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The Trusted Integrator for Sustainable Solutions

27 March 2012

U.S. Environmental Protection Agency Region III
Attn: Ms. Ruth Scharr
On-Scene Coordinator
1650 Arch Street
Philadelphia, Pennsylvania 19103

Subject: Final Trip Report Addendum – Phase II Soil Assessment

Project: FMO Pesticide Site
EPA Contract No.: EP-S3-10-05
TDD No.: WS-01-10-07-006
Document Control No.: W0006.1A.00266

Dear Ms. Scharr:

Weston Solutions, Inc. (WESTON®) is submitting the Final Phase II Trip Report Addendum for the FMO Pesticide Site. This Trip Report summarizes the phase II soil sampling activities conducted at the Site from July 2010 to October 2011 and is an addendum to the "Trip Report for the Phase II Soil Assessment at the Former Mohr Orchard Site," submitted June 30, 2010. If you have any questions regarding this report, please call me at (610) 701-3191.

Sincerely,

WESTON SOLUTIONS, INC,

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A black rectangular box redacting the name of the sender.

Project Task Co-Lead

Enclosure

cc: TDD File

**FINAL
TRIP REPORT ADDENDUM
PHASE II SOIL ASSESSMENT
FMO PESTICIDE SITE
NORTH WHITEHALL TOWNSHIP, LEHIGH COUNTY,
PENNSYLVANIA**

**EPA CONTRACT NO.: EP-S3-10-05
TECHNICAL DIRECTION DOCUMENT NO.: WS-01-10-07-006
DOCUMENT CONTROL NO.: W0006.1A.00266**

Prepared For:



**U.S. ENVIRONMENTAL PROTECTION AGENCY REGION III
HAZARDOUS SITE CLEANUP DIVISION
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Prepared By




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WESTON PROJECT No.: 20403.012.001.0006.00


MARCH 2012


**FINAL
TRIP REPORT ADDENDUM
PHASE II SOIL ASSESSMENT
FMO PESTICIDE SITE
NORTH WHITEHALL TOWNSHIP, LEHIGH COUNTY,
PENNSYLVANIA**




Project Task Co-Lead


3/27/2012
Date




WESTON – Project Work Scope Manager


3/27/2012
Date



WESTON – Program Manager


3/27/2012
Date



USEPA – On-Scene Coordinator
Ruth Scharr

3/30/2012
Date

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ACRONYM LIST

bgs	below ground surface
CLP	Contract Laboratory Program
EPA	United States Environmental Protection Agency
OSC	On-Scene Coordinator
ppm	parts per million
SOP	Standard Operating Procedure
START	Superfund Technical Assessment and Response Team
TDD	Technical Direction Document
WESTON	Weston Solutions, Inc.

1.0 INTRODUCTION

Under the Eastern Area Superfund Technical Assessment and Response Team (START) Contract No. EP-S3-10-05, Technical Direction Document (TDD) No. WS-01-10-07-006, the U.S. Environmental Protection Agency (EPA) Region III tasked Weston Solutions, Inc. (WESTON®) to conduct additional Phase II soil sampling activities at the FMO Pesticide Site (site) in Lehigh County, Pennsylvania. Sampling activities began in July 2010 and continued through October 2011. The soil sampling activities were to assist in determining if historical use of lead-arsenate pesticide resulted in a threat to human health and/or the environment on individual residential properties within the site. This report is an addendum to Tetra Tech's Phase II Trip Report dated June 30, 2010 (Tetra Tech 2010). Soil was sampled from an additional 16 residences from July 2010 to October 2011. Sampling was conducted in accordance with the "Phase II Soil Sampling & Phase II Confirmation Soil Sampling Field Sampling and Analysis Plan," (WESTON 2010a) and the "Abbreviated Sampling Plan for Extended Phase II Soil Sampling at the FMO Pesticide Site" (WESTON 2011).

This trip report presents site background information in Section 2.0, summarized field activities in Section 3.0, and summarizes analytical results in Section 4.0. All references cited in this trip report are listed in Section 5.0.

2.0 BACKGROUND

Site background and geologic details can be found in Sections 2.0 and 3.0 of the "Trip Report for the Phase II Soil Assessment at the Former Mohr Orchard Site" submitted by Tetra Tech EM, Inc. on June 30, 2010 (Tetra Tech 2010).

3.0 SITE ACTIVITIES

From July 2010 to October 2011, Phase II soil sampling was conducted at 16 residential properties. Samples were analyzed for arsenic and lead. WESTON documented and photographed site activities in accordance with WESTON Standard Operating Procedure (SOP) No. 101, "Logbook Documentation" (WESTON 2006a). This section discusses soil sampling and related activities during this assessment.

3.1 PHASE II RESIDENTIAL SOIL SAMPLING

Prior to June 29, 2011, at each residential property, composite surface soil samples were collected at a depth of 0 to 3 inches below ground surface (bgs) from five discrete points in each yard area (front and back). Any side yard areas were included with discrete points from the front and back yard composite samples. Each of the discrete points was located within approximately 40 feet of the dwelling. One of the discrete locations in both the front and back yard was selected randomly for a grab subsurface soil sample from 6 to 12 inches bgs. If present, one grab surface soil sample was collected from an existing vegetable garden area at a depth of 0 - 6 inches bgs. In addition, if present on the property and identified by the resident, one grab surface soil sample was collected from a toddler play area at a depth of 0 - 3 inches bgs.

From June 29, 2011 to August 22, 2011, at each residential property, composite surface soil samples were collected at a depth of 0 to 3 inches below ground surface (bgs) from up to 10 discrete points in each yard area (front and back). Any side yard areas were included with discrete points from the front and back yard composite samples. Each of the discrete points was located within approximately 40 feet of the dwelling. The number of discrete points collected was at the discretion of the On-Scene Coordinator (OSC) and based upon the size and layout of the yard. The rationale behind modifying the sampling strategy to include additional sampling points was to achieve a more representative sample of the entire yard and was the decision of the OSC. No grab subsurface samples were collected at any residences sampled during or after June 29, 2011, at the direction of the OSC.

From June 29, 2011 to August 22, 2011, the decision was made by the OSC to modify the sampling strategy for vegetable garden areas from grab sampling to composite sampling to achieve a more representative sample of the vegetable garden area. If present, one composite surface soil sample composed of up to five discrete points was collected from an existing vegetable garden area at a depth of 0 - 6 inches bgs. The number of discrete points collected was at the discretion of the On-Scene Coordinator (OSC) and based up on the size and layout of the vegetable garden area. In addition, if present on the property and identified by the resident, one grab surface soil sample was collected from a toddler play area at a depth of 0 - 3 inches bgs.

At the residential property sampled in October 2011, composite surface soil samples were collected at a depth of 0 to 3 inches below ground surface (bgs) from up to 10 discrete points in each yard area (front, side, and back). The decision was made by the OSC to include the side yard as a separate sample due to the expansive nature of the property in order to accurately characterize the soil concentrations. Each of the discrete points was located within approximately 40 feet of the dwelling. The number of discrete points collected was at the discretion of the On-Scene Coordinator (OSC). No grab subsurface samples were collected at this residence, at the direction of the OSC. In addition, neither a vegetable garden area nor toddler play area sample was collected at this residence.

All sampling locations were recorded in the field using hand drawn sketches. Soil samples were collected in accordance with WESTON SOP No. 302, "Surface Soil Sampling" (WESTON 2006b). Non-dedicated sampling equipment, including pickaxes, was decontaminated following each use in accordance with WESTON SOP No. 301, "Decontamination Procedures" (WESTON 2006c).

3.2 SAMPLING MANAGEMENT

Soil samples collected prior to June 2011 were prepared by Weston for XRF analysis in accordance with EPA Method 6200, "Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment." A copy of EPA Method 6200 is provided as Appendix A. Each sample was homogenized in an on-site laboratory within the sealed plastic bag. A 20- to 50-gram aliquot of each sample was dried and sieved through a no. 60-mesh sieve. The dried and sieved aliquot was then placed in a dedicated XRF sampling container for analysis. Each dedicated XRF sampling container was labeled with the corresponding site-specific sampling location identifier. Field blanks prepared from silicon dioxide were collected and prepared using identical equipment and methods as for surface soil samples. Non-dedicated sampling equipment, including sieves, pans, and ovens, was decontaminated following each use in accordance with Weston SOP No. 301, "Decontamination Procedures" (Weston 2006c).

All soil samples collected prior to June 2011 were analyzed for total lead and arsenic by ex-situ XRF analysis in accordance with EPA Method 6200.

As part of quality assurance/quality control procedures, soil samples were split from approximately 10% of all samples following homogenization. Original and duplicate samples were treated as individual samples throughout the remaining preparation and analysis activities. Split sampling was conducted in order to determine if the homogenization process was sufficient for measuring an accurate average concentration within each sample.

Six soil samples were analyzed at EPA Region III Laboratories, in Fort Meade, MD, under Delivery of Analytical Services numbers R33659 and R33690, and one sample was sent to Sentinel, Inc. in Huntsville, AL under Contract Laboratory Program (CLP) case number 42117, in order to confirm the accuracy of XRF analysis at the on-site laboratory. These samples were bulked together with soil samples from other phases of the FMO Pesticide site for validation. The results from the EPA Region III Laboratory and Sentinel, Inc. confirmed that the XRF data obtained by Weston were accurate and precise. Data Validation Reports for all sampling analyzed by XRF are included in Appendix B. A copy of the validated analytical results packages are provided in Appendix C.

All soil samples collected after June 2011 were shipped to either A4 Scientific, of The Woodlands, TX, Bonner Analytical Testing Co., of Hattiesburg, MS, or Chemtech Consulting Group, of Mountainside, NJ, on Case No. 41534, 41713, or 41912, respectively, for lead and arsenic analysis. Samples were handled and packaged in accordance with WESTON's *Environmental Sample Shipment Checklist* (WESTON 2010b), and with WESTON's *EPA Region III START 4 Program-Wide Uniform Federal Policy Quality Assurance Program Plan* (WESTON 2010c). All shipping containers were properly labeled with EPA custody seals and were delivered with signed chain-of-custody forms and appropriate hazard warnings for laboratory personnel. A copy of the validated analytical results packages are provided in Appendix C.

4.0 ANALYTICAL RESULTS

This section summarizes the analytical results for the samples collected at the site by WESTON during this assessment. The CLP analytical data packages are provided in Appendix C.

4.1 PHASE II SOIL RESULTS

A total of 36 samples from eight properties were analyzed for lead and arsenic by XRF in accordance with EPA Method 6200. In addition, a total of 20 soil samples from eight properties were analyzed by the assigned CLP laboratory for lead and arsenic in accordance with CLP Statement of Work for Inorganic Superfund Method 01.2 (EPA 2010). Arsenic concentrations in surface soil samples ranged from 12.71 parts per million (ppm) to 92.9 ppm. Lead concentrations in surface soil samples ranged from 21.79 ppm to 469 ppm. Arsenic concentrations in subsurface soil samples ranged in concentration from 8.88 ppm to 45.15 ppm. Lead concentrations in subsurface soil samples ranged from 13.30 ppm to 280 ppm. Due to privacy regulations, individual property results may not be discussed in this report.

5.0 REFERENCES

- EPA. 2010. "USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-media, Multi-Concentration). Inorganic Superfund Method 01.2." January.
- Tetra Tech EM, Inc. (Tetra Tech). 2010. "Trip Report for the Phase II Soil Assessment at the Former Mohr Orchard Site." June.
- WESTON. 2006a. "*Logbook Documentation*." SOP No. 101. September.
- WESTON. 2006b. "*Surface Soil Sampling*." SOP No. 302. September.
- WESTON. 2006c. "*Decontamination Procedures*." SOP No. 301. September.
- WESTON. 2010a. "Phase II Soil Sampling & Phase II Confirmation Soil Sampling Field Sampling and Analysis Plan." August.
- WESTON. 2010b. "*Environmental Sample Shipment Checklist*." Draft. July.
- WESTON. 2010c. "*EPA Region III START 4 Program-Wide Uniform Federal Policy Quality Assurance Program Plan*." Final. December.
- WESTON. 2011. "Abbreviated Sampling Plan for Extended Phase II Soil Sampling at the FMO Pesticide Site." June.

APPENDIX A

EPA METHOD 6200

METHOD 6200

FIELD PORTABLE X-RAY FLUORESCENCE SPECTROMETRY FOR THE DETERMINATION OF ELEMENTAL CONCENTRATIONS IN SOIL AND SEDIMENT

SW-846 is not intended to be an analytical training manual. Therefore, method procedures are written based on the assumption that they will be performed by analysts who are formally trained in at least the basic principles of chemical analysis and in the use of the subject technology.

In addition, SW-846 methods, with the exception of required method use for the analysis of method-defined parameters, are intended to be guidance methods which contain general information on how to perform an analytical procedure or technique which a laboratory can use as a basic starting point for generating its own detailed Standard Operating Procedure (SOP), either for its own general use or for a specific project application. The performance data included in this method are for guidance purposes only, and are not intended to be and must not be used as absolute QC acceptance criteria for purposes of laboratory accreditation.

1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the in situ and intrusive analysis of the 26 analytes listed below for soil and sediment samples. Some common elements are not listed in this method because they are considered "light" elements that cannot be detected by field portable x-ray fluorescence (FPXRF). These light elements are: lithium, beryllium, sodium, magnesium, aluminum, silicon, and phosphorus. Most of the analytes listed below are of environmental concern, while a few others have interference effects or change the elemental composition of the matrix, affecting quantitation of the analytes of interest. Generally elements of atomic number 16 or greater can be detected and quantitated by FPXRF. The following RCRA analytes have been determined by this method:

Analytes	CAS Registry No.
Antimony (Sb)	7440-36-0
Arsenic (As)	7440-38-0
Barium (Ba)	7440-39-3
Cadmium (Cd)	7440-43-9
Chromium (Cr)	7440-47-3
Cobalt (Co)	7440-48-4
Copper (Cu)	7440-50-8
Lead (Pb)	7439-92-1
Mercury (Hg)	7439-97-6
Nickel (Ni)	7440-02-0
Selenium (Se)	7782-49-2
Silver (Ag)	7440-22-4
Thallium (Tl)	7440-28-0
Tin (Sn)	7440-31-5

Analytes	CAS Registry No.
Vanadium (V)	7440-62-2
Zinc (Zn)	7440-66-6

In addition, the following non-RCRA analytes have been determined by this method:

Analytes	CAS Registry No.
Calcium (Ca)	7440-70-2
Iron (Fe)	7439-89-6
Manganese (Mn)	7439-96-5
Molybdenum (Mo)	7439-93-7
Potassium (K)	7440-09-7
Rubidium (Rb)	7440-17-7
Strontium (Sr)	7440-24-6
Thorium (Th)	7440-29-1
Titanium (Ti)	7440-32-6
Zirconium (Zr)	7440-67-7

1.2 This method is a screening method to be used with confirmatory analysis using other techniques (e.g., flame atomic absorption spectrometry (FLAA), graphite furnace atomic absorption spectrometry (GFAA), inductively coupled plasma-atomic emission spectrometry, (ICP-AES), or inductively coupled plasma-mass spectrometry, (ICP-MS)). This method's main strength is that it is a rapid field screening procedure. The method's lower limits of detection are typically above the toxicity characteristic regulatory level for most RCRA analytes. However, when the obtainable values for precision, accuracy, and laboratory-established sensitivity of this method meet project-specific data quality objectives (DQOs), FPXRF is a fast, powerful, cost effective technology for site characterization.

1.3 The method sensitivity or lower limit of detection depends on several factors, including the analyte of interest, the type of detector used, the type of excitation source, the strength of the excitation source, count times used to irradiate the sample, physical matrix effects, chemical matrix effects, and interelement spectral interferences. Example lower limits of detection for analytes of interest in environmental applications are shown in Table 1. These limits apply to a clean spiked matrix of quartz sand (silicon dioxide) free of interelement spectral interferences using long (100 -600 second) count times. These sensitivity values are given for guidance only and may not always be achievable, since they will vary depending on the sample matrix, which instrument is used, and operating conditions. A discussion of performance-based sensitivity is presented in Sec. 9.6.

1.4 Analysts should consult the disclaimer statement at the front of the manual and the information in Chapter Two for guidance on the intended flexibility in the choice of methods, apparatus, materials, reagents, and supplies, and on the responsibilities of the analyst for demonstrating that the techniques employed are appropriate for the analytes of interest, in the matrix of interest, and at the levels of concern.

In addition, analysts and data users are advised that, except where explicitly specified in a regulation, the use of SW-846 methods is *not* mandatory in response to Federal testing requirements. The information contained in this method is provided by EPA as guidance to be used by the analyst and the regulated community in making judgments necessary to generate results that meet the data quality objectives for the intended application.

1.5 Use of this method is restricted to use by, or under supervision of, personnel appropriately experienced and trained in the use and operation of an XRF instrument. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The FPXRF technologies described in this method use either sealed radioisotope sources or x-ray tubes to irradiate samples with x-rays. When a sample is irradiated with x-rays, the source x-rays may undergo either scattering or absorption by sample atoms. This latter process is known as the photoelectric effect. When an atom absorbs the source x-rays, the incident radiation dislodges electrons from the innermost shells of the atom, creating vacancies. The electron vacancies are filled by electrons cascading in from outer electron shells. Electrons in outer shells have higher energy states than inner shell electrons, and the outer shell electrons give off energy as they cascade down into the inner shell vacancies. This rearrangement of electrons results in emission of x-rays characteristic of the given atom. The emission of x-rays, in this manner, is termed x-ray fluorescence.

Three electron shells are generally involved in emission of x-rays during FPXRF analysis of environmental samples. The three electron shells include the K, L, and M shells. A typical emission pattern, also called an emission spectrum, for a given metal has multiple intensity peaks generated from the emission of K, L, or M shell electrons. The most commonly measured x-ray emissions are from the K and L shells; only metals with an atomic number greater than 57 have measurable M shell emissions.

Each characteristic x-ray line is defined with the letter K, L, or M, which signifies which shell had the original vacancy and by a subscript alpha (α), beta (β), or gamma (γ) etc., which indicates the higher shell from which electrons fell to fill the vacancy and produce the x-ray. For example, a K_α line is produced by a vacancy in the K shell filled by an L shell electron, whereas a K_β line is produced by a vacancy in the K shell filled by an M shell electron. The K_α transition is on average 6 to 7 times more probable than the K_β transition; therefore, the K_α line is approximately 7 times more intense than the K_β line for a given element, making the K_α line the choice for quantitation purposes.

The K lines for a given element are the most energetic lines and are the preferred lines for analysis. For a given atom, the x-rays emitted from L transitions are always less energetic than those emitted from K transitions. Unlike the K lines, the main L emission lines (L_α and L_β) for an element are of nearly equal intensity. The choice of one or the other depends on what interfering element lines might be present. The L emission lines are useful for analyses involving elements of atomic number (Z) 58 (cerium) through 92 (uranium).

An x-ray source can excite characteristic x-rays from an element only if the source energy is greater than the absorption edge energy for the particular line group of the element, that is, the K absorption edge, L absorption edge, or M absorption edge energy. The absorption edge energy is somewhat greater than the corresponding line energy. Actually, the K absorption edge energy is approximately the sum of the K, L, and M line energies of the particular element, and the L absorption edge energy is approximately the sum of the L and M line energies. FPXRF is more sensitive to an element with an absorption edge energy close to but less than

the excitation energy of the source. For example, when using a cadmium-109 source, which has an excitation energy of 22.1 kiloelectron volts (keV), FPXRF would exhibit better sensitivity for zirconium which has a K line energy of 15.77 keV than to chromium, which has a K line energy of 5.41 keV.

2.2 Under this method, inorganic analytes of interest are identified and quantitated using a field portable energy-dispersive x-ray fluorescence spectrometer. Radiation from one or more radioisotope sources or an electrically excited x-ray tube is used to generate characteristic x-ray emissions from elements in a sample. Up to three sources may be used to irradiate a sample. Each source emits a specific set of primary x-rays that excite a corresponding range of elements in a sample. When more than one source can excite the element of interest, the source is selected according to its excitation efficiency for the element of interest.

For measurement, the sample is positioned in front of the probe window. This can be done in two manners using FPXRF instruments, specifically, in situ or intrusive. If operated in the in situ mode, the probe window is placed in direct contact with the soil surface to be analyzed. When an FPXRF instrument is operated in the intrusive mode, a soil or sediment sample must be collected, prepared, and placed in a sample cup. The sample cup is then placed on top of the window inside a protective cover for analysis.

Sample analysis is then initiated by exposing the sample to primary radiation from the source. Fluorescent and backscattered x-rays from the sample enter through the detector window and are converted into electric pulses in the detector. The detector in FPXRF instruments is usually either a solid-state detector or a gas-filled proportional counter. Within the detector, energies of the characteristic x-rays are converted into a train of electric pulses, the amplitudes of which are linearly proportional to the energy of the x-rays. An electronic multichannel analyzer (MCA) measures the pulse amplitudes, which is the basis of qualitative x-ray analysis. The number of counts at a given energy per unit of time is representative of the element concentration in a sample and is the basis for quantitative analysis. Most FPXRF instruments are menu-driven from software built into the units or from personal computers (PC).

The measurement time of each source is user-selectable. Shorter source measurement times (30 seconds) are generally used for initial screening and hot spot delineation, and longer measurement times (up to 300 seconds) are typically used to meet higher precision and accuracy requirements.

FPXRF instruments can be calibrated using the following methods: internally using fundamental parameters determined by the manufacturer, empirically based on site-specific calibration standards (SSCS), or based on Compton peak ratios. The Compton peak is produced by backscattering of the source radiation. Some FPXRF instruments can be calibrated using multiple methods.

3.0 DEFINITIONS

3.1 FPXRF -- Field portable x-ray fluorescence.

3.2 MCA -- Multichannel analyzer for measuring pulse amplitude.

3.3 SSCS -- Site-specific calibration standards.

3.4 FP -- Fundamental parameter.

3.5 ROI -- Region of interest.

3.6 SRM -- Standard reference material; a standard containing certified amounts of metals in soil or sediment.

3.7 eV -- Electron volt; a unit of energy equivalent to the amount of energy gained by an electron passing through a potential difference of one volt.

3.8 Refer to Chapter One, Chapter Three, and the manufacturer's instructions for other definitions that may be relevant to this procedure.

4.0 INTERFERENCES

4.1 The total method error for FPXRF analysis is defined as the square root of the sum of squares of both instrument precision and user- or application-related error. Generally, instrument precision is the least significant source of error in FPXRF analysis. User- or application-related error is generally more significant and varies with each site and method used. Some sources of interference can be minimized or controlled by the instrument operator, but others cannot. Common sources of user- or application-related error are discussed below.

4.2 Physical matrix effects result from variations in the physical character of the sample. These variations may include such parameters as particle size, uniformity, homogeneity, and surface condition. For example, if any analyte exists in the form of very fine particles in a coarser-grained matrix, the analyte's concentration measured by the FPXRF will vary depending on how fine particles are distributed within the coarser-grained matrix. If the fine particles "settle" to the bottom of the sample cup (i.e., against the cup window), the analyte concentration measurement will be higher than if the fine particles are not mixed in well and stay on top of the coarser-grained particles in the sample cup. One way to reduce such error is to grind and sieve all soil samples to a uniform particle size thus reducing sample-to-sample particle size variability. Homogeneity is always a concern when dealing with soil samples. Every effort should be made to thoroughly mix and homogenize soil samples before analysis. Field studies have shown heterogeneity of the sample generally has the largest impact on comparability with confirmatory samples.

