
208-96-8	Acenaphthylene	8.3	< 8.3 U
83-32-9	Acenaphthene	8.3	12
86-73-7	Fluorene	8.3	< 8.3 U
85-01-8	Phenanthrene	8.3	---
120-12-7	Anthracene	8.3	15
206-44-0	Fluoranthene	8.3	150
129-00-0	Pyrene	8.3	250
56-55-3	Benzo(a)anthracene	8.3	110
218-01-9	Chrysene	8.3	---
205-99-2	Benzo(b)fluoranthene	8.3	120
207-08-9	Benzo(k)fluoranthene	8.3	---
50-32-8	Benzo(a)pyrene	8.3	170
193-39-5	Indeno(1,2,3-cd)pyrene	8.3	88
53-70-3	Dibenz(a,h)anthracene	8.3	33
191-24-2	Benzo(g,h,i)perylene	8.3	110
132-64-9	Dibenzofuran	8.3	< 8.3 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	68.0%
d14-Dibenzo(a,h)anthracene	78.7%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: ST780-6
MATRIX SPIKE DUP

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 13:35
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.06 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
~~pH: 6.2~~

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	8.3	< 8.3 U
91-57-6	2-Methylnaphthalene	8.3	< 8.3 U
208-96-8	Acenaphthylene	8.3	< 8.3 U
83-32-9	Acenaphthene	8.3	12
86-73-7	Fluorene	8.3	< 8.3 U
85-01-8	Phenanthrene	8.3	---
120-12-7	Anthracene	8.3	19
206-44-0	Fluoranthene	8.3	180
129-00-0	Pyrene	8.3	280
56-55-3	Benzo(a)anthracene	8.3	130
218-01-9	Chrysene	8.3	---
205-99-2	Benzo(b)fluoranthene	8.3	150
207-08-9	Benzo(k)fluoranthene	8.3	---
50-32-8	Benzo(a)pyrene	8.3	200
193-39-5	Indeno(1,2,3-cd)pyrene	8.3	110
53-70-3	Dibenz(a,h)anthracene	8.3	40
191-24-2	Benzo(g,h,i)perylene	8.3	140
132-64-9	Dibenzofuran	8.3	< 8.3 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	93.0%
d14-Dibenzo(a,h)anthracene	104%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST790-6
SAMPLE

Lab Sample ID: GC18D
LIMS ID: 03-16471
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 14:00
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 0.40 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 22.5 %
pH: 6.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	190
91-57-6	2-Methylnaphthalene	120	190
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	2,000
86-73-7	Fluorene	120	520
85-01-8	Phenanthrene	120	16,000 E
120-12-7	Anthracene	120	2,900
206-44-0	Fluoranthene	120	64,000 E
129-00-0	Pyrene	120	71,000 E
56-55-3	Benzo(a)anthracene	120	45,000 E
218-01-9	Chrysene	120	59,000 E
205-99-2	Benzo(b)fluoranthene	120	65,000 E
207-08-9	Benzo(k)fluoranthene	120	38,000 E
50-32-8	Benzo(a)pyrene	120	64,000 E
193-39-5	Indeno(1,2,3-cd)pyrene	120	40,000 E
53-70-3	Dibenz(a,h)anthracene	120	15,000 E
191-24-2	Benzo(g,h,i)perylene	120	44,000 E
132-64-9	Dibenzofuran	120	180

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	89.0%
d14-Dibenzo(a,h)anthracene	100%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: ST790-6
DILUTION

Lab Sample ID: GC18D
LIMS ID: 03-16471
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 19:16
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 0.40 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 10.0
Percent Moisture: 22.5 %
pH: 6.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	1200	< 1,200 U
91-57-6	2-Methylnaphthalene	1200	< 1,200 U
208-96-8	Acenaphthylene	1200	< 1,200 U
83-32-9	Acenaphthene	1200	2,400
86-73-7	Fluorene	1200	< 1,200 U
85-01-8	Phenanthrene	1200	15,000
120-12-7	Anthracene	1200	2,500
206-44-0	Fluoranthene	1200	64,000
129-00-0	Pyrene	1200	76,000
56-55-3	Benzo(a)anthracene	1200	46,000
218-01-9	Chrysene	1200	62,000
205-99-2	Benzo(b)fluoranthene	1200	52,000
207-08-9	Benzo(k)fluoranthene	1200	60,000
50-32-8	Benzo(a)pyrene	1200	70,000
193-39-5	Indeno(1,2,3-cd)pyrene	1200	41,000
53-70-3	Dibenz(a,h)anthracene	1200	13,000
191-24-2	Benzo(g,h,i)perylene	1200	46,000
132-64-9	Dibenzofuran	1200	< 1,200 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	96.7%
d14-Dibenzo(a,h)anthracene	110%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: ST800-6
SAMPLE

