SITE ASSESSMENT REPORT
DON BENNETT SHOOTING RANGE
FAIRBANKS INTERNATIONAL AIRPORT
AKSAS PROJECT NUMBER 61112

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SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

At Shannon & Wilson, our mission is to be a progressive, well-managed professional consulting firm in the fields of engineering and applied earth sciences. Our goal is to perform our services with the highest degree of professionalism with due consideration to the best interests of the public, our clients, and our employees.

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1.0 INTRODUCTION

The Don Bennett Shooting Range, a small arms firing range at the Fairbanks International Airport (FIA), has been used over a period of about 30 years by airport security, state and local police, and sportsmen's clubs. The FIA wishes to close the range due to its location near the end of a small aircraft runway. It is in the location of improvements for approach lighting. Shannon & Wilson performed this site assessment for the FIA under contract RFP and Agreement # 368-3-3-026 dated February 21, 2003.

1.1 Objective and Scope

The objectives of the site assessment were to evaluate the distribution of lead in the shooting range soils and groundwater, and present planning-level corrective action costs for various cleanup methods.

Our scope of services consisted of the following tasks:

- Assess shot/fragment/casing penetration distance in backstop, side berms, and range floor
- Collect and analyze soil samples for lead concentrations and potential leachability and distinguish lead shot contamination from natural background lead levels in soil
- Identify locations and calculate volumes of soil that exceed Alaska Department of Environmental Conservation (ADEC) cleanup levels, potentially requiring treatment
- Collect groundwater samples to assess potential impact from lead shot on groundwater quality
- Provide a report describing results of site assessment activities, and present a range of potential remediation/corrective action alternatives and an estimate of probable costs

1.2 Site and Vicinity Description

The shooting range is located at the southwest end of the small aircraft runway (East Ramp). The range is within the fenced area of the airport. As shown in Figure 1, features in the vicinity of the range include a fire training pit, old slough meanders, a spur of the Alaska Railroad, and the Airport Perimeter Road. Further to the south are the Corps of Engineers Chena Flood Control Project levee and the Tanana River. FIA lease lots are to the north and east of the site. The closest residential properties are located about one mile from the range.

1.2.1 Configuration

The small-arms firing range used for pistol practice consists of firing lines where shooters are positioned, a target line, and an impact (or backstop) berm behind the target line. The shooting range is approximately 200 feet wide by 340 feet long. The backstop berms and side berms are about 15 feet high and 50 feet wide. A small "clubhouse" is located at the northwest end of the berms. Timbers with electric "headbolt heaters" are located about 15 feet from the backstop. A cable suspended between two poles at the south corner of the range holds a frame for a moving target.

1.2.2 Site History and Use

The shooting range has been used since at least the late 1960s. In 1983 the Alaska Peace Officers Association (APOA) obtained State funding to improve the range for law enforcement use. This is thought to be when the side berms were added. In 1986 the APOA signed an agreement with the Tanana Valley Sportsman's Association for civilian access to the range. In 1992 the berms were built up to their current height.

1.3 Chemicals of Potential Concern and Transport Mechanisms

While our scope of work was limited to the evaluation of lead, other possible soil contaminants found at small arms firing ranges may include "lead, antimony, copper, zinc, arsenic, and polycyclic aromatic hydrocarbons (PAHs) from bullets, fragments, and bullet jackets. These chemicals may leach from bullets, fragments, and bullet jackets, and contaminate soils and possibly surface and groundwater. Lead accounts for more than 85% of the weight of the projectile and constitutes the greatest environmental concern. This heavy accumulation of lead in a relatively small soil volume coupled with the fine lead present results in range soils high in total lead, which can fail standard leachability tests such as the RCRA Toxicity Characteristic Leaching Procedure (TCLP)" (ITRC, 2003).

At shooting ranges, lead can be introduced into the environment in one or more of the following ways. Lead oxidizes when exposed to air and dissolves when exposed to acidic water or soil. Lead bullets and particles and dissolved lead can be moved by water runoff. Dissolved lead can migrate through soils to groundwater.

1.4 Regulatory Requirements and Cleanup Levels

Following is a discussion of the most applicable environmental regulations that can apply to shooting ranges.

1.4.1 State of Alaska Cleanup Levels

The Environmental Protection Agency (EPA) and ADEC require cleanup levels for lead in soil to be determined on a site-specific basis, based on land use. Under 18 AAC 75, the ADEC soil cleanup level for residential land use is 400 milligrams per kilogram (mg/kg) and 1,000 mg/kg for industrial or commercial land use. We anticipate the 1,000 mg/kg cleanup level would apply to soils at this shooting range. The ADEC groundwater cleanup level for lead is equivalent to the EPA drinking water standard of 15 micrograms per liter (µg/L).

1.4.2 Federal Regulations

The EPA does not consider lead shot to be hazardous waste at the time it is discharged from a firearm, since it is used for its intended purpose. "Shooting lead shot (or bullets) is not regulated.... However, spent lead shot (or bullets), left in the environment, is subject to the broader definition of solid waste... The Resource Conservation and Recovery Act (RCRA) potentially applies to many phases of range operation because lead bullets/shot, if abandoned, may be a solid and/or a hazardous waste and may present an actual or potential imminent and substantial endangerment" (*Best Management Practices for Lead at Outdoor Shooting Ranges*, EPA-902-B-01-001, January 2001).

The following sections presenting regulatory issues concerning shootings ranges are from the Interstate Technology and Regulatory Council (ITRC) *Characterization and remediation of soils at closed small arms firing ranges.*

Classification of Spent Ammunition

Since spent ammunition is "a product made of recyclable metal, it falls within the definition of scrap metal. In accordance with 40 CFR 261.6(a)(3)(ii), scrap metal is a solid waste but is exempt from the regulatory requirements of RCRA Subpart C. Additionally, ... processed scrap metal is exempted from RCRA regulation (i.e., is not a RCRA solid waste) when it is being recycled (40 CFR 261.4(a)(13). Therefore, as long as the selected remediation technology (e.g., soil washing) meets the definition of processed scrap metal, the technology is exempt from regulation under RCRA."

Lead Recycling

"During remediation activities, recovery of bullets and bullet fragments from firing range sands or soils via physical treatment constitutes 'reclamation' per 40 CFR 261.1(c)(4). Metal concentrates reclaimed from firing range berms via size classification and density concentration

contain more than 50% lead on a dry weight basis. The other metals included in the concentrate are predominantly copper and antimony. The concentrate reclaimed from the firing range material is 'scrap metal' per 40 CFR 261.1(c)(6).

...Scrap metal is not regulated as solid waste or as hazardous waste when recycled.... Therefore, the scrap metal reclaimed from the firing range sand, or soil, does not need to be regulated or manifested as a hazardous waste during generation or transport to a smelter for recycling."

Range Soil Reuse as a Backstop on Range Property

"At some ranges, it may be possible and desirable to reuse the soil from the backstop of a range that is being closed to construct a new berm or rebuild an existing berm located in another area of the same property or facility. It is USEPA's position that ranges that reclaim and recycle lead bullets or lead shot may place the soil that is generated during the reclamation process back onto an active range on the same property or facility or a property adjacent to and under the same ownership as the property where the soils originated, without testing the soil for hazardous waste characteristics.

Consistent with this approach, range soil that has been processed to reclaim lead for recycling is considered a construction material if it is used to construct or rebuild a backstop on the same site. Defining the 'site' in such a manner to allow the soil to be reused to construct another shooting range component on the same range property or on an adjacent range property, under the same ownership and control as the property where the material originated, is an option that deserves consideration. Range soil includes soil from a former backstop or from other parts of the range. As a construction material, range soil after reclamation is not considered as either a solid or hazardous waste.

It is important to note that lead reclamation and recycling is required for the soil to be considered a construction material. If lead reclamation is not conducted prior to moving the backstop, then pursuant to RCRA, the movement of the backstop may be considered illegal disposal of hazardous waste."

Disposal of Range Soil

"The soil that is removed from a closed range for treatment or disposal may be considered to contain hazardous waste and classified as 'characteristically hazardous' if it exhibits the characteristics of toxicity.

However, the soil can be considered to no longer contain a hazardous waste through removal of the live rounds and particulate lead, with residual stabilization, if required, to meet the regulatory TCLP level of 5 mg/l. Once the soil is viewed as not containing lead, the soil may be able to be disposed at a Subtitle D (nonhazardous) facility. Any applicable land disposal restrictions should be consulted. It should be noted that individual states may not utilize the contained-in policy (and, thus, these soils would be regulated under RCRA) or may have additional, more stringent disposal requirements."

2.0 FIELD ACTIVITIES

2.1 Investigation Approach

The objective of the initial screening was to determine areas of highest concentration of lead in surface soils, select locations for subsurface sampling to estimate penetration distance, and select locations for soil verification sampling for laboratory analysis. Field screening of lead in soils was conducted using an X-ray fluorescence (XRF) instrument following EPA Method 6200. Soil was field screened for lead using a NITON 703A XRF by SUNEX, Inc.

The study area designated by the FIA project manager was the half of the range floor near the backstop, and the adjacent sidewalls and backstop. A sampling grid was marked on the base and up the berms. The first row was located partway up the backstop. An alphanumeric numbering system was used to identify the soil screening locations, soil borings, and groundwater probes, and shown in Figure 2.

Surface soil characterization was done by XRF field screening. Subsurface soil samples were collected from soil borings, and these samples were field screened. Samples at 20 percent of field screening locations were submitted for laboratory analysis. Temporary wells were installed in the area of concern to determine if groundwater has been impacted by range activities.

2.2 Surface Soil Characterization

Soil sampling was performed February 27 and 28, 2003. Because of the required schedule, field screening and sampling were conducted prior to snowmelt and thawing of surface soils. Snow from the half of the shooting range adjacent to the backstop was cleared by the Department of Transportation & Public Facilities (DOT/PF) personnel with a grader. Shannon & Wilson field personnel used a broom to remove snow from the berms at the field screening locations. A 20-by 20-foot sampling grid was laid out on the area of concern using a cloth tape and spray paint.

Due to the cover of packed snow and ice, even after plowing, it was not possible to estimate the concentration of bullets on the ground surface. Surface soil XRF field screening was conducted in grid areas of presumed high bullet concentration at about 400 square feet, and grid areas of less than 1,600 square feet for low bullet concentration areas. A total of 75 surface soil, field screening locations inside the range were tested using the procedures described in Section 2.4.

2.3 Drilling and Subsurface Sampling

At 20 percent of these locations we collected subsurface soil samples from 6, 12, and 24 inches below the ground surface (bgs). Each of these samples, including the surface sample, was field screened with the XRF. Based on the XRF field screening results, two verification soil samples from each horizon were collected for laboratory analysis, plus quality control samples. One soil sample outside the shooting range was collected to evaluate the background lead concentration. Where the XRF detected lead above the 400 mg/kg action level at the 24-inch-deep sample, additional samples were collected at intervals until the XRF did not detect lead above the action level.

Since the ground was frozen, we collected subsurface soil samples using our SIMCO 2400 drill rig equipped with a 4-inch-diameter, solid-stem auger drill. This drill was mounted in a pickup truck and capable of drilling borings in the shooting range floor and midway up the berms. Vertical borings were advanced in the range floor 3 to 4 feet bgs. Angled borings were located in the berms at 10 to 15 feet. The angle of penetration was measured using an inclinometer.

We used the solid-stem auger and collected samples off the auger flights. Samples were placed inside plastic bags for field screening and reserved for possible gradation and/or analytical testing. "Dry" decontamination of the auger was performed by brushing the soil off the flights. Soil borings were backfilled with the cuttings.

2.4 XRF Field Screening

Mr. Jim Johnson of SUNEX, INC, performed XRF field screening. The field screening procedure to measure lead concentrations in soil is outlined below:

1. XRF analysis was done with a NITON 703A XRF. The instrument was operated in accordance with the manufacturer's recommendation and good field practices. The *in situ* screen method is based on EPA Method 6200 and the manufacturer's recommendations. The method detection limit for this instrument is 65 ppm lead, based on replicate analyses of the silica blank. A silica blank and certified standard were analyzed before field tests were made.

2. Field readings were taken by *in situ* measurements and on field-prepared samples recovered from depth. For each surface sample the soil was cleared of debris and flattened to provide a uniform surface for the XRF sample window. XRF was conducted on subsurface samples inside resealable baggies, and avoided obvious bullets and fragments.

2.5 Soil Sample Collection and Analysis

Based on the field screening results, verification soil samples were submitted for laboratory analysis. We collected 20 percent of the field-screened samples for penetration distance assessment. This included three surface samples and two samples from each depth profile. Soil samples were collected in general accordance with our ADEC-approved Quality Assurance Project Plan. Soil samples for analytical testing were transferred from the plastic bag used for field screening into laboratory-supplied sample containers. Soil samples were submitted to SGS Laboratories (SGS; formerly CT&E Environmental Services) for analysis of inorganic lead by EPA Method 6020 (ICP Metals). Two of the soil samples with the highest lead concentration were analyzed for lead following the toxicity characteristic leaching procedure (TCLP) extraction by EPA Method 1311. Soil samples included one background sample and two field duplicate samples for quality control.

2.6 TCLP Leachability Testing

A surface sample was collected at Boring 1G, located near the center of the backstop to represent a "worst-case" lead level. This soil was split into two separate samples, identified as *1162-022803-1GSA* and *1162-022803-1GSB*. Sample *1162-022803-1GSA* was representative of the surface soils and materials visible on the backstop, including spent bullets, lead fragments, and spent casings. Sample *1162-022803-1GSA* was analyzed for total lead and TCLP lead. No attempt was made to segregate visible lead fragments from the soils submitted for analysis. Soils consisted of medium brown, silty sand fill with visible spent bullets, lead fragments, and spent casings. Sample *1162-022803-1GSB*, from which the bullets and visible lead fragments had been removed, was submitted for both TCLP lead and total lead testing.

2.7 Grain Size Analysis

Grain-size distribution analysis (ASTM Method C 136) were performed on sample *1162-022803-1GSB*. Soils that passed through a #4 sieve (0.187-inch opening) were retained for analysis of total and TCLP lead. These soils consisted of medium brown, silty sand fill with no visible lead fragments or particles.

Additionally, grain size analysis was performed on samples collected from 1 to 1.5 feet in Boring 1G, from 0.5 to 1 foot in Boring 3E, and from 0 to 0.5 feet from Boring 3G.

2.8 Groundwater Sample Collection and Analysis

On March 3, 2003, we installed three temporary well points for the collection of groundwater samples to evaluate lead groundwater concentrations. Well points WP-1 through WP-3 were located inside the shooting range as shown in Figure 1. The well points were constructed of 1.25-inch inside diameter (ID) steel with a 2-foot screened interval and a 0.006-inch slot size. The well points were driven with our drill rig to a depth of 8 feet bgs (just under the water table).

The depth to groundwater was measured using a decontaminated electronic water level meter, and ranged from 6.09 to 6.36 feet bgs. The well points were purged prior to sampling until the water temperature stabilized and the water ran clear (about 2 gallons from each). Purge water was discharged to the ground surface. Water samples were collected from the well point with a peristaltic pump. Samples were collected into laboratory-supplied acidified sample containers. Samples for dissolved lead were field-filtered; samples for total lead were not filtered. A new 0.45 µm in-line filter was used for each sample. A new well point was used for each sample location. Following sampling, the well points were removed from the ground and the holes backfilled.

A background water sample was also collected at a location selected by FIA for comparison. Monitoring well MW-1 is located about 750 feet north of the backstop and is one of three monitoring wells installed for groundwater monitoring at the fire training pit. The monitoring well was purged (3 gallons) and sampled with the peristaltic pump using the procedures described above.

The water samples were submitted to SGS for laboratory analysis following EPA Method 6020 for total and dissolved lead. A duplicate water sample was collected from WP-2. Well point and monitoring well locations are shown in Figure 1.

3.0 RESULTS AND DISCUSSION

3.1 Site Conditions

About 1 to 2 feet of snow covered the berms. The berms were sparsely vegetated with alder, rose bushes, and other brush. Soils encountered in the berms and floor were silty sand. No significant organic matter was encountered. Seasonal frost was about 5.5 feet deep. Groundwater was not encountered in the soil borings. The depth to groundwater was measured at about 6 feet bgs in the well points. Soil boring samples are described in Appendix A. Spent bullets and casings were visible in highest concentration in the backstop and the area closest to the backstop. The two snow piles resulting from plowing the range floor were both about 40 feet in diameter and 10 to 15 high. The piles likely contain bullets and bullet fragments that had collected this winter. The lead concentrations in or under these piles were not evaluated.

Interpretation of planimetric drawings suggests that in 1992 about 10 feet of fill material were placed on the berms. We attempted to locate the original berm surface with soil borings. Samples were collected as deep as 15 feet into the berm. Visible bullet fragments were only observed as deep as 1 foot. Soil characteristics did not change significantly with depth, and field screening results were not elevated. Refer to Figure 3 for a generalized cross section of the backstop showing original berm locations inferred from planimetric mapping, as well as boring penetration depths.

The planimetric drawings suggest about 8 feet was added to the face of the backstop near the south end and about 20 feet near the north end. The cross section (Figure 3) suggests Boring 1C and 1G penetrated the original backstop; however, based on observations of soil conditions and field screening and analytical results, the old backstop surface was not encountered. Alternately, the old backstop was not contaminated with lead and had the same characteristics (soil type) as the material placed over it. Field screening should be done during the excavation to determine the presence of lead, and allowances should be made for potential additional contaminated soil.

3.2 Field Screening Results

The XRF lead field-screening results ranged from less than the detection limit (about 50 ppm) at the northwest end of the shooting range to as high as 17,300 ppm at the surface of the backstop. Lead field-screening results for the surface soil samples are depicted in Figure 2. Field screening results for the subsurface samples are shown in Table 2. The SUNEX report is included in Appendix B.

3.3 Soil Sample Analytical Results

The analytical results for total lead in the soil samples ranged from not above the laboratory's Practical Quantitation Limit (PQL) to as high as 53,400 mg/kg. The highest concentrations were reported at the surface soils from the backstop and on the range floor in front of the backstop. Soil sample results are summarized in Table 1. The SGS Analytical reports are included in Appendix C.

Field screening results were compared to analytical results for the same sample to determine the correlation. In general, field screening results greater than 500 ppm indicated lead results above about 1,000 mg/kg, between 150 and 500 ppm suggested lead results of between 400 and 1,000 mg/kg, and less than 150 ppm suggested lead results less than 400 mg/kg.

Following the evaluation of results, we requested the analysis of two additional samples from boring E8, from 6 feet and 10 feet bgs, since the sample at 8 feet was 1,320 mg/kg, not correlating with the field screening result. Also, reanalysis of sample *1162-022703-1E8* was performed, since the original result (1,320 mg/kg) appeared anomalous compared to its field screening result and the analytical result of the 4-foot sample. The second result for this sample is more congruous with field screening results. While the original result has not been rejected, the second result was used to estimate depth of contamination.

The background soil sample *1162-022803-BKG* was collected at a depth of 2.5 feet bgs along the roadside approximately 700 feet northwest of the backstop (Figure 1). The soils were undisturbed, silty, sandy gravel and contained no visible lead bullets or fragments. The analytical result for this sample was 22.5 mg/kg. The geometric mean of lead concentrations in Alaska soils is 12 mg/kg with a geometric deviation of 1.74 mg/kg. The observed range of lead concentrations is less than 4 to 310 mg/kg (USGS). The lead concentration in background soil sample *1162-022803-BKG* was greater than the geometric mean and within the observed range.

3.4 TCLP Results

The TCLP lead level in sample *1162-022803-1GSA*, which contained lead particles and bullets, was less than the PQL. For comparison, the total lead concentration in *1162-022803-1GSA* was 53,400 mg/kg. The TCLP lead concentration in sample *1162-022803-1GSB*, from which the obvious large lead particles were removed, was 606 mg/L. This concentration exceeds the TCLP regulatory level of 5.0 mg/L. This suggests that more lead could be leached from the fine soil particles than the coarser fractions. TCLP results and total lead concentrations for the sample splits are summarized in Table 3.

3.5 Grain Size Distribution Analysis

A grain-size distribution test was run on *1162-022803-1GSB*, the surface sample collected from the backstop at 1G. The individual size fractions were examined, and it was determined that bullets and bullet fragments were retained on the $^1/_2$-inch to #4 sieve (with a 0.187-inch opening). Metal particles (bullets and bullet fragments) represented 54 percent of the total weight of this sample. Gradation tests of the sample from 1 to 1.5 feet in Boring 1G indicated that metal particles were in the same size range as the corresponding surface sample, but represented only 14 percent of the total sample weight. Grain-size results from the samples collected at 0 to 0.5 foot in Boring 3G, and at 0.5 to 1 foot in 3E, indicate the samples were silty sand with no visible bullet fragments. Both borings are on the shooting range floor near the backstop. Grain-size distribution results are included in Appendix D.

3.6 Groundwater Sample Analytical Results

Total lead was reported in the samples from well points WP-1, WP-2, and WP-3 at 15.3 µg/L, 7.18 µg/L, and 1.96 µg/L, respectively. The duplicate sample from WP-2 contained 7.11 µg/L total lead. Dissolved lead was not reported above its PQL in any of the water samples.

The background water sample from MW-1 contained 3.22 µg/L total lead. The lead concentration in the sample from WP-3 was less than this level. Groundwater at WP-3 has not been affected by lead. Analytical results indicate the groundwater at WP-1 and, to a lesser degree, WP-2 have been affected by lead contamination in the backstop. The extent of groundwater contamination appears limited. Lead levels in the underlying groundwater should be verified through additional sampling. If elevated lead levels are confirmed, regular groundwater monitoring will likely be warranted following removal or treatment of lead-affected soil to evaluate its change over time.

Groundwater analytical results are summarized in Table 4.

3.7 Quality Control

Field quality control (QC) procedures for this project included the analysis of three duplicate sample pairs. The QC samples were analyzed in order to assess the precision of the laboratory's analytical procedures and the potential for cross-contamination during storage and handling.

The duplicate samples were analyzed to evaluate error associated with sampling and laboratory variability. Field duplicate precision can be expressed as a relative percent difference (RPD)

between duplicates if both samples contain analytes above their PQL. Duplicate soil samples *1162-022703-1ESA* and *1162-022703-1ESB* were collected from the ground surface at soil boring 1E; their RPD was 44 percent. Samples *1162-022803-1G2A* and *1162-022803-1G2B* were collected from a depth of 2 feet bgs in soil boring 2G; their RPD was 105 percent. Samples *1162-030303-WP2* and *1162-030303-WP4* were collected from temporary well point WP-2. The RPD for total lead between these samples was 1 percent.

Laboratory QC included procedures outlined in SGS's ADEC-approved standard operating procedures documentation. As presented in the laboratory report's QC data package summary sheets (Appendix C), the majority of the laboratory QC parameters fell within SGS's acceptable limits.

According to the laboratory, the few deviations from the QC goals did not affect the data. Temperatures of the sample coolers were acceptable, and all samples were analyzed within holding time. Lead PQLs were not above the cleanup levels. The data are considered acceptable for the purposes of this study.

4.0 SOIL VOLUME CALCULATIONS

4.1 Bullet Penetration Assessment and Depth of Lead-Affected Soils

Visible bullets and bullet fragments appear to have only penetrated the backstop about 1 foot. Using the field screening and laboratory results, the depth of soils affected by lead above the two cleanup levels was approximated. From the Row 1 results, the backstop soils contain lead above the 1,000 mg/kg cleanup level to a depth of about 2.5 feet. At Row 2, lead above 1,000 mg/kg cleanup level is estimated to be 1.5 feet deep. The upper 6 inches of soil in Rows 3 through 8 were estimated to exceed the cleanup level.

The depth of soil exceeding the more stringent, residential cleanup level was estimated at about 4 feet in the backstop. Depths of contamination are similar to those for the 1,000 mg/kg cleanup level, except that a greater area exceed the 400 mg/kg cleanup level, and Row 10 was also affected.

4.2 Volume of Soil Exceeding Cleanup Levels

The in-place volume of contaminated soil was calculated by multiplying the estimated depth of contamination by a representative area in each row. All soil volumes are presented as "in-place," and the unit weight of the silty sandy soil was assumed to be approximately 1.5 tons per cubic yard. The volume of soil exceeding 1,000 mg/kg was estimated at about 670 cubic yards or 1,000 tons. The volume of soil exceeding 400 mg/kg lead was estimated at about 1,050 cubic yards or 1,575 tons. Supporting calculations are presented in Tables 5 and 6.

Our calculations were based on a limited number of soil borings. Generalizations for penetration depth were made across the width of the backstop, as well as along a row of the sampling grid. Actual penetration/contamination depths are likely shallower.

5.0 REMEDIAL ALTERNATIVES

5.1 Remedial Action Technologies

Various treatment technologies for lead-contaminated soil are described in the following sections.

5.1.1 Limited Action

As opposed to "No Action," the Limited Action alternative would combine groundwater monitoring with institutional controls such as fencing to control access to the shooting range. This alternative would prevent additional lead to be released to the soil through shooting, as well as human exposure to lead-containing soil. Limited action would not prevent the lead from leaching into groundwater or dispersal of lead as airborne particles.

5.1.2 Lead Reclamation and Soil Reuse in Firing Range

This alternative utilizes the regulatory interpretation that reclaimed and recycled spent bullets are not subject to RCRA. The reuse of processed range soil for construction material for a new backstop on the site is also not subject to RCRA. This presumes that construction of a new range on the site is feasible and desired. Methods of lead removal include dry screening and soil washing. The following points are presented in *Best Management Practices For Lead At Outdoor Shooting Ranges* (EPA 2001).

- "Removal contractors or reclaimers should apply standard best management practices, mentioned in this manual, to separate the lead from soil. The soil, if then placed back on the range, is exempt from RCRA. However, if the soil is to be removed off-site, then it would require testing to determine if it is a RCRA hazardous waste."

- "Lead, if recycled or reused, is considered a scrap metal and is, therefore, excluded from RCRA."

- "Collected lead shot and bullets are excluded from RCRA regulation, and need not have a manifest, nor does a range need to obtain a RCRA generator number (i.e., the range is not a hazardous waste "generator"), provided that the lead is recycled or re-used. The reclaimer does not need to be a RCRA transporter. However, it is recommended that ranges retain records of shipments of lead to the receiving facilities in order to demonstrate that the lead was recycled....The range should be aware that it ultimately may be responsible for the lead sent for reclamation. Therefore, only reputable reclaimers should be utilized."

- "The above RCRA discussion applies to both operating and non-operating ranges. The application of (best management plans)...may not preclude the need for remediation as appropriate, and as required by individual states' regulations when a range is permanently closed and or abandoned or the land use changes and may result in potential exposure to soil containing lead."

This approach does not address soils that exceed the ADEC soil cleanup level for total lead. However it is possible that removal of the lead fragments from the backstop soils may reduce the total lead concentrations in the soil to below ADEC cleanup level, particularly if a "mining-based" sampling approach (see ITRC, 2003) is utilized to obtain more representative total lead analytical results.

5.1.3 Landfilling

The most basic approach for closing firing ranges is excavation and transport of the soil to an appropriate landfill for disposal. Testing to confirm whether the soil is RCRA hazardous using the TCLP method is necessary. If lead concentrations exceed the TCLP regulatory level (5.0 mg/L), the soil is then considered hazardous and must be managed as a hazardous waste. In addition, if soil contains live rounds it can be considered characteristically hazardous (based on reactivity). Remediation may generate both hazardous and nonhazardous wastes and require landfills for both types.

This technology has the advantage of relatively short-term implementation. However, without treatment, soil that exceeds the TCLP will always have the characteristics of a hazardous waste. Hazardous waste transport and disposal will require manifesting.

The treatment technologies described in the following sections have been implemented on other firing ranges. These technologies may reduce liability, since the soil will no longer have hazardous waste characteristics.