4.3 Moisture content may affect the accuracy of analysis of soil and sediment sample analyses. When the moisture content is between 5 and 20 percent, the overall error from moisture may be minimal. However, moisture content may be a major source of error when analyzing samples of surface soil or sediment that are saturated with water. This error can be minimized by drying the samples in a convection or toaster oven. Microwave drying is not recommended because field studies have shown that microwave drying can increase variability between FPXRF data and confirmatory analysis and because metal fragments in the sample can cause arcing to occur in a microwave.

4.4 Inconsistent positioning of samples in front of the probe window is a potential source of error because the x-ray signal decreases as the distance from the radioactive source increases. This error is minimized by maintaining the same distance between the window and each sample. For the best results, the window of the probe should be in direct contact with the sample, which means that the sample should be flat and smooth to provide a good contact surface.

4.5 Chemical matrix effects result from differences in the concentrations of interfering elements. These effects occur as either spectral interferences (peak overlaps) or as x-ray absorption and enhancement phenomena. Both effects are common in soils contaminated with heavy metals. As examples of absorption and enhancement effects; iron (Fe) tends to absorb copper (Cu) x-rays, reducing the intensity of the Cu measured by the detector, while chromium (Cr) will be enhanced at the expense of Fe because the absorption edge of Cr is slightly lower in energy than the fluorescent peak of iron. The effects can be corrected mathematically through the use of fundamental parameter (FP) coefficients. The effects also can be compensated for using SSCS, which contain all the elements present on site that can interfere with one another.

4.6 When present in a sample, certain x-ray lines from different elements can be very close in energy and, therefore, can cause interference by producing a severely overlapped spectrum. The degree to which a detector can resolve the two different peaks depends on the energy resolution of the detector. If the energy difference between the two peaks in electron volts is less than the resolution of the detector in electron volts, then the detector will not be able to fully resolve the peaks.

The most common spectrum overlaps involve the K_{β} line of element Z-1 with the K_{α} line of element Z. This is called the K_{α}/K_{β} interference. Because the $K_{\alpha}:K_{\beta}$ intensity ratio for a given element usually is about 7:1, the interfering element, Z-1, must be present at large concentrations to cause a problem. Two examples of this type of spectral interference involve the presence of large concentrations of vanadium (V) when attempting to measure Cr or the presence of large concentrations of Fe when attempting to measure cobalt (Co). The V K_{α} and K_{β} energies are 4.95 and 5.43 keV, respectively, and the Cr K_{α} energy is 5.41 keV. The Fe K_{α} and K_{β} energies are 6.40 and 7.06 keV, respectively, and the Co K_{α} energy is 6.92 keV. The difference between the V K_{β} and Cr K_{α} energies is 20 eV, and the difference between the Fe K_{β} and the Co K_{α} energies is 140 eV. The resolution of the highest-resolution detectors in FPXRF instruments is 170 eV. Therefore, large amounts of V and Fe will interfere with quantitation of Cr or Co, respectively. The presence of Fe is a frequent problem because it is often found in soils at tens of thousands of parts per million (ppm).

4.7 Other interferences can arise from K/L, K/M, and L/M line overlaps, although these overlaps are less common. Examples of such overlap involve arsenic (As) K_{α} /lead (Pb) L_{α} and sulfur (S) K_{α} /Pb M_{α} . In the As/Pb case, Pb can be measured from the Pb L_{β} line, and As can be measured from either the As K_{α} or the As K_{β} line; in this way the interference can be corrected. If the As K_{β} line is used, sensitivity will be decreased by a factor of two to five times because it is a less intense line than the As K_{α} line. If the As K_{α} line is used in the presence of Pb, mathematical corrections within the instrument software can be used to subtract out the Pb interference. However, because of the limits of mathematical corrections, As concentrations cannot be efficiently calculated for samples with Pb:As ratios of 10:1 or more. This high ratio of Pb to As may result in reporting of a "nondetect" or a "less than" value (e.g., <300 ppm) for As, regardless of the actual concentration present.

No instrument can fully compensate for this interference. It is important for an operator to understand this limitation of FPXRF instruments and consult with the manufacturer of the FPXRF instrument to evaluate options to minimize this limitation. The operator's decision will be based on action levels for metals in soil established for the site, matrix effects, capabilities of the instrument, data quality objectives, and the ratio of lead to arsenic known to be present at the site. If a site is encountered that contains lead at concentrations greater than ten times the concentration of arsenic it is advisable that all critical soil samples be sent off site for confirmatory analysis using other techniques (e.g., flame atomic absorption spectrometry (FLAA), graphite furnace atomic absorption spectrometry (GFAA), inductively coupled plasma-

atomic emission spectrometry, (ICP-AES), or inductively coupled plasma-mass spectrometry, (ICP-MS)).

4.8 If SSCS are used to calibrate an FPXRF instrument, the samples collected must be representative of the site under investigation. Representative soil sampling ensures that a sample or group of samples accurately reflects the concentrations of the contaminants of concern at a given time and location. Analytical results for representative samples reflect variations in the presence and concentration ranges of contaminants throughout a site. Variables affecting sample representativeness include differences in soil type, contaminant concentration variability, sample collection and preparation variability, and analytical variability, all of which should be minimized as much as possible.

4.9 Soil physical and chemical effects may be corrected using SSCS that have been analyzed by inductively coupled plasma (ICP) or atomic absorption (AA) methods. However, a major source of error can be introduced if these samples are not representative of the site or if the analytical error is large. Another concern is the type of digestion procedure used to prepare the soil samples for the reference analysis. Analytical results for the confirmatory method will vary depending on whether a partial digestion procedure, such as Method 3050, or a total digestion procedure, such as Method 3052, is used. It is known that depending on the nature of the soil or sediment, Method 3050 will achieve differing extraction efficiencies for different analytes of interest. The confirmatory method should meet the project-specific data quality objectives (DQOs).

XRF measures the total concentration of an element; therefore, to achieve the greatest comparability of this method with the reference method (reduced bias), a total digestion procedure should be used for sample preparation. However, in the study used to generate the performance data for this method (see Table 8), the confirmatory method used was Method 3050, and the FPXRF data compared very well with regression correlation coefficients (r often exceeding 0.95, except for barium and chromium). The critical factor is that the digestion procedure and analytical reference method used should meet the DQOs of the project and match the method used for confirmation analysis.

4.10 Ambient temperature changes can affect the gain of the amplifiers producing instrument drift. Gain or drift is primarily a function of the electronics (amplifier or preamplifier) and not the detector as most instrument detectors are cooled to a constant temperature. Most FPXRF instruments have a built-in automatic gain control. If the automatic gain control is allowed to make periodic adjustments, the instrument will compensate for the influence of temperature changes on its energy scale. If the FPXRF instrument has an automatic gain control function, the operator will not have to adjust the instrument's gain unless an error message appears. If an error message appears, the operator should follow the manufacturer's procedures for troubleshooting the problem. Often, this involves performing a new energy calibration. The performance of an energy calibration check to assess drift is a quality control measure discussed in Sec. 9.2.

If the operator is instructed by the manufacturer to manually conduct a gain check because of increasing or decreasing ambient temperature, it is standard to perform a gain check after every 10 to 20 sample measurements or once an hour whichever is more frequent. It is also suggested that a gain check be performed if the temperature fluctuates more than 10° F. The operator should follow the manufacturer's recommendations for gain check frequency.

5.0 SAFETY

5.1 This method does not address all safety issues associated with its use. The user is responsible for maintaining a safe work environment and a current awareness file of OSHA regulations regarding the safe handling of the chemicals listed in this method. A reference file of material safety data sheets (MSDSs) should be available to all personnel involved in these analyses.

NOTE: No MSDS applies directly to the radiation-producing instrument because that is covered under the Nuclear Regulatory Commission (NRC) or applicable state regulations.

5.2 Proper training for the safe operation of the instrument and radiation training should be completed by the analyst prior to analysis. Radiation safety for each specific instrument can be found in the operator's manual. Protective shielding should never be removed by the analyst or any personnel other than the manufacturer. The analyst should be aware of the local state and national regulations that pertain to the use of radiation-producing equipment and radioactive materials with which compliance is required. There should be a person appointed within the organization that is solely responsible for properly instructing all personnel, maintaining inspection records, and monitoring x-ray equipment at regular intervals.

Licenses for radioactive materials are of two types, specifically: (1) a general license which is usually initiated by the manufacturer for receiving, acquiring, owning, possessing, using, and transferring radioactive material incorporated in a device or equipment, and (2) a specific license which is issued to named persons for the operation of radioactive instruments as required by local, state, or federal agencies. A copy of the radioactive material license (for specific licenses only) and leak tests should be present with the instrument at all times and available to local and national authorities upon request.

X-ray tubes do not require radioactive material licenses or leak tests, but do require approvals and licenses which vary from state to state. In addition, fail-safe x-ray warning lights should be illuminated whenever an x-ray tube is energized. Provisions listed above concerning radiation safety regulations, shielding, training, and responsible personnel apply to x-ray tubes just as to radioactive sources. In addition, a log of the times and operating conditions should be kept whenever an x-ray tube is energized. An additional hazard present with x-ray tubes is the danger of electric shock from the high voltage supply, however, if the tube is properly positioned within the instrument, this is only a negligible risk. Any instrument (x-ray tube or radioisotope based) is capable of delivering an electric shock from the basic circuitry when the system is inappropriately opened.

5.3 Radiation monitoring equipment should be used with the handling and operation of the instrument. The operator and the surrounding environment should be monitored continually for analyst exposure to radiation. Thermal luminescent detectors (TLD) in the form of badges and rings are used to monitor operator radiation exposure. The TLDs or badges should be worn in the area of maximum exposure. The maximum permissible whole-body dose from occupational exposure is 5 Roentgen Equivalent Man (REM) per year. Possible exposure pathways for radiation to enter the body are ingestion, inhaling, and absorption. The best precaution to prevent radiation exposure is distance and shielding.

6.0 EQUIPMENT AND SUPPLIES

The mention of trade names or commercial products in this manual is for illustrative purposes only, and does not constitute an EPA endorsement or exclusive recommendation for

use. The products and instrument settings cited in SW-846 methods represent those products and settings used during method development or subsequently evaluated by the Agency. Glassware, reagents, supplies, equipment, and settings other than those listed in this manual may be employed provided that method performance appropriate for the intended application has been demonstrated and documented.

6.1 FPXRF spectrometer -- An FPXRF spectrometer consists of four major components: (1) a source that provides x-rays; (2) a sample presentation device; (3) a detector that converts x-ray-generated photons emitted from the sample into measurable electronic signals; and (4) a data processing unit that contains an emission or fluorescence energy analyzer, such as an MCA, that processes the signals into an x-ray energy spectrum from which elemental concentrations in the sample may be calculated, and a data display and storage system. These components and additional, optional items, are discussed below.

6.1.1 Excitation sources -- FPXRF instruments use either a sealed radioisotope source or an x-ray tube to provide the excitation source. Many FPXRF instruments use sealed radioisotope sources to produce x-rays in order to irradiate samples. The FPXRF instrument may contain between one and three radioisotope sources. Common radioisotope sources used for analysis for metals in soils are iron Fe-55 (^{55}Fe), cadmium Cd-109 (^{109}Cd), americium Am-241 (^{241}Am), and curium Cm-244 (^{244}Cm). These sources may be contained in a probe along with a window and the detector; the probe may be connected to a data reduction and handling system by means of a flexible cable. Alternatively, the sources, window, and detector may be included in the same unit as the data reduction and handling system.

The relative strength of the radioisotope sources is measured in units of millicuries (mCi). All other components of the FPXRF system being equal, the stronger the source, the greater the sensitivity and precision of a given instrument. Radioisotope sources undergo constant decay. In fact, it is this decay process that emits the primary x-rays used to excite samples for FPXRF analysis. The decay of radioisotopes is measured in "half-lives." The half-life of a radioisotope is defined as the length of time required to reduce the radioisotopes strength or activity by half. Developers of FPXRF technologies recommend source replacement at regular intervals based on the source's half-life. This is due to the ever increasing time required for the analysis rather than a decrease in instrument performance. The characteristic x-rays emitted from each of the different sources have energies capable of exciting a certain range of analytes in a sample. Table 2 summarizes the characteristics of four common radioisotope sources.

X-ray tubes have higher radiation output, no intrinsic lifetime limit, produce constant output over their lifetime, and do not have the disposal problems of radioactive sources but are just now appearing in FPXRF instruments. An electrically-excited x-ray tube operates by bombarding an anode with electrons accelerated by a high voltage. The electrons gain an energy in electron volts equal to the accelerating voltage and can excite atomic transitions in the anode, which then produces characteristic x-rays. These characteristic x-rays are emitted through a window which contains the vacuum necessary for the electron acceleration. An important difference between x-ray tubes and radioactive sources is that the electrons which bombard the anode also produce a continuum of x-rays across a broad range of energies in addition to the characteristic x-rays. This continuum is weak compared to the characteristic x-rays but can provide substantial excitation since it covers a broad energy range. It has the undesired property of producing background in the spectrum near the analyte x-ray lines when it is scattered by the sample. For this reason a filter is often used between the x-ray tube and the sample to suppress the continuum radiation while passing the characteristic x-rays from the anode. This filter is sometimes incorporated into the window of the x-ray tube. The choice of

accelerating voltage is governed both by the anode material, since the electrons must have sufficient energy to excite the anode, which requires a voltage greater than the absorption edge of the anode material and by the instrument's ability to cool the x-ray tube. The anode is most efficiently excited by voltages 2 to 2.5 times the edge energy (most x-rays per unit power to the tube), although voltages as low as 1.5 times the absorption edge energy will work. The characteristic x-rays emitted by the anode are capable of exciting a range of elements in the sample just as with a radioactive source. Table 3 gives the recommended operating voltages and the sample elements excited for some common anodes.

6.1.2 Sample presentation device -- FPXRF instruments can be operated in two modes: in situ and intrusive. If operated in the in situ mode, the probe window is placed in direct contact with the soil surface to be analyzed. When an FPXRF instrument is operated in the intrusive mode, a soil or sediment sample must be collected, prepared, and placed in a sample cup. For FPXRF instruments operated in the intrusive mode, the probe may be rotated so that the window faces either upward or downward. A protective sample cover is placed over the window, and the sample cup is placed on top of the window inside the protective sample cover for analysis.

6.1.3 Detectors -- The detectors in the FPXRF instruments can be either solid-state detectors or gas-filled, proportional counter detectors. Common solid-state detectors include mercuric iodide (HgI_2), silicon pin diode and lithium-drifted silicon $\text{Si}(\text{Li})$. The HgI_2 detector is operated at a moderately subambient temperature controlled by a low power thermoelectric cooler. The silicon pin diode detector also is cooled via the thermoelectric Peltier effect. The $\text{Si}(\text{Li})$ detector must be cooled to at least -90°C either with liquid nitrogen or by thermoelectric cooling via the Peltier effect. Instruments with a $\text{Si}(\text{Li})$ detector have an internal liquid nitrogen dewar with a capacity of 0.5 to 1.0 L. Proportional counter detectors are rugged and lightweight, which are important features of a field portable detector. However, the resolution of a proportional counter detector is not as good as that of a solid-state detector. The energy resolution of a detector for characteristic x-rays is usually expressed in terms of full width at half-maximum (FWHM) height of the manganese K_α peak at 5.89 keV. The typical resolutions of the above mentioned detectors are as follows: HgI_2 –270 eV; silicon pin diode–250 eV; $\text{Si}(\text{Li})$ –170 eV; and gas-filled, proportional counter–750 eV.

During operation of a solid-state detector, an x-ray photon strikes a biased, solid-state crystal and loses energy in the crystal by producing electron-hole pairs. The electric charge produced is collected and provides a current pulse that is directly proportional to the energy of the x-ray photon absorbed by the crystal of the detector. A gas-filled, proportional counter detector is an ionization chamber filled with a mixture of noble and other gases. An x-ray photon entering the chamber ionizes the gas atoms. The electric charge produced is collected and provides an electric signal that is directly proportional to the energy of the x-ray photon absorbed by the gas in the detector.

6.1.4 Data processing units -- The key component in the data processing unit of an FPXRF instrument is the MCA. The MCA receives pulses from the detector and sorts them by their amplitudes (energy level). The MCA counts pulses per second to determine the height of the peak in a spectrum, which is indicative of the target analyte's concentration. The spectrum of element peaks are built on the MCA. The MCAs in FPXRF instruments have from 256 to 2,048 channels. The concentrations of target analytes are usually shown in ppm on a liquid crystal display (LCD) in the instrument. FPXRF instruments can store both spectra and from 3,000 to 5,000 sets of numerical analytical results. Most FPXRF instruments are menu-driven from software built into the

units or from PCs. Once the data-storage memory of an FPXRF unit is full or at any other time, data can be downloaded by means of an RS-232 port and cable to a PC.

6.2 Spare battery and battery charger.

6.3 Polyethylene sample cups -- 31 to 40 mm in diameter with collar, or equivalent (appropriate for FPXRF instrument).

6.4 X-ray window film -- Mylar™, Kapton™, Spectrolene™, polypropylene, or equivalent; 2.5 to 6.0 µm thick.

6.5 Mortar and pestle -- Glass, agate, or aluminum oxide; for grinding soil and sediment samples.

6.6 Containers -- Glass or plastic to store samples.

6.7 Sieves -- 60-mesh (0.25 mm), stainless-steel, Nylon, or equivalent for preparing soil and sediment samples.

6.8 Trowels -- For smoothing soil surfaces and collecting soil samples.

6.9 Plastic bags -- Used for collection and homogenization of soil samples.

6.10 Drying oven -- Standard convection or toaster oven, for soil and sediment samples that require drying.

7.0 REAGENTS AND STANDARDS

7.1 Reagent grade chemicals must be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 Pure element standards -- Each pure, single-element standard is intended to produce strong characteristic x-ray peaks of the element of interest only. Other elements present must not contribute to the fluorescence spectrum. A set of pure element standards for commonly sought analytes is supplied by the instrument manufacturer, if designated for the instrument; not all instruments require the pure element standards. The standards are used to set the region of interest (ROI) for each element. They also can be used as energy calibration and resolution check samples.

7.3 Site-specific calibration standards -- Instruments that employ fundamental parameters (FP) or similar mathematical models in minimizing matrix effects may not require SSCS. If the FP calibration model is to be optimized or if empirical calibration is necessary, then SSCSs must be collected, prepared, and analyzed.

7.3.1 The SSCS must be representative of the matrix to be analyzed by FPXRF. These samples must be well homogenized. A minimum of 10 samples spanning the concentration ranges of the analytes of interest and of the interfering elements must be obtained from the site. A sample size of 4 to 8 ounces is recommended, and standard glass sampling jars should be used.

7.3.2 Each sample should be oven-dried for 2 to 4 hr at a temperature of less than 150 °C. If mercury is to be analyzed, a separate sample portion should be dried at ambient temperature as heating may volatilize the mercury. When the sample is dry, all large, organic debris and nonrepresentative material, such as twigs, leaves, roots, insects, asphalt, and rock should be removed. The sample should be homogenized (see Sec. 7.3.3) and then a representative portion ground with a mortar and pestle or other mechanical means, prior to passing through a 60-mesh sieve. Only the coarse rock fraction should remain on the screen.

7.3.3 The sample should be homogenized by using a riffle splitter or by placing 150 to 200 g of the dried, sieved sample on a piece of kraft or butcher paper about 1.5 by 1.5 feet in size. Each corner of the paper should be lifted alternately, rolling the soil over on itself and toward the opposite corner. The soil should be rolled on itself 20 times. Approximately 5 g of the sample should then be removed and placed in a sample cup for FPXRF analysis. The rest of the prepared sample should be sent off site for ICP or AA analysis. The method use for confirmatory analysis should meet the data quality objectives of the project.

7.4 Blank samples -- The blank samples should be from a "clean" quartz or silicon dioxide matrix that is free of any analytes at concentrations above the established lower limit of detection. These samples are used to monitor for cross-contamination and laboratory-induced contaminants or interferences.

7.5 Standard reference materials -- Standard reference materials (SRMs) are standards containing certified amounts of metals in soil or sediment. These standards are used for accuracy and performance checks of FPXRF analyses. SRMs can be obtained from the National Institute of Standards and Technology (NIST), the U.S. Geological Survey (USGS), the Canadian National Research Council, and the national bureau of standards in foreign nations. Pertinent NIST SRMs for FPXRF analysis include 2704, Buffalo River Sediment; 2709, San Joaquin Soil; and 2710 and 2711, Montana Soil. These SRMs contain soil or sediment from actual sites that has been analyzed using independent inorganic analytical methods by many different laboratories. When these SRMs are unavailable, alternate standards may be used (e.g., NIST 2702).

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

Sample handling and preservation procedures used in FPXRF analyses should follow the guidelines in Chapter Three, "Inorganic Analytes."

9.0 QUALITY CONTROL

9.1 Follow the manufacturer's instructions for the quality control procedures specific to use of the testing product. Refer to Chapter One for additional guidance on quality assurance (QA) and quality control (QC) protocols. Any effort involving the collection of analytical data should include development of a structured and systematic planning document, such as a Quality Assurance Project Plan (QAPP) or a Sampling and Analysis Plan (SAP), which translates project objectives and specifications into directions for those that will implement the project and assess the results.

9.2 Energy calibration check -- To determine whether an FPXRF instrument is operating within resolution and stability tolerances, an energy calibration check should be run. The energy calibration check determines whether the characteristic x-ray lines are shifting,

which would indicate drift within the instrument. As discussed in Sec. 4.10, this check also serves as a gain check in the event that ambient temperatures are fluctuating greatly (more than 10 °F).

9.2.1 The energy calibration check should be run at a frequency consistent with manufacturer's recommendations. Generally, this would be at the beginning of each working day, after the batteries are changed or the instrument is shut off, at the end of each working day, and at any other time when the instrument operator believes that drift is occurring during analysis. A pure element such as iron, manganese, copper, or lead is often used for the energy calibration check. A manufacturer-recommended count time per source should be used for the check.

9.2.2 The instrument manufacturer's manual specifies the channel or kiloelectron volt level at which a pure element peak should appear and the expected intensity of the peak. The intensity and channel number of the pure element as measured using the source should be checked and compared to the manufacturer's recommendation. If the energy calibration check does not meet the manufacturer's criteria, then the pure element sample should be repositioned and reanalyzed. If the criteria are still not met, then an energy calibration should be performed as described in the manufacturer's manual. With some FPXRF instruments, once a spectrum is acquired from the energy calibration check, the peak can be optimized and realigned to the manufacturer's specifications using their software.

9.3 Blank samples -- Two types of blank samples should be analyzed for FPXRF analysis, specifically, instrument blanks and method blanks.

9.3.1 An instrument blank is used to verify that no contamination exists in the spectrometer or on the probe window. The instrument blank can be silicon dioxide, a polytetrafluoroethylene (PTFE) block, a quartz block, "clean" sand, or lithium carbonate. This instrument blank should be analyzed on each working day before and after analyses are conducted and once per every twenty samples. An instrument blank should also be analyzed whenever contamination is suspected by the analyst. The frequency of analysis will vary with the data quality objectives of the project. A manufacturer-recommended count time per source should be used for the blank analysis. No element concentrations above the established lower limit of detection should be found in the instrument blank. If concentrations exceed these limits, then the probe window and the check sample should be checked for contamination. If contamination is not a problem, then the instrument must be "zeroed" by following the manufacturer's instructions.