Lab Sample ID: GC18E
LIMS ID: 03-16472
Matrix: Soil
Data Release Authorized: AB
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 14:26
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 5.34 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 28.9 %
pH: 5.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	9.4	< 9.4 U
91-57-6	2-Methylnaphthalene	9.4	< 9.4 U
208-96-8	Acenaphthylene	9.4	< 9.4 U
83-32-9	Acenaphthene	9.4	130
86-73-7	Fluorene	9.4	15
85-01-8	Phenanthrene	9.4	230
120-12-7	Anthracene	9.4	49
206-44-0	Fluoranthene	9.4	690
129-00-0	Pyrene	9.4	700
56-55-3	Benzo(a)anthracene	9.4	500
218-01-9	Chrysene	9.4	590
205-99-2	Benzo(b)fluoranthene	9.4	650
207-08-9	Benzo(k)fluoranthene	9.4	660
50-32-8	Benzo(a)pyrene	9.4	880
193-39-5	Indeno(1,2,3-cd)pyrene	9.4	590
53-70-3	Dibenz(a,h)anthracene	9.4	180
191-24-2	Benzo(g,h,i)perylene	9.4	670
132-64-9	Dibenzofuran	9.4	< 9.4 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	86.7%
d14-Dibenzo(a,h)anthracene	87.0%

ANALYTICAL RESOURCES INCORPORATED

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PNAs by SW8270C SIM GC/MS
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Sample ID: ST810-6
SAMPLE

Lab Sample ID: GC18F
LIMS ID: 03-16473
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 14:52
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 2.01 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	25	60
91-57-6	2-Methylnaphthalene	25	55
208-96-8	Acenaphthylene	25	< 25 U
83-32-9	Acenaphthene	25	470
86-73-7	Fluorene	25	120
85-01-8	Phenanthrene	25	2,700 E
120-12-7	Anthracene	25	480
206-44-0	Fluoranthene	25	12,000 E
129-00-0	Pyrene	25	13,000 E
56-55-3	Benzo(a)anthracene	25	8,500 E
218-01-9	Chrysene	25	11,000 E
205-99-2	Benzo(b)fluoranthene	25	14,000 E
207-08-9	Benzo(k)fluoranthene	25	8,800 E
50-32-8	Benzo(a)pyrene	25	15,000 E
193-39-5	Indeno(1,2,3-cd)pyrene	25	8,800 E
53-70-3	Dibenz(a,h)anthracene	25	3,700 E
191-24-2	Benzo(g,h,i)perylene	25	9,500 E
132-64-9	Dibenzofuran	25	32

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	88.7%
d14-Dibenzo(a,h)anthracene	103%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: ST810-6
DILUTION

Lab Sample ID: GC18F
LIMS ID: 03-16473
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 19:42
Instrument/Analyst: NT1/Van
GPC Cleanup: No
~~Alumina: 1:1~~

Sample Amount: 2.01 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 10.0
Percent Moisture: 19.7 %
~~pH: 6.7~~

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	250	< 250 U
91-57-6	2-Methylnaphthalene	250	< 250 U
208-96-8	Acenaphthylene	250	< 250 U
83-32-9	Acenaphthene	250	370
86-73-7	Fluorene	250	< 250 U
85-01-8	Phenanthrene	250	3,100
120-12-7	Anthracene	250	450
206-44-0	Fluoranthene	250	14,000
129-00-0	Pyrene	250	15,000
56-55-3	Benzo(a)anthracene	250	9,200
218-01-9	Chrysene	250	13,000
205-99-2	Benzo(b)fluoranthene	250	11,000
207-08-9	Benzo(k)fluoranthene	250	12,000
50-32-8	Benzo(a)pyrene	250	16,000
193-39-5	Indeno(1,2,3-cd)pyrene	250	9,400
53-70-3	Dibenz(a,h)anthracene	250	3,100
191-24-2	Benzo(g,h,i)perylene	250	11,000
132-64-9	Dibenzofuran	250	< 250 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	73.3%
d14-Dibenzo(a,h)anthracene	96.7%