5.1.4 Soil Washing/Particle Separation

The soil washing process uses mineral processing methods to recover particulate lead as a refined "product." In the soil-washing technology, spent bullets and bullet fragments are physically separated through solids-separation technology and refined. The recovered lead has a commercial salvage value. If necessary, the remaining soil is treated with an appropriate secondary technology.

Under 40 CFR 261.1(c)(6), the recovered metal is considered "scrap metal" and classified as a "recyclable material," which is not regulated or manifested. Prior to treatment, live rounds should be segregated from the soil. The soil washing process is dust-free. The treated soil is suitable for reuse in a new shooting range on the site. Alternately, the treated soil can be reused for restoration following closure of the site. Public perception of soil washing has been positive. This alternative has the benefit of recycling the lead as a product. The time required for treatment is short, and long-term environmental monitoring is not required. The relative costs for this technology on a per-ton basis are primarily dependent on the volume of soil requiring treatment.

Other factors affecting costs are soil cleanup standards, soil characteristics, availability and costs of utilities, and requirements for sampling and treatability studies. Factors affecting cost and performance of soil washing/physical separation are presented in further detail in *Implementation Guidance Handbook: Physical Leaching To Process Small-Arms Range Soils* (Battelle, 1997).

5.1.5 Chemical Extraction

If soil washing alone does not reduce lead concentrations in the soil to acceptable levels, chemical extraction can be utilized. After particulate lead removal, a leachant is added to the water used in the physical separation process to promote the dissolution of residual metals into solution. Hydrochloric acid, which is most often used for chemical extraction of lead, lowers the pH of the fluid and solubilizes the metals from the soil. The metals precipitated out of solution are dewatered for subsequent recycling. The treated, leached soil is separated, rinsed, and dewatered for reuse.

Chemical extraction is a proven technology when combined with soil washing. Soil characteristics affecting cost include soil pH and amount of silt, organics, iron, and manganese. Refer to Battelle (1997) for a detailed presentation of factors affecting cost and performance of acid leaching. A treatability study is required to optimize the technology.

"Physical separation and acid leaching provide long-term effectiveness by recovering much of the lead and returning it to commercial use. Conventional alternatives, such as (solidification/-stabilization) treatment or disposal, rely on chemical and physical containment to immobilize the metals. Both of these containment methods have demonstrated effectiveness over periods of years or decades, but effectiveness beyond this time frame cannot be predicted" (Battelle, 1997).

5.1.6 Solidification/Stabilization

Through stabilization/solidification processes the hazardous characteristic of soils are changed prior to long-term management. These processes can also control the solubility of metals in soil to protect groundwater. Stabilization/solidification describes several processes.

Solidification generally refers to reducing waste permeability and surface area, therefore reducing leaching of the contaminant. Cement and cement-based mixtures are the most common solidification agents. Solidification can be performed *in situ* or *ex situ* to produce a block of waste that can be left on the site or landfilled.

In stabilization, the reagents added to the contaminated soil form less soluble compounds while controlling pH in a range of minimum solubility. Because less soluble compounds are formed, stabilized waste is often considered more protective of groundwater. Stabilization followed by landfilling is the most common treatment for lead-contaminated soils. Common stabilizing agents include phosphates, sulfates, hydroxides, and carbonates. Recent studies have shown phosphate amendment to be a preferred method of stabilizing lead-impacted wastes (FRTR, 2003).

Ex situ solidification/stabilization processes are among the most mature remediation technologies (FRTR, 2003). Environmental conditions may affect the long-term immobility of lead. Some processes may result in a significant volume increase.

5.1.7 Asphalt Encapsulation

"Asphalt-based emulsions have been used extensively in the commercial construction industry to stabilize soils for dust control, thereby minimizing their mechanical migration through wind or water erosion. These same emulsions have been modified (and the modifications patented) to encapsulate heavy metals, rendering them resistant to leaching to groundwater and creating a material that reduces infiltration and is resistant to wind and water erosive forces.

In July 2000, USEPA issued a determination that use of encapsulation technologies qualifies as recycling for RCRA characteristic wastes, in that permanent chemical bonding is achieved in a commercially useable end product. Treated soils exhibit increased soil strength and can be used as an asphalt base material. The technology is especially applicable for lead contamination. The emulsions can be mixed into the soil and/or applied topically.

The objective of the technology is to provide permanent encapsulation of contaminated soils, where the resultant treated soil exhibits reduced leachability of the contaminant, reduced permeability of the soil surface, and increased soil strength to withstand wind and water erosion. In most cases, the end product can be used as a nonhazardous construction material, road base, or structural fills. On military firing ranges, the soil can be topically treated or, in the absence of UXO, mixed and compacted. Resultant compacted treated soils typically exhibit high strength and low permeability characteristics.

The objective of site-specific demonstration testing would be to refine emulsion designs for specific application sites, evaluate and compare application methods, and implement rigorous postapplication monitoring to evaluate key performance data. Proposed testing would also evaluate the technology's efficacy on residual explosives in soil.

This patented technology includes improvements over other stabilization technologies. Most previous stabilization technologies do not exhibit 'permanent' treatment and are subject to loss of effectiveness under changing physical or chemical (pH) conditions. Additionally, most stabilization technologies do not work well on a range of inorganic and organic contaminants.

Once soil-specific emulsion design testing is completed, implementation of this technology in the field can be done with normal road construction equipment and crews" (ITRC, 2003).

5.2 Remedial Action Alternatives and Estimated Costs

A range of potential remediation action alternatives is presented in the following sections. For each alternative, a planning-level cost estimate is provided in Table 7. The following table summarizes the anticipated tasks and concerns associated with each described alternative.

Requirements	Alternative 1: Limited Action	Alternative 2: Lead Reclamation, Range Soil Reuse	Alternative 3: Hazardous Waste Landfilling	Alternative 4: Soil Washing/ Particle Separation	Alternative 5: Acid Extraction	Alternative 6: Solidification/ Stabilization (ex situ)	Alternative 7: Asphalt Encapsulation
Agency notification/ coordination	X		X	X	X	X	X
Fencing of shooting range	X						
Treatability study				X	X	X	X
Hazardous waste transport/disposal			X				
Contaminated soil transport/disposal			X				
Soil handling		X	X	X	X	X	X
Excavation monitoring		X	X	X	X	X	X
Verification sampling			X	X	X	X	X
On site treatment		X		X	X	X	X
RCRA requirements			X	X	X	X	X
Groundwater monitoring		X	X	X		X	X
Reporting	X	X	X	X	X	X	X
Site restrictions	X						
Soil contamination remaining	X	X					

The following sources were used for cost information: the FRTR website, case studies presented in *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges* (ITRC, 2003), and local vendors (BESCORP and Philip Services).

5.2.1 Alternative 1: Limited Action

Our estimate of probable costs for Limited Action at the site is approximately $74,500. Estimated costs are for fencing and securing the site. This alternative includes installation of three monitoring wells and annual groundwater monitoring for lead for a period of 10 years. Components include routine groundwater monitoring of upgradient and downgradient monitoring wells, routine inspection of site conditions, agency coordination and project management, establishing deed restrictions as institutional controls, and plat recording with a description of materials left in place. A summary of our estimated costs is presented in Table 7

5.2.2 Alternative 2: Lead Reclamation and Range Soil Reuse for Firing Range

If construction of a new shooting range at the Fairbanks International Airport is feasible, reuse of the existing range soil should be considered. If the range soils are reused and the range

is closed, access to the area would presumably be limited, due to its location at the end of a runway. Paving of the area may also occur.

For this alternative, we have assumed that the soil from the berms would be reused on a new, active range on ADOT/PF controlled property. We also assumed that removal of spent bullets by dry screening the backstop soil would be sufficient to recover the lead from the soil at a concentration suitable for recycling. The spent bullets can be accepted by local scrap metal recyclers.

We have assumed that lead reclamation could be performed by a general contractor with appropriate lead awareness training, and utilizing health and safety procedures to avoid exposure to elevated levels of airborne lead.

The following additional assumptions were made:

- Only the backstop soils containing bullets would be processed. At a minimum, processing of the soil in the upper foot of the backstop by dry sieving could physically accomplish removal of spent bullets.
- The bullet-laden soil volume is estimated to be on the order of 100 cubic yards in place (15-foot backstop height by 200-foot width by 1-foot depth of bullet penetration), and as much as 150 cy excavated.
- Soil handling, processing, and transport to the new range area could be performed using a front-end loader, vibratory screen/classifier, and a dump truck, respectively.
- Verification sampling would not be required, though reporting is included.
- Transport distance of the screened soil is within the limits of the FIA property, or about one mile.
- Estimated costs for this alternative do not include construction of a new firing range.
- A local recycler would accept the sieved material.

The remaining range soil, including that portion of the backstop not containing bullets, would be transported for reuse to construct a new shooting range. This soil may exceed the ADEC soil cleanup level for lead. Total costs for lead reclamation from the backstop soil, and transport to a new range area on site were estimated at $79,400.

5.2.3 Alternative 3: Landfilling as Hazardous Waste, Contaminated Soil

Landfilling of the contaminated soil would include excavation of the bullets, lead particles, and soil that exceed the TCLP limit. No physical or chemical treatment to remove lead from this soil would be performed prior to its transport to a permitted hazardous waste landfill for disposal. Transport to and disposal costs for hazardous waste landfill in Arlington, Oregon are included.

Soil that exceeds the ADEC soil cleanup level for lead would be excavated and transported for disposal at a permitted solid waste landfill. The FNSB Solid Waste landfill would not accept "polluted" soils for disposal; transport to a landfill in the Lower 48 is assumed. Costs for a total of 1,000 tons of soil (including both "hazardous waste" and "nonhazardous waste") are estimated at $541,400.

5.2.4 Alternative 4: Soil Washing/Particle Separation

According to Brice Environmental Services Corporation (BESCORP), a range of estimated costs to implement their soil washing/particle separation treatment system at the site is $100 to $800 per ton, which would include cost components such as a treatability study as well as lead recycling. We have added additional costs for project management, agency coordination, monitoring well installation, and groundwater monitoring. For the estimated soil volume based on a 1,000 mg/kg cleanup level, the approximated costs range from $148,000 to $848,000.

5.2.5 Alternative 5: Acid Extraction

Since the requirements for acid extraction technology are highly site-specific, BESCORP would not provide a cost range without the additional information that a treatability study would provide. However, according to this vendor's literature and experience, acid extraction is not cost-competitive for the small volume of lead-containing soil at the site.

5.2.6 Alternative 6: Stabilization/Solidification

Costs for stabilization/solidification were estimated by BESCORP to be an additional $15 to $60 per ton for stabilization of the stated soil volume following their soil washing process. This cost includes treatability studies, lead recycling, and landfilling of the stabilized soil as a nonhazardous waste. We have added additional costs for project management, agency coordination, monitoring well installation, and groundwater monitoring. For a volume of 1,000 tons, the estimated costs range from $163,000 to $908,000.

5.2.7 Alternative 7: Asphalt Encapsulation

BESCORP estimated an additional $25 to $110 per ton for asphalt emulsion (encapsulation) of the stated soil volumes following their soil washing process (Alternative 4). This cost includes treatability studies, lead recycling, and stockpiling on site for future use as a paving product. For a volume of 1,000 tons, the estimated costs range from $173,000 to $958,000.

6.0 LIMITATIONS

Report Limitations

The conclusions we have presented in this report are based on the sampling and analysis that we performed. They should not be construed as a guarantee of the soil or groundwater quality at the site. Our sampling was intended to confirm the presence or absence of selected contaminants at the sampled locations. It is possible that our subsurface tests do not represent the highest levels of contamination. In addition, conclusions cannot be drawn on the presence or absence of contaminants for which laboratory analyses were not run. As a result, the analysis and sampling performed can only provide you with our judgment as to the environmental characteristics of the site, and in no way guarantees that an agency or its staff will reach the same conclusions.

Changes in site conditions can occur with time because of natural forces or human activity. The data presented in this report should be considered representative only of the time the data were collected. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

Use of Documents

This report was prepared for the exclusive use of the Fairbanks International Airport and its agents for assessment in accordance with our scope of work. If it is made available to others, it should be for information on factual data only and not as a warranty of described conditions, such as those interpreted from the discussions of subsurface conditions included in this report.

All documents prepared by Shannon & Wilson are instruments of service with respect to the project for the sole use of the client. Only our client shall have the right to rely upon such documents.

Such documents are not intended or represented to be suitable for reuse by the client, or others, after the passage of time, on extensions of the project, or on any other project. Any such reuse without written verification or adaptation by Shannon & Wilson, as appropriate for the specific purpose intended, shall be at user's sole risk.

7.0 REFERENCES

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TABLE 1
Summary of Soil Sample Analytical and Field Screening Results
FIA Shooting Range, Fairbanks, Alaska

Sample Number	Sample Location		Total Lead (mg/kg)	Field Screening Result (ppm)	Notes
	Boring	Depth (ft.)			
1162-022803-1C6	1C	6	63.4	62	No visible lead or fragments
1162-022803-1C8	1C	8	99.1	93	No visible lead or fragments
1162-022803-1C10	1C	10	81.6	76	No visible lead or fragments
1162-030303-1C15	1C	15	17.5	<60	No visible lead or fragments
*1162-022703-1ESA**	1E	0	48,800	17,300	Visible shell casing, spent bullets
*1162-022703-1ESB**	1E	0	31,100	17,300	Visible shell casing, spent bullets
1162-022703-1E1	1E	1	6,610	1200	No visible lead or fragments
1162-022703-1E2	1E	2	1,680	624	No visible lead or fragments
1162-022703-1E4	1E	4	938	476	No visible lead or fragments
1162-022703-1E6	1E	6	439	<96	No visible lead or fragments
1162-022703-1E8	1E	8	1,320	128	No visible lead or fragments
1162-022703-1E8	1E	8	360	128	(Reanalysis of sample)
1162-022703-1E10	1E	10	35	85	No visible lead or fragments
1162-022803-1GSA	1G	0	53,400	6,900	Visible shell casing, spent bullets
*1162-022803-1G2A**	1G	2	1,600	546	No visible lead or fragments
*1162-022803-1G2B**	1G	2	5,150	546	No visible lead or fragments
1162-022803-1G3	1G	3	666	204	No visible lead or fragments
1162-022803-1G4	1G	4	431	87	No visible lead or fragments
1162-022803-1G6	1G	6	231	96	No visible lead or fragments
1162-022803-1G10	1G	10	83.6	112	No visible lead or fragments
1162-022703-2F0.5	2F	0.5	11,500	7,760	Visible spent bullets and fragments
1162-022703-2F1	2F	1	995	1,270	Visible fragments
1162-022803-2I3	2I	3	215	183	No visible lead or fragments
1162-022803-3K1	3K	1	11.2	<55	No visible lead or fragments
1162-022803-4JS	4J	0	351	7,260	Visible shell casing, spent bullets
1162-022803-6L8	6L	8	10.9	<58	No visible lead or fragments
1162-022803-10F0.5	10F	0.5	7.64	<57	No visible lead or fragments
1162-022803-BKG	background	2.5	23	<54	No visible lead or fragments

Note:

* Field duplicate samples

TABLE 2
Lead Field Screening Results for Soil Boring Samples (ppm)
FIA Shooting Range, Fairbanks, Alaska

Sample Depth (ft.)	Soil Boring									
	1C	1E	1G	2F	2I	3E	3K	4J	6L	10F
0	7,510	17,300	6,900	13,800	268	7,040	384	7,260	<54	376
0.5	–	10,600	–	7,760	–	<53	–	<58	–	<57
1	<64	1,200	<67	1,270	<52	<54	<55	<57	<60	<56
2	<60	624	546	459	78	<55	<60	<54	<61	<55
3	<62	144	204	60	183	<57	<57	<54	<58	<60
4	<62	476	87	<54	68	–	<57	–	<61	–
6	62	<96	96	–	89	–	<61	–	<55	–
8	93	128	<66	–	<57	–	<58	–	<58	–
10	76	85	112	–	<60	–	<54	–	<55	–
12	<62	–	–	–	–	–	–	–	–	–
13.5	<56	–	–	–	–	–	–	–	–	–
15	<60	–	–	–	–	–	–	–	–	–

Note:

– No sample collected

TABLE 3
Summary of Soil Sample TCLP and Total Lead Results
FIA Shooting Range, Fairbanks, Alaska

Sample Number	Location		TCLP Lead (mg/L)	Total Lead (mg/kg)	Notes
	Boring	Depth (ft.)			
1162-022803-1GSA	1G	0	<0.500	53,400	No lead particle removal prior to analysis
1162-022803-1GSB	1G	0	606	54,600	Lead particles removed prior to analysis

TABLE 4
Summary of Groundwater Sample Analytical Results
FIA Shooting Range, Fairbanks, Alaska

Sample Number	Location	Depth to groundwater (ft.)	Total Lead (ug/L)	Dissolved Lead (ug/L)
1162-030303-MW1	MW-1	6.14	3.22	<0.400
1162-030303-WP1	WP-1	6.09	15.3	<0.400
*1162-030303-WP2**	WP-2	6.36	7.18	<0.400
1162-030303-WP3	WP-3	6.32	1.96	<0.400
*1162-030303-WP4**	WP-2	6.36	7.11	<0.400

Notes:

* Field duplicate samples

Sample reports have an A or B designation at the end of each sample number; A indicates a sample analyzed for total lead, B indicates a field-filtered sample analyzed for dissolved lead.

TABLE 5
Soil Volume Calculations for 1,000 mg/kg Cleanup Level
FIA Shooting Range, Fairbanks, Alaska

Row	Average Depth of Contamination (ft)	Representative Area	Row Volume (cf)	Row Volume (cy)
1	2.5	15' x 200'	7,500	278
2	1.5	20' x 180'	5,400	200
3	0.5	20' x 180'	1,800	67
4	0.5	30' x 160'	2,400	89
6	0.5	30' x 40'	600	22
8	0.5	20' x 40'	400	15
			GRAND TOTAL (cy)	670
			GRAND TOTAL (tons)	1,006

TABLE 6
Soil Volume Calculations for 400 mg/kg Cleanup Level
FIA Shooting Range, Fairbanks, Alaska

Row	Average Depth of Contamination (ft)	Representative Area	Row Volume (cf)	Row Volume (cy)
1	4	15' x 200'	12,000	444
2	1.5	20' x 180'	5,400	200
3	0.5	20' x 180'	1,800	67
4	0.5	30' x 200'	3,000	111
6	0.5	30' x 150'	2,250	83
8	0.5	40' x 70'	1,400	52
10	0.5	60' x 80'	2,400	89
			GRAND TOTAL (cy)	1,046
			GRAND TOTAL (tons)	1,569

TABLE 7
Estimated Costs Calculations
FIA Shooting Range, Fairbanks, Alaska

Alternative 1: Limited Action

Task/Item	Unit Cost unit	Cost for 1,000 tons	Comments
Agency coordination/Project management		$15,000	
Fencing of shooting range		$5,000	
Site inspections (10 years)	$500 /yr	$5,000	
Deed restriction/plat recording		$1,500	
Monitoring well installation		$8,000	
Annual groundwater monitoring and reporting (10 years)	$4,000 /yr	$40,000	
Project Total		$74,500	

Alternative 2: Lead Reclamation and Range Soil Reuse for Firing Range

Task/Item	Unit Cost unit	Cost for 110 tons of backstop soil	Comments
Agency coordination/Project management		$15,000	
Mob/setup/demob		$3,000	
Equipment rental (classifier)	$1,000 /day	$2,000	
Loader and operator	$1,200 /day	$2,400	
Dump truck and operator	$500 /day	$1,000	
Excavation monitoring		$1,000	
Handling and transport of reclaimed lead to local recycler		$2,000	
Reporting		$5,000	
Monitoring well installation		$8,000	
Annual groundwater monitoring and reporting (10 years)	$4,000 /yr	$40,000	
Project Total		$79,400	

Alternative 3: Landfilling (hazardous waste, non-hazardous waste)

Task/Item	Unit Cost unit	Cost for 1,000 tons (total)	Comments
(assume 10% of contaminated soil is hazardous waste)			
Agency coordination/Project management		$15,000	
Waste profile		$200	Philip Services
Transport (900 tons non hazardous)	$328 /ton	$295,200	Philip Services
Transport (100 tons hazardous)(per 100 ton railcar)	$18,000 /100 to	$18,000	Philip Services
Treatment and Disposal (900 tons non hazardous waste)	$28 /ton	$28,000	Philip Services
Treatment and Disposal (100 tons hazardous waste)	$100 /ton	$100,000	Philip Services
Manifest and handling		$1,000	Philip Services
Work Plan		$5,000	
Excavation		$10,000	
Field screening		$10,000	
Excavation monitoring		$1,000	
Verification sampling		$5,000	
Reporting		$5,000	
Monitoring well installation		$8,000	
Annual groundwater monitoring and reporting (10 years)	$4,000 /yr	$40,000	
Project Total		$541,400	

TABLE 7
Estimated Costs Calculations
FIA Shooting Range, Fairbanks, Alaska

Alternative 4: Soil Washing/Particle Separation

Task/Item	Unit Cost unit	Cost for 1,000 tons Comments
Estimated total unit costs (includes agency coordination, project management, work plan, treatability study, lead recycling, field screening, reporting)	$ 100 to 800 /ton	$ 100,000 to $ 800,000 BESCORP
Monitoring well installation		$8,000
Annual groundwater monitoring and reporting (10 years)	$4,000 /yr	$40,000
Project Total		$ 148,000 to $ 848,000

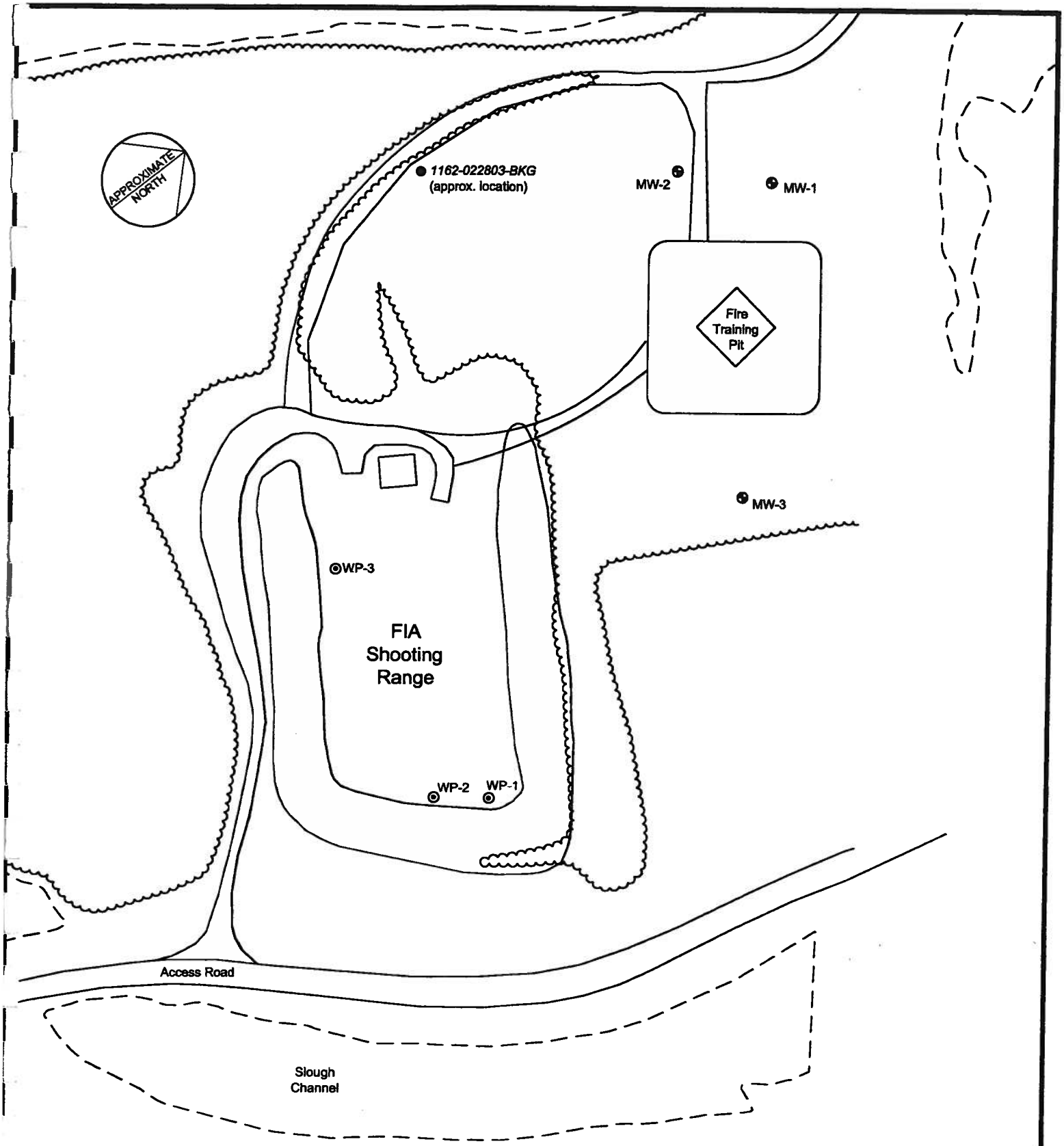
Alternative 5: Acid Extraction
(No costs provided)

Alternative 6: Solidification/Stabilization

Task/Item	Unit Cost unit	Cost for 1,000 tons Comments
Estimated total unit costs (includes agency coordination, project management, work plan, treatability study, lead recycling, field screening, reporting)	$ 115 to 860 /ton	$ 115,000 to $ 860,000 BESCORP
Monitoring well installation		$8,000
Annual groundwater monitoring and reporting (10 years)	$4,000 /yr	$40,000
Project Total		$ 163,000 to $ 908,000

Alternative 7: Asphalt Encapsulation

Task/Item	Unit Cost unit	Cost for 1,000 tons Comments
Estimated total unit costs (includes agency coordination, project management, work plan, treatability study, lead recycling, field screening, reporting)	$ 125 to 910 /ton	$ 125,000 to $ 910,000 BESCORP
Monitoring well installation		$8,000
Annual groundwater monitoring and reporting (10 years)	$4,000 /yr	$40,000
Project Total		$ 173,000 to $ 958,000



LEGEND

WP-2 Temporary Well Point

MW-2 Monitoring Well

Soil Sample

BASEMAP SOURCE: FIA

APPROXIMATE SCALE:

0 75 150 300

1 inch = 150 feet

FIA SHOOTING RANGE
FAIRBANKS, ALASKA

SITE SKETCH

APRIL 2003

31-1-11162-001

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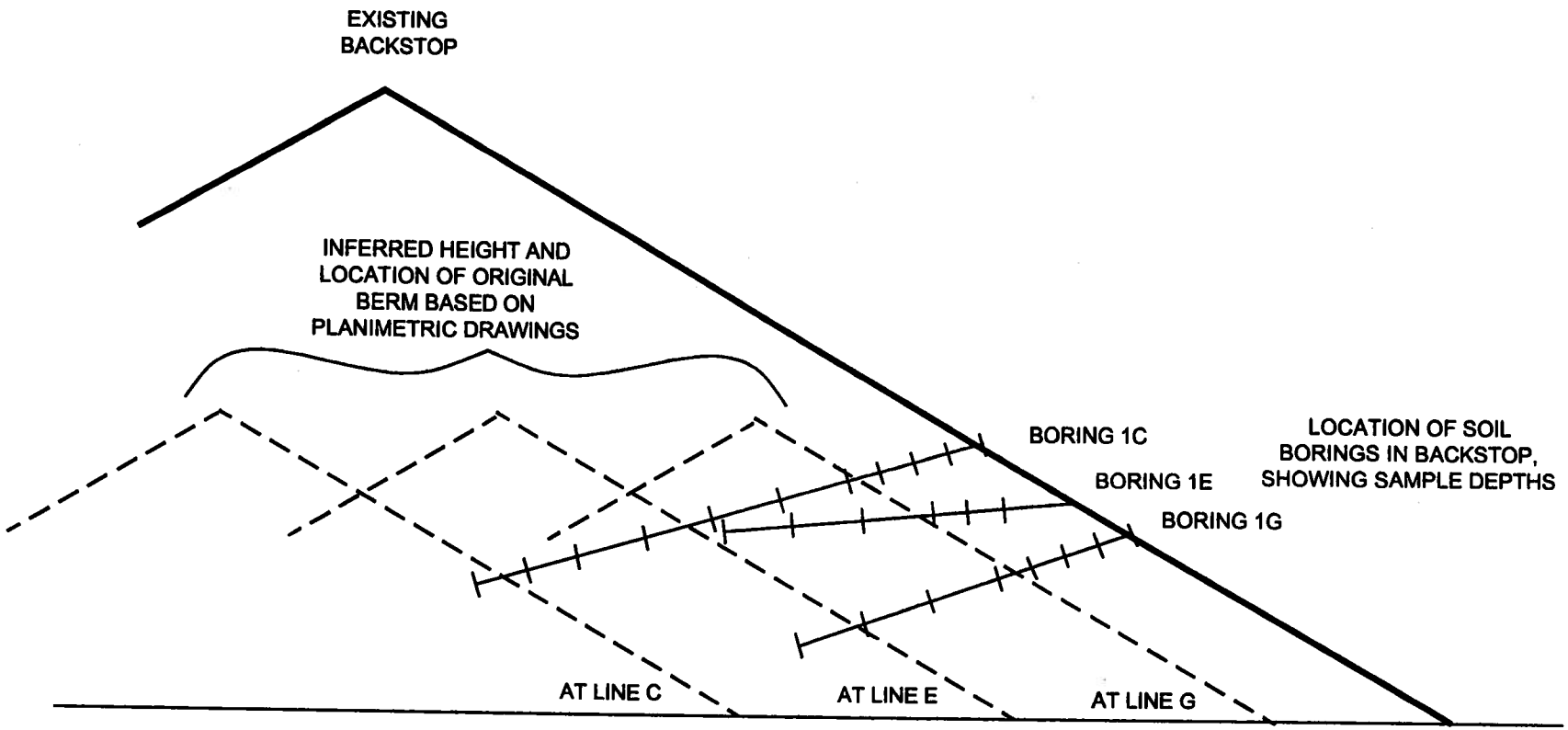
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



APPROXIMATE SCALE:

0 5 10

1 inch = 5 feet

FIA SHOOTING RANGE
FAIRBANKS, ALASKA

BACKSTOP CROSS SECTION

APRIL 2003

31-1-11162-001

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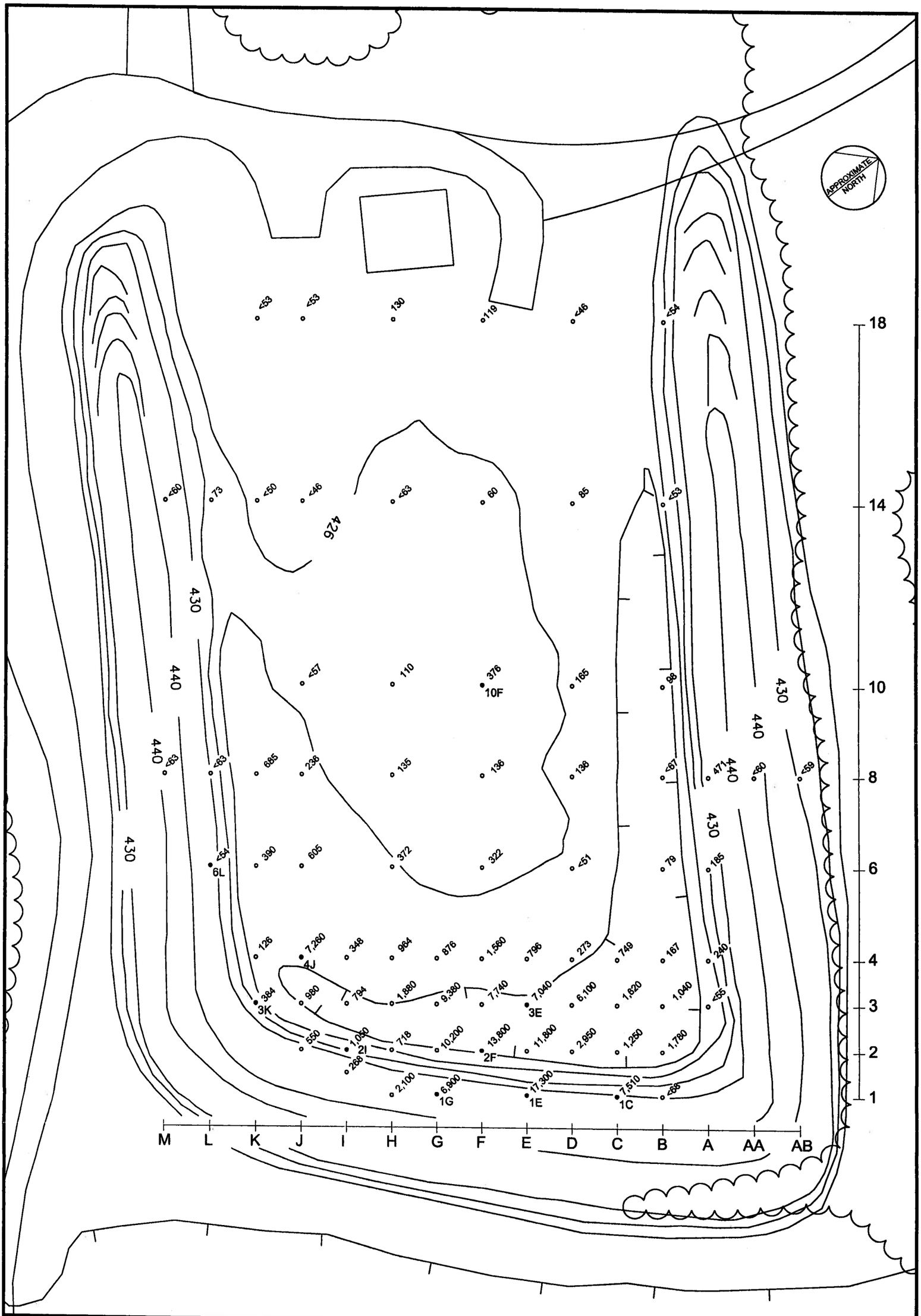
Figure 3



LEGEND

1,560 Lead Field Screening Result (ppm, surface soil)

1E Soil Boring Location

BASEMAP SOURCE: FIA

APPROXIMATE SCALE:

0 10 20 40 80

1 inch = 40 feet

FIA SHOOTING RANGE
FAIRBANKS, ALASKA

SAMPLING GRID AND LEAD FIELD SCREENING RESULTS

APRIL 2003

31-1-11162-001

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Figure 2

APPENDIX A

Description of Soil Boring Samples

Description of Soil Boring Samples
FIA Shooting Range, Fairbanks, Alaska

Sample Depth (ft.)	Soil Boring									
	1C	1E	1G	2F	2I	3E	3K	4J	6L	10F
0	Med. brown silty SAND; frozen; visible bullets, casings, lead fragments	Med. brown silty SAND; frozen; visible bullets, casings, lead fragments	Med. brown silty SAND; frozen; visible bullets, casings, lead fragments	Med. brown silty SAND; frozen; visible bullets, casings, lead fragments	Med. brown silty SAND; frozen; no visible lead or fragments	Med. brown silty SAND; frozen; visible bullets, casings, lead fragments	Med. brown silty SAND; frozen; no visible lead and fragments, broken asphalt pieces were noted in vicinity	Med. brown silty SAND; frozen; visible lead and fragments	Med. brown silty SAND; frozen; organics; no visible lead or fragments	Med. brown silty SAND; frozen; no visible lead or fragments
0.5	–	Med. brown silty SAND; frozen; visible bullets, casings, lead fragments	–	Med. brown silty SAND, trace gravel; frozen; visible bullets, casings, lead fragments	–	Med. brown silty SAND; frozen; visible lead and fragments	–	Med. brown silty SAND; frozen; no visible lead or fragments	–	Med. brown silty SAND; dry; no visible lead or fragments
1	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; visible lead and fragments	Med. brown silty SAND, trace gravel; dry; visible lead and fragments	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown, gravelly silty, fine to coarse SAND; dry; no visible lead and fragments	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; organics; no visible lead or fragments	Med. brown silty SAND; dry; no visible lead or fragments
2	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Light gray SAND; dry; no visible lead or fragments	Med. brown, gravelly silty, fine to coarse SAND; dry; no visible lead and fragments	Med. brown silty SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; organics; no visible lead or fragments	Med. brown silty SAND; dry; no visible lead or fragments
3	Med. brown silty SAND; dry; no visible lead or fragments	Light brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty gravelly SAND; dry; no visible lead or fragments	Light brown SAND, trace silt; dry; no visible lead or fragments	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Gray SAND; dry; no visible lead or fragments	Dark brown silty SAND, trace gravel; dry; no visible lead or fragments	Med. brown SAND; dry; no visible lead or fragments	Med. brown silty SAND; dry; organics; no visible lead or fragments	Gray SAND; dry; no visible lead or fragments
4	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty gravelly SAND; dry; no visible lead or fragments	Light brown SAND, trace silt; moist; no visible lead or fragments	Dark brown silty fine SAND; dry; no visible lead or fragments	–	Dark brown silty SAND, trace gravel; dry; no visible lead or fragments	–	Med. brown silty SAND; dry; organics; no visible lead or fragments	–
5	–	–	–	Light brown silty SAND, trace gravel; wet; no visible lead or fragments	–	–	–	–	–	–
6	Less dense med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty gravelly SAND; dry; no visible lead or fragments	–	Dark brown silty fine SAND; dry; no visible lead or fragments	–	Light-med. Brown silty SAND; dry; no visible lead or fragments	–	Very dense, dark brown sandy SILT, trace gravel; moist; no visible lead or fragments	–
8	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty SAND, trace gravel; dry; no visible lead or fragments	Less dense, light brown silty gravelly SAND; dry; no visible lead or fragments	–	Less dense, dark brown silty fine SAND; dry; no visible lead or fragments	–	Less dense, mottled med. brown coarse SAND and light brown fine SAND; dry; no visible lead or fragments	–	Very dense, dark brown sandy SILT, trace gravel; moist; no visible lead or fragments	–
10	Med. brown silty SAND, trace gravel; dry; no visible lead or fragments	Light brown silty SAND, trace gravel; dry; no visible lead or fragments	Less dense, light brown silty gravelly SAND; dry; no visible lead or fragments	–	Less dense, dark brown silty fine SAND; moist; no visible lead or fragments	–	Less dense, med. brown silty SAND; dry; organics and wood fragments; no visible lead or lead fragments	–	Very dense, dark brown sandy SILT; dry; no visible lead or fragments	–
12	Med. brown silty fine SAND, trace gravel; dry; no visible lead or fragments	–	–	–	–	–	–	–	–	–
13.5	Med. brown silty fine SAND, trace gravel; dry; no visible lead or fragments	–	–	–	–	–	–	–	–	–
15	Med. brown silty fine SAND, trace gravel; dry; no visible lead or fragments	–	–	–	–	–	–	–	–	–

Note:

– No sample collected

APPENDIX B

SUNEX Analytical Report

SUNEX Inc.

FIA Shooting Range Site Assessment
Lead in Soil by Field Portable XRF

for

Shannon & Wilson, Inc.
2055 Hill Road
Fairbanks, AK 99709-5244

April 02, 2003

Niton® state-of-the-art XRF technology
121 Trinidad Drive Fairbanks, AK 99709-2902
907-457-5478 phone 907-457-5479 fax
email sunex@ptialaska.net

Table of Contents

Appendices

1.0 Introduction

SUNEX, Inc. was retained by Shannon & Wilson, Inc. to provide field X-Ray fluorescence (XRF) analytical services for the FIA Shooting Range Site Assessment Project at the Fairbanks International Airport shooting range, Alaska.

Reference is made to Shannon & Wilson, Inc. Project Number 31-1-11162, response to RFP #368-3-1-26, for a description of the project.

2.0 Description

SUNEX provided both in-situ and ex-situ XRF field screening for lead in soil for this project.

2.1 In-Situ Field Screening for Lead in Soil

In-situ XRF lead in soil analyses were done on February 27 & 28, 2003 by James H. Johnson, to assess surface lead values at this site.

2.2 Ex-Situ Field Screening for Lead in Soil

Ex-situ XRF lead in soil analyses were done on February 27 & 28, and April 02, 2003 to assess sub-surface lead values. Ex-situ samples were collected from auger drill flights by Andrea Carlson of Shannon & Wilson, Inc.

3.0 Method

Reference is made to the Project Understanding and Scope of Services for this project for general information about the field sampling methods and procedure used for the XRF lead in soil screen. XRF analyses were done with a NITON 703A field portable XRF Spectrum Analyzer, SNU882NR3842, in accordance with the manufacturer's instructions and EPA Method 6200. Both in-situ surface and ex-situ sub-surface samples were analyzed throughout the day on February 27 and 28, 2003. Three ex-situ samples from auger drill hole C-1 were analyzed on April 02, 2003. A silica blank and a NIST certified soil sample were analyzed at the beginning and end of the day, and at an interval of every one or two hours during the day to provide quality control checks.

3.1 In-Situ Field Screening for Lead in Soil

The FIA Shooting Range is a rectangular area about 200 feet wide by 340 feet long, surrounded on one end and both sides by a backstop berm about

15 feet high and 50 feet wide at its base. Prior to sampling, most of the snow had been removed from the floor of the range, but the backstops were covered by one to two feet of snow.

Surface sample sites for in-situ testing were prepared by Jim Johnson of SUNEX and Andrea Carlson, Environmental Specialist with Shannon & Wilson. A grid with lines approximately twenty feet apart was established with a chain and visual control. Grid sampling density was highest near the end of the range adjacent to the backstop, where the highest concentration of spent bullets was expected to be found. A total of 76 surface sample sites were tested.

For individual sample sites, an area of about one square foot was cleared with hand tools down to bare frozen soil. Snow, ice and vegetation were removed. Each site was visually inspected for the presence of spent bullets and casings, and analyzed for lead in-situ by XRF. Where spent bullets were noted, an effort was made to not take the XRF reading directly on a piece of visible lead.

Reference is made to the final assessment report by Shannon & Wilson for a drawing of the location of the surface sample sites.

3.2 *Ex-Situ Field Screening for Lead in Soil*

Ex-situ XRF analyses were made on 64 sub-surface samples from 10 auger drill holes (ADH) within the firing range and backstop, and on one sub-surface background sample from an auger drill hole outside the assessment area. In addition, four replicate tests were made on two ex-situ samples to assess analytical variability.

Samples for ex-situ testing were collected by Andrea Carlson into one quart or one gallon plastic bags. Enough sample was collected into each bag to assure sufficient depth of material, nominally ½", for XRF analysis. Since plastic film does not significantly attenuate the useful XRF energy, the ex-situ samples were tested directly in the plastic bags, in accordance with manufacturer's recommendations and established field practice.

Reference is made to the final assessment report by Shannon & Wilson for a drawing of the location of the auger drill sites.

4.0 XRF Data

A copy of the field data forms for soil sampling is attached in Appendix A, Field Data.

Analytical data for lead in soil screening is presented in Table 1, XRF Analytical Data, in Appendix B, Tables.

Sample results along with visual determinations of spent bullets and casings, are summarized in Table 2, Soil Sample Results, in Appendix B, Tables. The data is organized by surface in-situ and sub-surface ex-situ samples.

Table 3, Replicate Sample Results, in Appendix B, Tables, summarizes the results of replicate analyses of two bulk samples.

4.1 XRF Data Quality

All silica blank values were below the projected XRF detection limit of 65 ppm lead. The back ground ex-situ sample result was <57 ppm lead, below the detection limit of 65 ppm. Calibration check sample results ranged between 0.2 – 5.3 relative percent deviation (RPD), within the project goal of 20%.

The results of the replicate analyses are shown in Table 3, Ex-Situ Replicates, in Appendix B, Tables. The average value for the four samples from Sample Site G-3, Surface – 6", is 358 ppm lead and the standard deviation is 253 ppm. For Sample Site G-1, 1'- 1.5', the average is 534 with a standard deviation of 84 ppm. The results show significantly higher variability for surface samples, where the greatest amount of particulate lead is expected. The average value of the replicates at G-1, 1'- 1.5', 534 ppm lead, correlates well with 546 ppm lead, the value of auger drill hole (ADH) G-1, 2'.

5.0 Results

5.1 In-Situ Field Screening for Lead in Soil

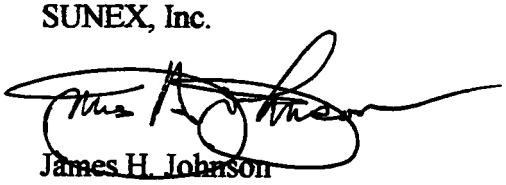
The results of the visual examination and XRF analysis of surface soil samples are summarized in Table 2, Soil Sample Results, in Appendix B, Tables. The highest values are on or near the backstop at the East end of the range. Much of the surface of the range within the study area contains visible casings and spent bullets. Spent shotgun shell wads or broken clay birds were observed at six sample locations.

5.2 Ex-Situ Field Screening for Lead in Soil

The results of the XRF analysis of sub-surface soil samples are summarized in Table 2, Soil Sample Results, in Appendix B, Tables.

6.0 Signature

SUNEX, Inc.



James H. Johnson
President

Appendix A, Field Data

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE

Client: SHANNON & WILSON

Date: 2003 FEB 26/27

Sampler: *James H. Johnson*

Sampler's Signature _____

XRF Sample No.	Location	Lead (ppm)	Notes
2	SILICA BLANK	< 39	
3		< 39	AVE 38 x 1.5 = 57 ppm 3σ d.l. 67 < 165 ppm. OK
4		< 37	
5	NIST MEDIUM	1120	
6		1140	AVE 1120 T.V. 1162 ± 31 R.D. 3.6% OK
7		1100	
8	SHUTTER		
9	SILICA BLANK	< 43	OK
10	NIST MEDIUM	1130	T.V. 1162. OK 0900 2003 FEB 27
11	B2	480	CASINGS VISUAL. *
12	~~B3~~ ~~C3~~ C2	1250	CASINGS VISUAL
13	~~B~~ ~~C4~~ D2	2950	CASINGS VISUAL
14	E2	11800	CASINGS & LEAD VISIBLE
15	F2	13800	CASINGS & LEAD VISIBLE
16	G2	10200	CASINGS & LEAD VISIBLE
17	H2	718	CASINGS & BULLETS VISIBLE.
18	I2	1050	CASINGS, WADS
19	J2	488	SNOW, VEGETATION. NO CASINGS / BULLETS ETC VISIBLE.
20	J3	980	CASINGS VISIBLE
21	I3	794	CASINGS VISIBLE

FEB 26 ↑ ↓ FEB 27

* NOTES ON VISIBLE CASINGS BULLETS ETC REFER TO TAKE IMMEDIATE SAMPLE AREA, USUALLY ABOUT 1 ft.²

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE

Date: 2003 FEB 27

Client: HANNUM & WILSON

Sampler: *James H. Johnson*

Sampler's Signature

XRF Sample No.	Location	Lead (ppm)	Notes
22	H3	NULL	ZERO
23	H3	1880	CASINGS & LEAD VISIBLE
24	G3	9380	CASINGS & LEAD VISIBLE
25	F3	7740	CASINGS & LEAD VISIBLE
26	E3	7040	CASINGS & LEAD VISIBLE
27	D3	6100	CASINGS & LEAD VISIBLE
28	C3	1620	CASINGS & LEAD VISIBLE
29	B3	1040	CASINGS & BULLETS VISIBLE
30	A3	<55	NO CASINGS OR ETC VISIBLE.
31	SILICA BLANK	<40	OK
32	NIST MEDIUM	1080	T.V. 1162 OK 1115
33	A4	240	NO CASINGS/ETC VISIBLE.
34	B4	167	CASINGS VISIBLE
35	C4	749	CASINGS & BULLETS VISIBLE
36	D4	273	CASINGS VISIBLE
37	E4	796	CASINGS VISIBLE
38	F4	1560	CASINGS VISIBLE
39	G4	876	CASINGS VISIBLE
40	H4	964	CASINGS VISIBLE
41	I4	348	CASINGS VISIBLE

SUNEX Inc.
Soil Sample Data Form

Project: FIA - SHOOTING RANGE

Client: SHANNON & WILSON

Date: 2003 FEB 27

Sampler's Signature [signature]

Sampler: *James H. Johnson*

3775161 TOWNE?

XRF Sample No.	Location	Lead (ppm)	Notes
42	J4	7260	CASINGS & LEAD VISIBLE
43	K4	126	NO CASINGS ETC VISIBLE
44	K6	390	NO CASINGS ETC. VISIBLE
45	J6	605	CASINGS & LEAD VISIBLE
46	H6	372	CASINGS VISIBLE
47	F6	322	CASINGS VISIBLE
48	D6	<51	NO CASINGS VISIBLE
49	B6	79	NO CASINGS VISIBLE
50	A6	185	NO CASINGS VISIBLE
51	A8	471	NO CASINGS VISIBLE
52	B8	<67	NO CASINGS VISIBLE
53	D8	186	NO CASINGS VISIBLE
54	F8	136	CASINGS VISIBLE
55	H8	135	NO CASINGS VISIBLE.
56	J8	230	CASINGS VISIBLE
57	K8	685	NO CASINGS VISIBLE
58	SILICA BLANK	<40	OK
59	NIST MED	1170	T.V. 1162 OK 1230
100	AA8	<60	1/3 UP N WALL @ HWB. NO CASINGS VISIBLE.
101	ABB	<39	2/3 UP N WALL @ DWB. NO CASINGS VISIBLE

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE

Client: SHANNON & WILSON

Date: 2003 FEB 27

Sampler's Signature [signature]

Sampler: *James H. Johnson*

XRF Sample No.	Location	Lead (ppm)	Notes
62	E(+1)	17300	VISIBLE LEAD, BULLETS. 1/3 UP E WALL @ DRILLHOLE. ALLIED
63	E(+1) 6"	10600	EX SITU.
64	E(+1) 1'	1200	EX SITU
65	E(+1) 2'	624	EX SITU
66	E(+1) 3'	144	EX SITU
67	E(+1) 4'	476	EX SITU
68	E(+1) 5'	284	EX SITU
69	SILICA BLANK	<39	OK
70	NIST MEDIUM	1140	T.V. 1162 OK 1415
71	E(+1) 6'	<96	EX SITU
72	E(+1) 7'	207	EX SITU
73	E(+1) 8'	128	EX SITU
74	E(+1) 9'	140	EX SITU
75	E(+1) 10'	85	EX SITU
76	F2 Ft 6" 1'	12700	EX SITU
77	F2 Ft 6"	7760	EX SITU
78	F2 2'	459	EX SITU
79	F2 3'	60	EX SITU
80	F2 4'	<54	EX SITU
81	F2 5'	114	EX SITU

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE

Date: 2003 FEB 27

Client: SHANNON & WILSON

Sampler: *James H. Johnson*

Sampler's Signature

XRF Sample No.	Location	Lead (ppm)	Notes
82	L8	<63	1/3 UP S BANK. NO VISIBLE CASINGS
83	M8	<63	2/3 UP S BANK. NO VISIBLE CASINGS
84	B10	98	NO VISIBLE CASINGS.
85	D10	165	NO VISIBLE CASINGS.
86	F10	376	CASINGS VISIBLE
87	10H	110	GRAVEL. NO CASINGS VISIBLE
88	J10	<57	NO VISIBLE CASINGS
89	SILICA BLANK	<41	OK
90	NIST MED	1170	T.V. = 1162 OK 1610
91	B14	<53	NO VISIBLE CASINGS
92	D14	85	CASINGS VISIBLE
93	F14	60	WADS VISIBLE
94	H14	<63	NO VISIBLE CASINGS.
95	J14	<46	NO VISIBLE CASINGS.
96	K14	<50	NO VISIBLE CASINGS.
97	L14	73	1/3 UP S BANK. NO CASINGS ETC. SOME CLAY BIRDS.
98	M14	<60	2/3 UP S BANK. NO CASINGS ETC. SOME CLAY BIRDS.
99	B18	<54	NO CASINGS VISIBLE.
100	D18	<46	CASINGS VISIBLE
101	F18	119	CASINGS VISIBLE

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE

Client: SHANNON & WILSON

Date: 2003 FEB 27/28

Sampler: *James H. Johnson*

Sampler's Signature _____

XRF Sample No.	Location	Lead (ppm)	Notes
102	H 18	130	CASINGS VISIBLE
103	J 18	<53	CASINGS VISIBLE
104	K 18	<50	CASINGS VISIBLE
105	SILICA BLANK	<36	OK/
106	NIST MID	1120	T.V. 1162. OK/ 1710 1720
107	SHUTTER		
108	SILICA BLANK	<41	OK/
109	NIST MID	1180	T.V. 1162 OK/
110	J4 (DRILL HOLE) 16"	<58	EX SITU 0920
111	J4 1'	<57	"
112	J4 2'	<54	"
113	J4 3'	<54	"
114	C1	7510	BULLETS SWADS VISIBLE
115	A+B1	<68	NO BULLETS CASINGS ETC VISIBLE
116	G1	6900	BULLETS ETC VISIBLE
117	H1	2100	BULLETS ETC VISIBLE
118	I2	268	NO BULLETS VISIBLE
119	J2	350	NO BULLETS VISIBLE
120	K3	384	BULLETS, WADS VISIBLE
121	L6	<54	NO BULLETS ETC VISIBLE

SUNEX Inc.
Soil Sample Data Form

Project: FIA - SHOOTING RANGE

Date: 2003FEB28

Client: _____

Sampler: *James H. Johnson*

Sampler's Signature _____

XRF Sample No.	Location	Lead (ppm)	Notes
122	SILICA BLANK	<42	OK/
123	NIST MED	1150	T.V. 1162 OK/
124	C1 1'	<64	EX SITU 1030
125	C1 2'	<60	"
126	C1 3'	<62	"
127	C1 4'	<62	"
128	C1 6'	62	"
129	C1 8'	93	"
130	C1 10'	76	"
131	G1 1'	<67	EX SITU
132	G1 2'	546	"
133	G1 3'	204	"
134	G1 4'	87	"
135	G1 6'	96	"
136	G1 8'	<66	"
137	G1 10'	112	"
138	SILICA BLANK	<39	OK/
139	NIST MED	1210	T.V. 1162 OK/
140	I2 1'	<52	EX SITU 1145
141	I2 2'	78	"

SUNEX Inc.
Soil Sample Data Form

Project: FIA - SHOOTING RANGE

Client: SHANNON & WILSON

Date: 2003 FEB 28

Sampler: *James H. Johnson*

Sampler's Signature

XRF Sample No.	Location	Lead (ppm)	Notes
142	I2 3'	183	EX SITU
143	I2 4'	68	"
144	I2 6'	89	"
145	I2 8'	<57	"
146	I2 10'	<60	"
147	SILICA BLANK	<40	OK
148	NIST MED	1110	T.V. 1162. OK
149	K3 1'	<55	EX SITU
150	K3 2'	<60	"
151	K3 3'	<57	"
152	K3 4'	<57	"
153	K3 6'	<61	"
154	K3 8'	<58	"
155	K3 10'	<54	"
156	L6 1'	<60	EX SITU
157	L6 2'	<61	"
158	L6 3'	<58	"
159	L6 4'	<61	"
160	L6 6'	<55	"
161	L6 8'	<58	"