9.3.2 A method blank is used to monitor for laboratory-induced contaminants or interferences. The method blank can be "clean" silica sand or lithium carbonate that undergoes the same preparation procedure as the samples. A method blank must be analyzed at least daily. The frequency of analysis will depend on the data quality objectives of the project. If the method blank does not contain the target analyte at a level that interferes with the project-specific data quality objectives then the method blank would be considered acceptable. In the absence of project-specific data quality objectives, if the blank is less than the lowest level of detection or less than 10% of the lowest sample concentration for the analyte, whichever is greater, then the method blank would be considered acceptable. If the method blank cannot be considered acceptable, the cause of the problem must be identified, and all samples analyzed with the method blank must be reanalyzed.

9.4 Calibration verification checks -- A calibration verification check sample is used to check the accuracy of the instrument and to assess the stability and consistency of the analysis for the analytes of interest. A check sample should be analyzed at the beginning of each working day, during active sample analyses, and at the end of each working day. The frequency of calibration checks during active analysis will depend on the data quality objectives of the project. The check sample should be a well characterized soil sample from the site that is representative of site samples in terms of particle size and degree of homogeneity and that contains contaminants at concentrations near the action levels. If a site-specific sample is not available, then an NIST or other SRM that contains the analytes of interest can be used to verify the accuracy of the instrument. The measured value for each target analyte should be within ± 20 percent (%D) of the true value for the calibration verification check to be acceptable. If a measured value falls outside this range, then the check sample should be reanalyzed. If the value continues to fall outside the acceptance range, the instrument should be recalibrated, and the batch of samples analyzed before the unacceptable calibration verification check must be reanalyzed.

9.5 Precision measurements -- The precision of the method is monitored by analyzing a sample with low, moderate, or high concentrations of target analytes. The frequency of precision measurements will depend on the data quality objectives for the data. A minimum of one precision sample should be run per day. Each precision sample should be analyzed 7 times in replicate. It is recommended that precision measurements be obtained for samples with varying concentration ranges to assess the effect of concentration on method precision. Determining method precision for analytes at concentrations near the site action levels can be extremely important if the FPXRF results are to be used in an enforcement action; therefore, selection of at least one sample with target analyte concentrations at or near the site action levels or levels of concern is recommended. A precision sample is analyzed by the instrument for the same field analysis time as used for other project samples. The relative standard deviation (RSD) of the sample mean is used to assess method precision. For FPXRF data to be considered adequately precise, the RSD should not be greater than 20 percent with the exception of chromium. RSD values for chromium should not be greater than 30 percent. If both in situ and intrusive analytical techniques are used during the course of one day, it is recommended that separate precision calculations be performed for each analysis type.

The equation for calculating RSD is as follows:

$$\text{RSD} = (\text{SD}/\text{Mean Concentration}) \times 100$$

where:

RSD	=	Relative standard deviation for the precision measurement for the analyte
SD	=	Standard deviation of the concentration for the analyte
Mean concentration	=	Mean concentration for the analyte

The precision or reproducibility of a measurement will improve with increasing count time, however, increasing the count time by a factor of 4 will provide only 2 times better precision, so there is a point of diminishing return. Increasing the count time also improves the sensitivity, but decreases sample throughput.

9.6 The lower limits of detection should be established from actual measured performance based on spike recoveries in the matrix of concern or from acceptable method performance on a certified reference material of the appropriate matrix and within the appropriate calibration range for the application. This is considered the best estimate of the true method sensitivity as opposed to a statistical determination based on the standard deviation of

replicate analyses of a low-concentration sample. While the statistical approach demonstrates the potential data variability for a given sample matrix at one point in time, it does not represent what can be detected or most importantly the lowest concentration that can be calibrated. For this reason the sensitivity should be established as the lowest point of detection based on acceptable target analyte recovery in the desired sample matrix.

9.7 Confirmatory samples -- The comparability of the FPXRF analysis is determined by submitting FPXRF-analyzed samples for analysis at a laboratory. The method of confirmatory analysis must meet the project and XRF measurement data quality objectives. The confirmatory samples must be splits of the well homogenized sample material. In some cases the prepared sample cups can be submitted. A minimum of 1 sample for each 20 FPXRF-analyzed samples should be submitted for confirmatory analysis. This frequency will depend on project-specific data quality objectives. The confirmatory analyses can also be used to verify the quality of the FPXRF data. The confirmatory samples should be selected from the lower, middle, and upper range of concentrations measured by the FPXRF. They should also include samples with analyte concentrations at or near the site action levels. The results of the confirmatory analysis and FPXRF analyses should be evaluated with a least squares linear regression analysis. If the measured concentrations span more than one order of magnitude, the data should be log-transformed to standardize variance which is proportional to the magnitude of measurement. The correlation coefficient (r) for the results should be 0.7 or greater for the FPXRF data to be considered screening level data. If the r is 0.9 or greater and inferential statistics indicate the FPXRF data and the confirmatory data are statistically equivalent at a 99 percent confidence level, the data could potentially meet definitive level data criteria.

10.0 CALIBRATION AND STANDARDIZATION

10.1 Instrument calibration -- Instrument calibration procedures vary among FPXRF instruments. Users of this method should follow the calibration procedures outlined in the operator's manual for each specific FPXRF instrument. Generally, however, three types of calibration procedures exist for FPXRF instruments, namely: FP calibration, empirical calibration, and the Compton peak ratio or normalization method. These three types of calibration are discussed below.

10.2 Fundamental parameters calibration -- FP calibration procedures are extremely variable. An FP calibration provides the analyst with a "standardless" calibration. The advantages of FP calibrations over empirical calibrations include the following:

- No previously collected site-specific samples are necessary, although site-specific samples with confirmed and validated analytical results for all elements present could be used.
- Cost is reduced because fewer confirmatory laboratory results or calibration standards are necessary.

However, the analyst should be aware of the limitations imposed on FP calibration by particle size and matrix effects. These limitations can be minimized by adhering to the preparation procedure described in Sec. 7.3. The two FP calibration processes discussed below are based on an effective energy FP routine and a back scatter with FP (BFP) routine. Each FPXRF FP calibration process is based on a different iterative algorithmic method. The calibration procedure for each routine is explained in detail in the manufacturer's user manual for each FPXRF instrument; in addition, training courses are offered for each instrument.

10.2.1 Effective energy FP calibration -- The effective energy FP calibration is performed by the manufacturer before an instrument is sent to the analyst. Although SSCS can be used, the calibration relies on pure element standards or SRMs such as those obtained from NIST for the FP calibration. The effective energy routine relies on the spectrometer response to pure elements and FP iterative algorithms to compensate for various matrix effects.

Alpha coefficients are calculated using a variation of the Sherman equation, which calculates theoretical intensities from the measurement of pure element samples. These coefficients indicate the quantitative effect of each matrix element on an analyte's measured x-ray intensity. Next, the Lachance Traill algorithm is solved as a set of simultaneous equations based on the theoretical intensities. The alpha coefficients are then downloaded into the specific instrument.

The working effective energy FP calibration curve must be verified before sample analysis begins on each working day, after every 20 samples are analyzed, and at the end of sampling. This verification is performed by analyzing either an NIST SRM or an SSCS that is representative of the site-specific samples. This SRM or SSCS serves as a calibration check. A manufacturer-recommended count time per source should be used for the calibration check. The analyst must then adjust the y-intercept and slope of the calibration curve to best fit the known concentrations of target analytes in the SRM or SSCS.

A percent difference (%D) is then calculated for each target analyte. The %D should be within ± 20 percent of the certified value for each analyte. If the %D falls outside this acceptance range, then the calibration curve should be adjusted by varying the slope of the line or the y-intercept value for the analyte. The SRM or SSCS is reanalyzed until the %D falls within ± 20 percent. The group of 20 samples analyzed before an out-of-control calibration check should be reanalyzed.

The equation to calibrate %D is as follows:

$$\%D = ((C_s - C_k) / C_k) \times 100$$

where:

%D = Percent difference

C_k = Certified concentration of standard sample

C_s = Measured concentration of standard sample

10.2.2 BFP calibration -- BFP calibration relies on the ability of the liquid nitrogen-cooled, Si(Li) solid-state detector to separate the coherent (Compton) and incoherent (Rayleigh) backscatter peaks of primary radiation. These peak intensities are known to be a function of sample composition, and the ratio of the Compton to Rayleigh peak is a function of the mass absorption of the sample. The calibration procedure is explained in detail in the instrument manufacturer's manual. Following is a general description of the BFP calibration procedure.

The concentrations of all detected and quantified elements are entered into the computer software system. Certified element results for an NIST SRM or confirmed and validated results for an SSCS can be used. In addition, the concentrations of oxygen and silicon must be entered; these two concentrations are not found in standard metals analyses. The manufacturer provides silicon and oxygen concentrations for typical soil types. Pure element standards are then analyzed using a manufacturer-recommended

count time per source. The results are used to calculate correction factors in order to adjust for spectrum overlap of elements.

The working BFP calibration curve must be verified before sample analysis begins on each working day, after every 20 samples are analyzed, and at the end of the analysis. This verification is performed by analyzing either an NIST SRM or an SSCS that is representative of the site-specific samples. This SRM or SSCS serves as a calibration check. The standard sample is analyzed using a manufacturer-recommended count time per source to check the calibration curve. The analyst must then adjust the y-intercept and slope of the calibration curve to best fit the known concentrations of target analytes in the SRM or SSCS.

A %D is then calculated for each target analyte. The %D should fall within ± 20 percent of the certified value for each analyte. If the %D falls outside this acceptance range, then the calibration curve should be adjusted by varying the slope of the line the y-intercept value for the analyte. The standard sample is reanalyzed until the %D falls within ± 20 percent. The group of 20 samples analyzed before an out-of-control calibration check should be reanalyzed.

10.3 Empirical calibration -- An empirical calibration can be performed with SSCS, site-typical standards, or standards prepared from metal oxides. A discussion of SSCS is included in Sec. 7.3; if no previously characterized samples exist for a specific site, site-typical standards can be used. Site-typical standards may be selected from commercially available characterized soils or from SSCS prepared for another site. The site-typical standards should closely approximate the site's soil matrix with respect to particle size distribution, mineralogy, and contaminant analytes. If neither SSCS nor site-typical standards are available, it is possible to make gravimetric standards by adding metal oxides to a "clean" sand or silicon dioxide matrix that simulates soil. Metal oxides can be purchased from various chemical vendors. If standards are made on site, a balance capable of weighing items to at least two decimal places is necessary. Concentrated ICP or AA standard solutions can also be used to make standards. These solutions are available in concentrations of 10,000 parts per million, thus only small volumes have to be added to the soil.

An empirical calibration using SSCS involves analysis of SSCS by the FPXRF instrument and by a conventional analytical method such as ICP or AA. A total acid digestion procedure should be used by the laboratory for sample preparation. Generally, a minimum of 10 and a maximum of 30 well characterized SSCS, site-typical standards, or prepared metal oxide standards are necessary to perform an adequate empirical calibration. The exact number of standards depends on the number of analytes of interest and interfering elements. Theoretically, an empirical calibration with SSCS should provide the most accurate data for a site because the calibration compensates for site-specific matrix effects.

The first step in an empirical calibration is to analyze the pure element standards for the elements of interest. This enables the instrument to set channel limits for each element for spectral deconvolution. Next the SSCS, site-typical standards, or prepared metal oxide standards are analyzed using a count time of 200 seconds per source or a count time recommended by the manufacturer. This will produce a spectrum and net intensity of each analyte in each standard. The analyte concentrations for each standard are then entered into the instrument software; these concentrations are those obtained from the laboratory, the certified results, or the gravimetrically determined concentrations of the prepared standards. This gives the instrument analyte values to regress against corresponding intensities during the modeling stage. The regression equation correlates the concentrations of an analyte with its net intensity.

The calibration equation is developed using a least squares fit regression analysis. After the regression terms to be used in the equation are defined, a mathematical equation can be developed to calculate the analyte concentration in an unknown sample. In some FPXRF instruments, the software of the instrument calculates the regression equation. The software uses calculated intercept and slope values to form a multiterm equation. In conjunction with the software in the instrument, the operator can adjust the multiterm equation to minimize interelement interferences and optimize the intensity calibration curve.

It is possible to define up to six linear or nonlinear terms in the regression equation. Terms can be added and deleted to optimize the equation. The goal is to produce an equation with the smallest regression error and the highest correlation coefficient. These values are automatically computed by the software as the regression terms are added, deleted, or modified. It is also possible to delete data points from the regression line if these points are significant outliers or if they are heavily weighing the data. Once the regression equation has been selected for an analyte, the equation can be entered into the software for quantitation of analytes in subsequent samples. For an empirical calibration to be acceptable, the regression equation for a specific analyte should have a correlation coefficient of 0.98 or greater or meet the DQOs of the project.

In an empirical calibration, one must apply the DQOs of the project and ascertain critical or action levels for the analytes of interest. It is within these concentration ranges or around these action levels that the FPXRF instrument should be calibrated most accurately. It may not be possible to develop a good regression equation over several orders of analyte concentration.

10.4 Compton normalization method -- The Compton normalization method is based on analysis of a single, certified standard and normalization for the Compton peak. The Compton peak is produced from incoherent backscattering of x-ray radiation from the excitation source and is present in the spectrum of every sample. The Compton peak intensity changes with differing matrices. Generally, matrices dominated by lighter elements produce a larger Compton peak, and those dominated by heavier elements produce a smaller Compton peak. Normalizing to the Compton peak can reduce problems with varying matrix effects among samples. Compton normalization is similar to the use of internal standards in organics analysis. The Compton normalization method may not be effective when analyte concentrations exceed a few percent.

The certified standard used for this type of calibration could be an NIST SRM such as 2710 or 2711. The SRM must be a matrix similar to the samples and must contain the analytes of interests at concentrations near those expected in the samples. First, a response factor has to be determined for each analyte. This factor is calculated by dividing the net peak intensity by the analyte concentration. The net peak intensity is gross intensity corrected for baseline reading. Concentrations of analytes in samples are then determined by multiplying the baseline corrected analyte signal intensity by the normalization factor and by the response factor. The normalization factor is the quotient of the baseline corrected Compton K_{α} peak intensity of the SRM divided by that of the samples. Depending on the FPXRF instrument used, these calculations may be done manually or by the instrument software.

11.0 PROCEDURE

11.1 Operation of the various FPXRF instruments will vary according to the manufacturers' protocols. Before operating any FPXRF instrument, one should consult the manufacturer's manual. Most manufacturers recommend that their instruments be allowed to warm up for 15 to 30 minutes before analysis of samples. This will help alleviate drift or energy calibration problems later during analysis.

11.2 Each FPXRF instrument should be operated according to the manufacturer's recommendations. There are two modes in which FPXRF instruments can be operated: in situ and intrusive. The in situ mode involves analysis of an undisturbed soil sediment or sample. Intrusive analysis involves collection and preparation of a soil or sediment sample before analysis. Some FPXRF instruments can operate in both modes of analysis, while others are designed to operate in only one mode. The two modes of analysis are discussed below.

11.3 For in situ analysis, remove any large or nonrepresentative debris from the soil surface before analysis. This debris includes rocks, pebbles, leaves, vegetation, roots, and concrete. Also, the soil surface must be as smooth as possible so that the probe window will have good contact with the surface. This may require some leveling of the surface with a stainless-steel trowel. During the study conducted to provide example performance data for this method, this modest amount of sample preparation was found to take less than 5 min per sample location. The last requirement is that the soil or sediment not be saturated with water. Manufacturers state that their FPXRF instruments will perform adequately for soils with moisture contents of 5 to 20 percent but will not perform well for saturated soils, especially if ponded water exists on the surface. Another recommended technique for in situ analysis is to tamp the soil to increase soil density and compactness for better repeatability and representativeness. This condition is especially important for heavy element analysis, such as barium. Source count times for in situ analysis usually range from 30 to 120 seconds, but source count times will vary among instruments and depending on the desired method sensitivity. Due to the heterogeneous nature of the soil sample, in situ analysis can provide only "screening" type data.

11.4 For intrusive analysis of surface or sediment, it is recommended that a sample be collected from a 4- by 4-inch square that is 1 inch deep. This will produce a soil sample of approximately 375 g or 250 cm³, which is enough soil to fill an 8-ounce jar. However, the exact dimensions and sample depth should take into consideration the heterogeneous deposition of contaminants and will ultimately depend on the desired project-specific data quality objectives. The sample should be homogenized, dried, and ground before analysis. The sample can be homogenized before or after drying. The homogenization technique to be used after drying is discussed in Sec. 4.2. If the sample is homogenized before drying, it should be thoroughly mixed in a beaker or similar container, or if the sample is moist and has a high clay content, it can be kneaded in a plastic bag. One way to monitor homogenization when the sample is kneaded in a plastic bag is to add sodium fluorescein dye to the sample. After the moist sample has been homogenized, it is examined under an ultraviolet light to assess the distribution of sodium fluorescein throughout the sample. If the fluorescent dye is evenly distributed in the sample, homogenization is considered complete; if the dye is not evenly distributed, mixing should continue until the sample has been thoroughly homogenized. During the study conducted to provide data for this method, the time necessary for homogenization procedure using the fluorescein dye ranged from 3 to 5 min per sample. As demonstrated in Secs. 13.5 and 13.7, homogenization has the greatest impact on the reduction of sampling variability. It produces little or no contamination. Often, the direct analysis through the plastic bag is possible without the more labor intensive steps of drying, grinding, and sieving given in Secs. 11.5 and 11.6. Of course, to achieve the best data quality possible all four steps should be followed.

11.5 Once the soil or sediment sample has been homogenized, it should be dried. This can be accomplished with a toaster oven or convection oven. A small aliquot of the sample (20 to 50 g) is placed in a suitable container for drying. The sample should be dried for 2 to 4 hr in the convection or toaster oven at a temperature not greater than 150 °C. Samples may also be air dried under ambient temperature conditions using a 10- to 20-g portion. Regardless of what drying mechanism is used, the drying process is considered complete when a constant sample weight can be obtained. Care should be taken to avoid sample cross-contamination and these measures can be evaluated by including an appropriate method blank sample along with any sample preparation process.

CAUTION: Microwave drying is not a recommended procedure. Field studies have shown that microwave drying can increase variability between the FPXRF data and confirmatory analysis. High levels of metals in a sample can cause arcing in the microwave oven, and sometimes slag forms in the sample. Microwave oven drying can also melt plastic containers used to hold the sample.

11.6 The homogenized dried sample material should be ground with a mortar and pestle and passed through a 60-mesh sieve to achieve a uniform particle size. Sample grinding should continue until at least 90 percent of the original sample passes through the sieve. The grinding step normally takes an average of 10 min per sample. An aliquot of the sieved sample should then be placed in a 31.0-mm polyethylene sample cup (or equivalent) for analysis. The sample cup should be one-half to three-quarters full at a minimum. The sample cup should be covered with a 2.5 μm Mylar (or equivalent) film for analysis. The rest of the soil sample should be placed in a jar, labeled, and archived for possible confirmation analysis. All equipment including the mortar, pestle, and sieves must be thoroughly cleaned so that any cross-contamination is below the established lower limit of detection of the procedure or DQOs of the analysis. If all recommended sample preparation steps are followed, there is a high probability the desired laboratory data quality may be obtained.

12.0 DATA ANALYSIS AND CALCULATIONS

Most FPXRF instruments have software capable of storing all analytical results and spectra. The results are displayed in ppm and can be downloaded to a personal computer, which can be used to provide a hard copy printout. Individual measurements that are smaller than three times their associated SD should not be used for quantitation. See the manufacturer's instructions regarding data analysis and calculations.

13.0 METHOD PERFORMANCE

13.1 Performance data and related information are provided in SW-846 methods only as examples and guidance. The data do not represent required performance criteria for users of the methods. Instead, performance criteria should be developed on a project-specific basis, and the laboratory should establish in-house QC performance criteria for the application of this method. These performance data are not intended to be and must not be used as absolute QC acceptance criteria for purposes of laboratory accreditation.

13.2 The sections to follow discuss three performance evaluation factors; namely, precision, accuracy, and comparability. The example data presented in Tables 4 through 8 were generated from results obtained from six FPXRF instruments (see Sec. 13.3). The soil samples analyzed by the six FPXRF instruments were collected from two sites in the United States. The soil samples contained several of the target analytes at concentrations ranging from "nondetect" to tens of thousands of mg/kg. These data are provided for guidance purposes only.

13.3 The six FPXRF instruments included the TN 9000 and TN Lead Analyzer manufactured by TN Spectrace; the X-MET 920 with a SiLi detector and X-MET 920 with a gas-filled proportional detector manufactured by Metorex, Inc.; the XL Spectrum Analyzer manufactured by Niton; and the MAP Spectrum Analyzer manufactured by Scitec. The TN 9000 and TN Lead Analyzer both have a HgI_2 detector. The TN 9000 utilized an Fe-55, Cd-109, and Am-241 source. The TN Lead Analyzer had only a Cd-109 source. The X-Met 920 with the SiLi detector had a Cd-109 and Am-241 source. The X-MET 920 with the gas-filled proportional detector had only a Cd-109 source. The XL Spectrum Analyzer utilized a silicon pin-diode

detector and a Cd-109 source. The MAP Spectrum Analyzer utilized a solid-state silicon detector and a Cd-109 source.

13.4 All example data presented in Tables 4 through 8 were generated using the following calibrations and source count times. The TN 9000 and TN Lead Analyzer were calibrated using fundamental parameters using NIST SRM 2710 as a calibration check sample. The TN 9000 was operated using 100, 60, and 60 second count times for the Cd-109, Fe-55, and Am-241 sources, respectively. The TN Lead analyzer was operated using a 60 second count time for the Cd-109 source. The X-MET 920 with the Si(Li) detector was calibrated using fundamental parameters and one well characterized site-specific soil standard as a calibration check. It used 140 and 100 second count times for the Cd-109 and Am-241 sources, respectively. The X-MET 920 with the gas-filled proportional detector was calibrated empirically using between 10 and 20 well characterized site-specific soil standards. It used 120 second times for the Cd-109 source. The XL Spectrum Analyzer utilized NIST SRM 2710 for calibration and the Compton peak normalization procedure for quantitation based on 60 second count times for the Cd-109 source. The MAP Spectrum Analyzer was internally calibrated by the manufacturer. The calibration was checked using a well-characterized site-specific soil standard. It used 240 second times for the Cd-109 source.

13.5 Precision measurements -- The example precision data are presented in Table 4. These data are provided for guidance purposes only. Each of the six FPXRF instruments performed 10 replicate measurements on 12 soil samples that had analyte concentrations ranging from "nondetects" to thousands of mg/kg. Each of the 12 soil samples underwent 4 different preparation techniques from in situ (no preparation) to dried and ground in a sample cup. Therefore, there were 48 precision data points for five of the instruments and 24 precision points for the MAP Spectrum Analyzer. The replicate measurements were taken using the source count times discussed at the beginning of this section.

For each detectable analyte in each precision sample a mean concentration, standard deviation, and RSD was calculated for each analyte. The data presented in Table 4 is an average RSD for the precision samples that had analyte concentrations at 5 to 10 times the lower limit of detection for that analyte for each instrument. Some analytes such as mercury, selenium, silver, and thorium were not detected in any of the precision samples so these analytes are not listed in Table 4. Some analytes such as cadmium, nickel, and tin were only detected at concentrations near the lower limit of detection so that an RSD value calculated at 5 to 10 times this limit was not possible.