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Sample ID: ST820-6
SAMPLE

Lab Sample ID: GC18G
LIMS ID: 03-16474
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 16:10
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:2

Sample Amount: 0.49 g-dry-wt
Final Extract Volume: 2.0 mL
Dilution Factor: 1.00
Percent Moisture: 18.0 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	410	< 410 U
91-57-6	2-Methylnaphthalene	410	< 410 U
208-96-8	Acenaphthylene	410	< 410 U
83-32-9	Acenaphthene	410	< 410 U
86-73-7	Fluorene	410	< 410 U
85-01-8	Phenanthrene	410	1,900
120-12-7	Anthracene	410	450
206-44-0	Fluoranthene	410	13,000
129-00-0	Pyrene	410	17,000
56-55-3	Benzo(a)anthracene	410	11,000
218-01-9	Chrysene	410	16,000
205-99-2	Benzo(b)fluoranthene	410	22,000
207-08-9	Benzo(k)fluoranthene	410	19,000
50-32-8	Benzo(a)pyrene	410	24,000
193-39-5	Indeno(1,2,3-cd)pyrene	410	20,000
53-70-3	Dibenz(a,h)anthracene	410	4,900
191-24-2	Benzo(g,h,i)perylene	410	27,000
132-64-9	Dibenzofuran	410	< 410 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.7%
d14-Dibenzo(a,h)anthracene	91.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST780-6
MS/MSD

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted MS/MSD: 12/09/03

Date Analyzed MS: 12/12/03 13:09
MSD: 12/12/03 13:35
Instrument/Analyst MS: NT1/Van
MSD: NT1/Van
GPC Cleanup: No
Alumina Cleanup: Yes

Sample Amount MS: 6.05 g-dry-wt
MSD: 6.06 g-dry-wt
Final Extract Volume MS: 0.5 mL
MSD: 0.5 mL
Dilution Factor MS: 1.00
MSD: 1.00
pH: 6.2
Moisture: 19.7%

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Phenanthrene	21.5	246	248	90.5%	324	248	122%	27.4%
Chrysene	89.1	350	248	105%	450	248	146%	25.0%
Benzo(k)fluoranthene	79.2	275	248	79.0%	387	248	124%	33.8%

Reported in µg/kg (ppb)
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: LCS-120903
LAB CONTROL

Lab Sample ID: LCS-120903
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 11:25
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina Cleanup: Yes

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
pH: NA
Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	177	200	88.5%
Chrysene	228	200	114%
Benzo(k)fluoranthene	187	200	93.5%

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.7%
d14-Dibenzo(a,h)anthracene	91.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: LCS-120903
LAB CONTROL

Lab Sample ID: LCS-120903
LIMS ID: 03-16474
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 15:44
Instrument/Analyst: NT1/Van
GPC Cleanup: No
~~Alumina Cleanup: Yes~~

Sample Amount: 15.0 g
Final Extract Volume: 2.0 mL
Dilution Factor: 1.00
pH: NA
~~Moisture: NA~~

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	324	400	81.0%
Chrysene	385	400	96.2%
Benzo(k)fluoranthene	331	400	82.8%

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	83.7%
d14-Dibenzo(a,h)anthracene	87.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS
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Sample ID: MB-120903
METHOD BLANK

Lab Sample ID: MB-120903
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: NA
Date Received: NA

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 20:07
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	6.7	< 6.7 U
91-57-6	2-Methylnaphthalene	6.7	< 6.7 U
208-96-8	Acenaphthylene	6.7	< 6.7 U
83-32-9	Acenaphthene	6.7	< 6.7 U
86-73-7	Fluorene	6.7	< 6.7 U
85-01-8	Phenanthrene	6.7	< 6.7 U
120-12-7	Anthracene	6.7	< 6.7 U
206-44-0	Fluoranthene	6.7	< 6.7 U
129-00-0	Pyrene	6.7	< 6.7 U
56-55-3	Benzo(a)anthracene	6.7	< 6.7 U
218-01-9	Chrysene	6.7	< 6.7 U
205-99-2	Benzo(b)fluoranthene	6.7	< 6.7 U
207-08-9	Benzo(k)fluoranthene	6.7	< 6.7 U
50-32-8	Benzo(a)pyrene	6.7	< 6.7 U
193-39-5	Indeno(1,2,3-cd)pyrene	6.7	< 6.7 U
53-70-3	Dibenz(a,h)anthracene	6.7	< 6.7 U
191-24-2	Benzo(g,h,i)perylene	6.7	< 6.7 U
132-64-9	Dibenzofuran	6.7	< 6.7 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.0%
d14-Dibenzo(a,h)anthracene	75.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS
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Sample ID: MB-120903
METHOD BLANK