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE

Client: SHANNON & WILSON

Date: 2003 FEB 28

Sampler: *James H. Johnson*

Sampler's Signature _____

XRF Sample No.	Location	Lead (ppm)	Notes
162	L6 10'	<55	EX SITU
163	SILICA BLANK	<44	OK/
164	NIST MED	1130	T.V. = 1162 OK/
165	E3 6"	<53	EX SITU 1355
166	E3 6"-1'	<54	"
167	E3 2'	<55	"
168	E3 3'	<57	"
169	F10 6"	<57	EX SITU
170	F10 1'	<56	"
171	F10 2'	<55	"
172	F10 3'	<60	"
173	BACKGROUND	<54	EXSITU
174	G3 SURFACE-6"	649	EXSITU REPLICATE 1
175		99	" REPLICATE 2
176		568	" REPLICATE 3
177		114	" REPLICATE 4
178	G1 VICINITY 1'-1.5'	437	EXSITU REPLICATE 1
179		503	REPLICATE 2
180		527	REPLICATE 3
181		667	REPLICATE 4

SUNEX Inc.
Soil Sample Data Form

Project: FIA SHOOTING RANGE Date: 2003 FEB 28 / APRIL 02

Client: SHANNON & WILSON Sampler: *James H. Johnson*

Sampler's Signature [signature]

XRF Sample No.	Location	Lead (ppm)	Notes
182	SILICA BLANK	<36	OK/
183	NIST MED	1160	T.V. 1162 OK/
622	SILICA BLANK	<41	1525 / 1645 2003 APRIL 02
623	↓	<37	
624		<40	
625	NIST MED	1080	T.V. 1162
626	↓	1280	AVE 1147 OK/
627		1080	
628	ADHC1 12'	<62	
629	ADHC1 13.5'	<56	
630	ADHC1 15'	<60	
631	SILICA BLANK	<41	
632	NIST MED	1160	T.V. 1162 OK/

Appendix B, Tables

TABLE 1, XRF Analytical Data

Site: Fairbanks International Airport - Shooting Range
Date: February 26 - 28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

XLNo	Sample Site	Depth	Ssec	Date/Time	Pb ppm	"+/-"	NIST T. V. ppm	RPD %
2	Silica blank		64	2/26/2003 10:03	<39			
3	Silica blank		67	2/26/2003 10:05	<39			
4	Silica blank		64	2/26/2003 10:07	<37			
5	NIST 2711 Med		103	2/26/2003 10:12	1120	79	1162 +/- 31	3.6
6	NIST 2711 Med		64	2/26/2003 10:17	1140	100	1162 +/- 31	1.9
7	NIST 2711 Med		107	2/26/2003 10:20	1100	76	1162 +/- 31	5.3
9	Silica blank		65	2/27/2003 8:53	<43			
10	NIST 2711 Med		64	2/27/2003 8:56	1130	100	1162 +/- 31	2.8
11	B-2	Surface	61	2/27/2003 10:06	1779	100		
12	C-2	Surface	62	2/27/2003 10:12	1250	85		
13	D-2	Surface	64	2/27/2003 10:15	2949	140		
14	E-2	Surface	61	2/27/2003 10:19	11795	470		
15	F-2	Surface	63	2/27/2003 10:22	13798	490		
16	G-2	Surface	61	2/27/2003 10:25	10195	380		
17	H-2	Surface	62	2/27/2003 10:29	718	74		
18	I-2	Surface	64	2/27/2003 10:32	1050	87		
19	J-2	Surface	67	2/27/2003 10:36	488	61		
20	J-3	Surface	63	2/27/2003 10:39	980	68		
21	I-3	Surface	67	2/27/2003 10:42	794	76		
23	H-3	Surface	61	2/27/2003 10:47	1880	100		
24	G-3	Surface	63	2/27/2003 10:49	9376	320		
25	F-3	Surface	63	2/27/2003 10:53	7738	300		
26	E-3	Surface	61	2/27/2003 10:55	7040	270		
27	D-3	Surface	61	2/27/2003 10:58	6099	240		
28	C-3	Surface	61	2/27/2003 11:01	1620	100		
29	B-3	Surface	62	2/27/2003 11:04	1040	84		
30	A-3	Surface	62	2/27/2003 11:07	<55			
31	Silica blank		62	2/27/2003 11:11	<40			
32	NIST 2711 Med		64	2/27/2003 11:13	1080	99	1162 +/- 31	7.1
33	A-4	Surface	62	2/27/2003 11:17	240	50		
34	B-4	Surface	62	2/27/2003 11:20	167	41		
35	C-4	Surface	61	2/27/2003 11:23	749	62		
36	D-4	Surface	62	2/27/2003 11:26	273	51		
37	E-4	Surface	62	2/27/2003 11:28	796	76		
38	F-4	Surface	62	2/27/2003 11:32	1560	100		
39	G-4	Surface	62	2/27/2003 11:35	876	77		
40	H-4	Surface	63	2/27/2003 11:38	964	66		
41	I-4	Surface	64	2/27/2003 11:40	348	56		
42	J-4	Surface	63	2/27/2003 11:44	7264	260		
43	K-4	Surface	64	2/27/2003 11:47	126	37		
44	K-6	Surface	64	2/27/2003 11:51	391	51		
45	J-6	Surface	64	2/27/2003 11:54	605	65		
46	H-6	Surface	64	2/27/2003 11:57	372	47		

TABLE 1, XRF Analytical Data

Site: Fairbanks International Airport - Shooting Range
Date: February 26 - 28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

XLNo	Sample Site	Depth	Ssec	Date/Time	Pb ppm	"+/-"	NIST T. V. ppm	RPD %
47	F-6	Surface	64	2/27/2003 11:59	322	52		
48	D-6	Surface	67	2/27/2003 12:05	<51			
49	B-6	Surface	64	2/27/2003 12:07	79	38		
50	A-6	Surface	60	2/27/2003 12:10	185	55		
51	A-8	Surface	62	2/27/2003 12:13	471	62		
52	B-8	Surface	67	2/27/2003 12:16	<57			
53	D-8	Surface	62	2/27/2003 12:18	136	40		
54	F-8	Surface	62	2/27/2003 12:20	136	49		
55	H-8	Surface	64	2/27/2003 12:23	135	40		
56	J-8	Surface	64	2/27/2003 12:25	236	41		
57	K-8	Surface	62	2/27/2003 12:28	685	68		
58	Silica blank		62	2/27/2003 12:31	<40			
59	NIST 2711 Med		64	2/27/2003 12:34	1170	100	1162 +/- 31	0.7
60	AA-8	Surface	62	2/27/2003 12:58	<60			
61	AB-8	Surface	64	2/27/2003 13:01	<59			
62	ADH E-1	Surface	63	2/27/2003 13:09	17293	710		
63	ADH E-1	6"	61	2/27/2003 13:52	10598	430		
64	ADH E-1	1'	67	2/27/2003 13:57	1200	95		
65	ADH E-1	2'	64	2/27/2003 14:00	624	74		
66	ADH E-1	3'	65	2/27/2003 14:03	144	51		
67	ADH E-1	4'	62	2/27/2003 14:05	476	68		
68	ADH E-1	5'	62	2/27/2003 14:08	284	59		
69	Silica blank		62	2/27/2003 14:13	<39			
70	NIST 2711 Med		62	2/27/2003 14:15	1140	100	1162 +/- 31	1.9
71	ADH E-1	6'	68	2/27/2003 14:45	<96			
72	ADH E-1	7'	62	2/27/2003 14:49	207	54		
73	ADH E-1	8'	62	2/27/2003 14:51	128	48		
74	ADH E-1	9'	62	2/27/2003 14:54	140	48		
75	ADH E-1	10'	62	2/27/2003 14:56	85	46		
76	ADH F-2	1'	62	2/27/2003 15:15	1270	97		
77	ADH F-2	6"	67	2/27/2003 15:20	7757	280		
78	ADH F-2	2'	62	2/27/2003 15:31	459	63		
79	ADH F-2	3'	62	2/27/2003 15:33	60	39		
80	ADH F-2	4'	64	2/27/2003 15:36	<54			
81	ADH F-2	5'	62	2/27/2003 15:38	114	44		
82	L-8	Surface	62	2/27/2003 15:47	<63			
83	M-8	Surface	68	2/27/2003 15:49	<63			
84	B-10	Surface	62	2/27/2003 15:53	98	40		
85	D-10	Surface	63	2/27/2003 15:57	165	51		
86	F-10	Surface	64	2/27/2003 15:59	376	58		
87	H-10	Surface	69	2/27/2003 16:02	110	44		
88	J-10	Surface	65	2/27/2003 16:06	<57			
89	Silica blank		64	2/27/2003 16:10	<41			

TABLE 1, XRF Analytical Data

Site: Fairbanks International Airport - Shooting Range
Date: February 26 - 28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

XLNo	Sample Site	Depth	Ssec	Date/Time	Pb ppm	"+/-"	NIST T. V. ppm	RPD %
90	NIST 2711 Med		69	2/27/2003 16:12	1170	100	1162 +/- 31	0.7
91	B-14	Surface	64	2/27/2003 16:16	<53			
92	D-14	Surface	64	2/27/2003 16:20	85	37		
93	F-14	Surface	64	2/27/2003 16:22	60	34		
94	H-14	Surface	62	2/27/2003 16:25	<63			
95	J-14	Surface	74	2/27/2003 16:27	<46			
96	K-14	Surface	64	2/27/2003 16:31	<50			
97	L-14	Surface	64	2/27/2003 16:34	73	44		
98	M-14	Surface	69	2/27/2003 16:38	<60			
99	B-18	Surface	65	2/27/2003 16:41	<54			
100	D-18	Surface	62	2/27/2003 16:45	<46			
101	F-18	Surface	64	2/27/2003 16:47	119	42		
102	H-18	Surface	64	2/27/2003 16:50	130	43		
103	J-18	Surface	62	2/27/2003 16:53	<53			
104	K-18	Surface	64	2/27/2003 16:55	<50			
105	Silica blank		64	2/27/2003 17:08	<36			
106	NIST 2711 Med		66	2/27/2003 17:10	1120	100	1162 +/- 31	3.6
108	Silica blank		62	2/28/2003 9:15	<41			
109	NIST 2711 Med		62	2/28/2003 9:17	1180	100	1162 +/- 31	1.9
110	ADH J-4	6"	64	2/28/2003 9:21	<58			
111	ADH J-4	1'	64	2/28/2003 9:25	<57			
112	ADH J-4	2'	62	2/28/2003 9:28	<54			
113	ADH J-4	3'	64	2/28/2003 9:31	<54			
114	C-1	Surface	61	2/28/2003 9:35	7507	300		
115	B-1	Surface	62	2/28/2003 9:42	<68			
116	G-1	Surface	62	2/28/2003 9:46	6899	330		
117	H-1	Surface	62	2/28/2003 9:51	2099	130		
118	I-2	Surface	64	2/28/2003 9:56	268	59		
119	J-2	Surface	67	2/28/2003 10:03	550	70		
120	K-3	Surface	62	2/28/2003 10:11	384	68		
121	L-6	Surface	64	2/28/2003 10:18	<54			
122	Silica blank		64	2/28/2003 10:25	<42			
123	NIST 2711 Med		62	2/28/2003 10:27	1150	100	1162 +/- 31	1.0
124	ADH C-1	1'	64	2/28/2003 10:33	<64			
125	ADH C-1	2'	64	2/28/2003 10:36	<60			
126	ADH C-1	3'	67	2/28/2003 10:40	<62			
127	ADH C-1	4'	64	2/28/2003 10:42	<62			
128	ADH C-1	6'	69	2/28/2003 10:46	62	40		
129	ADH C-1	8'	62	2/28/2003 10:49	94	46		
130	ADH C-1	10'	62	2/28/2003 10:53	76	45		
131	ADH G-1	1'	62	2/28/2003 11:14	<67			
132	ADH G-1	2'	62	2/28/2003 11:18	546	73		
133	ADH G-1	3'	62	2/28/2003 11:21	204	54		

TABLE 1, XRF Analytical Data

Site: Fairbanks International Airport - Shooting Range
Date: February 26 - 28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

XLNo	Sample Site	Depth	Ssec	Date/Time	Pb ppm	"+/-"	NIST T. V. ppm	RPD %
134	ADH G-1	4'	62	2/28/2003 11:24	87	49		
135	ADH G-1	6'	64	2/28/2003 11:27	96	48		
136	ADH G-1	8'	64	2/28/2003 11:30	<66			
137	ADH G-1	10'	85	2/28/2003 11:33	112	40		
138	Silica blank		64	2/28/2003 11:42	<39			
139	NIST 2711 Med		67	2/28/2003 11:44	1210	100	1162 +/- 31	4.1
140	ADH I-2	1'	71	2/28/2003 11:55	<52			
141	ADH I-2	2'	64	2/28/2003 12:03	78			
142	ADH I-2	3'	69	2/28/2003 12:06	183	49		
143	ADH I-2	4'	67	2/28/2003 12:10	69	43		
144	ADH I-2	6'	64	2/28/2003 12:13	89	46		
145	ADH I-2	8'	62	2/28/2003 12:16	<57			
146	ADH I-2	10'	62	2/28/2003 12:20	<60			
147	Silica blank		64	2/28/2003 12:28	<40			
148	NIST 2711 Med		64	2/28/2003 12:30	1110	100	1162 +/- 31	4.5
149	ADH K-3	1'	62	2/28/2003 13:06	<55			
150	ADH K-3	2'	64	2/28/2003 13:08	<60			
151	ADH K-3	3'	64	2/28/2003 13:11	<57			
152	ADH K-3	4'	64	2/28/2003 13:13	<57			
153	ADH K-3	6'	64	2/28/2003 13:16	<61			
154	ADH K-3	8'	64	2/28/2003 13:18	<58			
155	ADH K-3	10'	62	2/28/2003 13:20	<54			
156	ADH L-6	1'	64	2/28/2003 13:29	<60			
157	ADH L-6	2'	64	2/28/2003 13:32	<61			
158	ADH L-6	3'	64	2/28/2003 13:34	<58			
159	ADH L-6	4'	64	2/28/2003 13:36	<61			
160	ADH L-6	6'	64	2/28/2003 13:41	<55			
161	ADH L-6	8'	62	2/28/2003 13:45	<58			
162	ADH L-6	10'	64	2/28/2003 13:48	<55			
163	Silica blank		62	2/28/2003 13:52	<44			
164	NIST 2711 Med		62	2/28/2003 13:54	1130	100	1162 +/- 31	2.8
165	ADH E-3	6"	64	2/28/2003 14:34	<53			
166	ADH E-3	6"-1'	64	2/28/2003 14:36	<54			
167	ADH E-3	2'	67	2/28/2003 14:39	<55			
168	ADH E-3	3'	64	2/28/2003 14:41	<57			
169	ADH F-10	6"	67	2/28/2003 14:45	<57			
170	ADH F-10	1'	71	2/28/2003 14:52	<56			
171	ADH F-10	2'	62	2/28/2003 14:54	<55			
172	ADH F-10	3'	65	2/28/2003 14:57	<60			
173	Back Ground	2'	64	2/28/2003 15:01	<54			
174	G-3 Replicate 1	Surface-6"	64	2/28/2003 15:04	649	72		
175	G-3 Replicate 2	Surface-6"	78	2/28/2003 15:06	99	40		
176	G-3 Replicate 3	Surface-6"	62	2/28/2003 15:09	568	66		

TABLE 1, XRF Analytical Data

Site: Fairbanks International Airport - Shooting Range
Date: February 26 - 28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

XLNo	Sample Site	Depth	Ssec	Date/Time	Pb ppm	"+/-"	NIST T. V. ppm	RPD %
177	G-3 Replicate 4	Surface-6"	69	2/28/2003 15:11	114	42		
178	G-1 Replicate 1	1' - 1.5'	62	2/28/2003 15:14	437	66		
179	G-1 Replicate 2	1' - 1.5'	64	2/28/2003 15:16	503	70		
180	G-1 Replicate 3	1' - 1.5'	64	2/28/2003 15:18	527	69		
181	G-1 Replicate 4	1' - 1.5'	64	2/28/2003 15:22	667	75		
182	Silica blank		71	2/28/2003 15:25	<36	36		
183	NIST 2711 Med		64	2/28/2003 15:28	1160	100	1162 +/- 31	0.2
622	Silica blank		62	4/2/2003 15:30	<41			
623	Silica blank		62	4/2/2003 15:33	<37			
624	Silica blank		64	4/2/2003 15:35	<40			
625	NIST 2711 Med		62	4/2/2003 1537	1080	100	1162 +/- 31	7.1
626	NIST 2711 Med		64	4/2/2003 15:39	1280	110	1162 +/- 31	10.2
627	NIST 2711 Med		64	4/2/2003 15:42	1100	99	1162 +/- 31	5.3
628	ADH C-1	12'	64	4/2/2003 16:01	<62			
629	ADH C-1	13.5'	64	4/2/2003 16:04	<56			
630	ADH C-1	15'	66	4/2/2003 16:06	<60			
631	Silica blank		64	4/2/2003 16:09	<41			
632	NIST 2711 Med		64	4/2/2003 16:11	1160	100	1162 +/- 31	0.2

Silica Blank Ave.	<40	
NIST 2711 Ave.	1144	
Ave. Deviation		3.4

ADH stands for auger drill hole.

TABLE 2, Soil Sample Results

Site: Fairbanks International Airport - Shooting Range
Date: February 26 -28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

Sample Site	Type	Depth	Pb, ppm	Notes
B-2	In-situ	Surface	1779	Visible shell casings
C-2	In-situ	Surface	1250	Visible shell casings
D-2	In-situ	Surface	2949	Visible shell casings
E-2	In-situ	Surface	11795	Visible shell casings, spent bullets
F-2	In-situ	Surface	13798	Visible shell casings, spent bullets
G-2	In-situ	Surface	10195	Visible shell casings, spent bullets
H-2	In-situ	Surface	718	Visible shell casings, spent bullets
I-2	In-situ	Surface	1050	Visible shell casings, wads
J-2	In-situ	Surface	488	No visible shell casings, spent bullets
J-3	In-situ	Surface	980	Visible shell casings
I-3	In-situ	Surface	794	Visible shell casings
H-3	In-situ	Surface	1880	Visible shell casings, spent bullets
G-3	In-situ	Surface	9376	Visible shell casings, spent bullets
F-3	In-situ	Surface	7738	Visible shell casings, spent bullets
E-3	In-situ	Surface	7040	Visible shell casings, spent bullets
D-3	In-situ	Surface	6099	Visible shell casings, spent bullets
C-3	In-situ	Surface	1620	Visible shell casings, spent bullets
B-3	In-situ	Surface	1040	Visible shell casings, spent bullets
A-3	In-situ	Surface	<55	No visible shell casings, spent bullets
A-4	In-situ	Surface	240	No visible shell casings, spent bullets
B-4	In-situ	Surface	167	Visible shell casings
C-4	In-situ	Surface	749	Visible shell casings, spent bullets
D-4	In-situ	Surface	273	Visible shell casings
E-4	In-situ	Surface	796	Visible shell casings
F-4	In-situ	Surface	1560	Visible shell casings
G-4	In-situ	Surface	876	Visible shell casings
H-4	In-situ	Surface	964	Visible shell casings
I-4	In-situ	Surface	348	Visible shell casings
J-4	In-situ	Surface	7264	Visible shell casings, spent bullets
K-4	In-situ	Surface	126	No visible shell casings, spent bullets
K-6	In-situ	Surface	391	No visible shell casings, spent bullets
J-6	In-situ	Surface	605	Visible shell casings, spent bullets
H-6	In-situ	Surface	372	Visible shell casings
F-6	In-situ	Surface	322	Visible shell casings
D-6	In-situ	Surface	<51	No visible shell casings, spent bullets
B-6	In-situ	Surface	79	No visible shell casings, spent bullets
A-6	In-situ	Surface	185	No visible shell casings, spent bullets
A-8	In-situ	Surface	471	No visible shell casings, spent bullets
B-8	In-situ	Surface	<57	No visible shell casings, spent bullets
D-8	In-situ	Surface	136	No visible shell casings, spent bullets
F-8	In-situ	Surface	136	Visible shell casings
H-8	In-situ	Surface	135	No visible shell casings, spent bullets
J-8	In-situ	Surface	236	Visible shell casings

TABLE 2, Soil Sample Results

Site: Fairbanks International Airport - Shooting Range
Date: February 26 -28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

Sample Site	Type	Depth	Pb, ppm	Notes
K-8	In-situ	Surface	685	No visible shell casings, spent bullets
AA-8	In-situ	Surface	<60	No visible shell casings, spent bullets
AB-8	In-situ	Surface	<59	No visible shell casings, spent bullets
L-8	In-situ	Surface	<63	No visible shell casings, spent bullets
M-8	In-situ	Surface	<63	No visible shell casings, spent bullets
B-10	In-situ	Surface	98	No visible shell casings, spent bullets
D-10	In-situ	Surface	165	No visible shell casings, spent bullets
F-10	In-situ	Surface	376	Visible shell casings
H-10	In-situ	Surface	110	No visible shell casings, spent bullets
J-10	In-situ	Surface	<57	No visible shell casings, spent bullets
B-14	In-situ	Surface	<53	No visible shell casings, spent bullets
D-14	In-situ	Surface	85	Visible shell casings
F-14	In-situ	Surface	60	Visible wads
H-14	In-situ	Surface	<63	No visible shell casings, spent bullets
J-14	In-situ	Surface	<46	No visible shell casings, spent bullets
K-14	In-situ	Surface	<50	No visible shell casings, spent bullets
L-14	In-situ	Surface	73	Spent clay birds visible, no shells or bullets
M-14	In-situ	Surface	<60	Spent clay birds visible, no shells or bullets
B-18	In-situ	Surface	<54	No visible shell casings, spent bullets
D-18	In-situ	Surface	<46	Visible shell casings
F-18	In-situ	Surface	119	Visible shell casings
H-18	In-situ	Surface	130	Visible shell casings
J-18	In-situ	Surface	<53	Visible shell casings
K-18	In-situ	Surface	<50	Visible shell casings
C-1	In-situ	Surface	7507	Visible spent bullets & wads
B-1	In-situ	Surface	<68	No visible shell casings, spent bullets
G-1	In-situ	Surface	6899	Visible shell casings, spent bullets
H-1	In-situ	Surface	2099	Visible shell casings, spent bullets
I-2	In-situ	Surface	268	No visible shell casings, spent bullets
J-2	In-situ	Surface	550	No visible shell casings, spent bullets
K-3	In-situ	Surface	384	Visible spent bullets & wads
L-6	In-situ	Surface	<54	No visible shell casings, spent bullets
ADH E-1	In-situ	Surface	17293	Visible shell casings, spent bullets
ADH E-1	Ex-situ	6"	10598	
ADH E-1	Ex-situ	1'	1200	
ADH E-1	Ex-situ	2'	624	
ADH E-1	Ex-situ	3'	144	
ADH E-1	Ex-situ	4'	476	
ADH E-1	Ex-situ	5'	284	
ADH E-1	Ex-situ	6'	<96	
ADH E-1	Ex-situ	7'	207	
ADH E-1	Ex-situ	8'	128	
ADH E-1	Ex-situ	9'	140	

TABLE 2. Soil Sample Results

Site: Fairbanks International Airport - Shooting Range
Date: February 26 -28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

Sample Site	Type	Depth	Pb, ppm	Notes
ADH E-1	Ex-situ	10'	85	
ADH F-2	Ex-situ	1'	1270	
ADH F-2	Ex-situ	6"	7757	
ADH F-2	Ex-situ	2'	459	
ADH F-2	Ex-situ	3'	60	
ADH F-2	Ex-situ	4'	<54	
ADH F-2	Ex-situ	5'	114	
ADH J-4	Ex-situ	6"	<58	
ADH J-4	Ex-situ	1'	<57	
ADH J-4	Ex-situ	2'	<54	
ADH J-4	Ex-situ	3'	<54	
ADH C-1	Ex-situ	1'	<64	
ADH C-1	Ex-situ	2'	<60	
ADH C-1	Ex-situ	3'	<62	
ADH C-1	Ex-situ	4'	<62	
ADH C-1	Ex-situ	6'	62	
ADH C-1	Ex-situ	8'	94	
ADH C-1	Ex-situ	10'	76	
ADH C-1	Ex-situ	12'	<62	
ADH C-1	Ex-situ	13.5'	<56	
ADH C-1	Ex-situ	15'	<60	
ADH G-1	Ex-situ	1'	<67	
ADH G-1	Ex-situ	2'	546	
ADH G-1	Ex-situ	3'	204	
ADH G-1	Ex-situ	4'	87	
ADH G-1	Ex-situ	6'	96	
ADH G-1	Ex-situ	8'	<66	
ADH G-1	Ex-situ	10'	112	
ADH I-2	Ex-situ	1'	<52	
ADH I-2	Ex-situ	2'	78	
ADH I-2	Ex-situ	3'	183	
ADH I-2	Ex-situ	4'	69	
ADH I-2	Ex-situ	6'	89	
ADH I-2	Ex-situ	8'	<57	
ADH I-2	Ex-situ	10'	<60	
ADH K-3	Ex-situ	1'	<55	
ADH K-3	Ex-situ	2'	<60	
ADH K-3	Ex-situ	3'	<57	
ADH K-3	Ex-situ	4'	<57	
ADH K-3	Ex-situ	6'	<61	
ADH K-3	Ex-situ	8'	<58	
ADH K-3	Ex-situ	10'	<54	
ADH L-6	Ex-situ	1'	<60	

TABLE 2, Soil Sample Results

Site: Fairbanks International Airport - Shooting Range
Date: February 26 -28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

Sample Site	Type	Depth	Pb, ppm	Notes
ADH L-6	Ex-situ	2'	<61	
ADH L-6	Ex-situ	3'	<58	
ADH L-6	Ex-situ	4'	<61	
ADH L-6	Ex-situ	6'	<55	
ADH L-6	Ex-situ	8'	<58	
ADH L-6	Ex-situ	10'	<55	
ADH E-3	Ex-situ	6"	<53	
ADH E-3	Ex-situ	6"-1'	<54	
ADH E-3	Ex-situ	2'	<55	
ADH E-3	Ex-situ	3'	<57	
ADH F-10	Ex-situ	6"	<57	
ADH F-10	Ex-situ	1'	<56	
ADH F-10	Ex-situ	2'	<55	
ADH F-10	Ex-situ	3'	<60	
Backgrnd	Ex-situ	2'	<54	

TABLE 3, Replicate Sample Results

Site: Fairbanks International Airport - Shooting Range
Date: February 26 - 28 & April 02, 2003
Data: Lead in Soil by Field Portable XRF
Instrument: NITON 703A, SNU882NR3842

Sample Site	Depth	Pb, ppm
G-3 Replicate 1	Surface - 6"	649
G-3 Replicate 2	Surface - 6"	99
G-3 Replicate 3	Surface - 6"	568
G-3 Replicate 4	Surface - 6"	114
G-3 Average		358
Standard Dev.		253
G-1 Replicate 1	1' - 1.5'	437
G-1 Replicate 2	1' - 1.5'	503
G-1 Replicate 3	1' - 1.5'	527
G-1 Replicate 4	1' - 1.5'	667
G-1 Average		534
Standard Dev.		84
G-1 Average	1' - 1.5'	534
ADH G-1	2'	546
RPD %		2

APPENDIX C

SGS Analytical Reports

SGS

SGS Environmental Services
Alaska Division
Level I Data Report

Project:	Firing Range Fairbanks Airport
Client:	Shannon & Wilson-Fairbanks
CT&E Work Order:	1030668

Contents:

Note:
Unless otherwise noted, all quality assurance/quality control criteria are in compliance with the proper regulatory authority and/or SGS's Quality Assurance Program Plan.

SGS

Case Narrative

Client	SHANFBK	Shannon & Wilson-Fairbanks	**Printed Date/Time** 3/14/2003 10:18
Workorder	1030668	Firing Range Fairbanks Airport	

Sample ID	**Client Sample ID**

480991 **MS**

EPA 200.8 ICP Metals - MS recovery for Na, Ca, Fe, Mg, K were outside of acceptance criteria. Sample concentration is 4X greater than the spike level.