One FPXRF instrument collected replicate measurements on an additional nine soil samples to provide a better assessment of the effect of sample preparation on precision. Table 5 shows these results. These data are provided for guidance purposes only. The additional nine soil samples were comprised of three from each texture and had analyte concentrations ranging from near the lower limit of detection for the FPXRF analyzer to thousands of mg/kg. The FPXRF analyzer only collected replicate measurements from three of the preparation methods; no measurements were collected from the in situ homogenized samples. The FPXRF analyzer conducted five replicate measurements of the in situ field samples by taking measurements at five different points within the 4-inch by 4-inch sample square. Ten replicate measurements were collected for both the intrusive undried and unground and intrusive dried and ground samples contained in cups. The cups were shaken between each replicate measurement.

Table 5 shows that the precision dramatically improved from the in situ to the intrusive measurements. In general there was a slight improvement in precision when the sample was dried and ground. Two factors caused the precision for the in situ measurements to be poorer. The major factor is soil heterogeneity. By moving the probe within the 4-inch by 4-inch square,

measurements of different soil samples were actually taking place within the square. Table 5 illustrates the dominant effect of soil heterogeneity. It overwhelmed instrument precision when the FPXRF analyzer was used in this mode. The second factor that caused the RSD values to be higher for the in situ measurements is the fact that only five instead of ten replicates were taken. A lesser number of measurements caused the standard deviation to be larger which in turn elevated the RSD values.

13.6 Accuracy measurements -- Five of the FPXRF instruments (not including the MAP Spectrum Analyzer) analyzed 18 SRMs using the source count times and calibration methods given at the beginning of this section. The 18 SRMs included 9 soil SRMs, 4 stream or river sediment SRMs, 2 sludge SRMs, and 3 ash SRMs. Each of the SRMs contained known concentrations of certain target analytes. A percent recovery was calculated for each analyte in each SRM for each FPXRF instrument. Table 6 presents a summary of this data. With the exception of cadmium, chromium, and nickel, the values presented in Table 6 were generated from the 13 soil and sediment SRMs only. The 2 sludge and 3 ash SRMs were included for cadmium, chromium, and nickel because of the low or nondetectable concentrations of these three analytes in the soil and sediment SRMs.

Only 12 analytes are presented in Table 6. These are the analytes that are of environmental concern and provided a significant number of detections in the SRMs for an accuracy assessment. No data is presented for the X-MET 920 with the gas-filled proportional detector. This FPXRF instrument was calibrated empirically using site-specific soil samples. The percent recovery values from this instrument were very sporadic and the data did not lend itself to presentation in Table 6.

Table 7 provides a more detailed summary of accuracy data for one particular FPXRF instrument (TN 9000) for the 9 soil SRMs and 4 sediment SRMs. These data are provided for guidance purposes only. Table 7 shows the certified value, measured value, and percent recovery for five analytes. These analytes were chosen because they are of environmental concern and were most prevalently certified for in the SRM and detected by the FPXRF instrument. The first nine SRMs are soil and the last 4 SRMs are sediment. Percent recoveries for the four NIST SRMs were often between 90 and 110 percent for all analytes.

13.7 Comparability -- Comparability refers to the confidence with which one data set can be compared to another. In this case, FPXRF data generated from a large study of six FPXRF instruments was compared to SW-846 Methods 3050 and 6010 which are the standard soil extraction for metals and analysis by inductively coupled plasma. An evaluation of comparability was conducted by using linear regression analysis. Three factors were determined using the linear regression. These factors were the y-intercept, the slope of the line, and the coefficient of determination (r^2).

As part of the comparability assessment, the effects of soil type and preparation methods were studied. Three soil types (textures) and four preparation methods were examined during the study. The preparation methods evaluated the cumulative effect of particle size, moisture, and homogenization on comparability. Due to the large volume of data produced during this study, linear regression data for six analytes from only one FPXRF instrument is presented in Table 8. Similar trends in the data were seen for all instruments. These data are provided for guidance purposes only.

Table 8 shows the regression parameters for the whole data set, broken out by soil type, and by preparation method. These data are provided for guidance purposes only. The soil types are as follows: soil 1--sand; soil 2--loam; and soil 3--silty clay. The preparation methods are as follows: preparation 1--in situ in the field; preparation 2--intrusive, sample collected and homogenized; preparation 3--intrusive, with sample in a sample cup but sample still wet and not

ground; and preparation 4—intrusive, with sample dried, ground, passed through a 40-mesh sieve, and placed in sample cup.

For arsenic, copper, lead, and zinc, the comparability to the confirmatory laboratory was excellent with r^2 values ranging from 0.80 to 0.99 for all six FPXRF instruments. The slopes of the regression lines for arsenic, copper, lead, and zinc, were generally between 0.90 and 1.00 indicating the data would need to be corrected very little or not at all to match the confirmatory laboratory data. The r^2 values and slopes of the regression lines for barium and chromium were not as good as for the other for analytes, indicating the data would have to be corrected to match the confirmatory laboratory.

Table 8 demonstrates that there was little effect of soil type on the regression parameters for any of the six analytes. The only exceptions were for barium in soil 1 and copper in soil 3. In both of these cases, however, it is actually a concentration effect and not a soil effect causing the poorer comparability. All barium and copper concentrations in soil 1 and 3, respectively, were less than 350 mg/kg.

Table 8 shows there was a preparation effect on the regression parameters for all six analytes. With the exception of chromium, the regression parameters were primarily improved going from preparation 1 to preparation 2. In this step, the sample was removed from the soil surface, all large debris was removed, and the sample was thoroughly homogenized. The additional two preparation methods did little to improve the regression parameters. This data indicates that homogenization is the most critical factor when comparing the results. It is essential that the sample sent to the confirmatory laboratory match the FPXRF sample as closely as possible.

Sec. 11.0 of this method discusses the time necessary for each of the sample preparation techniques. Based on the data quality objectives for the project, an analyst must decide if it is worth the extra time necessary to dry and grind the sample for small improvements in comparability. Homogenization requires 3 to 5 min. Drying the sample requires one to two hours. Grinding and sieving requires another 10 to 15 min per sample. Lastly, when grinding and sieving is conducted, time has to be allotted to decontaminate the mortars, pestles, and sieves. Drying and grinding the samples and decontamination procedures will often dictate that an extra person be on site so that the analyst can keep up with the sample collection crew. The cost of requiring an extra person on site to prepare samples must be balanced with the gain in data quality and sample throughput.

13.8 The following documents may provide additional guidance and insight on this method and technique:

13.8.1 A. D. Hewitt, "Screening for Metals by X-ray Fluorescence Spectrometry/Response Factor/Compton K_α Peak Normalization Analysis," American Environmental Laboratory, pp 24-32, 1994.

13.8.2 S. Piorek and J. R. Pasmore, "Standardless, In Situ Analysis of Metallic Contaminants in the Natural Environment With a PC-Based, High Resolution Portable X-Ray Analyzer," Third International Symposium on Field Screening Methods for Hazardous Waste and Toxic Chemicals, Las Vegas, Nevada, February 24-26, 1993, Vol 2, pp 1135-1151, 1993.

13.8.3 S. Shefsky, "Sample Handling Strategies for Accurate Lead-in-soil Measurements in the Field and Laboratory," *International Symposium of Field Screening Methods for Hazardous Waste and Toxic Chemicals*, Las Vegas, NV, January 29-31, 1997.

14.0 POLLUTION PREVENTION

14.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity and/or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operation. The EPA has established a preferred hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention techniques to address their waste generation. When wastes cannot be feasibly reduced at the source, the Agency recommends recycling as the next best option.

14.2 For information about pollution prevention that may be applicable to laboratories and research institutions consult *Less is Better: Laboratory Chemical Management for Waste Reduction* available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th St., N.W. Washington, D.C. 20036, <http://www.acs.org>.

15.0 WASTE MANAGEMENT

The Environmental Protection Agency requires that laboratory waste management practices be conducted consistent with all applicable rules and regulations. The Agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods and bench operations, complying with the letter and spirit of any sewer discharge permits and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management, consult *The Waste Management Manual for Laboratory Personnel* available from the American Chemical Society at the address listed in Sec. 14.2.

16.0 REFERENCES

1. Metorex, X-MET 920 User's Manual.
2. Spectrace Instruments, "Energy Dispersive X-ray Fluorescence Spectrometry: An Introduction," 1994.
3. TN Spectrace, Spectrace 9000 Field Portable/Benchtop XRF Training and Applications Manual.
4. Unpublished SITE data, received from PRC Environment Management, Inc.

17.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

The following pages contain the tables referenced by this method. A flow diagram of the procedure follows the tables.

TABLE 1

EXAMPLE INTERFERENCE FREE LOWER LIMITS OF DETECTION

Analyte	Chemical Abstract Series Number	Lower Limit of Detection in Quartz Sand (milligrams per kilogram)
Antimony (Sb)	7440-36-0	40
Arsenic (As)	7440-38-0	40
Barium (Ba)	7440-39-3	20
Cadmium (Cd)	7440-43-9	100
Calcium (Ca)	7440-70-2	70
Chromium (Cr)	7440-47-3	150
Cobalt (Co)	7440-48-4	60
Copper (Cu)	7440-50-8	50
Iron (Fe)	7439-89-6	60
Lead (Pb)	7439-92-1	20
Manganese (Mn)	7439-96-5	70
Mercury (Hg)	7439-97-6	30
Molybdenum (Mo)	7439-93-7	10
Nickel (Ni)	7440-02-0	50
Potassium (K)	7440-09-7	200
Rubidium (Rb)	7440-17-7	10
Selenium (Se)	7782-49-2	40
Silver (Ag)	7440-22-4	70
Strontium (Sr)	7440-24-6	10
Thallium (Tl)	7440-28-0	20
Thorium (Th)	7440-29-1	10
Tin (Sn)	7440-31-5	60
Titanium (Ti)	7440-32-6	50
Vanadium (V)	7440-62-2	50
Zinc (Zn)	7440-66-6	50
Zirconium (Zr)	7440-67-7	10

Source: Refs. 1, 2, and 3

These data are provided for guidance purposes only.

TABLE 2
SUMMARY OF RADIOISOTOPE SOURCE CHARACTERISTICS

Source	Activity (mCi)	Half-Life (Years)	Excitation Energy (keV)	Elemental Analysis Range	
Fe-55	20-50	2.7	5.9	Sulfur to Chromium Molybdenum to Barium	K Lines L Lines
Cd-109	5-30	1.3	22.1 and 87.9	Calcium to Rhodium Tantalum to Lead Barium to Uranium	K Lines K Lines L Lines
Am-241	5-30	432	26.4 and 59.6	Copper to Thulium Tungsten to Uranium	K Lines L Lines
Cm-244	60-100	17.8	14.2	Titanium to Selenium Lanthanum to Lead	K Lines L Lines

Source: Refs. 1, 2, and 3

TABLE 3
SUMMARY OF X-RAY TUBE SOURCE CHARACTERISTICS

Anode Material	Recommended Voltage Range (kV)	K-alpha Emission (keV)	Elemental Analysis Range	
Cu	18-22	8.04	Potassium to Cobalt Silver to Gadolinium	K Lines L Lines
Mo	40-50	17.4	Cobalt to Yttrium Europium to Radon	K Lines L Lines
Ag	50-65	22.1	Zinc to Technicium Ytterbium to Neptunium	K Lines L Lines

Source: Ref. 4

Notes: The sample elements excited are chosen by taking as the lower limit the same ratio of excitation line energy to element absorption edge as in Table 2 (approximately 0.45) and the requirement that the excitation line energy be above the element absorption edge as the upper limit (L2 edges used for L lines). K-beta excitation lines were ignored.

TABLE 4
EXAMPLE PRECISION VALUES

Analyte	Average Relative Standard Deviation for Each Instrument at 5 to 10 Times the Lower Limit of Detection					
	TN 9000	TN Lead Analyzer	X-MET 920 (SiLi Detector)	X-MET 920 (Gas-Filled Detector)	XL Spectrum Analyzer	MAP Spectrum Analyzer
Antimony	6.54	NR	NR	NR	NR	NR
Arsenic	5.33	4.11	3.23	1.91	12.47	6.68
Barium	4.02	NR	3.31	5.91	NR	NR
Cadmium	29.84 ^a	NR	24.80 ^a	NR	NR	NR
Calcium	2.16	NR	NR	NR	NR	NR
Chromium	22.25	25.78	22.72	3.91	30.25	NR
Cobalt	33.90	NR	NR	NR	NR	NR
Copper	7.03	9.11	8.49	9.12	12.77	14.86
Iron	1.78	1.67	1.55	NR	2.30	NR
Lead	6.45	5.93	5.05	7.56	6.97	12.16
Manganese	27.04	24.75	NR	NR	NR	NR
Molybdenum	6.95	NR	NR	NR	12.60	NR
Nickel	30.85 ^a	NR	24.92 ^a	20.92 ^a	NA	NR
Potassium	3.90	NR	NR	NR	NR	NR
Rubidium	13.06	NR	NR	NR	32.69 ^a	NR
Strontium	4.28	NR	NR	NR	8.86	NR
Tin	24.32 ^a	NR	NR	NR	NR	NR
Titanium	4.87	NR	NR	NR	NR	NR
Zinc	7.27	7.48	4.26	2.28	10.95	0.83
Zirconium	3.58	NR	NR	NR	6.49	NR

These data are provided for guidance purposes only.

Source: Ref. 4

^a These values are biased high because the concentration of these analytes in the soil samples was near the lower limit of detection for that particular FPXRF instrument.

NR Not reported.

NA Not applicable; analyte was reported but was below the established lower limit detection.

TABLE 5

EXAMPLES OF PRECISION AS AFFECTED BY SAMPLE PREPARATION

Analyte	Average Relative Standard Deviation for Each Preparation Method		
	In Situ-Field	Intrusive-Undried and Unground	Intrusive-Dried and Ground
Antimony	30.1	15.0	14.4
Arsenic	22.5	5.36	3.76
Barium	17.3	3.38	2.90
Cadmium ^a	41.2	30.8	28.3
Calcium	17.5	1.68	1.24
Chromium	17.6	28.5	21.9
Cobalt	28.4	31.1	28.4
Copper	26.4	10.2	7.90
Iron	10.3	1.67	1.57
Lead	25.1	8.55	6.03
Manganese	40.5	12.3	13.0
Mercury	ND	ND	ND
Molybdenum	21.6	20.1	19.2
Nickel ^a	29.8	20.4	18.2
Potassium	18.6	3.04	2.57
Rubidium	29.8	16.2	18.9
Selenium	ND	20.2	19.5
Silver ^a	31.9	31.0	29.2
Strontium	15.2	3.38	3.98
Thallium	39.0	16.0	19.5
Thorium	NR	NR	NR
Tin	ND	14.1	15.3
Titanium	13.3	4.15	3.74
Vanadium	NR	NR	NR
Zinc	26.6	13.3	11.1
Zirconium	20.2	5.63	5.18

These data are provided for guidance purposes only.

Source: Ref. 4

^a These values may be biased high because the concentration of these analytes in the soil samples was near the lower limit of detection.

ND Not detected.

NR Not reported.

TABLE 6
EXAMPLE ACCURACY VALUES

Analyte	Instrument															
	TN 9000				TN Lead Analyzer				X-MET 920 (SiLi Detector)				XL Spectrum Analyzer			
	n	Range of % Rec.	Mean % Rec.	SD	n	Range of % Rec.	Mean % Rec.	SD	n	Range of % Rec.	Mean % Rec.	SD	n	Range of % Rec.	Mean % Rec.	SD
Sb	2	100-149	124.3	NA	--	--	--	--	--	--	--	--	--	--	--	--
As	5	68-115	92.8	17.3	5	44-105	83.4	23.2	4	9.7-91	47.7	39.7	5	38-535	189.8	206
Ba	9	98-198	135.3	36.9	--	--	--	--	9	18-848	168.2	262	--	--	--	--
Cd	2	99-129	114.3	NA	--	--	--	--	6	81-202	110.5	45.7	--	--	--	--
Cr	2	99-178	138.4	NA	--	--	--	--	7	22-273	143.1	93.8	3	98-625	279.2	300
Cu	8	61-140	95.0	28.8	6	38-107	79.1	27.0	11	10-210	111.8	72.1	8	95-480	203.0	147
Fe	6	78-155	103.7	26.1	6	89-159	102.3	28.6	6	48-94	80.4	16.2	6	26-187	108.6	52.9
Pb	11	66-138	98.9	19.2	11	68-131	97.4	18.4	12	23-94	72.7	20.9	13	80-234	107.3	39.9
Mn	4	81-104	93.1	9.70	3	92-152	113.1	33.8	--	--	--	--	--	--	--	--
Ni	3	99-122	109.8	12.0	--	--	--	--	--	--	--	--	3	57-123	87.5	33.5
Sr	8	110-178	132.6	23.8	--	--	--	--	--	--	--	--	7	86-209	125.1	39.5
Zn	11	41-130	94.3	24.0	10	81-133	100.0	19.7	12	46-181	106.6	34.7	11	31-199	94.6	42.5

Source: Ref. 4. These data are provided for guidance purposes only.

n: Number of samples that contained a certified value for the analyte and produced a detectable concentration from the FPXRF instrument.

SD: Standard deviation; NA: Not applicable; only two data points, therefore, a SD was not calculated.

%Rec.: Percent recovery.

-- No data.

TABLE 7
EXAMPLE ACCURACY FOR TN 9000^a

Standard Reference Material	Arsenic			Barium			Copper			Lead			Zinc		
	Cert. Conc.	Meas. Conc.	%Rec.	Cert. Conc.	Meas. Conc.	%Rec.	Cert. Conc.	Meas. Conc.	%Rec.	Cert. Conc.	Meas. Conc.	%Rec.	Cert. Conc.	Meas. Conc.	%Rec.
RTC CRM-021	24.8	ND	NA	586	1135	193.5	4792	2908	60.7	144742	149947	103.6	546	224	40.9
RTC CRM-020	397	429	92.5	22.3	ND	NA	753	583	77.4	5195	3444	66.3	3022	3916	129.6
BCR CRM 143R	--	--	--	--	--	--	131	105	80.5	180	206	114.8	1055	1043	99.0
BCR CRM 141	--	--	--	--	--	--	32.6	ND	NA	29.4	ND	NA	81.3	ND	NA
USGS GXR-2	25.0	ND	NA	2240	2946	131.5	76.0	106	140.2	690	742	107.6	530	596	112.4
USGS GXR-6	330	294	88.9	1300	2581	198.5	66.0	ND	NA	101	80.9	80.1	118	ND	NA
NIST 2711	105	104	99.3	726	801	110.3	114	ND	NA	1162	1172	100.9	350	333	94.9
NIST 2710	626	722	115.4	707	782	110.6	2950	2834	96.1	5532	5420	98.0	6952	6476	93.2
NIST 2709	17.7	ND	NA	968	950	98.1	34.6	ND	NA	18.9	ND	NA	106	98.5	93.0
NIST 2704	23.4	ND	NA	414	443	107.0	98.6	105	106.2	161	167	103.5	438	427	97.4
CNRC PACS-1	211	143	67.7	--	772	NA	452	302	66.9	404	332	82.3	824	611	74.2
SARM-51	--	--	--	335	466	139.1	268	373	139.2	5200	7199	138.4	2200	2676	121.6
SARM-52	--	--	--	410	527	128.5	219	193	88.1	1200	1107	92.2	264	215	81.4

Source: Ref. 4. These data are provided for guidance purposes only.

^a All concentrations in milligrams per kilogram.

%Rec.: Percent recovery; ND: Not detected; NA: Not applicable.

-- No data.

TABLE 8

EXAMPLE REGRESSION PARAMETERS FOR COMPARABILITY¹

	Arsenic				Barium				Copper			
	n	r ²	Int.	Slope	n	r ²	Int.	Slope	n	r ²	Int.	Slope
All Data	824	0.94	1.62	0.94	1255	0.71	60.3	0.54	984	0.93	2.19	0.93
Soil 1	368	0.96	1.41	0.95	393	0.05	42.6	0.11	385	0.94	1.26	0.99
Soil 2	453	0.94	1.51	0.96	462	0.56	30.2	0.66	463	0.92	2.09	0.95
Soil 3	—	—	—	—	400	0.85	44.7	0.59	136	0.46	16.60	0.57
Prep 1	207	0.87	2.69	0.85	312	0.64	53.7	0.55	256	0.87	3.89	0.87
Prep 2	208	0.97	1.38	0.95	315	0.67	64.6	0.52	246	0.96	2.04	0.93
Prep 3	204	0.96	1.20	0.99	315	0.78	64.6	0.53	236	0.97	1.45	0.99
Prep 4	205	0.96	1.45	0.98	313	0.81	58.9	0.55	246	0.96	1.99	0.96

	Lead				Zinc				Chromium			
	n	r ²	Int.	Slope	n	r ²	Int.	Slope	n	r ²	Int.	Slope
All Data	1205	0.92	1.66	0.95	1103	0.89	1.86	0.95	280	0.70	64.6	0.42
Soil 1	357	0.94	1.41	0.96	329	0.93	1.78	0.93	—	—	—	—
Soil 2	451	0.93	1.62	0.97	423	0.85	2.57	0.90	—	—	—	—
Soil 3	397	0.90	2.40	0.90	351	0.90	1.70	0.98	186	0.66	38.9	0.50
Prep 1	305	0.80	2.88	0.86	286	0.79	3.16	0.87	105	0.80	66.1	0.43
Prep 2	298	0.97	1.41	0.96	272	0.95	1.86	0.93	77	0.51	81.3	0.36
Prep 3	302	0.98	1.26	0.99	274	0.93	1.32	1.00	49	0.73	53.7	0.45
Prep 4	300	0.96	1.38	1.00	271	0.94	1.41	1.01	49	0.75	31.6	0.56

Source: Ref. 4. These data are provided for guidance purposes only.