Lab Sample ID: MB-120903
LIMS ID: 03-16474
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: NA
Date Received: NA

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 15:18
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:2

Sample Amount: 15.0 g
Final Extract Volume: 2.0 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	13	< 13 U
91-57-6	2-Methylnaphthalene	13	< 13 U
208-96-8	Acenaphthylene	13	< 13 U
83-32-9	Acenaphthene	13	< 13 U
86-73-7	Fluorene	13	< 13 U
85-01-8	Phenanthrene	13	< 13 U
120-12-7	Anthracene	13	< 13 U
206-44-0	Fluoranthene	13	< 13 U
129-00-0	Pyrene	13	< 13 U
56-55-3	Benzo(a)anthracene	13	< 13 U
218-01-9	Chrysene	13	< 13 U
205-99-2	Benzo(b)fluoranthene	13	< 13 U
207-08-9	Benzo(k)fluoranthene	13	< 13 U
50-32-8	Benzo(a)pyrene	13	< 13 U
193-39-5	Indeno(1,2,3-cd)pyrene	13	< 13 U
53-70-3	Dibenz(a,h)anthracene	13	< 13 U
191-24-2	Benzo(g,h,i)perylene	13	< 13 U
132-64-9	Dibenzofuran	13	< 13 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	75.3%
d14-Dibenzo(a,h)anthracene	86.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: ST11 12-24
SAMPLE

Lab Sample ID: GC18A
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 11:51
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.46 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 14.5 %
pH: 6.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	7.7	< 7.7 U
91-57-6	2-Methylnaphthalene	7.7	< 7.7 U
208-96-8	Acenaphthylene	7.7	< 7.7 U
83-32-9	Acenaphthene	7.7	41
86-73-7	Fluorene	7.7	12
85-01-8	Phenanthrene	7.7	400
120-12-7	Anthracene	7.7	62
206-44-0	Fluoranthene	7.7	1,600 E
129-00-0	Pyrene	7.7	2,000 E
56-55-3	Benzo(a)anthracene	7.7	1,000 E
218-01-9	Chrysene	7.7	1,500 E
205-99-2	Benzo(b)fluoranthene	7.7	1,300 E
207-08-9	Benzo(k)fluoranthene	7.7	1,100 E
50-32-8	Benzo(a)pyrene	7.7	1,600 E
193-39-5	Indeno(1,2,3-cd)pyrene	7.7	890 E
53-70-3	Dibenz(a,h)anthracene	7.7	320
191-24-2	Benzo(g,h,i)perylene	7.7	1,000 E
132-64-9	Dibenzofuran	7.7	< 7.7 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	80.7%
d14-Dibenzo(a,h)anthracene	89.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST11 12-24
DILUTION

Lab Sample ID: GC18A
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 18:24
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.46 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 5.00
Percent Moisture: 14.5 %
pH: 6.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	< 39 U
85-01-8	Phenanthrene	39	390
120-12-7	Anthracene	39	62
206-44-0	Fluoranthene	39	1,700
129-00-0	Pyrene	39	2,000
56-55-3	Benzo(a)anthracene	39	1,000
218-01-9	Chrysene	39	1,500
205-99-2	Benzo(b)fluoranthene	39	1,100
207-08-9	Benzo(k)fluoranthene	39	1,400
50-32-8	Benzo(a)pyrene	39	1,600
193-39-5	Indeno(1,2,3-cd)pyrene	39	850
53-70-3	Dibenz(a,h)anthracene	39	330
191-24-2	Benzo(g,h,i)perylene	39	940
132-64-9	Dibenzofuran	39	< 39 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	78.3%
d14-Dibenzo(a,h)anthracene	93.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: ST16 12-24
SAMPLE

Lab Sample ID: GC18B
LIMS ID: 03-16469
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 12:17
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 3.82 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 16.0 %
pH: 6.6