480992 **MS**

EPA 200.8 ICP Metals - MS recovery for Al was outside of acceptance criteria; post digestion spike was successful.

1030668001 **PS** **1162-030303-MW1A**

EPA 200.8 ICP Metals - MS recovery for Al was outside of acceptance criteria; post digestion spike was successful.

CHAIN OF CUSTODY RECORD

1030668

CT&E Environmental Services Inc.
Laboratory Division

(1)

CLIENT: Shannon & Wilson
CONTACT: David McDowell PHONE NO: 907 479-0600
PROJECT: Firing Range Fairbanks Airport PWSID#:
REPORTS TO: Julie Keener FAX NO: ( )
INVOICE TO: S&W QUOTE#
P.O. NUMBER:

CT&E Reference:

PAGE 1 OF 1

(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No. CONTAINERS	SAMPLE TYPE C=COMP G=GRAB	(3) Preservatives Used: HNO3 HNO3	Analysis Required: TOTAL Pb	DISSOLVED Pb	REMARKS
(1) A	1162-030303-MW1A	030303	2:08	H_2O	1	G		X		
(2) A	1162-030303-MW1B		2:10		1				X	F Filtered
(3) A	1162-030303-WP1A		12:09		1			X		
(4) A	1162-030303-WP1B		12:13		1				X	Field Filtered
(5) A	1162-030303-WP2A		12:38		1			X		
(6) A	1162-030303-WP2B		12:43		1				X	Field Filtered
(7) A	1162-030303-WP3A		1:15		1			X		
(8) A	1162-030303-WP3B		1:18		1				X	Field Filtered
(9) A	1162-030303-WP4A		12:50		1			X		
(10) A	1162-030303-WP4B		12:53		1				X	Field Filtered

(5)

	Date	Time	
Collected/Relinquished By: (1) AE	03/03/03	4:45	Received By: Melody Debenham
Relinquished By: (2) Melody Debenham	3/4/03	430	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	3-5-3	0850	Received For Laboratory By:

(4)

Shipping Carrier: Hand
Shipping Ticket No:

Temperature C: 4.6°C

Data Deliverables: (Level I) Level II Level III EDD Type:

Chain of Custody Seal: (Circle) NA
INTACT BROKEN ABSENT

Requested Turnaround Time and Special Instructions:
Standard

200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
3180 Peger Road Fairbanks, AK 99701 Tel: (907) 474-8656 Fax: (907) 474-9685

SGS

1030668

SAMPLE RECEIPT FORM **CT&E WO#:**

Yes	No	
___	✓	Are samples **RUSH**, priority, or *within 72 hrs.* of **hold time**?
___	NA	If yes have you done *e-mail notification*?
___	✓	Are samples *within 24 hrs.* of **hold time** or **due date**?
___	NA	If yes, have you *spoken with* Supervisor?
___	NA	Archiving bottles – if required, are they properly marked?
___	✓	Are there any **problems**? PM Notified?
✓	___	Were samples preserved correctly and pH verified?
___	✓	If this is for PWS, provide **PWSID.** ___
___	✓	Will courier charges apply?
___	___	Method of payment? ___
✓	___	Data package required? (Level: 1 / 2 / 3)
___	✓	Is this a DOD project? (USACE, Navy, AFCEE) *If yes, complete DOD block below*

Due Date: 3/12/03
Received Date/Time: 3/3/03 @ 4
Received Temperature*:
Thermometer ID: Probe C

Cooler ID	Temp Blank	Cooler Temp
1	4.8°C	4.6°C

*Temperature readings include thermometer correction factors

Delivery method (circle one): Commercial / Client / SGS-CT&E

Additional Sample Remarks

___	Extra Sample Volume?
___	Limited Sample Volume?
✓	Field pres'd for volatiles?
___	Field-filtered for dissolved? ___
___	Lab-filtered for dissolved? ___
___	Ref Lab required? ___

Yes	No	
___	___	Is received temperature 4 ± 2°C?
		Exceptions: ___ Samples/Analyses Affected: ___
___	___	Rad Screen performed? Result: ___
___	___	Was there an airbill? Note #: ___
___	___	Was cooler sealed with custody seals? Fax'd to COE? ___ #/where: ___
___	___	Were seal intact upon arrival?
___	___	Was there a COC with cooler?
___	___	Was the COC filled out properly?
___	___	Did the COC indicate ACOE / AFCEE project? (if applicable)
___	___	Did the COC and samples correspond?
___	___	Were all sample packed to prevent breakage? Packing material: ___
___	___	Were all samples unbroken and clearly labeled?
___	___	Were all samples sealed in separate plastic bags?
___	___	Were all bottles for volatiles free of headspace?
___	___	Were correct container / sample sizes submitted?
___	___	Is sample condition good?

Yes	No	
___	___	Was client notified of problems?

Individual contacted: ___
Date/Time: ___
Phone/Fax: ___
Reason for contact: ___

CT&E Contact: ___

Notes:
Quote 6328

Completed by (sign): Melody Debenham **(print):** Melody Debenham
Login proof (check one): waived ___ required ___ performed by: ___

SGS

SAMPLE RECEIPT FORM (page 2)

CT&E WO#: 1030668

=	Cont. ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8 oz	4 oz	Other	Container Type: AG	CG	HDPE	Nalge	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO3	H2SO4	MeOH	Na2S2O3	NaOH	Other
1	A	1	Lead			1													X						X					
2	A	↓	dissolved lead			1													↓						↓					Field Filtered
3	A		lead			1																								
4	A		diss. lead			1																								Field Filtered
5	A		lead			1																								
6	A		diss. lead			1																								Filtered
7	A		lead			1																								
8	A		dissolved lead			1																								Filtered
9	A		lead			1																								
10	A		diss. lead			1																								Filtered

Bottle Totals	10

CT

Completed by: Melody Deberham Date: 3/4/03

SGS

CT&E WO#: 1030668

SAMPLE RECEIPT FORM FOR TRANSFERS
From
FAIRBANKS, AK OR HONOLULU, HAWAII
To
ANCHORAGE, AK

TO BE COMPLETED IN ANCHORAGE UPON ARRIVAL FROM FAIRBANKS OR HAWAII. NOTES RECORDED BELOW ARE ACTIONS NEEDED UPON ARRIVAL IN ANCHORAGE.

Notes: _____

Receipt Date / Time: 3-5-3 0850

COOLER AND TEMP BLANK READINGS*

Cooler ID	Temp Blank	Cooler	Cooler ID	Temp Blank	Cooler
_____	1.0	1.6	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

CUSTODY SEALS INTACT: YES / NO # / WHERE: 2 front

COMPLETED BY (INITIAL): [signature]

CT&E Environmental Services Inc.
CUSTODY SEAL

Signature: Melody Deberham Date/Tin

Date/Time: 3/4/03 @ 430

CT&E Environmental

Signature: Melody Det

Services Inc.
CUSTODY SEAL

Date/Time: 3/4/03 @ 430

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.sgsenvironmental.com

Julie Keener
Shannon & Wilson-Fairbanks
2355 Hill Road
Fairbanks, AK 99709

Work Order:	1030668
	Firing Range Fairbanks Airport
Client:	Shannon & Wilson-Fairbanks
Report Date:	March 12, 2003

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your SGS Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates an estimated value that falls below PQL, but is greater than the MDL.
J	Indicates an estimated value that falls below PQL, but is greater than the MDL.
B	Indicates the analyte is found in the blank associated with the sample.
*	The analyte has exceeded allowable limits.
GT	Greater Than
D	Secondary Dilution
LT	Less Than
!	Surrogate out of range

SGS

SGS Ref.#	1030668001
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-MW1A
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 14:08
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

EPA 200.8 ICP Metals - MS recovery for Al was outside of acceptance criteria; post digestion spike was successful.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	3.22	0.400	ug/L	EPA 200.8		03/10/03	03/11/03	KGF

SGS

SGS Ref.#	1030668002
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-MW1B
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 14:10
Received Date/Time	03/03/2003 16:45
Technical Director	**Stephen C. Ede**

Released By Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	0.400 U	0.400	ug/L	EPA 200.8 Dissolved		03/03/03	03/11/03	KG

SGS

SGS Ref.#	1030668003
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP1A
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 12:09
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	15.3	0.400	ug/L	EPA 200.8		03/10/03	03/11/03	KGF

SGS

SGS Ref.#	1030668004
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP1B
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 12:13
Received Date/Time	03/03/2003 16:45
Technical Director	**Stephen C. Ede**
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	0.400 U	0.400	ug/L	EPA 200.8 Dissolved		03/03/03	03/11/03	KG

SGS

SGS Ref.#	1030668005
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP2A
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 12:38
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	7.18	0.400	ug/L	EPA 200.8		03/10/03	03/11/03	KGF

SGS

SGS Ref.#	1030668006
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP2B
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 12:43
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	0.400 U	0.400	ug/L	EPA 200.8 Dissolved		03/03/03	03/11/03	KG

SGS

SGS Ref.#	1030668007
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP3A
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 13:15
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	1.96	0.400	ug/L	EPA 200.8		03/10/03	03/11/03	KGF

SGS

SGS Ref.#	1030668008
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP3B
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 13:18
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	0.400 U	0.400	ug/L	EPA 200.8 Dissolved		03/03/03	03/11/03	KC

SGS

SGS Ref.#	1030668009
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP4A
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 12:50
Received Date/Time	03/03/2003 16:45
Technical Director	Stephen C. Ede
Released By	Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	7.11	0.400	ug/L	EPA 200.8		03/10/03	03/11/03	KGF

SGS

SGS Ref.#	1030668010
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	Firing Range Fairbanks Airport
Client Sample ID	1162-030303-WP4B
Matrix	Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/12/2003 11:29
Collected Date/Time	03/03/2003 12:53
Received Date/Time	03/03/2003 16:45
Technical Director	**Stephen C. Ede**

Released By Stephen C. Ede

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals by ICP/MS								
Lead	0.400 U	0.400	ug/L	EPA 200.8 Dissolved		03/03/03	03/11/03	KG

SGS

SGS Ref.#	480989 Method Blank	**Printed Date/Time**	03/14/2003 10:19
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXX 11292
Project Name/#	Firing Range Fairbanks Airport	**Method**	E200.2
Matrix	Water (Surface, Eff., Ground)	**Date**	03/10/2003

QC results affect the following production samples:
1030668001, 1030668003, 1030668005, 1030668007, 1030668009

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Phosphorus	500 U	500	ug/L	03/11/03	KGF

Batch MMS 2410
Method EPA 200.8
Instrument Perkin Elmer Sciex ICP-MS P3

Metals by ICP/MS

Aluminum	20.0 U	20.0	ug/L	03/11/03	KGF
Antimony	1.00 U	1.00	ug/L	03/11/03	KGF
Arsenic	2.00 U	2.00	ug/L	03/11/03	KGF
Barium	3.00 U	3.00	ug/L	03/11/03	KGF
Beryllium	0.400 U	0.400	ug/L	03/11/03	KGF
Cadmium	0.100 U	0.100	ug/L	03/11/03	KGF
Calcium	500 U	500	ug/L	03/11/03	KGF
Chromium	4.00 U	4.00	ug/L	03/11/03	KGF
Cobalt	4.00 U	4.00	ug/L	03/11/03	KGF
Copper	1.00 U	1.00	ug/L	03/11/03	KGF
Iron	250 U	250	ug/L	03/11/03	KGF
Lead	0.400 U	0.400	ug/L	03/11/03	KGF
Magnesium	500 U	500	ug/L	03/11/03	KGF
Manganese	5.00 U	5.00	ug/L	03/11/03	KGF
Molybdenum	10.0 U	10.0	ug/L	03/11/03	KGF
Nickel	5.00 U	5.00	ug/L	03/11/03	KGF
Potassium	500 U	500	ug/L	03/11/03	KGF
Selenium	2.00 U	2.00	ug/L	03/11/03	KGF
Sodium	500 U	500	ug/L	03/11/03	KGF
Zinc	2.00 U	2.00	ug/L	03/11/03	KGF
Silver	1.00 U	1.00	ug/L	03/11/03	KGF
Thallium	0.900 U	0.900	ug/L	03/11/03	KGF

Batch MMS 2410
Method EPA 200.8
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.# 480990 Lab Control Sample

Printed Date/Time 03/14/2003 10:20
Prep Batch MXX 11292
Method E200.2
Date 03/10/2003

Client Name Shannon & Wilson-Fairbanks
Project Name/# Firing Range Fairbanks Airport
Matrix Water (Surface, Eff., Ground)

QC results affect the following production samples:
1030668001, 1030668003, 1030668005, 1030668007, 1030668009

Sample Remarks:
LCS

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Phosphorus	LCS	942	94	(85-115)			1000 ug/L	03/11/03	KGF

Batch MMS 2410
Method EPA 200.8
Instrument Perkin Elmer Sciex ICP-MS P3

Metals by ICP/MS

Aluminum	LCS	940	94	(85-115)			1000 ug/L	03/11/03	KGF
Antimony	LCS	892	89	(85-115)			1000 ug/L	03/11/03	KGF
Arsenic	LCS	965	97	(85-115)			1000 ug/L	03/11/03	KGF
Barium	LCS	921	92	(85-115)			1000 ug/L	03/11/03	KGF
Beryllium	LCS	938	94	(85-115)			1000 ug/L	03/11/03	KGF
Cadmium	LCS	912	91	(85-115)			1000 ug/L	03/11/03	KGF
Calcium	LCS	9950	100	(85-115)			10000 ug/L	03/11/03	KGF
Chromium	LCS	898	90	(85-115)			1000 ug/L	03/11/03	KGF
Cobalt	LCS	927	93	(85-115)			1000 ug/L	03/11/03	KGF
Copper	LCS	923	92	(85-115)			1000 ug/L	03/11/03	KGF
Iron	LCS	960	96	(85-115)			1000 ug/L	03/11/03	KGF
Lead	LCS	942	94	(85-115)			1000 ug/L	03/11/03	KGF
Magnesium	LCS	9790	98	(85-115)			10000 ug/L	03/11/03	KGF
Manganese	LCS	913	91	(85-115)			1000 ug/L	03/11/03	KGF
Molybdenum	LCS	925	93	(85-115)			1000 ug/L	03/11/03	KGF
Nickel	LCS	914	91	(85-115)			1000 ug/L	03/11/03	KGF
Potassium	LCS	9730	97	(85-115)			10000 ug/L	03/11/03	KGF
Selenium	LCS	911	91	(85-115)			1000 ug/L	03/11/03	KGF
Sodium	LCS	9670	97	(85-115)			10000 ug/L	03/11/03	KGF
Zinc	LCS	921	92	(85-115)			1000 ug/L	03/11/03	KGF
Silver	LCS	192	96	(85-115)			200 ug/L	03/11/03	KGF
Thallium	LCS	962	96	(85-115)			1000 ug/L	03/11/03	KGF

Batch MMS 2410
Method EPA 200.8
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.# 480974 Bench Spike Liquid

Printed Date/Time 03/14/2003 10:20
Prep Batch
Method
Date

Original 1031186001
Matrix Water (Surface, Eff., Ground)

QC results affect the following production samples:
1030668002, 1030668004, 1030668006, 1030668008, 1030668010

Sample Remarks:
BN1

Parameter		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Potassium	BN1	7870	32600	99	(70-130)			25000 ug/L	03/11/03	KGF
Aluminum	BN1	100 U	4900	98	(70-130)			5000 ug/L	03/11/03	KGF
Zinc	BN1	10.0 U	4450	89	(70-130)			5000 ug/L	03/11/03	KGF
Thallium	BN1	0.900 U	4970	99	(70-130)			5000 ug/L	03/11/03	KGF
Sodium	BN1	7030	31100	96	(70-130)			25000 ug/L	03/11/03	KGF
Nickel	BN1	25.0 U	4650	93	(70-130)			5000 ug/L	03/11/03	KGF
Manganese	BN1	2050	6800	95	(70-130)			5000 ug/L	03/11/03	KGF
Magnesium	BN1	34500	56400	88	(70-130)			25000 ug/L	03/11/03	KGF
Arsenic	BN1	13.4	5350	107	(70-130)			5000 ug/L	03/11/03	KGF
Lead	BN1	0.400 U	5000	100	(70-130)			5000 ug/L	03/11/03	KGF
Cadmium	BN1	0.500 U	5010	100	(70-130)			5000 ug/L	03/11/03	KGF
Chromium	BN1	20.0 U	5080	101	(70-130)			5000 ug/L	03/11/03	KGF
Copper	BN1	5.00 U	4380	88	(70-130)			5000 ug/L	03/11/03	KGF

Batch MMS 2409
Method EPA 200.8
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS/CT&E Environmental Services
Alaska Division
Level I Data Report

Project:	31-1-11162-001 FIA Range
Client:	Shannon & Wilson-Fairbanks
CT&E Work Order:	1030672

Contents:

Note:
Unless otherwise noted, all quality assurance/quality control criteria are in compliance with the proper regulatory authority and/or SGS's Quality Assurance Program Plan.

SGS

Case Narrative

Client	SHANFBK	Shannon & Wilson-Fairbanks	**Printed Date/Time**	3/18/2003 15:31
Workorder	1030672	31-1-11162-001 FIA Range		

Sample ID	Client Sample ID

481143 **MS**

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level. SW6020 ICP Metals - RPD for Pb was outside of acceptance limits.

481144 **MSD**

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level. SW6020 ICP Metals - RPD for Pb was outside of acceptance limits.

481163 **MS**

SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

481164 **MSD**

SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

1030672003 **PS** **1162-022703-1E1**

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level. SW6020 ICP Metals - RPD for Pb was outside of acceptance limits.

1030672024 **PS** **1162-022803-1G2B**

SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

Quote # 6328

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Chain of Custody Record

Shannon & Wilson, Inc.

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

11500 Olive Blvd., Suite 276
St. Louis, MO 63141
(314) 872-8170

2055 Hill Road
Fairbanks, AK 99707
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

Page 1 of 1 Ac
Laboratory SGS
Attn: Melody

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	TOTAL LEAD						Total Number of Containers	Remarks/Matrix
1162-022703-1ESA	(1) A	1:00	2/27/03		X	X						1	SOIL
1162-022703-1ESB	(2) A	1:03	2/27/03		X	X						1	
1162-022703-1E1	(3) A	1:05	2/27/03		X	X						1	
1162-022703-1E2	(4) A	1:10	2/27/03		X	X						1	
1162-022703-1E4	(5) A	1:15	2/27/03		X	X						1	
1162-022703-1E8	(6) A	1:20	2/27/03		X	X						1	
1162-022703-2F0.5	(7) A	2:30	2/27/03		X	X						1	
1162-022703-2F1	(8) A	2:35	2/27/03		X	X						1	
1162-022803-4JS	(9) A	9:10	2/28/03		X	X						1	
1162-022803-2I3	(10) A	11:50	2/28/03		X	X						1	

Project Information		Sample Receipt		Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Project Number:	31-1-11162-001	Total Number of Containers	10	Signature: Time: 9:20	Signature: Time: 430	Signature: Time:
Project Name:	FIA RANGE	COC Seals/Intact? Y/N/NA		Printed Name: Date: 3/5/03	Printed Name: Date: 3/5/03	Printed Name: Date:
Contact:	AndreaCarlson	Received Good Cond/Cold	(Cold) 4.3	AndreaCarlson	Melody Debenham	
Ongoing Project?	Yes ☐ No ☐	Delivery Method:		Company: Shannon & Wilson	Company: CTE	Company:
Sampler:	AndreaCarlson	(attach shipping bill, if any)	HAND	**Received By: 1.**	**Received By: 2.**	**Received By: 3.**
Instructions				Signature: Time: 920	Signature: Time:	Signature: Time: 0855
Requested Turn Around Time:	Standard			Printed Name: Date: 3/5/03	Printed Name: Date:	Printed Name: Date: 3-6-03
Special Instructions:	Level I & EDD			Melody Debenham		Tam Johnson
				Company: CTE	Company:	Company: SGS

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

QUOTE #6328

1030672

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Chain of Custody Record

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Page 1 of 3

Laboratory SGS

Attn: Melody

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	total lead						Total Number of Containers	Remarks/Matrix
1162-022803-1C6	(11) A	10:45	2/28/03		X	X						1	SOIL
1162-022803-1C8	(12) A	10:50	2/28/03		X	X						1	
1162-022803-1C10	(13) A	10:55	2/28/03		X	X						1	
1162-030303-1C15	(14) A	2:40	3/3/03		X	X						1	
1162-022803-1G2A	(15) A	11:00	2/28/03		X	X						1	
1162-022803-1G3	(16) A	11:05	2/28/03		X	X						1	
1162-022803-1G4	(17) A	11:10	2/28/03		X	X						1	
1162-022803-1G6	(18) A	11:15	2/28/03		X	X						1	
1162-022803-1G10	(19) A	11:20	2/28/03		X	X						1	
1162-022803-3K1	(20) A	12:50	2/28/03		X	X						1	

Project Information		Sample Receipt	
Project Number:	31-1-1162-001	Total Number of Containers	10
Project Name:	FIA RANGE	COC Seals/Intact? Y/N/NA	(N)
Contact:	Andrea Carlson	Received Good Cond./Cold	(Y) 4.3
Ongoing Project?	Yes ☐ No ☐	Delivery Method:	HAND
Sampler:	Andrea Carlson	(attach shipping bill, if any)	

Instructions

Requested Turn Around Time: Standard

Special Instructions:

Level I & EDD

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 4:20	Signature: Melody Debenham Time: 430	Signature: Time:
Printed Name: Andrea Carlson Date: 3/5/03	Printed Name: Melody Debenham Date: 3/5/03	Printed Name: Date:
Company: Shannon & Wilson	Company: CTE	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Melody Debenham Time: 920	Signature: Time:	Signature: Time:
Printed Name: Melody Debenham Date: 3/5/03	Printed Name: Date:	Printed Name: Sama Johnson Date: 3-6-03
Company: CTE	Company:	Company: SGS

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

QUOTE # 6328

1030672

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Chain of Custody Record

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Laboratory SGS

Attn: Melody

Analysis Parameters/Sample Container Description
(Include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Total Lead	TCLP Lead					Total Number of Containers	Remarks/Matrix
1162-022803-6L8	(21) A	1:45	2/28/03		X	X						1	SOIL
1162-022803-10F0.5	(22) A	2:32	2/28/03		X	X						1	
1162-022803-BKG	(23) A	2:40	2/28/03		X	X						1	
1162-022803-1G2B	(24) A	11:03	2/28/03		X	X						1	
1162-022803-1G5A	(25) A	2:00	2/28/03		X	X	X					1	Shooting range soil 8oz. jar
	(26) A												

Project Information		Sample Receipt	
Project Number:	31-1-11162-001	Total Number of Containers	5
Project Name:	FIA RANGE	COC Seals/Intact? Y/N/NA	
Contact:	Andrea Carlson	Received Good Cond./Cold	4.3
Ongoing Project?	Yes ☐ No ☐	Delivery Method:	HAND
Sampler:	Andrea Carlson	(attach shipping bill, if any)	

Instructions

Requested Turn Around Time: Standard

Special Instructions:

Level I & EDD

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 9:20	Signature: Melody Debenham Time: 420	Signature: Time:
Printed Name: Andrea Carlson Date: 3/5/03	Printed Name: Melody Debenham Date: 3/5/03	Printed Name: Date:
Company: Shannon & Wilson	Company: CTE	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Melody Debenham Time: 420	Signature: Time:	Signature: James Johnson Time: 0850
Printed Name: Melody Debenham Date: 3/5/03	Printed Name: Date:	Printed Name: Date: 3-6-03
Company: CTE	Company:	Company: SGS

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

C5

F-19-91/UR

SGS

SAMPLE RECEIPT FORM **CT&E WO#:** 1030672

Yes	No		
___	✓	Are samples **RUSH**, priority, or *within 72 hrs.* of **hold time**?	
___	NA	If yes have you done *e-mail notification*?	
___	✓	Are samples *within 24 hrs.* of **hold time** or **due date**?	
___	NA	If yes, have you *spoken with* Supervisor?	
___	NA	Archiving bottles – if required, are they properly marked?	
___	✓	Are there any **problems**? PM Notified?	
___	NA	Were samples preserved correctly and pH verified?	
___	NA	If this is for PWS, provide **PWSID.** ___	
___	NA	Will courier charges apply?	
		Method of payment? ___	
✓	___	Data package required? (Level 1 / 2 / 3)	
___	✓	Is this a DOD project? (USACE, Navy, AFCEE)	
		If yes, complete DOD block below	

Due Date: 3/13/03
Received Date/Time: 3/5/03 @920
Received Temperature*:
Thermometer ID: Probe C

Cooler ID	Temp Blank	Cooler Temp
1	4.3°C	—

*Temperature readings include thermometer correction factors

Delivery method (circle one): Commercial / Client / SGS-CT&E

Additional Sample Remarks
___ Extra Sample Volume?
___ Limited Sample Volume?
___ Field pres'd for volatiles?
___ Field-filtered for dissolved? ___
___ Lab-filtered for dissolved? ___
___ Ref Lab required? ___

Yes	No		
___	___	Is received temperature 4 ± 2°C?	
		Exceptions:	Samples/Analyses Affected:
___	___	Rad Screen performed?	
		Result: ___	
___	___	Was there an airbill? Note #: ___	
___	___	Was cooler sealed with custody seals? Fax'd to COE? ___	
		#/where: ___	
___	___	Were seal intact upon arrival?	
___	___	Was there a COC with cooler?	
___	___	Was the COC filled out properly?	
___	___	Did the COC indicate ACOE / AFCEE project? (if applicable)	
___	___	Did the COC and samples correspond?	
___	___	Were all sample packed to prevent breakage?	
		Packing material: ___	
___	___	Were all samples unbroken and clearly labeled?	
___	___	Were all samples sealed in separate plastic bags?	
___	___	Were all bottles for volatiles free of headspace?	
___	___	Were correct container / sample sizes submitted?	
___	___	Is sample condition good?	

Yes	No	
___	___	Was client notified of problems?

Individual contacted: ___
Date/Time: ___
Phone/Fax: ___
Reason for contact: ___

CT&E Contact: ___

Notes:

Quote 6328

* samples from a shooting range, - please, try to use as representative a sample as possible. *

Completed by (sign): Melody Debenham **(print):** Melody Debenham
Login proof (check one): waived ___ required ___ performed by: ___

SGS

SAMPLE RECEIPT FORM (page 2)

CT&E WO#: 1030672

=	Cont. ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8 oz	4 oz	Other	Container Type: AG	CG	HDPE	Nalge	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO3	H2SO4	MeOH	Na2S2O3	NaOH	Other
1-24	A	2	Total lead										24		X								X							
25	A	2	Total lead									1			X								X							
26	A	2	TCLP Lead																											
Bottle Totals												1	24																	

Completed by: _____ Date: 3-6-03

SGS

CT&E WO#: 1030672

SAMPLE RECEIPT FORM FOR TRANSFERS
From
FAIRBANKS, AK OR HONOLULU, HAWAII
To
ANCHORAGE, AK

TO BE COMPLETED IN ANCHORAGE UPON ARRIVAL FROM FAIRBANKS OR HAWAII. NOTES RECORDED BELOW ARE ACTIONS NEEDED UPON ARRIVAL IN ANCHORAGE.

Notes: please letter the jars and do the 2nd page.