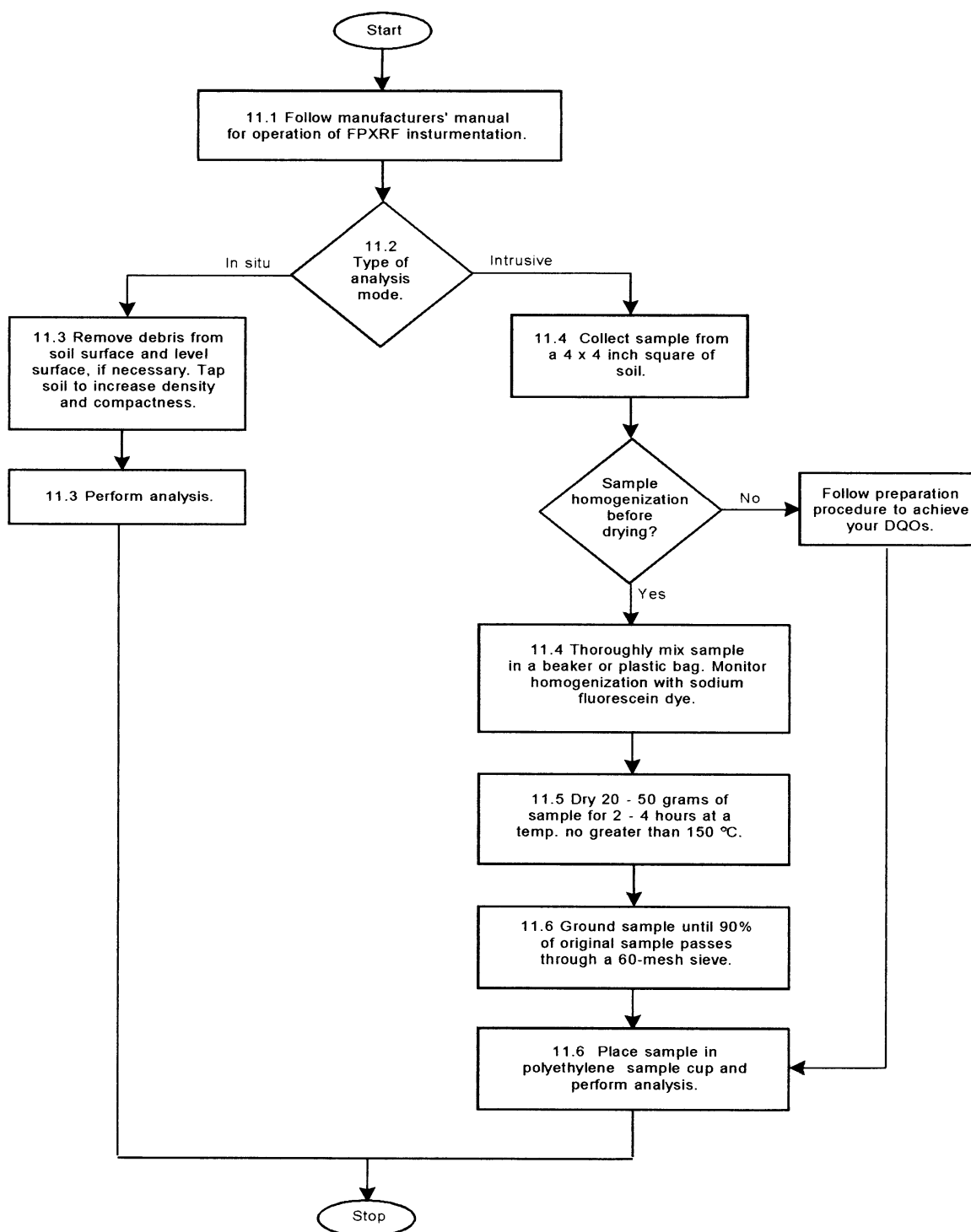
¹ Log-transformed data

n: Number of data points; r²: Coefficient of determination; Int.: Y-intercept

— No applicable data

METHOD 6200

FIELD PORTABLE X-RAY FLUORESCENCE SPECTROMETRY FOR THE DETERMINATION OF ELEMENTAL CONCENTRATIONS IN SOIL AND SEDIMENT



APPENDIX B

DATA VALIDATION REPORTS



Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380
610-701-3000 • Fax 610-701-3186
www.westonsolutions.com

The Trusted Integrator for Sustainable Solutions

7 April 2011

U.S. Environmental Protection Agency
Ms. Ruth Scharr (3HS31)
On-Scene Coordinator (OSC)
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: **FMO Pesticide Site - Data Quality Report**
EPA Contract No: EP-S3-10-05
Technical Direction Document Nos: WS01-10-07-006 and WS01-10-10-007
Document Control No. W0038.4B.00126

Dear Ms. Scharr:

This report provides a general review of the Weston Solutions Inc. (WESTON) x-ray fluorescence (XRF) analytical data package for the approximately 415 soil samples collected at the FMO Pesticide site in North Whitehall Township, Lehigh County, Pennsylvania, and analyzed on December 2, 2010 through January 4, 2011. The U.S. Environmental Protection Agency (EPA) asked that the samples be analyzed for lead and arsenic using the Niton Model 700 XRF instrument. Relevant results were extracted from the instrument's files, which include more than 20 metals. As part of the XRF quality assurance process, approximately 10 percent of the samples, a total of 40 samples, were sent as DAS R33659 and DAS R33660 to USEPA Region 3 Environmental Science Center of Fort Meade, Maryland, for confirmation analysis through the EPA DAS (Delivery of Analytical Services) Program. EPA validated the DAS reports so this report focuses on the review of the XRF data only.

The samples were analyzed for lead and arsenic by WESTON using the ex-situ variant of EPA SW-846 Method 6200 from "Test Methods for Evaluation Solid Waste", September 1986. The samples were prepared for analysis by drying and sieving to minimize heterogeneity.

The XRF data package was reviewed in accordance with the EPA, "Region III Modifications to National Functional Guidelines for Inorganic Data Review Multi-Media, Multi-Concentration," April 1993, to level IM1 for inorganic analysis. Those guidelines were modified, as appropriate to conform to Method 6200 and the requirements of WESTON's "Field Sampling Plan for the FMO Pesticide Site, North Whitehall Township, Lehigh County, Pennsylvania" (FSP), dated September 21, 2010.

There is a good correlation between the XRF and DAS data, as shown on the spreadsheet "Comparison XRF data.xls" and the linear regression analysis. For lead, the percent differences between the analyses averaged 16.4, with a maximum of 39.1 percent for sample 500B22. For arsenic, the percent differences averaged 18.7 percent, with a maximum of 59.1 percent for sample 1096 2 0. The higher percent differences are associated with the lower concentration



Ms. Ruth Scharr (3HS31)
U.S. Environmental Protection Agency

7 April 2011
Page 2

results; however, the average percent difference for both lead and arsenic met the project goal of less than 20% and are shown in the linear regression analysis to be very comparable to the offsite laboratory confirmation results.

The analyst followed the daily routine as established by Method 6200 and WESTON's FSP. The instrument (method) blanks contained no detectable analytes. Sample replicates and continuing calibration standards (blank, low level, intermediate level, and high level) were analyzed as required at the start of each day, after every 20 samples, and at the end of the day to verify precision and accuracy. As documented in the daily summaries reviewed for December 2, 2010 through January 4, 2011 included as "XRF daily calibration logs.zip", there were no irregularities found (all percent differences and %RSDs were less than 20% as stated in Method 6200). However, it was noted in the XRF dump data file (highlighted in red), there were duration errors for one blank and one sample performed on January 4, 2011. Since the blank and sample were reanalyzed, no qualifications were added.

No field duplicates were analyzed.

WESTON recommends that the data be accepted and used in decision-making as if they were DAS or CLP results. No qualifications were made. Please contact me at (603) 656-5434 regarding any aspect of this report.

Very truly yours,

WESTON SOLUTIONS, INC.

A black rectangular redaction box covering the signature of the Senior Technical Manager.

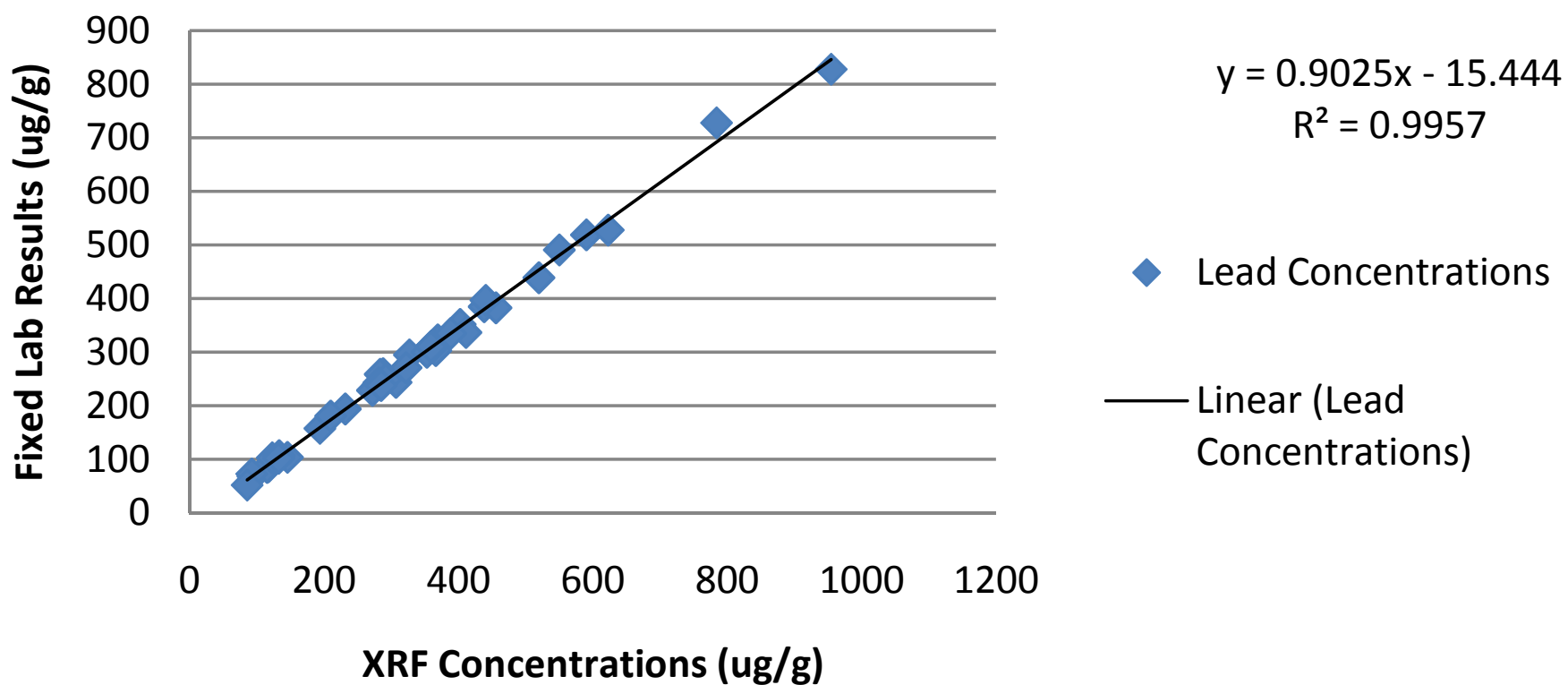
Senior Technical Manager

cc: START TDD File

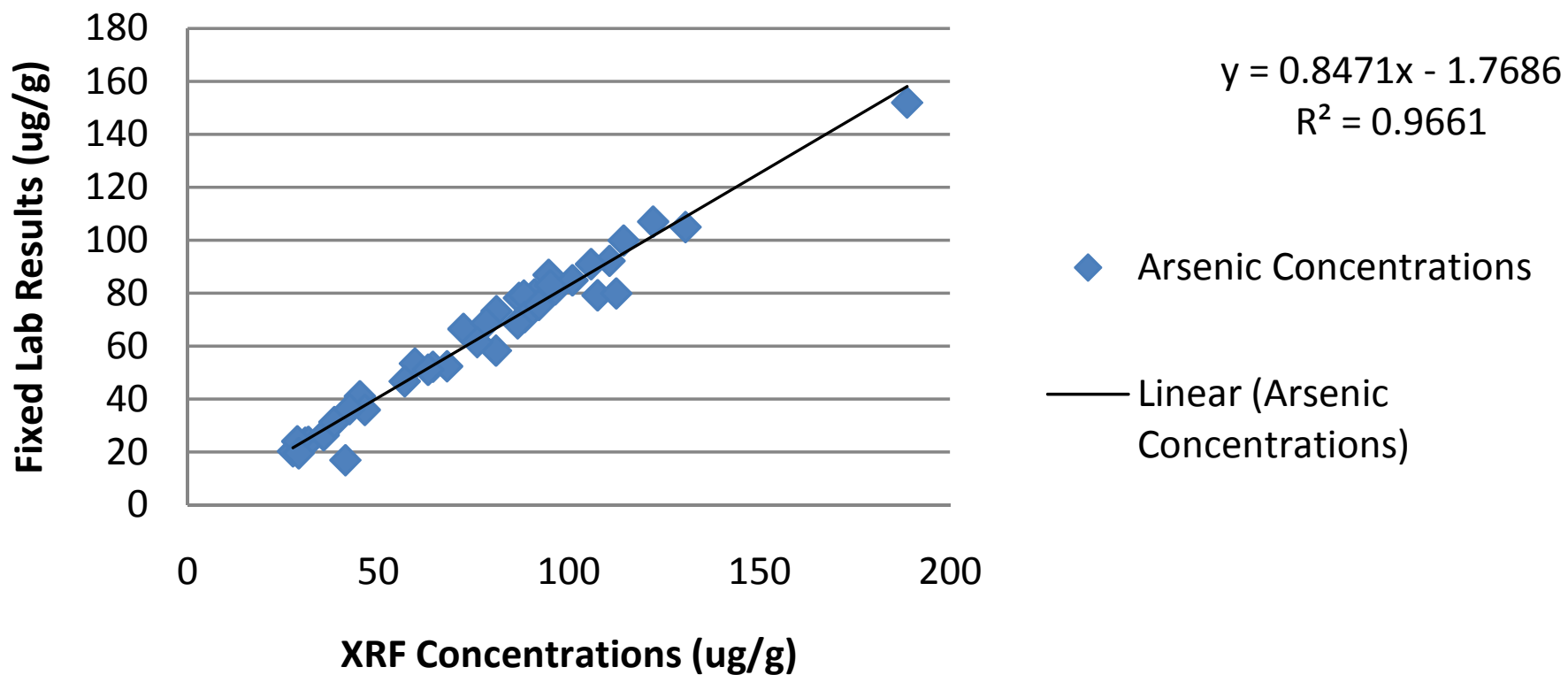
Enclosure: Spreadsheets with Validated Data

Reading No	Time	Duration	SAMPLE	Pb (ug/g)	Pb Error	Lab Confirmation Result (ug/g)	% D	PB Qualifier	As (ug/g)	As Error	Lab Confirmation Result (ug/g)	% D	AS Qualifier
28	12/2/2010 11:08		240 489 FY COMP	117.39	6.24		86.8	26.05843769	30.83	5.18		23.5	23.775543
	12/2/2010 11:30		240 424 TPA3	231.71	7.86		194	16.27465366	64.35	6.76		52.2	18.881119
38	12/2/2010 11:53		240 477 TPA5	307.12	8.88		244	20.55222714	80.86	7.67		58.3	27.900074
41	12/2/2010 12:29		240 134 BY COMP	94.2	5.86		68.5	27.28237792	27.61	4.84		20.3	26.475915
45	12/2/2010 12:55		240 542 FY 02	115.34	6.34		85	26.30483787	31.69	5.28		23.8	24.897444
62	12/2/2010 14:21		240 525 4TPA	326.98	9.21		295	9.780414704	107.56	8.14		79.2	26.366679
67	12/2/2010 14:44		240 478 BY1	280	8.6		239	14.64285714	45.15	7.13		41	9.1915836
71	12/2/2010 15:01		240 543 TPA3	353.07	9.3		300	15.03101368	59.61	7.78		53.4	10.417715
79	12/2/2010 16:24		240 506 FY06	145.7	6.8		104	28.62045299	46.47	5.8		35.9	22.745858
108	12/4/2010 11:38		240 506 FY09	360.31	9.4		312	13.40789875	86.92	8.08		78.2	10.032214
112	12/4/2010 11:56		240 506 FY13	438.39	10.22		385	12.17865371	96.39	8.77		81.4	15.551406
148	12/4/2010 17:47		240 399 FY04	272.09	8.31		229	15.83667169	81	7.22		73.2	9.6296296
151	12/4/2010 18:14		240 399 FY07	590.48	11.56		519	12.10540577	130.6	9.98		105	19.601838
199	12/5/2010 12:54		240 399 FY30	519.78	10.97		439	15.5411905	110.64	9.42		92.2	16.666667
224	12/5/2010 15:33		240 399 BY08	455.77	10.37		383	15.96638655	105.83	8.94		91	14.01304
265	12/6/2010 13:50		240 399 BY 24	287.76	8.51		260	9.646927996	72.35	7.29		66.5	8.0856945
277	12/6/2010 14:48		240 399 BY 36	283.61	8.37		259	8.677409118	68.05	7.15		52.4	22.997796
282	12/6/2010 15:15		240 13 BY 4	291.7	8.62		249	14.63832705	56.94	7.24		46.7	17.983843
326	12/7/2010 9:42		240 13 FY 2	440.7	10.13		397	9.916042659	96.25	8.69		84.1	12.623377
340	12/7/2010 10:51		240 13 FY 16	550.2	11.04		491	10.75972374	122.12	9.52		107	12.381264
394	12/10/2010 12:41		240 498 25	281.4	8.46		243	13.64605544	91	7.43		79.5	12.637363
397	12/10/2010 12:57		240 498 22	366.29	9.48		303	17.27865899	88.2	8.15		79.1	10.31746
442	12/13/2010 13:55		240 498 1	122.89	6.2		103	16.18520628	35.69	5.2		26.4	26.0297
450	12/13/2010 14:55		240 452 25B	369.18	9.34		323	12.50880329	78.32	7.96		68.7	12.282942
842	1/4/2011 13:27		240 462 08	383.07	9.66		329	14.11491372	97.59	8.36		81.3	16.692284
511	12/14/2010 14:25		240 452 1B	402.55	9.87		352	12.55744628	100.93	8.55		84.9	15.882295
512	12/14/2010 14:30		240 452 1TPA	784.19	13.1		728	7.165355335	188.73	11.45		152	19.461665
517	12/14/2010 15:07		240 452 1F	133.14	6.5		107	19.63346853	38.47	5.46		31.3	18.6379
518	12/14/2010 15:12		240 452 2F	92.46	5.83		73	21.04693922	28.74	4.83		24	16.492693
529	12/14/2010 16:07		240 452 13F	363.9	9.16		313	13.98735916	88.42	7.88		71	19.701425
575	12/16/2010 14:44		240 148 1	193.89	7.59		158	18.51049564	63.05	6.58		51.1	18.953212
615	12/17/2010 11:10		240 148 16	411.26	10.11		337	18.05670379	86.56	8.62		68.6	20.748614
651	12/17/2010 14:35		240 1096 20	954.69	14.89		828	13.27027622	41.36	12		16.9	59.139265
680	12/20/2010 11:14		240 1096 23	622.75	11.85		528	15.21477318	112.44	10.08		79.9	28.939879
682	12/20/2010 11:23		240 500 F1	209.83	7.64		181	13.73969404	75.95	6.72		61.5	19.025675
695	12/20/2010 13:41		240 500 F14	358.92	9.41		310	13.62977822	94.69	8.16		86.9	8.2268455
716	12/20/2010 15:18		240 500 F24	388.61	9.7		335	13.79532179	114.35	8.52		99.9	12.636642
761	12/23/2010 13:46		240 500 B2	132.4	6.74		102	22.96072508	42.46	5.72		36.2	14.743288
772	12/23/2010 14:38		240 500 B13	284.93	8.69		238	16.4707121	92.14	7.64		75.6	17.950944
807	1/4/2011 10:40		240 500 B22	85.65	6.03		52.2	39.05429072	29.11	5.02		19.5	33.01271
821	1/4/2011 11:43		240 500 B35	321.87	9.05		271	15.80451735	95.15	7.91		83	12.769312
AVG % D							16.38666841					18.646361	