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	13	18
91-57-6	2-Methylnaphthalene	13	13 J
208-96-8	Acenaphthylene	13	< 13 U
83-32-9	Acenaphthene	13	150
86-73-7	Fluorene	13	30
85-01-8	Phenanthrene	13	800
120-12-7	Anthracene	13	140
206-44-0	Fluoranthene	13	3,600 E
129-00-0	Pyrene	13	4,100 E
56-55-3	Benzo(a)anthracene	13	2,700 E
218-01-9	Chrysene	13	3,600 E
205-99-2	Benzo(b)fluoranthene	13	3,800 E
207-08-9	Benzo(k)fluoranthene	13	2,800 E
50-32-8	Benzo(a)pyrene	13	4,000 E
193-39-5	Indeno(1,2,3-cd)pyrene	13	2,500 E
53-70-3	Dibenz(a,h)anthracene	13	950
191-24-2	Benzo(g,h,i)perylene	13	2,800 E
132-64-9	Dibenzofuran	13	< 13 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.7%
d14-Dibenzo(a,h)anthracene	83.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: ST16 12-24
DILUTION

Lab Sample ID: GC18B
LIMS ID: 03-16469
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 18:50
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 3.82 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 5.00
Percent Moisture: 16.0 %
pH: 6.6

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	65	< 65 U
91-57-6	2-Methylnaphthalene	65	< 65 U
208-96-8	Acenaphthylene	65	< 65 U
83-32-9	Acenaphthene	65	130
86-73-7	Fluorene	65	< 65 U
85-01-8	Phenanthrene	65	820
120-12-7	Anthracene	65	160
206-44-0	Fluoranthene	65	3,700
129-00-0	Pyrene	65	4,300
56-55-3	Benzo(a)anthracene	65	2,800
218-01-9	Chrysene	65	3,800
205-99-2	Benzo(b)fluoranthene	65	3,500
207-08-9	Benzo(k)fluoranthene	65	3,200
50-32-8	Benzo(a)pyrene	65	4,000
193-39-5	Indeno(1,2,3-cd)pyrene	65	2,500
53-70-3	Dibenz(a,h)anthracene	65	820
191-24-2	Benzo(g,h,i)perylene	65	2,700
132-64-9	Dibenzofuran	65	< 65 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	86.7%
d14-Dibenzo(a,h)anthracene	86.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: ST780-6
SAMPLE

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 12:43
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.06 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	8.3	< 8.3 U
91-57-6	2-Methylnaphthalene	8.3	< 8.3 U
208-96-8	Acenaphthylene	8.3	< 8.3 U
83-32-9	Acenaphthene	8.3	< 8.3 U
86-73-7	Fluorene	8.3	< 8.3 U
85-01-8	Phenanthrene	8.3	22
120-12-7	Anthracene	8.3	< 8.3 U
206-44-0	Fluoranthene	8.3	78
129-00-0	Pyrene	8.3	96
56-55-3	Benzo(a)anthracene	8.3	62
218-01-9	Chrysene	8.3	89
205-99-2	Benzo(b)fluoranthene	8.3	90
207-08-9	Benzo(k)fluoranthene	8.3	79
50-32-8	Benzo(a)pyrene	8.3	96
193-39-5	Indeno(1,2,3-cd)pyrene	8.3	71
53-70-3	Dibenz(a,h)anthracene	8.3	25
191-24-2	Benzo(g,h,i)perylene	8.3	78
132-64-9	Dibenzofuran	8.3	< 8.3 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	91.0%
d14-Dibenzo(a,h)anthracene	92.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: ST780-6
MATRIX SPIKE

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 13:09
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.05 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	8.3	< 8.3 U
91-57-6	2-Methylnaphthalene	8.3	< 8.3 U
208-96-8	Acenaphthylene	8.3	< 8.3 U
83-32-9	Acenaphthene	8.3	12
86-73-7	Fluorene	8.3	< 8.3 U
85-01-8	Phenanthrene	8.3	---
120-12-7	Anthracene	8.3	15
206-44-0	Fluoranthene	8.3	150
129-00-0	Pyrene	8.3	250
56-55-3	Benzo(a)anthracene	8.3	110
218-01-9	Chrysene	8.3	---
205-99-2	Benzo(b)fluoranthene	8.3	120
207-08-9	Benzo(k)fluoranthene	8.3	---
50-32-8	Benzo(a)pyrene	8.3	170
193-39-5	Indeno(1,2,3-cd)pyrene	8.3	88
53-70-3	Dibenz(a,h)anthracene	8.3	33
191-24-2	Benzo(g,h,i)perylene	8.3	110
132-64-9	Dibenzofuran	8.3	< 8.3 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	68.0%
d14-Dibenzo(a,h)anthracene	78.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS
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Sample ID: ST780-6
MATRIX SPIKE DUP