Receipt Date / Time: 3-6-03 0850

COOLER AND TEMP BLANK READINGS*

Cooler ID	Temp Blank	Cooler	Cooler ID	Temp Blank	Cooler
1					

CUSTODY SEALS INTACT: YES / NO #/WHERE: _____

COMPLETED BY (INITIAL): _____

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.sgsenvironmental.com

Andrea Carlson
Shannon & Wilson-Fairbanks
2055 Hill Road
Fairbanks, Fairbanks North Star AK 99707

Work Order:	1030672
	31-1-11162-001 FIA Range
Client:	Shannon & Wilson-Fairbanks
Report Date:	March 18, 2003

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your SGS Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates an estimated value that falls below PQL, but is greater than the MDL.
J	Indicates an estimated value that falls below PQL, but is greater than the MDL.
B	Indicates the analyte is found in the blank associated with the sample.
*	The analyte has exceeded allowable limits.
GT	Greater Than
D	Secondary Dilution
LT	Less Than
!	Surrogate out of range

SGS

SGS Ref.#	1030672001
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-1ESA
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 13:00
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Stael

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	84.5		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	48800	8.92	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672002
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-1ESB
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 13:03
Received Date/Time	03/05/2003 9:20
Technical Director	Stephen C. Ede
Released By	Heather Isaac

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	81.4		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	31100	8.01	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672003
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-1E1
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 13:05
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level. SW6020 ICP Metals - RPD for Pb was outside of acceptance limits.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	94.1		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	6610	9.55	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672004
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-1E2
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 13:10
Received Date/Time	03/05/2003 9:20
Technical Director	Stephen C. Ede
Released By	Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	93.4		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	1680	6.41	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672005
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-1E4
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 13:15
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Stace

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	94.6		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	938	7.46	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672006
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-1E8
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 13:20
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	95.7		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	1320	7.15	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672007
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-2F0.5
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/25/2003 17:25
Collected Date/Time	02/27/2003 14:30
Received Date/Time	03/05/2003 9:20
Technical Director	Stephen C. Ede
Released By	Heather Steele

Sample Remarks:

Corrected report; Sample I.D. corrected.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	79.8		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	11500	7.79	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672008
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022703-2F1
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/27/2003 14:35
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Wall

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	78.2		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	995	8.90	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672009
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-4JS
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 9:10
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Hall

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	75.7		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	351	8.35	mg/Kg	SW846 6020		03/10/03	03/12/03	KGH

SGS

SGS Ref.#	1030672010
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-2I3
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:50
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Hall

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	90.3		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	215	6.48	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672011
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1C6
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 10:45
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**
Released By	Heather Hall

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	90.1		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	63.4	7.49	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672012
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1C8
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 10:50
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	91.9		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	99.1	7.46	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672013
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1C10
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 10:55
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Hall

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	92.3		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	81.6	7.60	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672014	**All Dates/Times are Alaska Standard Time**	
Client Name	Shannon & Wilson-Fairbanks	**Printed Date/Time**	03/18/2003 15:32
Project Name/#	31-1-11162-001 FIA Range	**Collected Date/Time**	03/03/2003 14:50
Client Sample ID	1162-030303-1C15	**Received Date/Time**	03/05/2003 9:20
Matrix	Soil/Solid	**Technical Director**	**Stephen C. Ede**
		Released By	Heather Haas

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	89.4		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	17.5	0.384	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672015
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G2A
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:00
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**
Released By	Heather Sda

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	91.3		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	1600	7.63	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672016
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G3
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:05
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Ward

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	94.6		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	666	6.78	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672017
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G4
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:10
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Stae

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	95.5		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	431	7.08	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672018
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G6
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:15
Received Date/Time	03/05/2003 9:20
Technical Director	Stephen C. Ede

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	90.9		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	231	7.93	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672019
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G10
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:20
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Shae

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	90.8		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	83.6	7.95	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672020
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-3K1
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 12:50
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	86.5		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	11.2	0.382	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672021
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-6L8
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 13:45
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Hale

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	85.5		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	10.9	0.206	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672022
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-10F0.5
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 14:32
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	79.3		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	7.64	0.221	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672023
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-BKG
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 14:40
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	79.9		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	22.5	0.184	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672024
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G2B
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 11:03
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Hall

Sample Remarks:

SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	91.7		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	5150	0.949	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672025
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1GSA
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/18/2003 15:32
Collected Date/Time	02/28/2003 14:00
Received Date/Time	03/05/2003 9:20
Technical Director	**Stephen C. Ede**

Released By Heather Shaw

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	82.3		%	SM20 2540G			03/12/03	MAH
Metals by ICP/MS								
Lead	53400	17.7	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030672026	**All Dates/Times are Alaska Standard Time**	
Client Name	Shannon & Wilson-Fairbanks	**Printed Date/Time**	03/18/2003 15:32
Project Name/#	31-1-11162-001 FIA Range	**Collected Date/Time**	02/28/2003 14:00
Client Sample ID	1162-022803-1GSA	**Received Date/Time**	03/05/2003 9:20
Matrix	Other Solids (Wet Weight)	**Technical Director**	**Stephen C. Ede**

Released By Heather Steele

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Characterization								
Aqueous Phase, Total	0.0		%	SW846-1311 TCLP			03/06/03	BJS
Oil Phase, Total	0.0		%	SW846-1311 TCLP			03/06/03	BJS
Solid Phase, Total	100		%	SW846-1311 TCLP			03/06/03	BJS
TCLP Metals								
Lead	0.500 U	0.500	mg/L	SW846-6010B TCLP	(<=5)	03/07/03	03/08/03	WAW

SGS

SGS Ref.#	481468 Method Blank	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Range	**Method**	
Matrix	Soil/Solid	**Date**	

QC results affect the following production samples:

1030672001, 1030672002, 1030672003, 1030672004, 1030672005, 1030672006, 1030672007, 1030672008, 1030672009, 1030672010

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Solids					
Total Solids	100		%	03/12/03	MCM
Batch SPT 4833 **Method** SM20 2540G **Instrument**					

SGS

SGS Ref.#	481469 Duplicate	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Range	**Method**	
Original	1030680001	**Date**	
Matrix	Soil/Solid		

QC results affect the following production samples:

1030672001, 1030672002, 1030672003, 1030672004, 1030672005, 1030672006, 1030672007, 1030672008, 1030672009, 1030672010

Sample Remarks:

Parameter	Original Result	QC Result	RPD	RPD Limits	Analysis Date	Init
Solids						
Total Solids	99.8	99.7	0	(< 5)	03/12/03	MCM

Batch SPT 4833
Method SM20 2540G
Instrument

SGS

SGS Ref.#	481508 Method Blank	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Range	**Method**	
Matrix	Soil/Solid	**Date**	

QC results affect the following production samples:

1030672011, 1030672012, 1030672013, 1030672014, 1030672015, 1030672016, 1030672017, 1030672018, 1030672019, 1030672020, 1030672021, 1030672022, 1030672023, 1030672024, 1030672025

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Solids					
Total Solids	100		%	03/12/03	MAH
Batch SPT 4834 **Method** SM20 2540G **Instrument**					

SGS

SGS Ref.#	480581 Leaching Blank #1 fluid	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXT 3533
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3010A
Matrix	Water (Surface, Eff., Ground)	**Date**	03/07/2003

QC results affect the following production samples:

1030672026

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
TCLP Metals					
Arsenic	0.500 U	0.500	mg/L	03/08/03	WAW
Barium	0.0387F	0.100	mg/L	03/08/03	WAW
Cadmium	0.0230F	0.0500	mg/L	03/08/03	WAW
Chromium	0.200 U	0.200	mg/L	03/08/03	WAW
Copper	0.100 U	0.100	mg/L	03/08/03	WAW
Lead	0.500 U	0.500	mg/L	03/08/03	WAW
Nickel	0.300 U	0.300	mg/L	03/08/03	WAW
Selenium	1.00 U	1.00	mg/L	03/08/03	WAW
Silver	0.200 U	0.200	mg/L	03/08/03	WAW
Zinc	0.300 U	0.300	mg/L	03/08/03	WAW

Batch MIP 4095
Method SW846-6010B TCLP
Instrument TJA Enviro II ICP P2

SGS

SGS Ref.#	480710 Method Blank	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXT 3533
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3010A
Matrix	Water (Surface, Eff., Ground)	**Date**	03/07/2003

QC results affect the following production samples:

1030672026

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
TCLP Metals					
Antimony	0.0250 U	0.0250	mg/L	03/08/03	WAW
Arsenic	0.0250 U	0.0250	mg/L	03/08/03	WAW
Barium	0.00399F	0.00500	mg/L	03/08/03	WAW
Beryllium	0.000910F	0.00100	mg/L	03/08/03	WAW
Cadmium	0.00250 U	0.00250	mg/L	03/08/03	WAW
Chromium	0.0100 U	0.0100	mg/L	03/08/03	WAW
Copper	0.00500 U	0.00500	mg/L	03/08/03	WAW
Lead	0.0250 U	0.0250	mg/L	03/08/03	WAW
Nickel	0.0150 U	0.0150	mg/L	03/08/03	WAW
Selenium	0.0500 U	0.0500	mg/L	03/08/03	WAW
Silver	0.0150 U	0.0150	mg/L	03/08/03	WAW
Vanadium	0.00500 U	0.00500	mg/L	03/08/03	WAW
Zinc	0.0150 U	0.0150	mg/L	03/08/03	WAW

Batch MIP 4095
Method SW846-6010B TCLP
Instrument TJA Enviro II ICP P2

SGS

SGS Ref.#	480713 Lab Control Sample	**Printed Date/Time**	03/18/2003 15:32
		Prep Batch	MXT 3533
Client Name	Shannon & Wilson-Fairbanks	**Method**	SW3010A
Project Name/#	31-1-11162-001 FIA Range	**Date**	03/07/2003
Matrix	Water (Surface, Eff., Ground)		

QC results affect the following production samples:

1030672026

Sample Remarks:

LCS

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
TCLP Metals									
Arsenic	LCS	1.89	95	(85-115)			2 mg/L	03/08/03	WAW
Barium	LCS	1.93	96	(85-115)			2 mg/L	03/08/03	WAW
Cadmium	LCS	1.99	100	(85-115)			2 mg/L	03/08/03	WAW
Chromium	LCS	2.00	100	(85-115)			2 mg/L	03/08/03	WAW
Copper	LCS	1.99	99	(85-115)			2 mg/L	03/08/03	WAW
Lead	LCS	2.10	105	(85-115)			2 mg/L	03/08/03	WAW
Nickel	LCS	2.03	101	(85-115)			2 mg/L	03/08/03	WAW
Selenium	LCS	1.98	99	(85-115)			2 mg/L	03/08/03	WAW
Silver	LCS	0.199	100	(85-115)			0.2 mg/L	03/08/03	WAW
Zinc	LCS	2.00	100	(85-115)			2 mg/L	03/08/03	WAW

Batch MIP 4095
Method SW846-6010B TCLP
Instrument TJA Enviro II ICP P2

SGS

SGS Ref.#	480752 Interference Std Waste	**Printed Date/Time**	03/18/2003 15:32
		Prep Batch	
Client Name	Shannon & Wilson-Fairbanks	**Method**	
Project Name/#	31-1-11162-001 FIA Range	**Date**	
Matrix	Water (Surface, Eff., Ground)		

QC results affect the following production samples:

1030672026

Sample Remarks:

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Batch	MIP 4095								
Method	SW846 6010B								
Instrument	TJA Enviro II ICP P2								
Metals Department									
Aluminum	SIC1	248	99	(80-120)			250 mg/L	03/08/03	WAW
Calcium	SIC1	237	95	(80-120)			250 mg/L	03/08/03	WAW
Iron	SIC1	89.8	90	(80-120)			100 mg/L	03/08/03	WAW
Magnesium	SIC1	250	100	(80-120)			250 mg/L	03/08/03	WAW
Batch	MIP 4095								
Method	SW846 6010B								
Instrument	TJA Enviro II ICP P2								

SGS

SGS Ref.# 480715 Matrix Spike

Printed Date/Time 03/18/2003 15:32
Prep Batch MXT 3533
Method Waters Digest for Metals by I
Date 03/07/2003

Original 1031226001
Matrix Other Solids (Wet Weight)

QC results affect the following production samples:
1030672026

Sample Remarks:

Parameter		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
TCLP Metals										
Selenium	MS	1.00 U	19.8	99	(50-125)			20 mg/L	03/08/03	WAW
	MSD		19.5	98		1	(< 20)	20 mg/L	03/08/03	WAW
Lead	MS	0.500 U	20.5	103	(50-125)			20 mg/L	03/08/03	WAW
	MSD		20.9	105		2	(< 20)	20 mg/L	03/08/03	WAW
Chromium	MS	0.200 U	19.3	96	(50-125)			20 mg/L	03/08/03	WAW
	MSD		19.8	99		2	(< 20)	20 mg/L	03/08/03	WAW
Cadmium	MS	0.0500 U	19.3	96	(50-125)			20 mg/L	03/08/03	WAW
	MSD		19.8	99		3	(< 20)	20 mg/L	03/08/03	WAW
Barium	MS	0.231	18.9	93	(50-125)			20 mg/L	03/08/03	WAW
	MSD		19.5	96		3	(< 20)	20 mg/L	03/08/03	WAW
Arsenic	MS	0.500 U	18.4	92	(50-125)			20 mg/L	03/08/03	WAW
	MSD		18.8	94		2	(< 20)	20 mg/L	03/08/03	WAW
Silver	MS	0.200 U	1.90	95	(50-125)			2 mg/L	03/08/03	WAW
	MSD		1.96	98		3	(< 20)	2 mg/L	03/08/03	WAW

Batch MIP 4095
Method SW846-6010B TCLP
Instrument TJA Enviro II ICP P2

SGS

SGS Ref.#	481140 Method Blank	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXX 11295
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3050B
Matrix	Soil/Solid	**Date**	03/10/2003

QC results affect the following production samples:

1030672001, 1030672002, 1030672003, 1030672004, 1030672005, 1030672006, 1030672007, 1030672008, 1030672009, 1030672010, 1030672011, 1030672012, 1030672013, 1030672014, 1030672015, 1030672016, 1030672017, 1030672018, 1030672019, 1030672020

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Metals by ICP/MS					
Aluminum	10.0 U	10.0	mg/Kg	03/12/03	KGF
Antimony	0.300 U	0.300	mg/Kg	03/12/03	KGF
Arsenic	1.00 U	1.00	mg/Kg	03/12/03	KGF
Barium	0.500 U	0.500	mg/Kg	03/12/03	KGF
Beryllium	0.100 U	0.100	mg/Kg	03/12/03	KGF
Cadmium	0.200 U	0.200	mg/Kg	03/12/03	KGF
Calcium	100 U	100	mg/Kg	03/12/03	KGF
Chromium	1.00 U	1.00	mg/Kg	03/12/03	KGF
Cobalt	0.500 U	0.500	mg/Kg	03/12/03	KGF
Copper	2.00 U	2.00	mg/Kg	03/12/03	KGF
Iron	100 U	100	mg/Kg	03/12/03	KGF
Lead	0.200 U	0.200	mg/Kg	03/12/03	KGF
Potassium	100 U	100	mg/Kg	03/12/03	KGF
Selenium	1.00 U	1.00	mg/Kg	03/12/03	KGF
Silver	0.100 U	0.100	mg/Kg	03/12/03	KGF
Sodium	200 U	200	mg/Kg	03/12/03	KGF
Thallium	0.0200 U	0.0200	mg/Kg	03/12/03	KGF
Vanadium	2.00 U	2.00	mg/Kg	03/12/03	KGF
Zinc	1.00 U	1.00	mg/Kg	03/12/03	KGF
Magnesium	30.0 U	30.0	mg/Kg	03/12/03	KGF
Manganese	2.00 U	2.00	mg/Kg	03/12/03	KGF
Molybdenum	1.00 U	1.00	mg/Kg	03/12/03	KGF
Nickel	2.00 U	2.00	mg/Kg	03/12/03	KGF

Batch	MMS 2411
Method	SW846 6020
Instrument	Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.# 481141 Lab Control Sample

Printed Date/Time 03/18/2003 15:32
Prep Batch MXX 11295
Method SW3050B
Date 03/10/2003

Client Name Shannon & Wilson-Fairbanks
Project Name/# 31-1-11162-001 FIA Range
Matrix Soil/Solid

QC results affect the following production samples:
1030672001, 1030672002, 1030672003, 1030672004, 1030672005, 1030672006, 1030672007, 1030672008, 1030672009, 1030672010, 1030672011, 1030672012, 1030672013, 1030672014, 1030672015, 1030672016, 1030672017, 1030672018, 1030672019, 1030672020

Sample Remarks:
LCS

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS									
Aluminum	LCS	43.2	86	(85-115)			50 mg/Kg	03/12/03	KGF
Antimony	LCS	44.5	89	(85-115)			50 mg/Kg	03/12/03	KGF
Arsenic	LCS	47.4	95	(85-115)			50 mg/Kg	03/12/03	KGF
Barium	LCS	47.6	95	(85-115)			50 mg/Kg	03/12/03	KGF
Beryllium	LCS	46.5	93	(85-115)			50 mg/Kg	03/12/03	KGF
Cadmium	LCS	45.8	92	(85-115)			50 mg/Kg	03/12/03	KGF
Calcium	LCS	464	93	(85-115)			500 mg/Kg	03/12/03	KGF
Chromium	LCS	46.4	93	(85-115)			50 mg/Kg	03/12/03	KGF
Cobalt	LCS	45.5	91	(85-115)			50 mg/Kg	03/12/03	KGF
Iron	LCS	50.9F	102	(85-115)			50 mg/Kg	03/12/03	KGF
Copper	LCS	47.1	94	(85-115)			50 mg/Kg	03/12/03	KGF
Lead	LCS	45.9	92	(85-115)			50 mg/Kg	03/12/03	KGF
Potassium	LCS	498	100	(85-115)			500 mg/Kg	03/12/03	KGF
Selenium	LCS	44.6	89	(85-115)			50 mg/Kg	03/12/03	KGF
Silver	LCS	9.22	92	(85-115)			10 mg/Kg	03/12/03	KGF
Sodium	LCS	474	95	(85-115)			500 mg/Kg	03/12/03	KGF
Thallium	LCS	45.9	92	(85-115)			50 mg/Kg	03/12/03	KGF
Vanadium	LCS	46.2	92	(85-115)			50 mg/Kg	03/12/03	KGF
Zinc	LCS	45.0	90	(85-115)			50 mg/Kg	03/12/03	KGF
Magnesium	LCS	472	94	(85-115)			500 mg/Kg	03/12/03	KGF
Manganese	LCS	46.4	93	(85-115)			50 mg/Kg	03/12/03	KGF
Molybdenum	LCS	43.6	87	(85-115)			50 mg/Kg	03/12/03	KGF
Nickel	LCS	46.9	94	(85-115)			50 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481143	Matrix Spike	**Printed Date/Time**		03/18/2003 15:32
	481144	Matrix Spike Duplicate	**Prep**	**Batch**	MXX 11295
				Method	Soils/Solids Digest for Metal
				Date	03/10/2003
Original	1030672003				
Matrix	Soil/Solid				

QC results affect the following production samples:

1030672001, 1030672002, 1030672003, 1030672004, 1030672005, 1030672006, 1030672007, 1030672008, 1030672009, 1030672010, 1030672011, 1030672012, 1030672013, 1030672014, 1030672015, 1030672016, 1030672017, 1030672018, 1030672019, 1030672020

Sample Remarks:

MS SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level. SW6020 ICP Metals - RPD for Pb was outside of acceptance limits.

MSD SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level. SW6020 ICP Metals - RPD for Pb was outside of acceptance limits.

Parameter		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS										
Lead	MS	6610	3400	-6350*	(75-125)			44.5 mg/Kg	03/12/03	KGF
	MSD		2530	-8350*		29*	(< 20)	44.3 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481142	Bench Spike DIGESTED	Printed Date/Time	03/18/2003 15:32
			Prep Batch	MXX 11295
			Method	Soils/Solids Digest for Metals
			Date	03/10/2003
Original	1030672003			
Matrix	Soil/Solid			

QC results affect the following production samples:

1030672001, 1030672002, 1030672003, 1030672004, 1030672005, 1030672006, 1030672007, 1030672008, 1030672009, 1030672010, 1030672011, 1030672012, 1030672013, 1030672014, 1030672015, 1030672016, 1030672017, 1030672018, 1030672019, 1030672020

Sample Remarks:

BND

Parameter	Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS									
Lead	BND	6610	28100	98	(75-125)		22500 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481160 Method Blank	**Printed Date/Time**	03/18/2003 15:32
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXX 11296
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3050B
Matrix	Soil/Solid	**Date**	03/10/2003

QC results affect the following production samples:

1030672021, 1030672022, 1030672023, 1030672024, 1030672025

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Metals by ICP/MS					
Aluminum	10.0 U	10.0	mg/Kg	03/12/03	KGF
Antimony	0.300 U	0.300	mg/Kg	03/12/03	KGF
Arsenic	1.00 U	1.00	mg/Kg	03/12/03	KGF
Barium	0.500 U	0.500	mg/Kg	03/12/03	KGF
Beryllium	0.100 U	0.100	mg/Kg	03/12/03	KGF
Cadmium	0.200 U	0.200	mg/Kg	03/12/03	KGF
Calcium	100 U	100	mg/Kg	03/12/03	KGF
Chromium	1.00 U	1.00	mg/Kg	03/12/03	KGF
Cobalt	0.500 U	0.500	mg/Kg	03/12/03	KGF
Copper	2.00 U	2.00	mg/Kg	03/12/03	KGF
Iron	100 U	100	mg/Kg	03/12/03	KGF
Lead	0.0729F	0.200	mg/Kg	03/12/03	KGF
Potassium	100 U	100	mg/Kg	03/12/03	KGF
Selenium	1.00 U	1.00	mg/Kg	03/12/03	KGF
Silver	0.100 U	0.100	mg/Kg	03/12/03	KGF
Sodium	200 U	200	mg/Kg	03/12/03	KGF
Thallium	0.0200 U	0.0200	mg/Kg	03/12/03	KGF
Vanadium	2.00 U	2.00	mg/Kg	03/12/03	KGF
Zinc	1.00 U	1.00	mg/Kg	03/12/03	KGF
Magnesium	30.0 U	30.0	mg/Kg	03/12/03	KGF
Manganese	2.00 U	2.00	mg/Kg	03/12/03	KGF
Molybdenum	1.00 U	1.00	mg/Kg	03/12/03	KGF
Nickel	2.00 U	2.00	mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481161 Lab Control Sample	**Printed Date/Time**	03/18/2003 15:32
		Prep Batch	MXX 11296
Client Name	Shannon & Wilson-Fairbanks	**Method**	SW3050B
Project Name/#	31-1-11162-001 FIA Range	**Date**	03/10/2003
Matrix	Soil/Solid		

QC results affect the following production samples:
1030672021, 1030672022, 1030672023, 1030672024, 1030672025

Sample Remarks:
LCS

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS								
Aluminum	LCS 44.1	88	(85-115)			50 mg/Kg	03/12/03	KGF
Antimony	LCS 44.2	88	(85-115)			50 mg/Kg	03/12/03	KGF
Arsenic	LCS 47.8	96	(85-115)			50 mg/Kg	03/12/03	KGF
Barium	LCS 47.0	94	(85-115)			50 mg/Kg	03/12/03	KGF
Beryllium	LCS 46.4	93	(85-115)			50 mg/Kg	03/12/03	KGF
Cadmium	LCS 45.4	91	(85-115)			50 mg/Kg	03/12/03	KGF
Calcium	LCS 476	95	(85-115)			500 mg/Kg	03/12/03	KGF
Chromium	LCS 45.5	91	(85-115)			50 mg/Kg	03/12/03	KGF
Cobalt	LCS 45.9	92	(85-115)			50 mg/Kg	03/12/03	KGF
Iron	LCS 50.4F	101	(85-115)			50 mg/Kg	03/12/03	KGF
Copper	LCS 46.9	94	(85-115)			50 mg/Kg	03/12/03	KGF
Lead	LCS 47.9	96	(85-115)			50 mg/Kg	03/12/03	KGF
Potassium	LCS 474	95	(85-115)			500 mg/Kg	03/12/03	KGF
Selenium	LCS 42.8	86	(85-115)			50 mg/Kg	03/12/03	KGF
Silver	LCS 9.35	94	(85-115)			10 mg/Kg	03/12/03	KGF
Sodium	LCS 470	94	(85-115)			500 mg/Kg	03/12/03	KGF
Thallium	LCS 46.9	94	(85-115)			50 mg/Kg	03/12/03	KGF
Vanadium	LCS 45.7	91	(85-115)			50 mg/Kg	03/12/03	KGF
Zinc	LCS 46.2	92	(85-115)			50 mg/Kg	03/12/03	KGF
Magnesium	LCS 476	95	(85-115)			500 mg/Kg	03/12/03	KGF
Manganese	LCS 46.6	93	(85-115)			50 mg/Kg	03/12/03	KGF
Molybdenum	LCS 44.4	89	(85-115)			50 mg/Kg	03/12/03	KGF
Nickel	LCS 46.5	93	(85-115)			50 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481163	Matrix Spike	**Printed Date/Time**		03/18/2003 15:32
	481164	Matrix Spike Duplicate	**Prep**	**Batch**	MXX 11296
				Method	Soils/Solids Digest for Metal
				Date	03/10/2003
Original	1030672024				
Matrix	Soil/Solid				

QC results affect the following production samples:

1030672021, 1030672022, 1030672023, 1030672024, 1030672025

Sample Remarks:

MS SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

MSD SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

Parameter		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS										
Lead	MS	5150	1350	-7550*	(75-125)			44.7 mg/Kg	03/12/03	KGF
	MSD		1250	-7820*		7	(< 20)	44.4 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481162	Bench Spike DIGESTED	**Printed Date/Time**		03/18/2003 15:32
			Prep	**Batch**	MXX 11296
				Method	Soils/Solids Digest for Metals
				Date	03/10/2003
Original	1030672024				
Matrix	Soil/Solid				

QC results affect the following production samples:

1030672021, 1030672022, 1030672023, 1030672024, 1030672025

Sample Remarks:

BND

Parameter	Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS									
Lead	BND 5150	6980	104	(75-125)			2180 mg/Kg	03/12/03	KGF
Batch	MMS 2411								
Method	SW846 6020								
Instrument	Perkin Elmer Sciex ICP-MS P3								

SGS

SGS/CT&E Environmental Services
Alaska Division
Level I Data Report

Project:	31-1-11162-001 FIA Range
Client:	Shannon & Wilson-Fairbanks
CT&E Work Order:	1030680

Contents:

Note:
Unless otherwise noted, all quality assurance/quality control criteria are in compliance with the proper regulatory authority and/or SGS's Quality Assurance Program Plan.

SGS

Case Narrative

Client	SHANFBK	Shannon & Wilson-Fairbanks	**Printed Date/Time**	3/24/2003 9:00
Workorder	1030680	31-1-11162-001 FIA Range		

Sample ID	Client Sample ID

481163 **MS**

SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

481164 **MSD**

SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

1030680

Chain of Custody Record

Shannon & Wilson, Inc.