Lead Concentrations



Arsenic Concentrations



Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1	11/24/2010 10:41	SHUTTER_CAL	55.95	cps	Final					
2	11/24/2010 10:47	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.3	< LOD	2.96
3	11/24/2010 10:52	SOIL	240	ppm	Final	NCS73308	14.95	3.89	23.21	3.27
4	11/24/2010 10:57	SOIL	240.07	ppm	Final	NCS73308	13.6	3.84	22.61	3.23
5	11/24/2010 11:02	SOIL	240.22	ppm	Final	NCS73308	14.04	3.84	22.08	3.22
6	11/24/2010 11:08	SOIL	240	ppm	Final	NIST2709a	11.06	4.06	7.41	3.09
7	11/24/2010 11:25	SOIL	240	ppm	Final	NIST2780	5016.21	34.39	< LOD	41.03
8	11/24/2010 11:27	SHUTTER_CAL	55.93	cps	Final					
9	11/24/2010 11:32	SOIL	240	ppm	Final	NCS73308	14.87	3.9	19.81	3.23
10	12/2/2010 7:58	SOIL	240	ppm	Final	NIST 2702	123.63	7.29	45.96	6.22
11	12/2/2010 9:31	SOIL	240.28	ppm	Final	NIST 2702	123.33	7.25	46.37	6.2
12	12/2/2010 9:35	SOIL	240.29	ppm	Final	NIST 2702	121.77	7.26	49.1	6.24
13	12/2/2010 9:45	SHUTTER_CAL	55.97	cps	Final					
14	12/2/2010 9:51	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.3	< LOD	2.95
15	12/2/2010 9:56	SOIL	240	ppm	Final	NIST 2782	496.62	17.4	157.74	15.58
16	12/2/2010 10:01	SOIL	240	ppm	Final	TILL-4	42.29	5.15	108.22	5.39
17	12/2/2010 10:05	SOIL	240	ppm	Final	GBW 7411	2665.15	26.16	199.09	21.51
18	12/2/2010 10:13	SOIL	240	ppm	Final	NIST 2702	120.24	7.24	50.07	6.24
19	12/2/2010 10:18	SOIL	240	ppm	Final	NIST 2711	1123.56	15.65	93.93	12.86
20	12/2/2010 10:23	SOIL	240.29	ppm	Final	PREC SAMP (489 FY COMP)	112.58	6.19	26.82	5.08
21	12/2/2010 10:27	SOIL	240.13	ppm	Final	PREC SAMP (489 FY COMP)	112.36	6.17	30.25	5.12
22	12/2/2010 10:31	SOIL	240.28	ppm	Final	PREC SAMP (489 FY COMP)	110.96	6.15	30.16	5.1
23	12/2/2010 10:35	SOIL	240.1	ppm	Final	PREC SAMP (489 FY COMP)	111.25	6.15	31.68	5.12
24	12/2/2010 10:39	SOIL	240.28	ppm	Final	PREC SAMP (489 FY COMP)	109.25	6.12	29.45	5.06
25	12/2/2010 10:43	SOIL	240.21	ppm	Final	PREC SAMP (489 FY COMP)	111.85	6.16	32.54	5.14
26	12/2/2010 10:47	SOIL	240.13	ppm	Final	PREC SAMP (489 FY COMP)	112.02	6.18	28.55	5.11
27	12/2/2010 11:03	SOIL	240	ppm	Final	489 F1	96.03	6.01	34.89	5.07
28	12/2/2010 11:08	SOIL	240	ppm	Final	489 FY COMP	117.39	6.24	30.83	5.18
29	12/2/2010 11:12	SOIL	240	ppm	Final	489 BY COMP	73.75	5.75	21.53	4.69
30	12/2/2010 11:17	SOIL	240	ppm	Final	489 BY3	16.17	4.43	8.88	3.42
31	12/2/2010 11:21	SOIL	240	ppm	Final	424 TPA1	250.35	8.11	66.61	6.96
32	12/2/2010 11:25	SOIL	240	ppm	Final	424 TPA2	234.14	7.88	67.7	6.8
33	12/2/2010 11:30	SOIL	240	ppm	Final	424 TPA3	231.71	7.86	64.35	6.76
34	12/2/2010 11:34	SOIL	240	ppm	Final	424 TPA4	230.17	7.84	55.16	6.65
35	12/2/2010 11:39	SOIL	240	ppm	Final	477 TPA1	129.33	6.46	78.84	5.91
36	12/2/2010 11:44	SOIL	240	ppm	Final	477 TPA2	221.99	7.8	89.35	6.95
37	12/2/2010 11:48	SOIL	240	ppm	Final	477 TPA3	126.57	6.42	40.42	5.43
38	12/2/2010 11:53	SOIL	240	ppm	Final	477 TPA5	307.12	8.88	80.86	7.67
39	12/2/2010 11:57	SOIL	240	ppm	Final	134 FY4	25.48	4.73	13.1	3.74
40	12/2/2010 12:02	SOIL	240	ppm	Final	134 FY COMP	80.24	5.62	27.91	4.67
41	12/2/2010 12:29	SOIL	240	ppm	Final	134 BY COMP	94.2	5.86	27.61	4.84
42	12/2/2010 12:33	SOIL	240	ppm	Final	134 BY2	16.54	4.49	7.83	3.46
43	12/2/2010 12:46	SOIL	240	ppm	Final	542 BY COMP	226.42	7.74	46.14	6.47
44	12/2/2010 12:50	SOIL	240	ppm	Final	542 BY 03	113.7	6.29	33.21	5.26
45	12/2/2010 12:55	SOIL	240	ppm	Final	542 FY5	115.34	6.34	31.69	5.28
46	12/2/2010 12:59	SOIL	240	ppm	Final	542 FY SUB	80.5	5.84	26.52	4.83
47	12/2/2010 13:10	SOIL	240.27	ppm	Final	PREC SAMP(424 TPA3)	238.43	7.99	59.91	6.82
48	12/2/2010 13:14	SOIL	240.18	ppm	Final	PREC SAMP(424 TPA3)	234.87	7.93	61.12	6.77
49	12/2/2010 13:18	SOIL	240.22	ppm	Final	PREC SAMP(424 TPA3)	222.26	7.77	63.15	6.67
50	12/2/2010 13:22	SOIL	240.22	ppm	Final	PREC SAMP(424 TPA3)	232.4	7.91	60.58	6.76
51	12/2/2010 13:26	SOIL	240.13	ppm	Final	PREC SAMP(424 TPA3)	228.65	7.85	64.89	6.75
52	12/2/2010 13:31	SOIL	240.25	ppm	Final	PREC SAMP(424 TPA3)	236.6	7.95	62.44	6.8
53	12/2/2010 13:35	SOIL	240.22	ppm	Final	PREC SAMP(424 TPA3)	232.86	7.91	60.04	6.75
54	12/2/2010 13:40	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.39	< LOD	3.01
55	12/2/2010 13:46	SOIL	240	ppm	Final	GBW 7411	2670.16	26.19	208.14	21.56
56	12/2/2010 13:53	SOIL	240	ppm	Final	TILL-4	37.43	5.05	107.63	5.32
57	12/2/2010 13:57	SOIL	240	ppm	Final	NIST 2711	1131.46	15.71	96.89	12.92
58	12/2/2010 14:02	SOIL	240	ppm	Final	NIST 2782	503.54	17.55	163.1	15.76
59	12/2/2010 14:07	SOIL	240	ppm	Final	NIST 2702	126.61	7.32	44.51	6.23
60	12/2/2010 14:12	SOIL	240	ppm	Final	525 2TPA	272.44	8.43	86.02	7.37
61	12/2/2010 14:16	SOIL	240	ppm	Final	525 1TPA	248.18	7.95	81.74	6.96
62	12/2/2010 14:21	SOIL	240	ppm	Final	525 4TPA	326.98	9.21	107.56	8.14
63	12/2/2010 14:25	SOIL	240	ppm	Final	525 5TPA	164.68	6.99	51.87	5.98
64	12/2/2010 14:30	SOIL	240	ppm	Final	478 FY COMP	183.37	7.18	40.54	6
65	12/2/2010 14:35	SOIL	240	ppm	Final	478 FY5	25.31	4.58	12.31	3.6
66	12/2/2010 14:39	SOIL	240	ppm	Final	478 BY COMP	241.35	7.94	52.92	6.69
67	12/2/2010 14:44	SOIL	240	ppm	Final	478 BY1	280	8.6	45.15	7.13
68	12/2/2010 14:48	SOIL	240	ppm	Final	478 TPA	103.35	6.11	40.44	5.2
69	12/2/2010 14:53	SOIL	240	ppm	Final	543 TPA1	205.74	7.56	39.29	6.27
70	12/2/2010 14:57	SOIL	240	ppm	Final	543 TPA2	235.14	7.93	53.26	6.7
71	12/2/2010 15:01	SOIL	240	ppm	Final	543 TPA3	353.07	9.3	59.61	7.78
72	12/2/2010 15:06	SOIL	240	ppm	Final	543 TPA04	208.98	7.6	54.54	6.47
73	12/2/2010 15:41	SOIL	240	ppm	Final	543 TPA05	225.25	7.86	72.46	6.83
74	12/2/2010 15:46	SOIL	240	ppm	Final	506 FY01	195.99	7.36	69.26	6.43
75	12/2/2010 15:50	SOIL	240	ppm	Final	506 FY02	263.95	8.32	78.41	7.22
76	12/2/2010 15:55	SOIL	240	ppm	Final	506 FY03	242.31	8.01	86.74	7.07
77	12/2/2010 15:59	SOIL	240	ppm	Final	506 FY04	157.84	6.91	47.13	5.87
78	12/2/2010 16:04	SOIL	240	ppm	Final	506 FY05	42.69	4.93	14.96	3.93
79	12/2/2010 16:24	SOIL	240	ppm	Final	506 FY06	145.7	6.8	46.47	5.8
80	12/2/2010 16:28	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.38	< LOD	2.98
81	12/2/2010 16:33	SOIL	240	ppm	Final	GBW 7411	2705.91	26.36	189.89	21.63
82	12/2/2010 16:39	SOIL	240	ppm	Final	NIST 2711	1117.47	15.64	105.91	12.91
83	12/2/2010 16:47	SOIL	240	ppm	Final	NIST 2702	119.91	7.23	42.22	6.12

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
84	12/2/2010 16:51	SOIL	240	ppm	Final	NIST 2782	516.14	17.63	150.63	15.66
85	12/2/2010 16:56	SOIL	240	ppm	Final	TILL-4	38.32	5.01	107.47	5.29
86	12/2/2010 17:01	SOIL	240.3	ppm	Final	PREC SAMP(506 FY06)	140.25	6.68	43.6	5.67
87	12/2/2010 17:05	SOIL	240.2	ppm	Final	PREC SAMP(506 FY06)	144.07	6.75	45.57	5.75
88	12/2/2010 17:09	SOIL	240.15	ppm	Final	PREC SAMP(506 FY06)	139.06	6.66	46.38	5.7
89	12/2/2010 17:13	SOIL	240.22	ppm	Final	PREC SAMP(506 FY06)	145.44	6.78	46.9	5.79
90	12/2/2010 17:17	SOIL	240.14	ppm	Final	PREC SAMP(506 FY06)	150.12	6.86	44.69	5.82
91	12/2/2010 17:21	SOIL	240.28	ppm	Final	PREC SAMP(506 FY06)	144.52	6.77	45.29	5.75
92	12/2/2010 17:25	SOIL	240.11	ppm	Final	PREC SAMP(506 FY06)	150.46	6.87	44.54	5.83
93	12/4/2010 10:01	SHUTTER_CAL	55.88	cps	Final					
94	12/4/2010 10:06	SOIL	240.12	ppm	Final	PREC SAMP(506 FY 06)	134.58	6.66	49.79	5.73
95	12/4/2010 10:10	SOIL	240.14	ppm	Final	PREC SAMP(506 FY 06)	135.39	6.64	48.91	5.71
96	12/4/2010 10:14	SOIL	240.04	ppm	Final	PREC SAMP(506 FY 06)	140.28	6.73	42.92	5.7
97	12/4/2010 10:18	SOIL	240.22	ppm	Final	PREC SAMP(506 FY 06)	143.09	6.76	43.61	5.74
98	12/4/2010 10:22	SOIL	240.21	ppm	Final	PREC SAMP(506 FY 06)	139.9	6.71	44.41	5.71
99	12/4/2010 10:26	SOIL	240.02	ppm	Final	PREC SAMP(506 FY 06)	139.99	6.7	43.08	5.68
100	12/4/2010 10:30	SOIL	240.01	ppm	Final	PREC SAMP(506 FY 06)	141.07	6.74	46.01	5.74
101	12/4/2010 10:47	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.44	< LOD	2.99
102	12/4/2010 10:54	SOIL	240	ppm	Final	NIST 2702	121.14	7.25	48.96	6.23
103	12/4/2010 10:58	SOIL	240	ppm	Final	NIST 2782	518.74	17.6	145.73	15.56
104	12/4/2010 11:03	SOIL	240	ppm	Final	NIST 2711	1126.49	15.74	88.84	12.9
105	12/4/2010 11:17	SOIL	240	ppm	Final	GBW 7411	2677.23	26.31	200.74	21.63
106	12/4/2010 11:29	SOIL	240	ppm	Final	506 FY07	319.68	8.87	91.6	7.73
107	12/4/2010 11:33	SOIL	240	ppm	Final	506 FY08	149.86	6.78	89	6.24
108	12/4/2010 11:38	SOIL	240	ppm	Final	506 FY09	360.31	9.4	86.92	8.08
109	12/4/2010 11:42	SOIL	240	ppm	Final	506 FY10	276.21	8.4	90.67	7.38
110	12/4/2010 11:47	SOIL	240	ppm	Final	506 FY11	386.55	9.69	88.13	8.31
111	12/4/2010 11:51	SOIL	240	ppm	Final	506 FY12	411.38	9.93	102.38	8.6
112	12/4/2010 11:56	SOIL	240	ppm	Final	506 FY13	438.39	10.22	96.39	8.77
113	12/4/2010 12:00	SOIL	240	ppm	Final	506 FY14	366.8	9.45	95.24	8.18
114	12/4/2010 12:10	SOIL	240	ppm	Final	506 FY15	396.51	9.81	95.47	8.46
115	12/4/2010 12:16	SOIL	240	ppm	Final	506 FY16	372.04	9.52	95.38	8.24
116	12/4/2010 12:20	SOIL	240	ppm	Final	506 FY17	353.58	9.29	92.72	8.05
117	12/4/2010 12:29	SOIL	240	ppm	Final	506 FY18	443.99	10.2	105.04	8.8
118	12/4/2010 12:42	SOIL	240	ppm	Final	506 FY19	350.65	9.24	100.93	8.07
119	12/4/2010 12:47	SOIL	240	ppm	Final	506 FY20	330.1	9	101.19	7.9
120	12/4/2010 13:04	SOIL	240	ppm	Final	506 FY21	66.86	5.29	19.93	4.29
121	12/4/2010 13:11	SOIL	240	ppm	Final	506 FY22	336.97	9.13	100.86	8
122	12/4/2010 13:16	SOIL	240	ppm	Final	506 FY23	24.12	4.54	18.79	3.7
123	12/4/2010 13:27	SOIL	240	ppm	Final	506 FY24	380.56	9.6	92.01	8.28
124	12/4/2010 13:32	SOIL	240	ppm	Final	506 FY33	33.22	4.63	13.72	3.66
125	12/4/2010 13:45	SOIL	240	ppm	Final	506 FY34	74.84	5.52	22.01	4.51
126	12/4/2010 13:50	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.41	< LOD	3.02
127	12/4/2010 13:54	SOIL	240	ppm	Final	NIST 2702	117.66	7.18	47.74	6.17
128	12/4/2010 14:01	SOIL	240	ppm	Final	NIST 2782	507.88	17.41	161.81	15.61
129	12/4/2010 14:06	SOIL	240	ppm	Final	NIST 2711	1110.18	15.57	104.33	12.85
130	12/4/2010 14:13	SOIL	240	ppm	Final	GBW 7411	2683.08	26.36	190.89	21.63
131	12/4/2010 14:21	SOIL	240.2	ppm	Final	PREC SAMP(506 FY12)	410.16	9.94	105.36	8.62
132	12/4/2010 14:25	SOIL	240.14	ppm	Final	PREC SAMP(506 FY12)	423.92	10.07	97.1	8.65
133	12/4/2010 14:29	SOIL	240.14	ppm	Final	PREC SAMP(506 FY12)	413.78	9.96	98.45	8.59
134	12/4/2010 14:33	SOIL	240.12	ppm	Final	PREC SAMP(506 FY12)	418.82	10	94.02	8.58
135	12/4/2010 14:37	SOIL	240.21	ppm	Final	PREC SAMP(506 FY12)	416.61	10	100.25	8.63
136	12/4/2010 14:41	SOIL	240.19	ppm	Final	PREC SAMP(506 FY12)	418.09	9.99	97.75	8.6
137	12/4/2010 14:45	SOIL	240.22	ppm	Final	PREC SAMP(506 FY12)	419.19	9.97	95.28	8.57
138	12/4/2010 15:58	SOIL	240	ppm	Final	506 FY31	216.58	7.72	75.16	6.77
139	12/4/2010 15:59	SOIL	0.49	ppm	Final	506 FY32	< LOD	294529.44	< LOD	118837.7
140	12/4/2010 16:07	SOIL	0.17	ppm	Final	506 FY32	0.67	0.1	0.21	0.1
141	12/4/2010 16:11	SOIL	240	ppm	Final	506 FY32	345.2	9.23	100.05	8.07
142	12/4/2010 16:16	SOIL	240	ppm	Final	506 FY35	30.17	4.55	13.26	3.6
143	12/4/2010 16:21	SOIL	240	ppm	Final	506 FY36	28.18	4.54	11.03	3.55
144	12/4/2010 17:24	SOIL	1.77	ppm	Final	399 FY01	< LOD	47.56	< LOD	10.82
145	12/4/2010 17:29	SOIL	240	ppm	Final	399 FY01	403.11	9.81	113.21	8.59
146	12/4/2010 17:33	SOIL	240	ppm	Final	399 FY02	441.16	10.13	100.52	8.71
147	12/4/2010 17:42	SOIL	240	ppm	Final	399 FY03	423.07	10.03	110.81	8.72
148	12/4/2010 17:47	SOIL	240	ppm	Final	399 FY04	272.09	8.31	81	7.22
149	12/4/2010 17:51	SOIL	240	ppm	Final	399 FY05	441.43	10.26	109.26	8.89
150	12/4/2010 17:56	SOIL	240	ppm	Final	399 FY06	531.43	10.95	108.41	9.37
151	12/4/2010 18:14	SOIL	240	ppm	Final	399 FY07	590.48	11.56	130.6	9.98
152	12/4/2010 18:19	SOIL	240	ppm	Final	399 FY08	531.22	10.97	111.64	9.41
153	12/4/2010 18:23	SOIL	240	ppm	Final	399 FY09	272.37	8.31	77.8	7.2
154	12/4/2010 18:28	SOIL	240	ppm	Final	399 FY10	474.02	10.4	103.33	8.93
155	12/4/2010 18:32	SOIL	240	ppm	Final	399 FY11	271.68	8.34	74.99	7.19
156	12/4/2010 18:37	SOIL	240	ppm	Final	399 FY12	451.99	10.15	102.21	8.73
157	12/4/2010 18:44	SOIL	240	ppm	Final	399 FY13	257.94	8.12	72.7	7.01
158	12/4/2010 18:49	SOIL	240	ppm	Final	399 FY14	406.68	9.76	96.64	8.41
159	12/4/2010 18:56	SOIL	240	ppm	Final	399 FY15	283.54	8.32	87.71	7.28
160	12/4/2010 19:01	SOIL	240	ppm	Final	399 FY16	432.51	10	97.35	8.59
161	12/4/2010 19:19	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.3	< LOD	2.96
162	12/4/2010 19:40	SOIL	240	ppm	Final	NIST 2702	127.43	7.32	45.07	6.24
163	12/4/2010 20:07	SOIL	240	ppm	Final	NIST 2782	495.87	17.34	165.38	15.6
164	12/4/2010 20:29	SOIL	240	ppm	Final	NIST 2711	1115.99	15.62	89.32	12.8
165	12/4/2010 20:38	SOIL	240	ppm	Final	GBW 7411	2684.86	26.37	215.05	21.74
166	12/4/2010 20:59	SOIL	240.13	ppm	Final	PREC SAMP(399 FY09)	262.07	8.18	76.39	7.08

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
167	12/4/2010 21:03	SOIL	240.12	ppm	Final	PREC SAMP(399 FY09)	271.42	8.3	69.39	7.11
168	12/4/2010 21:07	SOIL	240.26	ppm	Final	PREC SAMP(399 FY09)	267.06	8.25	74.75	7.13
169	12/4/2010 21:11	SOIL	240.1	ppm	Final	PREC SAMP(399 FY09)	264.3	8.22	74.03	7.09
170	12/4/2010 21:15	SOIL	240.21	ppm	Final	PREC SAMP(399 FY09)	265.18	8.22	73.65	7.1
171	12/4/2010 21:19	SOIL	240.19	ppm	Final	PREC SAMP(399 FY09)	272.02	8.34	73.18	7.18
172	12/4/2010 21:23	SOIL	240.2	ppm	Final	PREC SAMP(399 FY09)	267.11	8.24	71.56	7.08
173	12/5/2010 10:00	SHUTTER_CAL	55.99	cps	Final					
174	12/5/2010 10:09	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.32	< LOD	2.97
175	12/5/2010 10:13	SOIL	240	ppm	Final	NIST 2702	121.84	7.29	49.79	6.28
176	12/5/2010 10:18	SOIL	240	ppm	Final	NIST 2782	513.23	17.59	148.92	15.6
177	12/5/2010 10:23	SOIL	240	ppm	Final	NIST 2711	1116.61	15.64	86.06	12.81
178	12/5/2010 10:27	SOIL	240	ppm	Final	GBW 7411	2692.64	26.34	201.32	21.66
179	12/5/2010 10:32	SOIL	240.25	ppm	Final	506 FY32	343.9	9.21	100.6	8.06
180	12/5/2010 10:36	SOIL	240.05	ppm	Final	506 FY32	337.93	9.14	107.5	8.06
181	12/5/2010 10:40	SOIL	240.18	ppm	Final	506 FY32	356.91	9.37	96.45	8.14
182	12/5/2010 10:44	SOIL	240.01	ppm	Final	506 FY32	343.55	9.19	100.74	8.04
183	12/5/2010 10:48	SOIL	240.12	ppm	Final	506 FY32	342.49	9.17	100.14	8.02
184	12/5/2010 10:52	SOIL	240.22	ppm	Final	506 FY32	348.12	9.25	95.86	8.05
185	12/5/2010 10:56	SOIL	240.28	ppm	Final	506 FY32	347.39	9.23	102.88	8.09
186	12/5/2010 11:30	SOIL	240	ppm	Final	399 FY17	299.86	8.86	78.8	7.64
187	12/5/2010 11:36	SOIL	240	ppm	Final	399 FY18	335.58	9.08	101.21	7.96
188	12/5/2010 11:47	SOIL	240	ppm	Final	399 FY19	312.28	8.86	76.35	7.6
189	12/5/2010 11:55	SOIL	240	ppm	Final	399 FY20	400.48	9.81	107.74	8.54
190	12/5/2010 12:00	SOIL	240	ppm	Final	399 FY21	293.57	8.54	75.73	7.34
191	12/5/2010 12:04	SOIL	240	ppm	Final	399 FY22	373.09	9.41	84.26	8.05
192	12/5/2010 12:08	SOIL	240	ppm	Final	399 FY23	357.89	9.32	93.13	8.07
193	12/5/2010 12:13	SOIL	240	ppm	Final	399 FY24	372.16	9.57	84.06	8.18
194	12/5/2010 12:17	SOIL	240	ppm	Final	399 FY25	355.97	9.19	81.82	7.87
195	12/5/2010 12:29	SOIL	240	ppm	Final	399 FY26	488.83	10.67	100.32	9.12
196	12/5/2010 12:34	SOIL	240	ppm	Final	399 FY27	436.7	10.21	99.98	8.79
197	12/5/2010 12:39	SOIL	240	ppm	Final	399 FY28	548.42	11.16	102.18	9.49
198	12/5/2010 12:43	SOIL	240	ppm	Final	399 FY29	382.93	9.6	86.37	8.23
199	12/5/2010 12:54	SOIL	240	ppm	Final	399 FY30	519.78	10.97	110.64	9.42
200	12/5/2010 13:01	SOIL	240	ppm	Final	399 FY31	362.81	9.37	88.39	8.07
201	12/5/2010 13:09	SOIL	240	ppm	Final	399 FY32	489.67	10.63	116.39	9.2
202	12/5/2010 13:23	SOIL	240	ppm	Final	399 FY33	345.55	9.09	92.13	7.88
203	12/5/2010 13:28	SOIL	240	ppm	Final	399 FY34	375.51	9.37	80.66	7.99
204	12/5/2010 13:32	SOIL	240	ppm	Final	399 FY35	508.18	10.82	107.45	9.28
205	12/5/2010 13:40	SOIL	240	ppm	Final	399 BY01	496.51	10.47	124.31	9.11
206	12/5/2010 13:45	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.35	< LOD	2.96
207	12/5/2010 13:54	SOIL	240	ppm	Final	NIST 2702	127.92	7.35	42.34	6.23
208	12/5/2010 13:59	SOIL	240	ppm	Final	NIST 2782	523.48	17.69	136.45	15.54
209	12/5/2010 14:03	SOIL	240	ppm	Final	NIST 2711	1133.47	15.72	90.71	12.89
210	12/5/2010 14:10	SOIL	240	ppm	Final	GBW 7411	2666.84	26.31	215.12	21.69
211	12/5/2010 14:16	SOIL	240.03	ppm	Final	PREC SAMP(399 FY27)	434.27	10.2	98.34	8.77
212	12/5/2010 14:20	SOIL	240.04	ppm	Final	PREC SAMP(399 FY27)	439.67	10.26	94.96	8.79
213	12/5/2010 14:24	SOIL	240.05	ppm	Final	PREC SAMP(399 FY27)	434.52	10.21	94.74	8.75
214	12/5/2010 14:28	SOIL	240.27	ppm	Final	PREC SAMP(399 FY27)	432.27	10.21	97.23	8.77
215	12/5/2010 14:32	SOIL	240.29	ppm	Final	PREC SAMP(399 FY27)	432.58	10.18	99.41	8.76
216	12/5/2010 14:36	SOIL	240.27	ppm	Final	PREC SAMP(399 FY27)	421.81	10.11	106.1	8.76
217	12/5/2010 14:40	SOIL	240.05	ppm	Final	PREC SAMP(399 FY27)	421.75	10.1	103.78	8.74
218	12/5/2010 15:00	SOIL	240	ppm	Final	399 BY02	406.14	9.71	100.38	8.4
219	12/5/2010 15:04	SOIL	240	ppm	Final	399 BY03	394.57	9.69	109.49	8.46
220	12/5/2010 15:12	SOIL	240	ppm	Final	399 BY04	368.32	9.31	78.07	7.93
221	12/5/2010 15:17	SOIL	240	ppm	Final	399 BY05	278.94	8.41	91.76	7.4
222	12/5/2010 15:21	SOIL	240	ppm	Final	399 BY06	424.34	9.96	108.86	8.66
223	12/5/2010 15:29	SOIL	240	ppm	Final	399 BY07	227.74	7.75	93.44	6.93
224	12/5/2010 15:33	SOIL	240	ppm	Final	399 BY08	455.77	10.37	105.83	8.94
225	12/5/2010 15:38	SOIL	240	ppm	Final	399 BY09	301.37	8.7	87.02	7.57
226	12/5/2010 15:42	SOIL	240	ppm	Final	399 BY10	434.58	10.12	117.5	8.84
227	12/5/2010 15:47	SOIL	240	ppm	Final	399 BY11	278.02	8.42	84.39	7.35
228	12/5/2010 15:52	SOIL	240	ppm	Final	399 BY12	468.4	10.42	106.84	8.98
229	12/5/2010 15:56	SOIL	240	ppm	Final	399 BY13	355.12	9.25	109.09	8.14
230	12/5/2010 16:04	SOIL	240	ppm	Final	399 BY14	446.92	10.09	97.96	8.66
231	12/5/2010 16:09	SOIL	240	ppm	Final	399 BY15	383.11	9.65	99.96	8.37
232	12/5/2010 16:13	SOIL	240	ppm	Final	399 BY16	388.82	9.64	92.41	8.3
233	12/5/2010 16:18	SOIL	240	ppm	Final	399 BY17	419.52	9.97	107.16	8.65
234	12/5/2010 16:25	SOIL	240	ppm	Final	399 BY18	420.53	10.01	104.54	8.66
235	12/5/2010 16:49	SOIL	240	ppm	Final	399 BY19	395.59	9.68	92.37	8.32
236	12/5/2010 16:54	SOIL	240	ppm	Final	399 BY20	284.96	8.56	111.56	7.69
237	12/5/2010 17:02	SOIL	240	ppm	Final	399 BY21	381.65	9.48	106.32	8.28
238	12/5/2010 17:06	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.35	< LOD	2.96
239	12/5/2010 17:27	SOIL	240	ppm	Final	NIST 2702	126.48	7.34	45.23	6.26
240	12/5/2010 17:32	SOIL	240	ppm	Final	NIST 2782	511.4	17.59	149.85	15.62
241	12/5/2010 17:37	SOIL	240	ppm	Final	NIST 2711	1125.19	15.68	96.28	12.89
242	12/5/2010 17:51	SOIL	240	ppm	Final	GBW 7411	2693.62	26.46	189.11	21.71
243	12/5/2010 17:57	SOIL	240.25	ppm	Final	PREC SAMP(399 BY15)	387.99	9.7	97.83	8.4
244	12/5/2010 18:01	SOIL	240.36	ppm	Final	PREC SAMP(399 BY15)	388.45	9.7	91.36	8.34
245	12/5/2010 18:05	SOIL	240.1	ppm	Final	PREC SAMP(399 BY15)	384.14	9.68	101.52	8.41
246	12/5/2010 18:09	SOIL	240.27	ppm	Final	PREC SAMP(399 BY15)	374.88	9.56	108	8.37
247	12/5/2010 18:13	SOIL	240.14	ppm	Final	PREC SAMP(399 BY15)	377.8	9.63	102.27	8.38
248	12/5/2010 18:17	SOIL	240	ppm	Final	PREC SAMP(399 BY15)	379.71	9.61	101.01	8.36
249	12/5/2010 18:21	SOIL	240.01	ppm	Final	PREC SAMP(399 BY15)	380.06	9.62	103.46	8.38