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 13:35
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 6.06 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	8.3	< 8.3 U
91-57-6	2-Methylnaphthalene	8.3	< 8.3 U
208-96-8	Acenaphthylene	8.3	< 8.3 U
83-32-9	Acenaphthene	8.3	12
86-73-7	Fluorene	8.3	< 8.3 U
85-01-8	Phenanthrene	8.3	---
120-12-7	Anthracene	8.3	19
206-44-0	Fluoranthene	8.3	180
129-00-0	Pyrene	8.3	280
56-55-3	Benzo(a)anthracene	8.3	130
218-01-9	Chrysene	8.3	---
205-99-2	Benzo(b)fluoranthene	8.3	150
207-08-9	Benzo(k)fluoranthene	8.3	---
50-32-8	Benzo(a)pyrene	8.3	200
193-39-5	Indeno(1,2,3-cd)pyrene	8.3	110
53-70-3	Dibenz(a,h)anthracene	8.3	40
191-24-2	Benzo(g,h,i)perylene	8.3	140
132-64-9	Dibenzofuran	8.3	< 8.3 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	93.0%
d14-Dibenzo(a,h)anthracene	104%

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Sample ID: ST790-6
SAMPLE

Lab Sample ID: GC18D
LIMS ID: 03-16471
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 14:00
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 0.40 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 22.5 %
pH: 6.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	190
91-57-6	2-Methylnaphthalene	120	190
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	2,000
86-73-7	Fluorene	120	520
85-01-8	Phenanthrene	120	16,000 E
120-12-7	Anthracene	120	2,900
206-44-0	Fluoranthene	120	64,000 E
129-00-0	Pyrene	120	71,000 E
56-55-3	Benzo(a)anthracene	120	45,000 E
218-01-9	Chrysene	120	59,000 E
205-99-2	Benzo(b)fluoranthene	120	65,000 E
207-08-9	Benzo(k)fluoranthene	120	38,000 E
50-32-8	Benzo(a)pyrene	120	64,000 E
193-39-5	Indeno(1,2,3-cd)pyrene	120	40,000 E
53-70-3	Dibenz(a,h)anthracene	120	15,000 E
191-24-2	Benzo(g,h,i)perylene	120	44,000 E
132-64-9	Dibenzofuran	120	180

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	89.0%
d14-Dibenzo(a,h)anthracene	100%

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Sample ID: ST790-6
DILUTION

Lab Sample ID: GC18D
LIMS ID: 03-16471
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 19:16
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 0.40 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 10.0
Percent Moisture: 22.5 %
pH: 6.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	1200	< 1,200 U
91-57-6	2-Methylnaphthalene	1200	< 1,200 U
208-96-8	Acenaphthylene	1200	< 1,200 U
83-32-9	Acenaphthene	1200	2,400
86-73-7	Fluorene	1200	< 1,200 U
85-01-8	Phenanthrene	1200	15,000
120-12-7	Anthracene	1200	2,500
206-44-0	Fluoranthene	1200	64,000
129-00-0	Pyrene	1200	76,000
56-55-3	Benzo(a)anthracene	1200	46,000
218-01-9	Chrysene	1200	62,000
205-99-2	Benzo(b)fluoranthene	1200	52,000
207-08-9	Benzo(k)fluoranthene	1200	60,000
50-32-8	Benzo(a)pyrene	1200	70,000
193-39-5	Indeno(1,2,3-cd)pyrene	1200	41,000
53-70-3	Dibenz(a,h)anthracene	1200	13,000
191-24-2	Benzo(g,h,i)perylene	1200	46,000
132-64-9	Dibenzofuran	1200	< 1,200 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	96.7%
d14-Dibenzo(a,h)anthracene	110%