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

11500 Olive Blvd., Suite 276
St. Louis, MO 63141
(314) 872-8170

2055 Hill Road
Fairbanks, AK 99707
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

Page 1 of 1
Laboratory SG3
Attn: Melody

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	TCLP Lead	Total Lead					Total Number of Containers	Remarks/Matrix
1162-022803-16SB	1A Total	2:00	2/28/03		X	X	X					1	8oz Jar
	3A TCLP 515 3-7-03												

Project Information

Project Number: 31-41162-001
Project Name: FIA RANGE
Contact: Andrea Carlson
Ongoing Project? Yes ☐ No ☐
Sampler: Andrea Carlson

Sample Receipt

Total Number of Containers: 1
COC Seals/Intact? Y/N/NA: (N)
Received Good Cond/Cold: (Cold) 4.7°C
Delivery Method: Hand
(attach shipping bill, if any)

Instructions

Requested Turn Around Time: Standard
Special Instructions:
Level I & EDD

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: [signature] Time: 3:10	Signature: [signature] Time: 430	Signature: Time:
Printed Name: Andrea Carlson Date: 3/6/03	Printed Name: Melody Debenham Date: 3/6/03	Printed Name: Date:
Company: Shannon & Wilson	Company: CTE	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: [signature] Time: 3:10	Signature: [signature] Time: 0600	Signature: Time:
Printed Name: Melody Debenham Date: 3/6/03	Printed Name: Tim Hanson Date: 3-7-03	Printed Name: Date:
Company: CTE	Company: SGS	Company:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

SGS

1030680

SAMPLE RECEIPT FORM

CT&E WO#:

Yes	No		
___	✓	Are samples **RUSH**, priority, or *within 72 hrs.* of **hold time**?	
___	NA	If yes have you done *e-mail notification*?	
___	✓	Are samples *within 24 hrs.* of **hold time** or **due date**?	
___	NA	If yes, have you *spoken with* Supervisor?	
___	NA	Archiving bottles – if required, are they properly marked?	
___	✓	Are there any **problems**? PM Notified?	
___	NA	Were samples preserved correctly and pH verified?	
		_____	
		_____	
		_____	
___	✓	If this is for PWS, provide **PWSID.**_____	
___	✓	Will courier charges apply?	
		Method of payment? _____	
✓	___	Data package required? (Level: (1) / 2 / 3)	
___	✓	Is this a DOD project? (USACE, Navy, AFCEE)	
		If yes, complete DOD block below	

Due Date: 3/20/03
Received Date/Time: 3/6/03 @ 3:10
Received Temperature*:
Thermometer ID: Probe C

Cooler ID	Temp Blank	Cooler Temp
1	4.7°C	4.8°C

*Temperature readings include thermometer correction factors

Delivery method (circle one): Commercial / (Client) / SGS-CT&E

Additional Sample Remarks
_____Extra Sample Volume?
_____Limited Sample Volume?
_____Field pres'd for volatiles?
_____Field-filtered for dissolved?_____
_____Lab-filtered for dissolved? _____
_____Ref Lab required? _____

Yes	No		
___	___	Is received temperature 4 ± 2°C?	Samples/Analyses Affected:
		Exceptions:	
		_____	_____
		_____	_____
		_____	_____
		_____	_____
___	___	Rad Screen performed?	
		Result: _____	
___	___	Was there an airbill? Note #: _____	
___	___	Was cooler sealed with custody seals? Fax'd to COE? _____	
		#/where: _____	
___	___	Were seal intact upon arrival?	
___	___	Was there a COC with cooler?	
___	___	Was the COC filled out properly?	
___	___	Did the COC indicate ACOE / AFCEE project? (if applicable)	
___	___	Did the COC and samples correspond?	
___	___	Were all sample packed to prevent breakage?	
		Packing material: _____	
___	___	Were all samples unbroken and clearly labeled?	
___	___	Were all samples sealed in separate plastic bags?	
___	___	Were all bottles for volatiles free of headspace?	
___	___	Were correct container / sample sizes submitted?	
___	___	Is sample condition good?	

Yes	No	
___	___	Was client notified of problems?

Individual contacted: _____
Date/Time: _____
Phone/Fax: _____
Reason for contact: _____
_____
_____
_____
_____
_____
_____
_____
CT&E Contact: _____

Notes:

_____
_____
_____
_____
_____

Completed by (sign): Melody Debenham (print): Melody Debenham
Login proof (check one): waived ___ required ___ performed by: _____

SGS

SAMPLE RECEIPT FORM (page 2)

CT&E WO#: 1030680

#	Cont. ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8 oz	4 oz	Other	Container Type: AG	CG	HDPE	Nalge	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO3	H2SO4	MeOH	Na2S2O3	NaOH	Other
1	A	2	total lead, ~~TCLP lead~~									1			X								X							
2	A	2	TCLPlead			Same jar																								
Bottle Totals												1																		

Completed by: Melody Deberham Date: 3/6/03

CT

SGS

CT&E WO#: 1030680

SAMPLE RECEIPT FORM FOR TRANSFERS
From
FAIRBANKS, AK OR HONOLULU, HAWAII
To
ANCHORAGE, AK

TO BE COMPLETED IN ANCHORAGE UPON ARRIVAL FROM FAIRBANKS OR HAWAII. NOTES RECORDED BELOW ARE ACTIONS NEEDED UPON ARRIVAL IN ANCHORAGE.

Notes: _____

Receipt Date / Time: 3-7-07 0900

COOLER AND TEMP BLANK READINGS*

Cooler ID	Temp Blank	Cooler	Cooler ID	Temp Blank	Cooler
_____	4.2	3.1	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

CUSTODY SEALS INTACT: YES / NO #/WHERE: 2 front

COMPLETED BY (INITIAL): DH

CT&E Environmental Ser

Signature: Melody Debahan

Date/Time: 3/6/03 @ 430

vices Inc.
CUSTODY SEAL

Date/Time: 3/6/03 @ 430

CT&E Environmental Services Inc.
CUSTODY SEAL

Signature: Melody Debahan

Date/Time: 3/6/03 @ 430

TCLP SAMPLE CHARACTERIZATION

HSN#: 680-1 Date: 3/7/03 TCLP Pb

Sample Vol (mL): 250 Container Vol (mL): 250

Top_____% (xylene misc.)

Middle_____% (H20 misc.)

Bottom 100 % (solids)
Brown fine powder w/ various debris

HSN#: _____ Date: _____

Sample Vol (mL): Container Vol (mL): _____

Top_____% (xylene misc.)

Middle_____% (H20 misc.)

Bottom_____% (solids)

HSN#: _____ Date: _____

Sample Vol (mL): Container Vol (mL): _____

Top_____% (xylene misc.)

Middle_____% (H20 misc.)

Bottom_____% (solids)

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.sgsenvironmental.com

Andrea Carlson
Shannon & Wilson-Fairbanks
2055 Hill Road
Fairbanks, Fairbanks North Star AK 99707

Work Order:	1030680
	31-1-11162-001 FIA Range
Client:	Shannon & Wilson-Fairbanks
Report Date:	March 24, 2003

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your SGS Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates an estimated value that falls below PQL, but is greater than the MDL.
J	Indicates an estimated value that falls below PQL, but is greater than the MDL.
B	Indicates the analyte is found in the blank associated with the sample.
*	The analyte has exceeded allowable limits.
GT	Greater Than
D	Secondary Dilution
LT	Less Than
!	Surrogate out of range

SGS

SGS Ref.#	1030680001
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G-SB
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/24/2003 9:00
Collected Date/Time	02/28/2003 14:00
Received Date/Time	03/06/2003 15:10
Technical Director	Stephen C. Ede
Released By	Rhonda Stucker

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	99.8		%	SM20 2540G			03/12/03	MCM
Metals by ICP/MS								
Lead	54600	14.8	mg/Kg	SW846 6020		03/10/03	03/12/03	KGF

SGS

SGS Ref.#	1030680002
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Range
Client Sample ID	1162-022803-1G-SB
Matrix	Other Solids (Wet Weight)

All Dates/Times are Alaska Standard Time

Printed Date/Time	03/24/2003 9:00
Collected Date/Time	02/28/2003 14:00
Received Date/Time	03/06/2003 15:10
Technical Director	Stephen C. Ede
Released By	Rhonda Strucker

Sample Remarks:

Parameter	Results		PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Characterization									
Aqueous Phase, Total	0.0			%	SW846-1311 TCLP			03/07/03	BJS
Oil Phase, Total	0.0			%	SW846-1311 TCLP			03/07/03	BJS
Solid Phase, Total	100			%	SW846-1311 TCLP			03/07/03	BJS
TCLP Metals									
Lead	606	*	5.00	mg/L	SW846-6010B TCLP	(<=5)	03/20/03	03/21/03	MTG

SGS

SGS Ref.#	481468 Method Blank	**Printed Date/Time**	03/24/2003 9:00
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Range	**Method**	
Matrix	Soil/Solid	**Date**	

QC results affect the following production samples:

1030680001

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Solids					
Total Solids	100		%	03/12/03	MCM
Batch SPT 4833					
Method SM20 2540G					
Instrument					

SGS

SGS Ref.#	481469 Duplicate	**Printed Date/Time**	03/24/2003 9:00
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Range	**Method**	
Original	1030680001	**Date**	
Matrix	Soil/Solid		

QC results affect the following production samples:

1030680001

Sample Remarks:

Parameter	Original Result	QC Result	RPD	RPD Limits	Analysis Date	Init
Solids						
Total Solids	99.8	99.7	0	(< 5)	03/12/03	MCM
Batch SPT 4833						
Method SM20 2540G						
Instrument						

SGS

SGS Ref.#	482002 Leaching Blank #1 fluid	**Printed Date/Time**	03/24/2003 9:00
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXT 3535
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3010A
Matrix	Water (Surface, Eff., Ground)	**Date**	03/20/2003

QC results affect the following production samples:

1030680002

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
TCLP Metals					
Arsenic	0.500 U	0.500	mg/L	03/21/03	MTG
Barium	0.100 U	0.100	mg/L	03/21/03	MTG
Cadmium	0.0500 U	0.0500	mg/L	03/21/03	MTG
Chromium	0.200 U	0.200	mg/L	03/21/03	MTG
Copper	0.100 U	0.100	mg/L	03/21/03	MTG
Lead	0.500 U	0.500	mg/L	03/21/03	MTG
Nickel	0.300 U	0.300	mg/L	03/21/03	MTG
Selenium	1.00 U	1.00	mg/L	03/21/03	MTG
Silver	0.200 U	0.200	mg/L	03/21/03	MTG
Zinc	0.300 U	0.300	mg/L	03/21/03	MTG

Batch MIP 4107
Method SW846-6010B TCLP
Instrument TJA Enviro II ICP P2

SGS

SGS Ref.#	482304 Leaching Blank #1 fluid	**Printed Date/Time**	03/24/2003 9:00
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXT 3535
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3010A
Matrix	Water (Surface, Eff., Ground)	**Date**	03/20/2003

QC results affect the following production samples:

1030680002

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
TCLP Metals					
Arsenic			mg/L	03/21/03	MTG
Barium			mg/L	03/21/03	MTG
Cadmium			mg/L	03/21/03	MTG
Chromium			mg/L	03/21/03	MTG
Copper			mg/L	03/21/03	MTG
Lead			mg/L	03/21/03	MTG
Nickel			mg/L	03/21/03	MTG
Selenium			mg/L	03/21/03	MTG
Silver			mg/L	03/21/03	MTG
Zinc			mg/L	03/21/03	MTG

Batch	MIP 4107
Method	SW846-6010B TCLP
Instrument	TJA Enviro II ICP P2

SGS

SGS Ref.#	482387 Method Blank	**Printed Date/Time**	03/24/2003 9:00
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXT 3535
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3010A
Matrix	Water (Surface, Eff., Ground)	**Date**	03/20/2003

QC results affect the following production samples:

1030680002

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
TCLP Metals					
Antimony	0.0250 U	0.0250	mg/L	03/21/03	MTG
Arsenic	0.0250 U	0.0250	mg/L	03/21/03	MTG
Barium	0.00500 U	0.00500	mg/L	03/21/03	MTG
Beryllium	0.00100 U	0.00100	mg/L	03/21/03	MTG
Cadmium	0.00250 U	0.00250	mg/L	03/21/03	MTG
Chromium	0.0100 U	0.0100	mg/L	03/21/03	MTG
Copper	0.00500 U	0.00500	mg/L	03/21/03	MTG
Lead	0.0250 U	0.0250	mg/L	03/21/03	MTG
Nickel	0.0150 U	0.0150	mg/L	03/21/03	MTG
Selenium	0.0500 U	0.0500	mg/L	03/21/03	MTG
Silver	0.0150 U	0.0150	mg/L	03/21/03	MTG
Vanadium	0.00500 U	0.00500	mg/L	03/21/03	MTG
Zinc	0.0150 U	0.0150	mg/L	03/21/03	MTG

Batch	MIP 4107
Method	SW846-6010B TCLP
Instrument	TJA Enviro II ICP P2

SGS

SGS Ref.# 482390 Lab Control Sample

Printed Date/Time 03/24/2003 9:00

Client Name Shannon & Wilson-Fairbanks
Project Name/# 31-1-11162-001 FIA Range
Matrix Water (Surface, Eff., Ground)

Prep Batch MXT 3535
Method SW3010A
Date 03/20/2003

QC results affect the following production samples:
1030680002

Sample Remarks:
LCS

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
TCLP Metals									
Arsenic	LCS	3.67	92	(85-115)			4 mg/L	03/21/03	MTG
Barium	LCS	3.92	98	(85-115)			4 mg/L	03/21/03	MTG
Cadmium	LCS	3.87	97	(85-115)			4 mg/L	03/21/03	MTG
Chromium	LCS	3.94	99	(85-115)			4 mg/L	03/21/03	MTG
Copper	LCS	3.99	100	(85-115)			4 mg/L	03/21/03	MTG
Lead	LCS	4.02	101	(85-115)			4 mg/L	03/21/03	MTG
Nickel	LCS	3.84	96	(85-115)			4 mg/L	03/21/03	MTG
Selenium	LCS	3.94	98	(85-115)			4 mg/L	03/21/03	MTG
Silver	LCS	0.420	105	(85-115)			0.4 mg/L	03/21/03	MTG
Zinc	LCS	3.82	95	(85-115)			4 mg/L	03/21/03	MTG

Batch MIP 4107
Method SW846-6010B TCLP
Instrument TJA Enviro II ICP P2

SGS

SGS Ref.#	482524 Interference Std Waste	**Printed Date/Time**	03/24/2003 9:00
		Prep Batch	
Client Name	Shannon & Wilson-Fairbanks	**Method**	
Project Name/#	31-1-11162-001 FIA Range	**Date**	
Matrix	Water (Surface, Eff., Ground)		

QC results affect the following production samples:

1030680002

Sample Remarks:

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Batch	MIP 4107								
Method	SW846 6010B								
Instrument	TJA Enviro II ICP P2								
Metals Department									
Aluminum	SIC1	244	97	(80-120)			250 mg/L	03/21/03	MTG
Calcium	SIC1	231	92	(80-120)			250 mg/L	03/21/03	MTG
Iron	SIC1	90.0	90	(80-120)			100 mg/L	03/21/03	MTG
Magnesium	SIC1	247	99	(80-120)			250 mg/L	03/21/03	MTG
Batch	MIP 4107								
Method	SW846 6010B								
Instrument	TJA Enviro II ICP P2								

SGS

SGS Ref.#	481160 Method Blank	**Printed Date/Time**	03/24/2003 9:00
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXX 11296
Project Name/#	31-1-11162-001 FIA Range	**Method**	SW3050B
Matrix	Soil/Solid	**Date**	03/10/2003

QC results affect the following production samples:

1030680001

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Metals by ICP/MS					
Aluminum	10.0 U	10.0	mg/Kg	03/12/03	KGF
Antimony	0.300 U	0.300	mg/Kg	03/12/03	KGF
Arsenic	1.00 U	1.00	mg/Kg	03/12/03	KGF
Barium	0.500 U	0.500	mg/Kg	03/12/03	KGF
Beryllium	0.100 U	0.100	mg/Kg	03/12/03	KGF
Cadmium	0.200 U	0.200	mg/Kg	03/12/03	KGF
Calcium	100 U	100	mg/Kg	03/12/03	KGF
Chromium	1.00 U	1.00	mg/Kg	03/12/03	KGF
Cobalt	0.500 U	0.500	mg/Kg	03/12/03	KGF
Copper	2.00 U	2.00	mg/Kg	03/12/03	KGF
Iron	100 U	100	mg/Kg	03/12/03	KGF
Lead	0.0729F	0.200	mg/Kg	03/12/03	KGF
Potassium	100 U	100	mg/Kg	03/12/03	KGF
Selenium	1.00 U	1.00	mg/Kg	03/12/03	KGF
Silver	0.100 U	0.100	mg/Kg	03/12/03	KGF
Sodium	200 U	200	mg/Kg	03/12/03	KGF
Thallium	0.0200 U	0.0200	mg/Kg	03/12/03	KGF
Vanadium	2.00 U	2.00	mg/Kg	03/12/03	KGF
Zinc	1.00 U	1.00	mg/Kg	03/12/03	KGF
Magnesium	30.0 U	30.0	mg/Kg	03/12/03	KGF
Manganese	2.00 U	2.00	mg/Kg	03/12/03	KGF
Molybdenum	1.00 U	1.00	mg/Kg	03/12/03	KGF
Nickel	2.00 U	2.00	mg/Kg	03/12/03	KGF

Batch	MMS 2411
Method	SW846 6020
Instrument	Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481161 Lab Control Sample	**Printed Date/Time**	03/24/2003 9:00
		Prep Batch	MXX 11296
Client Name	Shannon & Wilson-Fairbanks	**Method**	SW3050B
Project Name/#	31-1-11162-001 FIA Range	**Date**	03/10/2003
Matrix	Soil/Solid		

QC results affect the following production samples:
1030680001

Sample Remarks:
LCS

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS									
Aluminum	LCS	44.1	88	(85-115)			50 mg/Kg	03/12/03	KGF
Antimony	LCS	44.2	88	(85-115)			50 mg/Kg	03/12/03	KGF
Arsenic	LCS	47.8	96	(85-115)			50 mg/Kg	03/12/03	KGF
Barium	LCS	47.0	94	(85-115)			50 mg/Kg	03/12/03	KGF
Beryllium	LCS	46.4	93	(85-115)			50 mg/Kg	03/12/03	KGF
Cadmium	LCS	45.4	91	(85-115)			50 mg/Kg	03/12/03	KGF
Calcium	LCS	476	95	(85-115)			500 mg/Kg	03/12/03	KGF
Chromium	LCS	45.5	91	(85-115)			50 mg/Kg	03/12/03	KGF
Cobalt	LCS	45.9	92	(85-115)			50 mg/Kg	03/12/03	KGF
Copper	LCS	46.9	94	(85-115)			50 mg/Kg	03/12/03	KGF
Iron	LCS	50.4F	101	(85-115)			50 mg/Kg	03/12/03	KGF
Lead	LCS	47.9	96	(85-115)			50 mg/Kg	03/12/03	KGF
Potassium	LCS	474	95	(85-115)			500 mg/Kg	03/12/03	KGF
Selenium	LCS	42.8	86	(85-115)			50 mg/Kg	03/12/03	KGF
Silver	LCS	9.35	94	(85-115)			10 mg/Kg	03/12/03	KGF
Sodium	LCS	470	94	(85-115)			500 mg/Kg	03/12/03	KGF
Thallium	LCS	46.9	94	(85-115)			50 mg/Kg	03/12/03	KGF
Vanadium	LCS	45.7	91	(85-115)			50 mg/Kg	03/12/03	KGF
Zinc	LCS	46.2	92	(85-115)			50 mg/Kg	03/12/03	KGF
Magnesium	LCS	476	95	(85-115)			500 mg/Kg	03/12/03	KGF
Manganese	LCS	46.6	93	(85-115)			50 mg/Kg	03/12/03	KGF
Molybdenum	LCS	44.4	89	(85-115)			50 mg/Kg	03/12/03	KGF
Nickel	LCS	46.5	93	(85-115)			50 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.# 481162 Bench Spike DIGESTED

Printed Date/Time 03/24/2003 9:00
Prep Batch MXX 11296
Method Soils/Solids Digest for Metals
Date 03/10/2003

Original 1030672024
Matrix Soil/Solid

QC results affect the following production samples:
1030680001

Sample Remarks:
BND

Parameter	Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS									
Lead	BND 5150	6980	104	(75-125)			2180 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	481163	Matrix Spike	**Printed Date/Time**		03/24/2003 9:00
	481164	Matrix Spike Duplicate	**Prep**	**Batch**	MXX 11296
				Method	Soils/Solids Digest for Metals
				Date	03/10/2003
Original	1030672024				
Matrix	Soil/Solid				

QC results affect the following production samples:

1030680001

Sample Remarks:

MS SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

MSD SW6020 ICP Metals - MS/MSD recoveries for Pb, Ba were outside of acceptance criteria; post digestion spike was successful.

Parameter		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS										
Lead	MS	5150	1350	-7550*	(75-125)			44.7 mg/Kg	03/12/03	KGF
	MSD		1250	-7820*		7	(< 20)	44.4 mg/Kg	03/12/03	KGF

Batch MMS 2411
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS/CT&E Environmental Services
Alaska Division
Level I Data Report

Project:	31-1-11162-001 FIA Shooting Rn
Client:	Shannon & Wilson-Fairbanks
CT&E Work Order:	1031359

Contents:

Note:
Unless otherwise noted, all quality assurance/quality control criteria are in compliance with the proper regulatory authority and/or SGS's Quality Assurance Program Plan.

SGS

Case Narrative

Client	SHANFBK	Shannon & Wilson-Fairbanks	**Printed Date/Time**	4/1/2003	15:49
Workorder	1031359	31-1-11162-001 FIA Shooting Rn			

Sample ID		Client Sample ID
1031359001	**PS**	**1162-022703-1E6**

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level.

Sample ID		Client Sample ID
1031359002	**PS**	**1162-022703-1E8**

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level.

Sample ID		Client Sample ID
1031359003	**PS**	**1162-022703-1E10**

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level.

QUOTE# 6328

1031359

Shannon & Wilson, Inc.

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

11500 Olive Blvd., Suite 276
St. Louis, MO 63141
(314) 872-8170

2055 Hill Road
Fairbanks, AK 99707
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

Chain of Custody Record

Laboratory SGS

Attn: Melody

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Total Lead					Total Number of Containers	Remarks/Matrix
1162-022703-1E6	(1) A	1:17	2/27/03		X	X						Soils from Shooting Range
1162-022703-1E8	(2) A	1:20	2/27/03		X	X						
1162-022703-1E10	(3) A	1:25	2/27/03		X	X						

RUSH

Project Information		Sample Receipt	
Project Number:	31-1-11162-001	Total Number of Containers	3
Project Name:	FIAC SHOOTING RANGE	COC Seals/Intact? Y/N/NA	NA
Contact:	JULIE KOERNER	Received Good Cond./Cold	(Cold) 5.7C
Ongoing Project?	Yes ☐ No ☐	Delivery Method:	HAND
Sampler:	ANDREA CARLSON	(attach shipping bill, if any)	

Instructions

Requested Turn Around Time: ~~STANDARD~~ 3-DAY (NO)

Special Instructions: LEVEL 1 & EDD

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 11:30	Signature: Time: 1430	Signature: Time:
Printed Name: Date: 3/27/03 ANDREA CARLSON	Printed Name: Date: 3/27/03 Melody Debenham	Printed Name: Date:
Company: S&W	Company: SGS/CTE	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 11:30	Signature: Time:	Signature: Time: 0925
Printed Name: Date: 3/27/03 Melody Debenham	Printed Name: Date:	Printed Name: Date: 3-28-03
Company: SGS/CTE	Company:	Company: SGS/CTE

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

SGS

1031359

SAMPLE RECEIPT FORM

CT&E WO#:

Yes	No		
✓		Are samples **RUSH**, priority, or *within 72 hrs.* of **hold time**?	
✓		If yes have you done *e-mail notification*?	
	✓	Are samples *within 24 hrs.* of **hold time** or **due date**?	
	NA	If yes, have you *spoken with* Supervisor?	
	NA	Archiving bottles – if required, are they properly marked?	
		Are there any **problems**? PM Notified?	
	NA	Were samples preserved correctly and pH verified?	
	✓	If this is for PWS, provide **PWSID.**	
	✓	Will courier charges apply?	
		Method of payment?	
✓		Data package required? (Level 1 / 2 / 3)	
	✓	Is this a DOD project? (USACE, Navy, AFCEE)	
		If yes, complete DOD block below	

Due Date: 4/1/03

Received Date/Time: 3/27/03 @ 1130

Received Temperature*:

Thermometer ID: Probe C

Cooler ID	Temp Blank	Cooler Temp
1	5.7°C	

*Temperature readings include thermometer correction factors

Delivery method (circle one): Commercial / Client / SGS-CT&E

Additional Sample Remarks

Yes	No	
		Extra Sample Volume?
		Limited Sample Volume?
		Field pres'd for volatiles?
		Field-filtered for dissolved?
		Lab-filtered for dissolved?
		Ref Lab required?

Yes	No	
		Is received temperature 4 ± 2°C?
		Exceptions: Samples/Analyses Affected:
		Rad Screen performed?
		Result:
		Was there an airbill? Note #:
		Was cooler sealed with custody seals? Fax'd to COE?
		#/where:
		Were seal intact upon arrival?
		Was there a COC with cooler?
		Was the COC filled out properly?
		Did the COC indicate ACOE / AFCEE project? (if applicable)
		Did the COC and samples correspond?
		Were all sample packed to prevent breakage?
		Packing material:
		Were all samples unbroken and clearly labeled?
		Were all samples sealed in separate plastic bags?
		Were all bottles for volatiles free of headspace?
		Were correct container / sample sizes submitted?
		Is sample condition good?

Yes	No	
		Was client notified of problems?

Individual contacted:

Date/Time:

Phone/Fax:

Reason for contact:

CT&E Contact:

otes:

Completed by (sign): Melody Debenham (print): Melody Debenham

Login proof (check one): waived ___ required X performed by:

SGS

1031359

CT&E WO#

SAMPLE RECEIPT FORM (page 2)

#	Cont. ID	Matrix	Test	QC	TB	Container Volume: 1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8 oz	4 oz	Other	Container Type: AG	CG	HDPE	Nalgene	Cubie	Coli	Septa	Other	Preservative: None	HCl	HNO3	H2SO4	MeOH	Na2S2O3	NaOH	Other
1-3	A	2	lead										3		X								X							

Bottle Totals	1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8 oz	4 oz	Other
								3	

Completed by: Melody Deberhan Date: 3/27/03

Form F004r08, 01-22-03 revision, file document forms approved F004r08(SRF).doc

SGS

CT&E WO#: 1031359

SAMPLE RECEIPT FORM FOR TRANSFERS
From
FAIRBANKS, AK OR HONOLULU, HAWAII
To
ANCHORAGE, AK

TO BE COMPLETED IN ANCHORAGE UPON ARRIVAL FROM FAIRBANKS OR HAWAII. NOTES RECORDED BELOW ARE ACTIONS NEEDED UPON ARRIVAL IN ANCHORAGE.

Notes: _____

Receipt Date / Time: 3.28-03 0928

COOLER AND TEMP BLANK READINGS*

Cooler ID	Temp Blank	Cooler	Cooler ID	Temp Blank	Cooler
1	2.2	5.5			

CUSTODY SEALS INTACT: (YES) / NO # / WHERE: 2 on 8

COMPLETED BY (INITIAL): _____

CT&E Environmental Services Inc.

CUSTODY SEAL

Signature: Melody Dekaham **Date/Time:** 3/27/03 @ 430

CT&E Environmental Services Inc.