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
250	12/6/2010 12:37	SHUTTER_CAL		55.9	cps	Final				
251	12/6/2010 12:42	SOIL		240	ppm	Final	SIO2 BLK	< LOD	4.4	< LOD
252	12/6/2010 12:48	SOIL		240	ppm	Final	NIST 2782	510.12	17.58	145.35
253	12/6/2010 12:53	SOIL		240	ppm	Final	NIST 2711	1113.75	15.61	100.35
254	12/6/2010 12:59	SOIL		240	ppm	Final	NIST 2702	126.22	7.35	41.25
255	12/6/2010 13:04	SOIL		240	ppm	Final	GBW 7411	2667.62	26.36	209.97
256	12/6/2010 13:10	SOIL		240.2	ppm	Final	PREC SAMP (399 BY 34)	386.27	9.59	91.82
257	12/6/2010 13:14	SOIL		240.2	ppm	Final	PREC SAMP (399 BY 34)	389.93	9.63	84.93
258	12/6/2010 13:18	SOIL		240.21	ppm	Final	PREC SAMP (399 BY 34)	392.75	9.64	80.44
259	12/6/2010 13:22	SOIL		240.05	ppm	Final	PREC SAMP (399 BY 34)	383.57	9.56	86.35
260	12/6/2010 13:26	SOIL		240.19	ppm	Final	PREC SAMP (399 BY 34)	386.46	9.58	81.76
261	12/6/2010 13:30	SOIL		240.07	ppm	Final	PREC SAMP (399 BY 34)	385.94	9.57	92.36
262	12/6/2010 13:34	SOIL		240	ppm	Final	PREC SAMP (399 BY 34)	387.77	9.61	83.92
263	12/6/2010 13:39	SOIL		240	ppm	Final	399 BY 22	359.55	9.3	93.76
264	12/6/2010 13:45	SOIL		240	ppm	Final	399 BY 23	324.15	8.91	95.37
265	12/6/2010 13:50	SOIL		240	ppm	Final	399 BY 24	287.76	8.51	72.35
266	12/6/2010 13:54	SOIL		240	ppm	Final	399 BY 25	415.01	9.89	118.84
267	12/6/2010 13:59	SOIL		240	ppm	Final	399 BY 26	319.63	8.87	80.15
268	12/6/2010 14:04	SOIL		240	ppm	Final	399 BY 27	284.28	8.61	71.12
269	12/6/2010 14:08	SOIL		240	ppm	Final	399 BY 28	252.14	8.11	49.7
270	12/6/2010 14:16	SOIL		240	ppm	Final	399 BY 29	430.07	10.12	121.31
271	12/6/2010 14:20	SOIL		240	ppm	Final	399 BY 30	354.45	9.27	78.84
272	12/6/2010 14:25	SOIL		240	ppm	Final	399 BY 31	225.44	7.82	57.57
273	12/6/2010 14:30	SOIL		240	ppm	Final	399 BY 32	458.38	10.34	119.3
274	12/6/2010 14:34	SOIL		240	ppm	Final	399 BY 33	426.34	10.06	97.76
275	12/6/2010 14:39	SOIL		240	ppm	Final	399 BY 34	378.69	9.49	90.38
276	12/6/2010 14:44	SOIL		240	ppm	Final	399 BY 35	277.43	8.49	67.08
277	12/6/2010 14:48	SOIL		240	ppm	Final	399 BY 36	283.61	8.37	68.05
278	12/6/2010 14:53	SOIL		240	ppm	Final	399 BY 37	597.2	11.7	126.15
279	12/6/2010 14:58	SOIL		240	ppm	Final	13 BY 1	100.11	5.8	13.65
280	12/6/2010 15:02	SOIL		240	ppm	Final	13 BY 2	143.06	6.47	28.48
281	12/6/2010 15:06	SOIL		240	ppm	Final	13 BY 3	91.65	5.51	16.84
282	12/6/2010 15:15	SOIL		240	ppm	Final	13 BY 4	291.7	8.62	56.94
283	12/6/2010 15:33	SOIL		240	ppm	Final	SIO2 BLK	< LOD	4.39	< LOD
284	12/6/2010 15:38	SOIL		240	ppm	Final	GBW 7411	2658.7	26.2	211.81
285	12/6/2010 15:42	SOIL		240	ppm	Final	NIST 2782	500.5	17.37	156.63
286	12/6/2010 15:47	SOIL		240	ppm	Final	NIST 2702	123.12	7.29	45.26
287	12/6/2010 15:52	SOIL		240	ppm	Final	NIST 2711	1119.52	15.62	104.44
288	12/6/2010 15:58	SOIL		240.23	ppm	Final	PREC SAMP (399 BY 30)	346.84	9.15	86.93
289	12/6/2010 16:02	SOIL		240.13	ppm	Final	PREC SAMP (399 BY 30)	357.15	9.3	90.61
290	12/6/2010 16:06	SOIL		240.27	ppm	Final	PREC SAMP (399 BY 30)	359.13	9.29	81.77
291	12/6/2010 16:10	SOIL		240.21	ppm	Final	PREC SAMP (399 BY 30)	355.37	9.27	82.28
292	12/6/2010 16:14	SOIL		240.29	ppm	Final	PREC SAMP (399 BY 30)	359.4	9.33	85.96
293	12/6/2010 16:18	SOIL		240.2	ppm	Final	PREC SAMP (399 BY 30)	357.16	9.29	88.73
294	12/6/2010 16:22	SOIL		240.09	ppm	Final	PREC SAMP (399 BY 30)	352.51	9.24	85.7
295	12/6/2010 16:27	SOIL		240	ppm	Final	13 BY 5	424.21	9.71	75.51
296	12/6/2010 16:32	SOIL		240	ppm	Final	13 BY 6	466.31	10.29	65.97
297	12/6/2010 16:36	SOIL		240	ppm	Final	13 BY 7	348.1	8.92	69.37
298	12/6/2010 16:40	SOIL		240	ppm	Final	13 BY 8	587.46	11.74	140.86
299	12/6/2010 16:45	SOIL		240	ppm	Final	13 BY 9	291.15	8.65	70.61
300	12/6/2010 16:49	SOIL		240	ppm	Final	13 BY 10	211.89	7.52	61.7
301	12/6/2010 16:54	SOIL		240	ppm	Final	SIO2 BLK	< LOD	4.34	< LOD
302	12/6/2010 16:59	SOIL		240	ppm	Final	GBW 7411	2694.8	26.35	178.44
303	12/6/2010 17:03	SOIL		240	ppm	Final	NIST 2782	509.28	17.51	159.29
304	12/6/2010 17:07	SOIL		240	ppm	Final	NIST 2702	117.12	7.16	49.43
305	12/6/2010 17:31	SOIL		240	ppm	Final	NIST 2711	1129.21	15.71	90.52
306	12/6/2010 17:37	SOIL		240.03	ppm	Final	PREC SAMP (13 BY 7)	348.22	8.93	65.62
307	12/6/2010 17:41	SOIL		240.02	ppm	Final	PREC SAMP (13 BY 7)	348.14	8.92	65.82
308	12/6/2010 17:45	SOIL		240.13	ppm	Final	PREC SAMP (13 BY 7)	341.53	8.84	73.3
309	12/6/2010 17:49	SOIL		240.05	ppm	Final	PREC SAMP (13 BY 7)	344.34	8.89	74.49
310	12/6/2010 17:53	SOIL		240.12	ppm	Final	PREC SAMP (13 BY 7)	332.91	8.76	76.62
311	12/6/2010 17:57	SOIL		240.12	ppm	Final	PREC SAMP (13 BY 7)	349.42	8.93	64.28
312	12/6/2010 18:01	SOIL		240.1	ppm	Final	PREC SAMP (13 BY 7)	340.39	8.84	68.18
313	12/7/2010 8:25	SOIL		240	ppm	Final	SIO2 BLK	< LOD	4.27	< LOD
314	12/7/2010 8:29	SOIL		240	ppm	Final	GBW 7411	2686.67	26.42	192.41
315	12/7/2010 8:34	SOIL		240	ppm	Final	NIST 2782	502.01	17.48	158.38
316	12/7/2010 8:39	SOIL		240	ppm	Final	NIST 2702	121.54	7.27	43.89
317	12/7/2010 8:44	SOIL		240	ppm	Final	NIST 2711	1117.4	15.66	93.47
318	12/7/2010 8:49	SOIL		240.02	ppm	Final	PREC SAMP (13 BY 4)	531.63	10.93	132.13
319	12/7/2010 8:53	SOIL		240.17	ppm	Final	PREC SAMP (13 BY 4)	529.12	10.91	123.77
320	12/7/2010 8:57	SOIL		240.28	ppm	Final	PREC SAMP (13 BY 4)	524.02	10.86	125.2
321	12/7/2010 9:01	SOIL		240.31	ppm	Final	PREC SAMP (13 BY 4)	521.38	10.83	133.97
322	12/7/2010 9:05	SOIL		240.02	ppm	Final	PREC SAMP (13 BY 4)	524.17	10.88	128.92
323	12/7/2010 9:09	SOIL		240.09	ppm	Final	PREC SAMP (13 BY 4)	511.33	10.74	140.51
324	12/7/2010 9:13	SOIL		240.05	ppm	Final	PREC SAMP (13 BY 4)	516.6	10.78	137.44
325	12/7/2010 9:37	SOIL		240	ppm	Final	13 FY 1	523.89	10.86	121.94
326	12/7/2010 9:42	SOIL		240	ppm	Final	13 FY 2	440.7	10.13	96.25
327	12/7/2010 9:46	SOIL		240	ppm	Final	13 FY 3	619.5	11.74	158.68
328	12/7/2010 9:51	SOIL		240	ppm	Final	13 FY 4	521.95	10.82	130.79
329	12/7/2010 9:55	SOIL		240	ppm	Final	13 FY 5	594.59	11.6	129.18
330	12/7/2010 10:00	SOIL		240	ppm	Final	13 FY 6	479.79	10.5	126.51
331	12/7/2010 10:04	SOIL		240	ppm	Final	13 FY 7	607.71	11.74	155.2
332	12/7/2010 10:16	SOIL		240	ppm	Final	13 FY 8	435.34	9.87	98.56

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
333	12/7/2010 10:20	SOIL	240	ppm	Final	13 FY 9	580.3	11.49	139.57	9.98
334	12/7/2010 10:24	SOIL	240	ppm	Final	13 FY 10	464.43	10.2	116.66	8.85
335	12/7/2010 10:29	SOIL	240	ppm	Final	13 FY 11	460.97	10.27	126.56	8.99
336	12/7/2010 10:34	SOIL	240	ppm	Final	13 FY 12	599.05	11.46	117.31	9.79
337	12/7/2010 10:38	SOIL	240	ppm	Final	13 FY 13	511.16	10.75	133.23	9.38
338	12/7/2010 10:43	SOIL	240	ppm	Final	13 FY 14	610.11	11.63	128.39	10
339	12/7/2010 10:47	SOIL	240	ppm	Final	13 FY 15	231.8	7.81	61.23	6.68
340	12/7/2010 10:51	SOIL	240	ppm	Final	13 FY 16	550.2	11.04	122.12	9.52
341	12/7/2010 10:56	SOIL	240	ppm	Final	13 FY 17	517.16	10.9	131.58	9.5
342	12/7/2010 11:00	SOIL	240	ppm	Final	13 FY 18	491.64	10.62	134.87	9.32
343	12/7/2010 11:05	SOIL	240	ppm	Final	13 FY 19	679.87	12.32	150.28	10.65
344	12/7/2010 11:28	SOIL	240	ppm	Final	13 FY 20	553.26	11.22	151.67	9.87
345	12/7/2010 11:32	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.45	< LOD	2.99
346	12/7/2010 11:37	SOIL	240	ppm	Final	GBW 7411	2664.62	26.27	213.73	21.66
347	12/7/2010 11:41	SOIL	240	ppm	Final	NIST 2782	499.78	17.3	157.4	15.48
348	12/7/2010 11:46	SOIL	240	ppm	Final	NIST 2702	126.72	7.3	45.65	6.23
349	12/7/2010 11:50	SOIL	240	ppm	Final	NIST 2711	1135.39	15.74	93.06	12.92
350	12/7/2010 11:56	SOIL	240.3	ppm	Final	PREC SAMP (13 FY 15)	236.08	7.85	57.67	6.67
351	12/7/2010 12:00	SOIL	240.27	ppm	Final	PREC SAMP (13 FY 15)	230.89	7.78	56.82	6.61
352	12/7/2010 12:04	SOIL	240.29	ppm	Final	PREC SAMP (13 FY 15)	234.36	7.84	59.04	6.68
353	12/7/2010 12:08	SOIL	240.12	ppm	Final	PREC SAMP (13 FY 15)	232.68	7.84	63.77	6.72
354	12/7/2010 12:12	SOIL	240.2	ppm	Final	PREC SAMP (13 FY 15)	236.25	7.85	59.17	6.68
355	12/7/2010 12:16	SOIL	240.05	ppm	Final	PREC SAMP (13 FY 15)	236.67	7.87	53.81	6.66
356	12/7/2010 12:20	SOIL	240.22	ppm	Final	PREC SAMP (13 FY 15)	242.04	7.94	55.62	6.72
357	12/7/2010 12:33	SOIL	240	ppm	Final	13 FY 21	633.94	11.98	175.88	10.58
358	12/7/2010 12:37	SOIL	240	ppm	Final	13 FY 22	599.48	11.61	163.2	10.22
359	12/7/2010 12:42	SOIL	240	ppm	Final	13 FY 23	488.33	10.59	82.3	8.92
360	12/7/2010 12:46	SOIL	240	ppm	Final	13 FY 24	485.23	10.59	138	9.32
361	12/7/2010 12:51	SOIL	240	ppm	Final	13 FY 25	254.28	8.23	59.78	6.98
362	12/7/2010 12:55	SOIL	240	ppm	Final	13 FY 26	531.09	11.03	147.98	9.71
363	12/7/2010 13:00	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.95
364	12/7/2010 13:05	SOIL	240	ppm	Final	GBW 7411	2670.14	26.24	197.14	21.57
365	12/7/2010 13:26	SOIL	240	ppm	Final	NIST 2782	507.14	17.46	150.14	15.54
366	12/7/2010 13:31	SOIL	240	ppm	Final	NIST 2702	124.02	7.3	47.63	6.26
367	12/7/2010 13:35	SOIL	240	ppm	Final	NIST 2711	1123.48	15.64	96.12	12.86
368	12/7/2010 13:41	SOIL	240.31	ppm	Final	PREC SAMP (13 FY 23)	476.23	10.51	93.02	8.94
369	12/7/2010 13:45	SOIL	240.28	ppm	Final	PREC SAMP (13 FY 23)	466.04	10.38	101.12	8.9
370	12/7/2010 13:49	SOIL	240.2	ppm	Final	PREC SAMP (13 FY 23)	471.21	10.42	92.96	8.87
371	12/7/2010 13:53	SOIL	240.11	ppm	Final	PREC SAMP (13 FY 23)	478.69	10.54	84.55	8.9
372	12/7/2010 13:57	SOIL	240.13	ppm	Final	PREC SAMP (13 FY 23)	471.94	10.44	93.94	8.9
373	12/7/2010 14:01	SOIL	240.05	ppm	Final	PREC SAMP (13 FY 23)	483.7	10.58	88.29	8.96
374	12/7/2010 14:05	SOIL	240.12	ppm	Final	PREC SAMP (13 FY 23)	476.34	10.52	89.67	8.92
375	12/10/2010 9:03	SHUTTER_CAL	55.87	cps	Final					
376	12/10/2010 9:20	SOIL	240	ppm	Final	GBW 7411	2623.87	26.07	219.22	21.52
377	12/10/2010 9:25	SOIL	240	ppm	Final	NIST 2711	1111.43	15.63	92.3	12.83
378	12/10/2010 9:30	SOIL	240	ppm	Final	NIST 2782	502.51	17.41	148.29	15.46
379	12/10/2010 9:35	SOIL	240	ppm	Final	NIST 2702	117.77	7.18	49.16	6.19
380	12/10/2010 9:40	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.34	< LOD	2.97
381	12/10/2010 9:47	SOIL	240.13	ppm	Final	PREC SAMP (13 FY 25)	252.8	8.21	67.05	7.05
382	12/10/2010 9:51	SOIL	240.28	ppm	Final	PREC SAMP (13 FY 25)	253.08	8.2	61.69	6.98
383	12/10/2010 9:55	SOIL	240.31	ppm	Final	PREC SAMP (13 FY 25)	258.41	8.29	56.49	7
384	12/10/2010 9:59	SOIL	240.04	ppm	Final	PREC SAMP (13 FY 25)	259.98	8.33	55.47	7.03
385	12/10/2010 10:03	SOIL	240.21	ppm	Final	PREC SAMP (13 FY 25)	255.59	8.24	58.98	6.99
386	12/10/2010 10:07	SOIL	240.03	ppm	Final	PREC SAMP (13 FY 25)	253.97	8.21	58.41	6.96
387	12/10/2010 10:11	SOIL	240.36	ppm	Final	PREC SAMP (13 FY 25)	258.7	8.29	59.2	7.03
388	12/10/2010 10:53	SOIL	240	ppm	Final	498 31	322.26	9.34	107.91	8.28
389	12/10/2010 10:58	SOIL	240	ppm	Final	498 30	268.98	8.22	93.02	7.26
390	12/10/2010 11:04	SOIL	240	ppm	Final	498 29	284.28	8.46	89.47	7.41
391	12/10/2010 11:10	SOIL	240	ppm	Final	498 28	274.18	8.3	86.1	7.26
392	12/10/2010 11:15	SOIL	240	ppm	Final	498 27	286.54	8.47	93.36	7.44
393	12/10/2010 11:20	SOIL	240	ppm	Final	498 26	341.03	9.17	98.09	8.01
394	12/10/2010 12:41	SOIL	240	ppm	Final	498 25	281.4	8.46	91	7.43
395	12/10/2010 12:46	SOIL	240	ppm	Final	498 24	334.8	9.06	97.9	7.93
396	12/10/2010 12:51	SOIL	240	ppm	Final	498 23	328.53	9	96.52	7.87
397	12/10/2010 12:57	SOIL	240	ppm	Final	498 22	366.29	9.48	88.2	8.15
398	12/10/2010 13:02	SOIL	240	ppm	Final	498 21	266.72	8.29	81.12	7.22
399	12/10/2010 13:06	SOIL	240	ppm	Final	498 20	316.05	8.95	92.4	7.81
400	12/10/2010 13:13	SOIL	240	ppm	Final	498 19	295.88	8.61	91.94	7.54
401	12/10/2010 13:19	SOIL	240	ppm	Final	498 18	292.48	8.6	80.22	7.44
402	12/10/2010 13:29	SOIL	240	ppm	Final	498 17	325.58	8.95	88	7.76
403	12/10/2010 13:33	SOIL	240	ppm	Final	498 16	192.13	7.21	68.43	6.3
404	12/10/2010 13:39	SOIL	240	ppm	Final	498 15	216.53	7.58	66.32	6.55
405	12/10/2010 13:44	SOIL	240	ppm	Final	498 14	229.01	7.83	71.08	6.8
406	12/10/2010 13:49	SOIL	240	ppm	Final	498 13	271.77	8.37	83.68	7.3
407	12/10/2010 13:54	SOIL	240	ppm	Final	498 12	284.18	8.38	91.68	7.35
408	12/10/2010 13:59	SOIL	240	ppm	Final	GBW 7411	2689.96	26.3	194.78	21.6
409	12/10/2010 14:04	SOIL	240	ppm	Final	NIST 2711	1123.34	15.65	93.76	12.85
410	12/10/2010 14:09	SOIL	240	ppm	Final	NIST 2782	512.84	17.6	153.4	15.67
411	12/10/2010 14:14	SOIL	240	ppm	Final	NIST 2702	121.71	7.21	45.21	6.16
412	12/10/2010 14:19	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.25	< LOD	2.93
413	12/10/2010 14:26	SOIL	240.3	ppm	Final	PREC SAMP (498 12)	296.31	8.51	91.33	7.46
414	12/10/2010 14:30	SOIL	240.02	ppm	Final	PREC SAMP (498 12)	295.81	8.52	86.95	7.42
415	12/10/2010 14:34	SOIL	240.02	ppm	Final	PREC SAMP (498 12)	296.75	8.54	85.51	7.43