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Sample ID: ST800-6
SAMPLE

Lab Sample ID: GC18E
LIMS ID: 03-16472
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 14:26
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 5.34 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 28.9 %
pH: 5.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	9.4	< 9.4 U
91-57-6	2-Methylnaphthalene	9.4	< 9.4 U
208-96-8	Acenaphthylene	9.4	< 9.4 U
83-32-9	Acenaphthene	9.4	130
86-73-7	Fluorene	9.4	15
85-01-8	Phenanthrene	9.4	230
120-12-7	Anthracene	9.4	49
206-44-0	Fluoranthene	9.4	690
129-00-0	Pyrene	9.4	700
56-55-3	Benzo(a)anthracene	9.4	500
218-01-9	Chrysene	9.4	590
205-99-2	Benzo(b)fluoranthene	9.4	650
207-08-9	Benzo(k)fluoranthene	9.4	660
50-32-8	Benzo(a)pyrene	9.4	880
193-39-5	Indeno(1,2,3-cd)pyrene	9.4	590
53-70-3	Dibenz(a,h)anthracene	9.4	180
191-24-2	Benzo(g,h,i)perylene	9.4	670
132-64-9	Dibenzofuran	9.4	< 9.4 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	86.7%
d14-Dibenzo(a,h)anthracene	87.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST810-6
SAMPLE

Lab Sample ID: GC18F
LIMS ID: 03-16473
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 14:52
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 2.01 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Percent Moisture: 19.7 %
pH: 6.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	25	60
91-57-6	2-Methylnaphthalene	25	55
208-96-8	Acenaphthylene	25	< 25 U
83-32-9	Acenaphthene	25	470
86-73-7	Fluorene	25	120
85-01-8	Phenanthrene	25	2,700 E
120-12-7	Anthracene	25	480
206-44-0	Fluoranthene	25	12,000 E
129-00-0	Pyrene	25	13,000 E
56-55-3	Benzo(a)anthracene	25	8,500 E
218-01-9	Chrysene	25	11,000 E
205-99-2	Benzo(b)fluoranthene	25	14,000 E
207-08-9	Benzo(k)fluoranthene	25	8,800 E
50-32-8	Benzo(a)pyrene	25	15,000 E
193-39-5	Indeno(1,2,3-cd)pyrene	25	8,800 E
53-70-3	Dibenz(a,h)anthracene	25	3,700 E
191-24-2	Benzo(g,h,i)perylene	25	9,500 E
132-64-9	Dibenzofuran	25	32

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	88.7%
d14-Dibenzo(a,h)anthracene	103%

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Sample ID: ST810-6
DILUTION

Lab Sample ID: GC18F
LIMS ID: 03-16473
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 19:42
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:1

Sample Amount: 2.01 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 10.0
Percent Moisture: 19.7 %
pH: 6.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	250	< 250 U
91-57-6	2-Methylnaphthalene	250	< 250 U
208-96-8	Acenaphthylene	250	< 250 U
83-32-9	Acenaphthene	250	370
86-73-7	Fluorene	250	< 250 U
85-01-8	Phenanthrene	250	3,100
120-12-7	Anthracene	250	450
206-44-0	Fluoranthene	250	14,000
129-00-0	Pyrene	250	15,000
56-55-3	Benzo(a)anthracene	250	9,200
218-01-9	Chrysene	250	13,000
205-99-2	Benzo(b)fluoranthene	250	11,000
207-08-9	Benzo(k)fluoranthene	250	12,000
50-32-8	Benzo(a)pyrene	250	16,000
193-39-5	Indeno(1,2,3-cd)pyrene	250	9,400
53-70-3	Dibenz(a,h)anthracene	250	3,100
191-24-2	Benzo(g,h,i)perylene	250	11,000
132-64-9	Dibenzofuran	250	< 250 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	73.3%
d14-Dibenzo(a,h)anthracene	96.7%

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Sample ID: ST820-6
SAMPLE

Lab Sample ID: GC18G
LIMS ID: 03-16474
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 16:10
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina: 1:2