CUSTODY SEAL

Signature: Melody Dekaham **Date/Time:** 3/27/03 @ 430

SGS

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.sgsenvironmental.com

Andrea Carlson
Shannon & Wilson-Fairbanks
2055 Hill Road
Fairbanks, Fairbanks North Star AK 99707

Work Order:	1031359
	31-1-11162-001 FIA Shooting Rn
Client:	Shannon & Wilson-Fairbanks
Report Date:	April 01, 2003

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your SGS Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates an estimated value that falls below PQL, but is greater than the MDL.
J	Indicates an estimated value that falls below PQL, but is greater than the MDL.
B	Indicates the analyte is found in the blank associated with the sample.
*	The analyte has exceeded allowable limits.
GT	Greater Than
D	Secondary Dilution
LT	Less Than
!	Surrogate out of range

SGS

SGS Ref.#	1031359001
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Shooting Rn
Client Sample ID	1162-022703-1E6
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	04/01/2003 15:49
Collected Date/Time	03/27/2003 1:17
Received Date/Time	03/27/2003 11:30
Technical Director	**Stephen C. Ede**

Released By Stephen C. Ede

Sample Remarks:

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	95.9		%	SM20 2540G			03/28/03	MCM
Metals by ICP/MS								
Lead	439	1.04	mg/Kg	SW846 6020		03/28/03	04/01/03	KGF

SGS

SGS Ref.#	1031359002
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Shooting Rn
Client Sample ID	1162-022703-1E8
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	04/01/2003 15:49
Collected Date/Time	03/27/2003 1:20
Received Date/Time	03/27/2003 11:30
Technical Director	**Stephen C. Ede**
Released By	Stephen C. Ede

Sample Remarks:

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	96.3		%	SM20 2540G			03/28/03	MCM
Metals by ICP/MS								
Lead	360	0.206	mg/Kg	SW846 6020		03/28/03	04/01/03	KGF

SGS

SGS Ref.#	1031359003
Client Name	Shannon & Wilson-Fairbanks
Project Name/#	31-1-11162-001 FIA Shooting Rn
Client Sample ID	1162-022703-1E10
Matrix	Soil/Solid

All Dates/Times are Alaska Standard Time

Printed Date/Time	04/01/2003 15:49
Collected Date/Time	03/27/2003 1:25
Received Date/Time	03/27/2003 11:30
Technical Director	**Stephen C. Ede**

Released By Stephen C. Ede

Sample Remarks:

SW6020 ICP Metals - MS/MSD recoveries for Pb were outside of acceptance criteria; post digestion spike was successful. Sample concentration is 4X greater than the spike level.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	94.9		%	SM20 2540G			03/28/03	MCM
Metals by ICP/MS								
Lead	35.2	0.210	mg/Kg	SW846 6020		03/28/03	04/01/03	KGF

SGS

SGS Ref.#	483683 Method Blank	**Printed Date/Time**	04/01/2003 15:49
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Shooting Rn	**Method**	
Matrix	Soil/Solid	**Date**	

QC results affect the following production samples:

1031359001, 1031359002, 1031359003

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Solids					
Total Solids	100		%	03/28/03	MCM
Batch SPT 4846					
Method SM20 2540G					
Instrument					

SGS

SGS Ref.#	483684 Duplicate	**Printed Date/Time**	04/01/2003 15:49
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	
Project Name/#	31-1-11162-001 FIA Shooting Rn	**Method**	
Original	1031359001	**Date**	
Matrix	Soil/Solid		

QC results affect the following production samples:

1031359001, 1031359002, 1031359003

Sample Remarks:

Parameter	Original Result	QC Result	RPD	RPD Limits	Analysis Date	Init
Solids						
Total Solids	95.9	95.8	0	(< 5)	03/28/03	MCM
Batch SPT 4846						
Method SM20 2540G						
Instrument						

SGS

SGS Ref.#	483576 Method Blank	**Printed Date/Time**	04/01/2003 15:49
Client Name	Shannon & Wilson-Fairbanks	**Prep Batch**	MXX 11373
Project Name/#	31-1-11162-001 FIA Shooting Rn	**Method**	SW3050B
Matrix	Soil/Solid	**Date**	03/28/2003

QC results affect the following production samples:

1031359001, 1031359002, 1031359003

Sample Remarks:

Parameter	Results	Reporting Limit	Units	Analysis Date	Init
Metals by ICP/MS					
Aluminum	10.0 U	10.0	mg/Kg	04/01/03	KGF
Antimony	0.300 U	0.300	mg/Kg	04/01/03	KGF
Arsenic	1.00 U	1.00	mg/Kg	04/01/03	KGF
Barium	0.500 U	0.500	mg/Kg	04/01/03	KGF
Beryllium	0.100 U	0.100	mg/Kg	04/01/03	KGF
Cadmium	0.200 U	0.200	mg/Kg	04/01/03	KGF
Calcium	100 U	100	mg/Kg	04/01/03	KGF
Chromium	1.00 U	1.00	mg/Kg	04/01/03	KGF
Cobalt	0.500 U	0.500	mg/Kg	04/01/03	KGF
Iron	100 U	100	mg/Kg	04/01/03	KGF
Copper	2.00 U	2.00	mg/Kg	04/01/03	KGF
Lead	0.200 U	0.200	mg/Kg	04/01/03	KGF
Potassium	100 U	100	mg/Kg	04/01/03	KGF
Selenium	1.00 U	1.00	mg/Kg	04/01/03	KGF
Silver	0.100 U	0.100	mg/Kg	04/01/03	KGF
Sodium	200 U	200	mg/Kg	04/01/03	KGF
Thallium	0.0200 U	0.0200	mg/Kg	04/01/03	KGF
Vanadium	2.00 U	2.00	mg/Kg	04/01/03	KGF
Zinc	1.00 U	1.00	mg/Kg	04/01/03	KGF
Magnesium	30.0 U	30.0	mg/Kg	04/01/03	KGF
Manganese	2.00 U	2.00	mg/Kg	04/01/03	KGF
Molybdenum	1.00 U	1.00	mg/Kg	04/01/03	KGF
Nickel	2.00 U	2.00	mg/Kg	04/01/03	KGF

Batch	MMS 2438
Method	SW846 6020
Instrument	Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	483577 Lab Control Sample	**Printed Date/Time**	04/01/2003 15:49
		Prep Batch	MXX 11373
Client Name	Shannon & Wilson-Fairbanks	**Method**	SW3050B
Project Name/#	31-1-11162-001 FIA Shooting Rn	**Date**	03/28/2003
Matrix	Soil/Solid		

QC results affect the following production samples:
1031359001, 1031359002, 1031359003

Sample Remarks:
LCS

Parameter		QC Results	Pct Recov		LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS										
Aluminum	LCS	42.3	85	*	(85-115)			50 mg/Kg	04/01/03	KGF
Antimony	LCS	46.2	92		(85-115)			50 mg/Kg	04/01/03	KGF
Arsenic	LCS	49.1	98		(85-115)			50 mg/Kg	04/01/03	KGF
Barium	LCS	48.4	97		(85-115)			50 mg/Kg	04/01/03	KGF
Beryllium	LCS	47.2	94		(85-115)			50 mg/Kg	04/01/03	KGF
Cadmium	LCS	46.9	94		(85-115)			50 mg/Kg	04/01/03	KGF
Calcium	LCS	502	100		(85-115)			500 mg/Kg	04/01/03	KGF
Chromium	LCS	47.8	96		(85-115)			50 mg/Kg	04/01/03	KGF
Cobalt	LCS	46.1	92		(85-115)			50 mg/Kg	04/01/03	KGF
Copper	LCS	48.4	97		(85-115)			50 mg/Kg	04/01/03	KGF
Iron	LCS	100 U	57	*	(85-115)			50 mg/Kg	04/01/03	KGF
Lead	LCS	46.4	93		(85-115)			50 mg/Kg	04/01/03	KGF
Potassium	LCS	527	105		(85-115)			500 mg/Kg	04/01/03	KGF
Selenium	LCS	46.4	93		(85-115)			50 mg/Kg	04/01/03	KGF
Silver	LCS	9.44	94		(85-115)			10 mg/Kg	04/01/03	KGF
Sodium	LCS	523	105		(85-115)			500 mg/Kg	04/01/03	KGF
Thallium	LCS	49.0	98		(85-115)			50 mg/Kg	04/01/03	KGF
Vanadium	LCS	48.0	96		(85-115)			50 mg/Kg	04/01/03	KGF
Zinc	LCS	46.0	92		(85-115)			50 mg/Kg	04/01/03	KGF
Magnesium	LCS	524	105		(85-115)			500 mg/Kg	04/01/03	KGF
Manganese	LCS	48.7	98		(85-115)			50 mg/Kg	04/01/03	KGF
Molybdenum	LCS	46.0	92		(85-115)			50 mg/Kg	04/01/03	KGF
Nickel	LCS	48.3	97		(85-115)			50 mg/Kg	04/01/03	KGF

Batch MMS 2438
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.#	483578	Matrix Spike	**Printed Date/Time**		04/01/2003 15:49
	483579	Matrix Spike Duplicate	**Prep**	**Batch**	MXX 11373
				Method	Soils/Solids Digest for Metals
				Date	03/28/2003
Original	1031359001				
Matrix	Soil/Solid				

QC results affect the following production samples:
1031359001, 1031359002, 1031359003

Sample Remarks:
MS

MSD

Parameter		Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS										
Lead	MS	439	599	358*	(75-125)			49.9 mg/Kg	04/01/03	KGF
	MSD		559	277*		7	(< 20)	49.8 mg/Kg	04/01/03	KGF

Batch MMS 2438
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

SGS

SGS Ref.# 483580 Bench Spike DIGESTED

Printed Date/Time 04/01/2003 15:49
Prep Batch MXX 11373
Method Soils/Solids Digest for Metals
Date 03/28/2003

Original 1031359001
Matrix Soil/Solid

QC results affect the following production samples:
1031359001, 1031359002, 1031359003

Sample Remarks:
BND

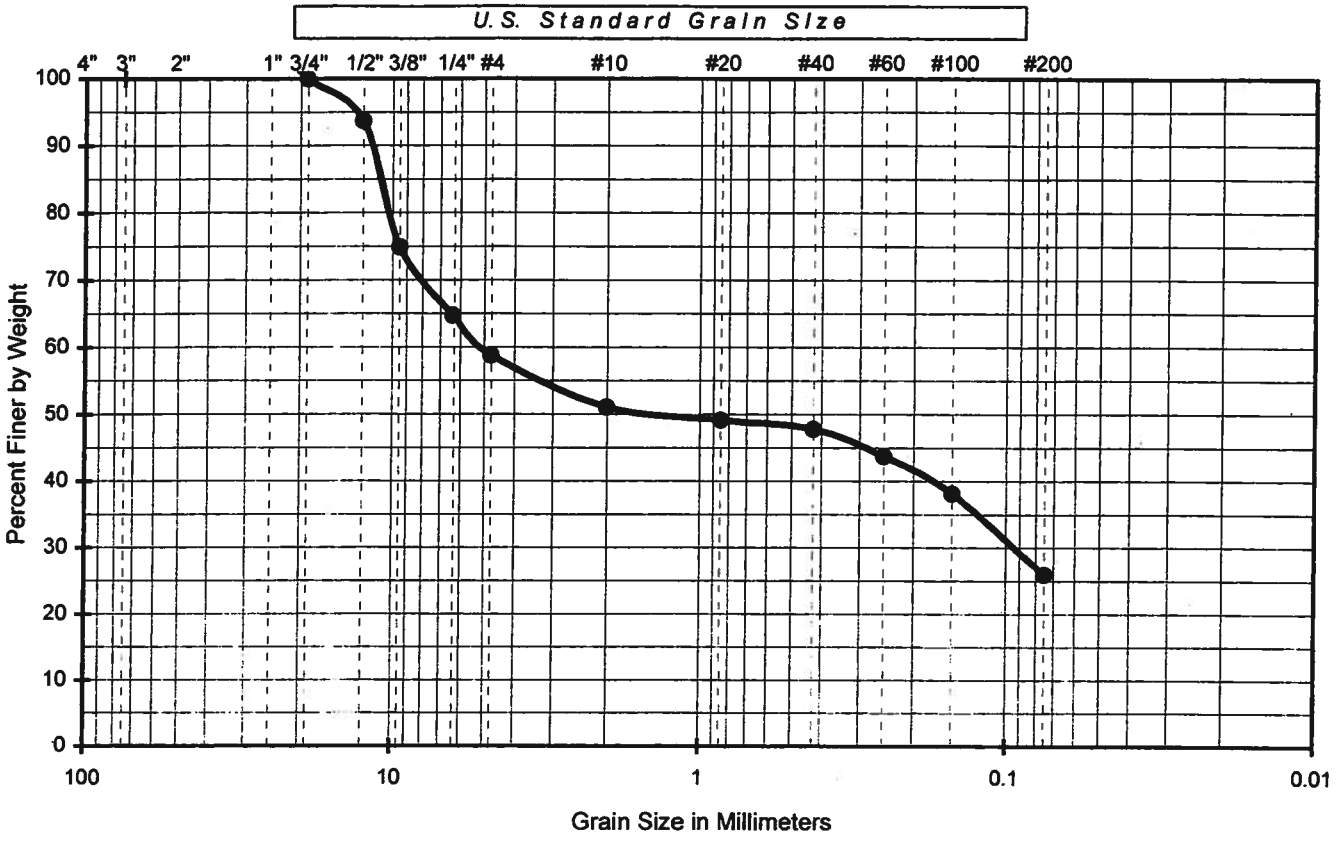
Parameter	Original Result	QC Result	Pct Recov	MS/MSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date	Init
Metals by ICP/MS									
Lead	BND 439	2980	103	(75-125)			2490 mg/Kg	04/01/03	KGF

Batch MMS 2438
Method SW846 6020
Instrument Perkin Elmer Sciex ICP-MS P3

APPENDIX D

Grain Size Distribution Results

GRAIN SIZE DISTRIBUTION



Sieve Size	Percent Passing by Weight	Percent Retained by Weight	Percent Metals Retained (Visual)
>6"			
4"			
3"			
2.5"			
2"			
1"			
3/4"	100	0	0
1/2"	94	6	3
3/8"	75	25	13
1/4"	65	35	14
#4	59	41	14
#10	51	49	
#20	49	51	
#40	48	52	
#60	44	56	
#100	38	62	
#200	26	74	

Sample Description/Classification:
Silty sand

Sample Location:
Boring 1G (1'-1.5')

Metals Retained by weight (%) **14**

Client Data:
Address: **Fairbanks International Airport**
6450 Airport Way
Fairbanks, Alaska 99709

Client Sample ID: **Boring 1G (1'-1.5')**
P.O. Number:

Date Sampled: **2/28/03**
Date Received: **3/4/03**

*Reviewed by:*_____

GRAIN SIZE DISTRIBUTION

ASTM C 136

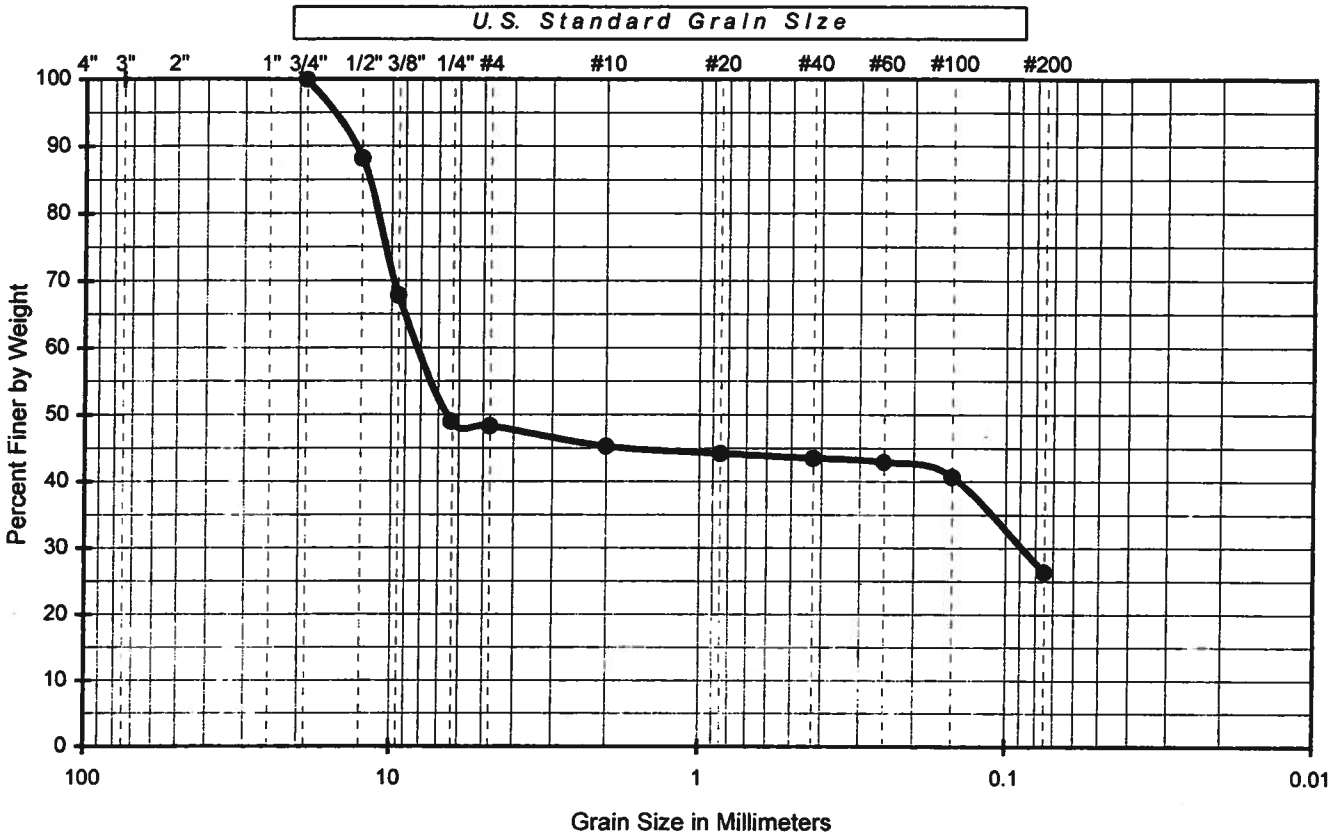
Project: **FIA Shooting Range**

S&W Sample Identification: **Boring 1G (1'-1.5')**

April 2003 31-1-11162-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
2055 Hill Road, Fairbanks, Alaska 99709-5244
Phone: (907) 479-0600 Fax: (907) 479-5691

GRAIN SIZE DISTRIBUTION



Sieve Size	Percent Passing by Weight	Percent Retained by Weight	Percent Metals Retained (Visual)
>6"			
4"			
3"			
2.5"			
2"			
1"			
3/4"	100	0	0
1/2"	88	12	12
3/8"	68	32	32
1/4"	49	51	51
#4	48	52	52
#10	45	55	
#20	44	56	
#40	44	56	
#60	43	57	
#100	41	59	
#200	26	74	

Sample Description/Classification:
Silty sand

Sample Location:
Boring 1G (Surface)

Metals Retained by weight (%) **52**

Client Data:
Address: **Fairbanks International Airport**
6450 Airport Way
Fairbanks, Alaska 99709

Client Sample ID: **Boring 1G (Surface)**
P.O. Number:

Date Sampled: **2/28/03**
Date Received: **3/4/03**

*Reviewed by:*_____

GRAIN SIZE DISTRIBUTION

ASTM C 136

Project: **FIA Shooting Range**

S&W Sample Identification: **Boring 1G (Surface)**

April 2003 31-1-11162-001

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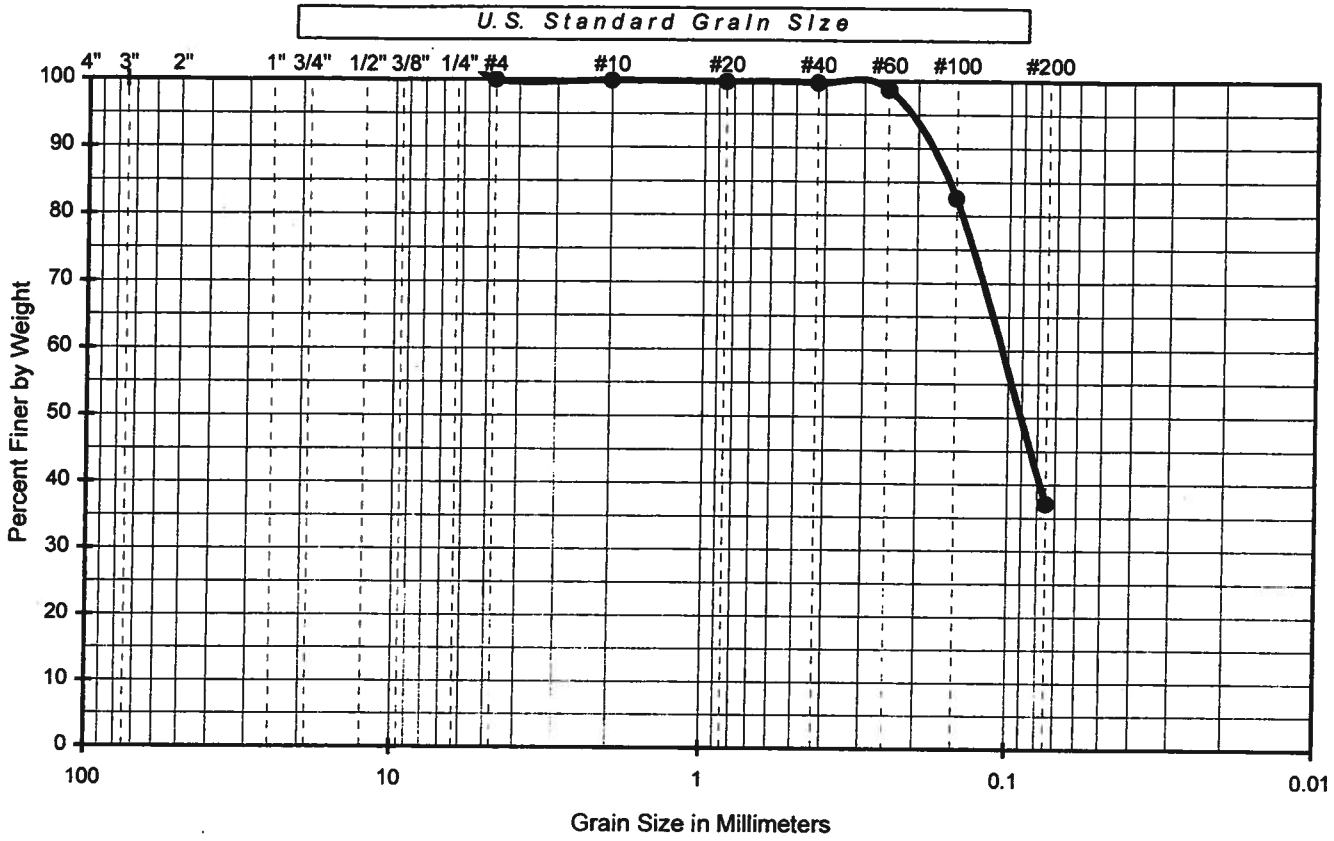
2055 Hill Road, Fairbanks, Alaska 99709-5244
Phone: (907) 479-0600 Fax: (907) 479-5691

GRAIN SIZE DISTRIBUTION



Sieve Size	Percent Passing by Weight	Percent Retained by Weight	Percent Metals Retained (Visual)
>6"			
4"			
3"			
2.5"			
2"			
1"			
3/4"			
1/2"			
3/8"			
1/4"			
#4	100	0	
#10	100	0.1	
#20	100	0.3	
#40	100	0.4	
#60	99	56	
#100	83	62	
#200	37	74	

Sample Description/Classification:
Silty sand

Sample Location:
Boring 3E (0.5'-1')

Metals Retained by weight (%) **0**
No Visible Metals

Client Data:
Address: **Fairbanks International Airport**
6450 Airport Way
Fairbanks, Alaska 99709

Client Sample ID: **Boring 3E (0.5'-1')**
P.O. Number:

Date Sampled: **2/28/03**
Date Received: **3/4/03**

*Reviewed by:*_____

GRAIN SIZE DISTRIBUTION

ASTM C 136

Project: **FIA Shooting Range**

S&W Sample Identification: **Boring 3E (0.5'-1')**

April 2003 31-1-11162-001

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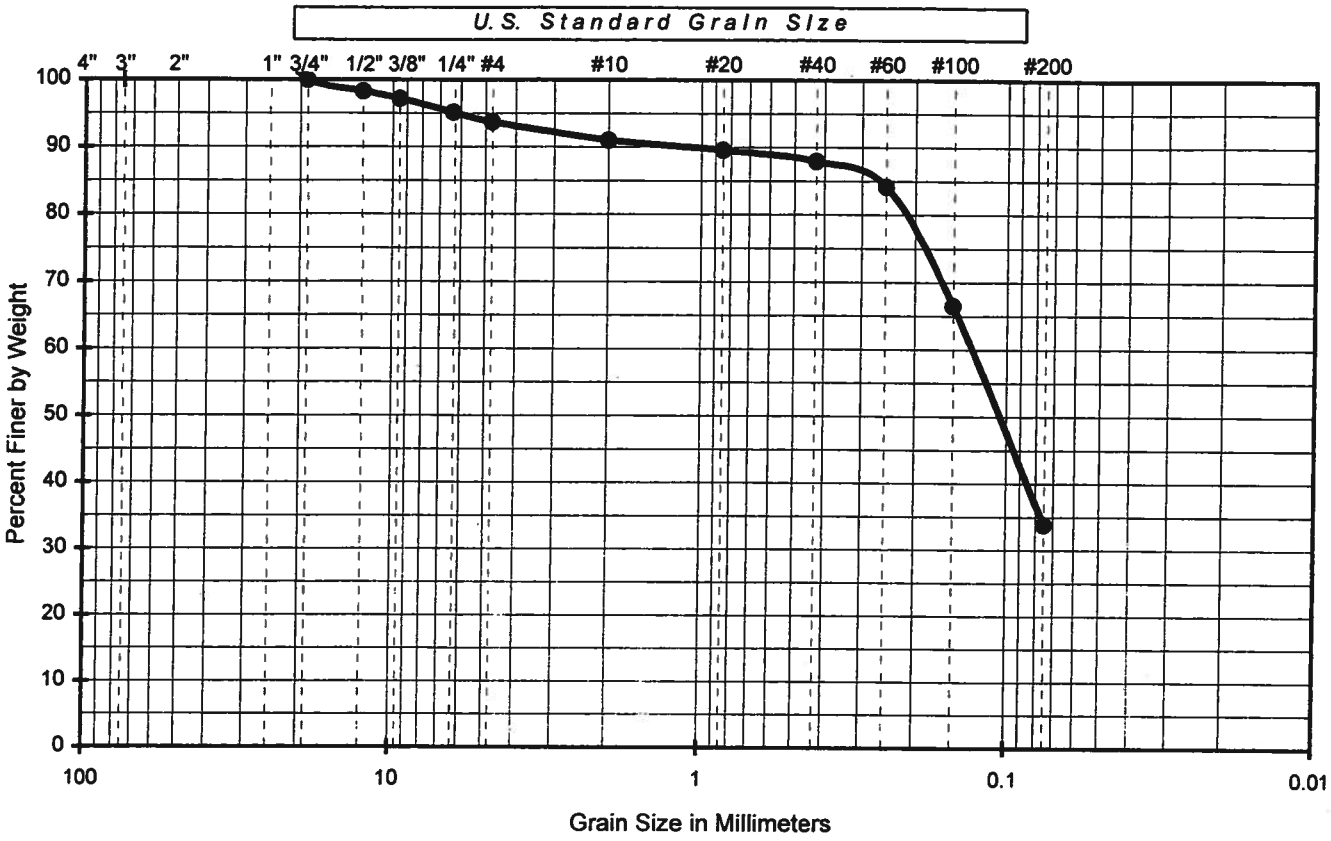
Phone: (907) 479-0600 Fax: (907) 479-5691

GRAIN SIZE DISTRIBUTION



Sieve Size	Percent Passing by Weight	Percent Retained by Weight	Percent Metals Retained (Visual)
>6"			
4"			
3"			
2.5"			
2"			
1"			
3/4"	100	0	
1/2"	98	2	
3/8"	97	3	
1/4"	95	5	
#4	94	6	
#10	91	9	
#20	90	10	
#40	88	12	
#60	84	16	
#100	67	33	
#200	34	66	

Sample Description/Classification:
Silty sand

Sample Location:
Boring 3G (0-.5')

Metals Retained by weight (%) **0**
No Visible Metals

Client Data:
Address: **Fairbanks International Airport**
6450 Airport Way
Fairbanks, Alaska 99709

Client Sample ID: **Boring 3G (0-.5')**
P.O. Number:

Date Sampled: **2/28/03**
Date Received: **3/4/03**

*Reviewed by:*_____

GRAIN SIZE DISTRIBUTION

ASTM C 136

Project: **FIA Shooting Range**

S&W Sample Identification: **Boring 3G (0-.5')**

April 2003 31-1-11162-001

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