Sample Amount: 0.49 g-dry-wt
Final Extract Volume: 2.0 mL
Dilution Factor: 1.00
Percent Moisture: 18.0 %
pH: 6.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	410	< 410 U
91-57-6	2-Methylnaphthalene	410	< 410 U
208-96-8	Acenaphthylene	410	< 410 U
83-32-9	Acenaphthene	410	< 410 U
86-73-7	Fluorene	410	< 410 U
85-01-8	Phenanthrene	410	1,900
120-12-7	Anthracene	410	450
206-44-0	Fluoranthene	410	13,000
129-00-0	Pyrene	410	17,000
56-55-3	Benzo(a)anthracene	410	11,000
218-01-9	Chrysene	410	16,000
205-99-2	Benzo(b)fluoranthene	410	22,000
207-08-9	Benzo(k)fluoranthene	410	19,000
50-32-8	Benzo(a)pyrene	410	24,000
193-39-5	Indeno(1,2,3-cd)pyrene	410	20,000
53-70-3	Dibenz(a,h)anthracene	410	4,900
191-24-2	Benzo(g,h,i)perylene	410	27,000
132-64-9	Dibenzofuran	410	< 410 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.7%
d14-Dibenzo(a,h)anthracene	91.0%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: ST780-6
MS/MSD

Lab Sample ID: GC18C
LIMS ID: 03-16470
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted MS/MSD: 12/09/03

Sample Amount MS: 6.05 g-dry-wt
MSD: 6.06 g-dry-wt

Date Analyzed MS: 12/12/03 13:09
MSD: 12/12/03 13:35

Final Extract Volume MS: 0.5 mL
MSD: 0.5 mL

Instrument/Analyst MS: NT1/Van
MSD: NT1/Van

Dilution Factor MS: 1.00
MSD: 1.00

GPC Cleanup: No
Alumina Cleanup: Yes

pH: 6.2
Moisture: 19.7%

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Phenanthrene	21.5	246	248	90.5%	324	248	122%	27.4%
Chrysene	89.1	350	248	105%	450	248	146%	25.0%
Benzo(k)fluoranthene	79.2	275	248	79.0%	387	248	124%	33.8%

Reported in µg/kg (ppb)
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS

Sample ID: LCS-120903
LAB CONTROL

Lab Sample ID: LCS-120903
LIMS ID: 03-16468
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 11:25
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina Cleanup: Yes

Sample Amount: 7.50 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
pH: NA
Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	177	200	88.5%
Chrysene	228	200	114%
Benzo(k)fluoranthene	187	200	93.5%

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	85.7%
d14-Dibenzo(a,h)anthracene	91.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C SIM GC/MS
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Sample ID: LCS-120903
LAB CONTROL

Lab Sample ID: LCS-120903
LIMS ID: 03-16474
Matrix: Soil
Data Release Authorized:
Reported: 12/15/03

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Date Sampled: 12/02/03
Date Received: 12/02/03

Date Extracted: 12/09/03
Date Analyzed: 12/12/03 15:44
Instrument/Analyst: NT1/Van
GPC Cleanup: No
Alumina Cleanup: Yes

Sample Amount: 15.0 g
Final Extract Volume: 2.0 mL
Dilution Factor: 1.00
pH: NA
Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Phenanthrene	324	400	81.0%
Chrysene	385	400	96.2%
Benzo(k)fluoranthene	331	400	82.8%

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery	
d10-2-Methylnaphthalene	83.7%
d14-Dibenzo(a,h)anthracene	87.7%

ANALYTICAL RESOURCES INCORPORATED

SIM SW8270 SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: GC18-Hart Crowser
Project: Former Skeet Range

Client ID	MNP	DBA	TOT OUT
MB-120903	85.0%	75.0%	0
LCS-120903	85.7%	91.0%	0
ST11 12-24	80.7%	89.0%	0
ST11 12-24 DL	78.3%	93.3%	0
ST16 12-24	85.7%	83.3%	0
ST16 12-24 DL	86.7%	86.7%	0
ST780-6	91.0%	92.0%	0
ST780-6 MS	68.0%	78.7%	0
ST780-6 MSD	93.0%	104%	0
ST790-6	89.0%	100%	0
ST790-6 DL	96.7%	110%	0
ST800-6	86.7%	87.0%	0
ST810-6	88.7%	103%	0
ST810-6 DL	73.3%	96.7%	0
MB-120903	75.3%	86.0%	0
LCS-120903	83.7%	87.7%	0
ST820-6	85.7%	91.0%	0

	LCS/MB LIMITS	QC LIMITS
(MNP) = d10-2-Methylnaphthalene	(35-113)	(11-127)
(DBA) = d14-Dibenzo(a,h)anthracene	(26-142)	(10-153)

Prep Method: SW3550B
Log Number Range: 03-16468 to 03-16474