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
416	12/10/2010 14:38	SOIL	240.12	ppm	Final	PREC SAMP (498 12)	298.76	8.55	86.44	7.44
417	12/10/2010 14:42	SOIL	240.09	ppm	Final	PREC SAMP (498 12)	293.56	8.51	86.04	7.41
418	12/10/2010 14:46	SOIL	240.13	ppm	Final	PREC SAMP (498 12)	286.82	8.44	96.16	7.44
419	12/10/2010 14:50	SOIL	240.28	ppm	Final	PREC SAMP (498 12)	291.21	8.45	87.13	7.37
420	12/13/2010 10:39	SHUTTER_CAL	57.93	cps	Final					
421	12/13/2010 10:45	SOIL	240	ppm	Final	GBW 7411	2663.62	26.28	201.81	21.62
422	12/13/2010 10:50	SOIL	240	ppm	Final	NIST 2711	1111.17	15.61	103.73	12.87
423	12/13/2010 10:55	SOIL	240	ppm	Final	NIST 2782	508.81	17.45	145.29	15.45
424	12/13/2010 11:05	SOIL	240	ppm	Final	NIST 2702	125.01	7.33	42.61	6.21
425	12/13/2010 11:09	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.34	< LOD	2.97
426	12/13/2010 11:16	SOIL	240.27	ppm	Final	PREC SAMP (498 17)	316.17	8.83	95.54	7.73
427	12/13/2010 11:20	SOIL	240.06	ppm	Final	PREC SAMP (498 17)	310.81	8.78	98.4	7.72
428	12/13/2010 11:24	SOIL	240.13	ppm	Final	PREC SAMP (498 17)	319.86	8.89	89.97	7.73
429	12/13/2010 11:29	SOIL	240.05	ppm	Final	PREC SAMP (498 17)	315.66	8.85	96.41	7.76
430	12/13/2010 11:33	SOIL	240.18	ppm	Final	PREC SAMP (498 17)	313.58	8.82	99.72	7.76
431	12/13/2010 11:37	SOIL	240.05	ppm	Final	PREC SAMP (498 17)	311.72	8.8	100.73	7.75
432	12/13/2010 11:41	SOIL	240.12	ppm	Final	PREC SAMP (498 17)	314	8.83	93.04	7.71
433	12/13/2010 13:15	SOIL	240	ppm	Final	498 11	232.24	7.99	75.18	6.97
434	12/13/2010 13:19	SOIL	240	ppm	Final	498 10	273.66	8.32	88.8	7.3
435	12/13/2010 13:24	SOIL	240	ppm	Final	498 9	291.35	8.5	87.51	7.41
436	12/13/2010 13:28	SOIL	240	ppm	Final	498 8	315.45	8.72	96.05	7.64
437	12/13/2010 13:33	SOIL	240	ppm	Final	498 7	287.88	8.5	90.57	7.45
438	12/13/2010 13:37	SOIL	240	ppm	Final	498 6	330.05	9.17	104	8.08
439	12/13/2010 13:42	SOIL	240	ppm	Final	498 5	116.9	6.02	28.42	4.96
440	12/13/2010 13:46	SOIL	240	ppm	Final	498 4	274.53	8.34	85.51	7.29
441	12/13/2010 13:51	SOIL	240	ppm	Final	498 2	203.74	7.4	51.14	6.27
442	12/13/2010 13:55	SOIL	240	ppm	Final	498 1	122.89	6.2	35.69	5.2
443	12/13/2010 14:04	SOIL	240	ppm	Final	452 32B	387.9	9.78	94.94	8.44
444	12/13/2010 14:09	SOIL	240	ppm	Final	452 31B	426.75	10.17	114.61	8.87
445	12/13/2010 14:29	SOIL	240	ppm	Final	452 30B	320.01	8.84	93.49	7.71
446	12/13/2010 14:36	SOIL	240	ppm	Final	452 29B	243.41	7.9	66.2	6.79
447	12/13/2010 14:41	SOIL	240	ppm	Final	452 28B	328.5	8.75	84.9	7.56
448	12/13/2010 14:46	SOIL	240	ppm	Final	452 27B	335.97	9.09	87.35	7.85
449	12/13/2010 14:50	SOIL	240	ppm	Final	452 26B	350.47	9.16	84.05	7.87
450	12/13/2010 14:55	SOIL	240	ppm	Final	452 25B	369.18	9.34	78.32	7.96
451	12/13/2010 14:59	SOIL	240	ppm	Final	452 24B	279.18	8.35	85.79	7.29
452	12/13/2010 15:03	SOIL	240	ppm	Final	452 23B	331.26	8.9	78.37	7.63
453	12/13/2010 15:08	SOIL	240	ppm	Final	GBW 7411	2690.57	26.28	196.68	21.59
454	12/13/2010 15:13	SOIL	240	ppm	Final	NIST 2711	1136.3	15.69	87.5	12.85
455	12/13/2010 15:18	SOIL	240	ppm	Final	NIST 2782	519.32	17.75	151.96	15.77
456	12/13/2010 15:24	SOIL	240	ppm	Final	NIST 2702	121.85	7.29	48.27	6.26
457	12/13/2010 15:28	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.46	< LOD	3.01
458	12/13/2010 15:36	SOIL	240.28	ppm	Final	PREP SAMP (452 26B)	341.74	9.03	82.81	7.76
459	12/13/2010 15:40	SOIL	240.01	ppm	Final	PREP SAMP (452 26B)	343.91	9.06	83.27	7.79
460	12/13/2010 15:44	SOIL	240.1	ppm	Final	PREP SAMP (452 26B)	348.59	9.13	79.73	7.81
461	12/13/2010 15:48	SOIL	240.02	ppm	Final	PREP SAMP (452 26B)	343.42	9.08	86.71	7.83
462	12/13/2010 15:52	SOIL	240.04	ppm	Final	PREP SAMP (452 26B)	342.07	9.06	82.97	7.78
463	12/13/2010 15:56	SOIL	240.13	ppm	Final	PREP SAMP (452 26B)	353.6	9.19	82.72	7.88
464	12/13/2010 16:00	SOIL	240.2	ppm	Final	PREP SAMP (452 26B)	348.73	9.12	78.26	7.8
465	12/14/2010 8:59	SHUTTER_CAL	56.01	cps	Final					
466	12/14/2010 9:08	SOIL	240	ppm	Final	GBW 7411	2665.81	26.27	194.85	21.58
467	12/14/2010 9:14	SOIL	240	ppm	Final	NIST 2711	1110.47	15.58	97.41	12.82
468	12/14/2010 9:18	SOIL	240	ppm	Final	NIST 2782	507.57	17.42	158.82	15.59
469	12/14/2010 9:23	SOIL	240	ppm	Final	NIST 2702	120.08	7.23	46.78	6.19
470	12/14/2010 9:28	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.38	< LOD	2.99
471	12/14/2010 9:34	SOIL	240.04	ppm	Final	PREC SAMP (452 26B)	343.83	9.08	80.68	7.79
472	12/14/2010 9:38	SOIL	240.28	ppm	Final	PREC SAMP (452 26B)	342.83	9.08	82.39	7.8
473	12/14/2010 9:42	SOIL	240.2	ppm	Final	PREC SAMP (452 26B)	334.71	8.98	85.74	7.75
474	12/14/2010 9:46	SOIL	240.14	ppm	Final	PREC SAMP (452 26B)	344.46	9.1	82.36	7.81
475	12/14/2010 9:50	SOIL	240.28	ppm	Final	PREC SAMP (452 26B)	337.73	9.02	90.36	7.82
476	12/14/2010 9:54	SOIL	240.03	ppm	Final	PREC SAMP (452 26B)	341.44	9.07	90.19	7.85
477	12/14/2010 9:59	SOIL	240.21	ppm	Final	PREC SAMP (452 26B)	335.27	8.98	90.21	7.79
478	12/14/2010 10:07	SOIL	240	ppm	Final	452 22B	305.54	8.52	84.33	7.38
479	12/14/2010 10:11	SOIL	240	ppm	Final	452 21B	316.45	8.67	72.55	7.41
480	12/14/2010 10:16	SOIL	240	ppm	Final	452 20B	223.7	7.63	80.85	6.72
481	12/14/2010 10:20	SOIL	240	ppm	Final	452 19B	299.53	8.43	70.84	7.2
482	12/14/2010 10:25	SOIL	240	ppm	Final	452 18B	346.84	9.08	95.58	7.89
483	12/14/2010 10:30	SOIL	240	ppm	Final	452 17B	377.34	9.4	90.11	8.09
484	12/14/2010 10:41	SOIL	240	ppm	Final	452 16B	346.58	9.28	87.99	8.01
485	12/14/2010 10:45	SOIL	240	ppm	Final	452 15B	295.03	8.4	93.52	7.37
486	12/14/2010 10:50	SOIL	240	ppm	Final	452 14B	261.88	8.09	78.58	7.02
487	12/14/2010 10:55	SOIL	240	ppm	Final	452 13B	261.83	8.09	83.15	7.07
488	12/14/2010 11:00	SOIL	240	ppm	Final	452 12B	322.25	8.88	84.26	7.67
489	12/14/2010 11:05	SOIL	240	ppm	Final	452 11B	341.52	9.12	95.45	7.94
490	12/14/2010 11:10	SOIL	240	ppm	Final	452 10B	372.49	9.38	86.12	8.05
491	12/14/2010 11:15	SOIL	240	ppm	Final	452 9B	316.32	8.8	86.03	7.62
492	12/14/2010 11:20	SOIL	240	ppm	Final	452 8B	342.18	9.19	93.07	7.98
493	12/14/2010 11:24	SOIL	240	ppm	Final	452 7B	403.5	9.74	88.64	8.33
494	12/14/2010 11:29	SOIL	240	ppm	Final	452 6B	375.24	9.44	96.47	8.18
495	12/14/2010 11:34	SOIL	240	ppm	Final	452 5B	411.06	9.82	98.68	8.47
496	12/14/2010 11:39	SOIL	240	ppm	Final	452 4B	241.92	7.83	76.78	6.83
497	12/14/2010 11:43	SOIL	240	ppm	Final	452 3B	376.33	9.43	102.13	8.21
498	12/14/2010 12:59	SOIL	240	ppm	Final	GBW 7411	2681.88	26.48	206.98	21.8

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
499	12/14/2010 13:07	SOIL	240	ppm	Final	NIST 2711	1117.65	15.62	95.84	12.84
500	12/14/2010 13:13	SOIL	240	ppm	Final	NIST 2782	511.72	17.55	154	15.63
501	12/14/2010 13:31	SOIL	240	ppm	Final	NIST 2702	122.56	7.29	46.42	6.23
502	12/14/2010 13:40	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.28	< LOD	2.95
503	12/14/2010 13:47	SOIL	240.12	ppm	Final	PREC SAMP (452 7B)	400.35	9.71	90.56	8.33
504	12/14/2010 13:51	SOIL	240.24	ppm	Final	PREC SAMP (452 7B)	402.97	9.73	87.4	8.32
505	12/14/2010 13:55	SOIL	240.28	ppm	Final	PREC SAMP (452 7B)	406.89	9.79	87.29	8.36
506	12/14/2010 13:59	SOIL	240.12	ppm	Final	PREC SAMP (452 7B)	409.26	9.8	79.98	8.31
507	12/14/2010 14:03	SOIL	240.19	ppm	Final	PREC SAMP (452 7B)	394.75	9.65	88.44	8.27
508	12/14/2010 14:07	SOIL	240.27	ppm	Final	PREC SAMP (452 7B)	404.24	9.76	83.99	8.32
509	12/14/2010 14:11	SOIL	240.3	ppm	Final	PREC SAMP (452 7B)	396.83	9.66	91.95	8.3
510	12/14/2010 14:21	SOIL	240	ppm	Final	452 2B	317.91	8.72	98.07	7.65
511	12/14/2010 14:25	SOIL	240	ppm	Final	452 1B	402.55	9.87	100.93	8.55
512	12/14/2010 14:30	SOIL	240	ppm	Final	452 1TPA	784.19	13.1	188.73	11.45
513	12/14/2010 14:34	SOIL	240	ppm	Final	452 2TPA	714.86	12.5	128.13	10.65
514	12/14/2010 14:40	SOIL	240	ppm	Final	452 3TPA	653.43	11.91	138.29	10.26
515	12/14/2010 14:56	SOIL	240	ppm	Final	452 4TPA	598.6	11.53	158.38	10.12
516	12/14/2010 15:02	SOIL	240	ppm	Final	452 5TPA	191	6.95	74.65	6.13
517	12/14/2010 15:07	SOIL	240	ppm	Final	452 1F	133.14	6.5	38.47	5.46
518	12/14/2010 15:12	SOIL	240	ppm	Final	452 2F	92.46	5.83	28.74	4.83
519	12/14/2010 15:16	SOIL	240	ppm	Final	452 3F	89.99	5.66	28.36	4.69
520	12/14/2010 15:21	SOIL	240	ppm	Final	452 4F	105.42	5.92	29.14	4.9
521	12/14/2010 15:25	SOIL	240	ppm	Final	452 5F	77.79	5.61	28.98	4.68
522	12/14/2010 15:31	SOIL	240	ppm	Final	452 6F	99.8	6.02	32.31	5.04
523	12/14/2010 15:38	SOIL	240	ppm	Final	452 7F	116.51	6.24	35.83	5.24
524	12/14/2010 15:43	SOIL	240	ppm	Final	452 8F	147.24	6.61	37.38	5.53
525	12/14/2010 15:48	SOIL	240	ppm	Final	452 9F	348.76	9.08	88.39	7.84
526	12/14/2010 15:53	SOIL	240	ppm	Final	452 10F	252.26	7.98	78.04	6.94
527	12/14/2010 15:57	SOIL	240	ppm	Final	452 11F	384.07	9.4	86.27	8.05
528	12/14/2010 16:02	SOIL	240	ppm	Final	452 12F	367.5	9.37	96.31	8.12
529	12/14/2010 16:07	SOIL	240	ppm	Final	452 13F	363.9	9.16	88.42	7.88
530	12/14/2010 16:12	SOIL	240	ppm	Final	GBW 7411	2663.73	26.17	195.39	21.51
531	12/14/2010 16:17	SOIL	240	ppm	Final	NIST 2711	1125.45	15.66	100	12.9
532	12/14/2010 16:22	SOIL	240	ppm	Final	NIST 2782	508.76	17.52	153.55	15.59
533	12/14/2010 16:22	SOIL	3.72	ppm	Final	NIST 2782	< LOD	331.08	< LOD	259.11
534	12/14/2010 16:27	SOIL	240	ppm	Final	NIST 2702	126.32	7.34	45.64	6.26
535	12/14/2010 16:32	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.34	< LOD	2.99
536	12/14/2010 16:39	SOIL	240.19	ppm	Final	PREC SAMP (452 13F)	361.6	9.11	82.26	7.8
537	12/14/2010 16:43	SOIL	240.27	ppm	Final	PREC SAMP (452 13F)	365.37	9.16	93.36	7.92
538	12/14/2010 16:47	SOIL	240.22	ppm	Final	PREC SAMP (452 13F)	361.16	9.11	90.16	7.86
539	12/14/2010 16:51	SOIL	240.04	ppm	Final	PREC SAMP (452 13F)	360.71	9.12	83.71	7.82
540	12/14/2010 16:55	SOIL	240.26	ppm	Final	PREC SAMP (452 13F)	371.12	9.22	86.57	7.91
541	12/14/2010 16:59	SOIL	240.19	ppm	Final	PREC SAMP (452 13F)	367.28	9.18	86.44	7.88
542	12/14/2010 17:03	SOIL	240.13	ppm	Final	PREC SAMP (452 13F)	360.62	9.09	91.73	7.86
543	12/16/2010 10:45	SHUTTER_CAL	55.98	cps	Final					
544	12/16/2010 10:50	SOIL	240	ppm	Final	GBW 7411	2674.37	26.34	182.42	21.58
545	12/16/2010 10:55	SOIL	240	ppm	Final	NIST 2711	1124.29	15.68	87.74	12.84
546	12/16/2010 11:00	SOIL	240	ppm	Final	NIST 2782	507.1	17.52	165.53	15.74
547	12/16/2010 11:04	SOIL	240	ppm	Final	NIST 2702	124.93	7.3	46.76	6.24
548	12/16/2010 11:09	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.32	< LOD	2.97
549	12/16/2010 11:15	SOIL	240.05	ppm	Final	PREC SAMP (452 12F)	356.17	9.25	97.68	8.05
550	12/16/2010 11:19	SOIL	240.04	ppm	Final	PREC SAMP (452 12F)	363.54	9.32	88.78	8.03
551	12/16/2010 11:23	SOIL	240	ppm	Final	PREC SAMP (452 12F)	356.47	9.25	94.7	8.03
552	12/16/2010 11:27	SOIL	240.28	ppm	Final	PREC SAMP (452 12F)	357.99	9.25	92.63	8
553	12/16/2010 11:31	SOIL	240.13	ppm	Final	PREC SAMP (452 12F)	371.81	9.42	90.22	8.11
554	12/16/2010 11:35	SOIL	240.29	ppm	Final	PREC SAMP (452 12F)	360.53	9.28	94.77	8.05
555	12/16/2010 11:39	SOIL	240	ppm	Final	PREC SAMP (452 12F)	366.84	9.35	95.34	8.11
556	12/16/2010 13:04	SOIL	240	ppm	Final	452 14F	384.73	9.57	99.07	8.3
557	12/16/2010 13:10	SOIL	240	ppm	Final	452 15F	365.67	9.38	97.81	8.15
558	12/16/2010 13:15	SOIL	240	ppm	Final	452 16F	352.74	9.12	94.6	7.91
559	12/16/2010 13:23	SOIL	240	ppm	Final	452 17F	344.46	9.09	100.75	7.95
560	12/16/2010 13:28	SOIL	240	ppm	Final	452 18F	395.31	9.53	99.55	8.25
561	12/16/2010 13:33	SOIL	240	ppm	Final	452 19F	344.37	8.98	90.21	7.77
562	12/16/2010 13:38	SOIL	240	ppm	Final	452 20F	393.08	9.61	87.37	8.23
563	12/16/2010 13:43	SOIL	240	ppm	Final	452 21F	383.94	9.42	88.42	8.09
564	12/16/2010 13:47	SOIL	240	ppm	Final	452 23F	390.89	9.57	111.76	8.38
565	12/16/2010 13:52	SOIL	240	ppm	Final	452 24F	384.86	9.57	103.75	8.33
566	12/16/2010 13:56	SOIL	240	ppm	Final	452 25F	392.64	9.65	104.61	8.4
567	12/16/2010 13:57	SOIL	3	ppm	Final	452 25F	669.5	285.81	< LOD	374.39
568	12/16/2010 14:01	SOIL	240	ppm	Final	452 26F	387.53	9.43	102.98	8.2
569	12/16/2010 14:06	SOIL	240	ppm	Final	452 27F	399.85	9.61	106.77	8.36
570	12/16/2010 14:10	SOIL	240	ppm	Final	452 28F	386.45	9.76	110.14	8.54
571	12/16/2010 14:15	SOIL	240	ppm	Final	452 29F	380.63	9.59	104.67	8.36
572	12/16/2010 14:21	SOIL	240	ppm	Final	452 30F	367.5	9.5	96.32	8.24
573	12/16/2010 14:25	SOIL	240	ppm	Final	452 31F	370.43	9.47	98.66	8.23
574	12/16/2010 14:30	SOIL	240	ppm	Final	452 32F	377.23	9.5	112.61	8.35
575	12/16/2010 14:44	SOIL	240	ppm	Final	148 1	193.89	7.59	63.05	6.58
576	12/16/2010 14:48	SOIL	240	ppm	Final	148 2	199.04	7.72	46.59	6.5
577	12/16/2010 14:53	SOIL	240	ppm	Final	GBW 7411	2649.5	26.09	206.31	21.48
578	12/16/2010 14:57	SOIL	240	ppm	Final	NIST 2711	1125.05	15.67	93.49	12.87
579	12/16/2010 15:02	SOIL	240	ppm	Final	NIST 2782	512.86	17.52	154.74	15.61
580	12/16/2010 15:07	SOIL	240	ppm	Final	NIST 2702	121.41	7.29	51.23	6.3
581	12/16/2010 15:12	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.29	< LOD	3

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
582	12/16/2010 15:18	SOIL	240.2	ppm	Final	PREC SAMP (452 25F)	393.34	9.62	101.06	8.34
583	12/16/2010 15:22	SOIL	240.19	ppm	Final	PREC SAMP (452 25F)	391.51	9.63	109.86	8.42
584	12/16/2010 15:26	SOIL	240.12	ppm	Final	PREC SAMP (452 25F)	395.71	9.66	98.76	8.35
585	12/16/2010 15:30	SOIL	240.28	ppm	Final	PREC SAMP (452 25F)	382.93	9.54	105.96	8.33
586	12/16/2010 15:34	SOIL	240.1	ppm	Final	PREC SAMP (452 25F)	386.23	9.58	108.64	8.38
587	12/16/2010 15:38	SOIL	240.28	ppm	Final	PREC SAMP (452 25F)	390.67	9.63	103.67	8.38
588	12/16/2010 15:42	SOIL	240.29	ppm	Final	PREC SAMP (452 25F)	381.53	9.53	110.53	8.35
589	12/17/2010 9:08	SHUTTER_CAL	57.88	cps	Final					
590	12/17/2010 9:13	SOIL	240	ppm	Final	GBW 7411	2653.65	26.22	194.28	21.54
591	12/17/2010 9:18	SOIL	240	ppm	Final	NIST 2711	1111.46	15.61	98.91	12.86
592	12/17/2010 9:22	SOIL	240	ppm	Final	NIST 2782	518.77	17.64	144.87	15.58
593	12/17/2010 9:27	SOIL	240	ppm	Final	NIST 2702	118.38	7.23	48.65	6.21
594	12/17/2010 9:32	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.31	< LOD	3
595	12/17/2010 9:37	SOIL	240.15	ppm	Final	PREC SAMP (452 27F)	394.65	9.6	112.39	8.41
596	12/17/2010 9:41	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	398.58	9.63	103.41	8.36
597	12/17/2010 9:45	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	401	9.7	99.18	8.38
598	12/17/2010 9:49	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	409.04	9.75	105.52	8.47
599	12/17/2010 9:53	SOIL	240.32	ppm	Final	PREC SAMP (452 27F)	397.74	9.61	114.58	8.43
600	12/17/2010 9:57	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	401.59	9.67	107.16	8.42
601	12/17/2010 10:01	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	404.34	9.71	107.57	8.45
602	12/17/2010 10:11	SOIL	240	ppm	Final	148 3	211	7.84	78.36	6.91
603	12/17/2010 10:15	SOIL	240	ppm	Final	148 4	237.87	8.14	57.94	6.91
604	12/17/2010 10:19	SOIL	240	ppm	Final	148 5	554.17	11.82	88.71	9.95
605	12/17/2010 10:24	SOIL	240	ppm	Final	148 6	382.3	9.96	97.3	8.62
606	12/17/2010 10:28	SOIL	240	ppm	Final	148 7	178.83	7.4	67.13	6.48
607	12/17/2010 10:33	SOIL	240	ppm	Final	148 8	348.64	9.46	80.22	8.1
608	12/17/2010 10:37	SOIL	240	ppm	Final	148 9	572.39	12.01	106.25	10.22
609	12/17/2010 10:42	SOIL	240	ppm	Final	148 10	585.14	12.09	122.09	10.38
610	12/17/2010 10:46	SOIL	240	ppm	Final	148 11	485.02	11.17	120.68	9.71
611	12/17/2010 10:51	SOIL	240	ppm	Final	148 12	465.54	12.39	153.29	11.07
612	12/17/2010 10:57	SOIL	240	ppm	Final	148 13	456.57	10.56	114.61	9.16
613	12/17/2010 11:01	SOIL	240	ppm	Final	148 14	615	12.03	104.59	10.19
614	12/17/2010 11:06	SOIL	240	ppm	Final	148 15	428.08	10.13	102.19	8.74
615	12/17/2010 11:10	SOIL	240	ppm	Final	148 16	411.26	10.11	86.56	8.62
616	12/17/2010 11:15	SOIL	240	ppm	Final	148 17	485.08	10.89	103.98	9.35
617	12/17/2010 11:20	SOIL	240	ppm	Final	148 18	556.21	11.47	110.69	9.8
618	12/17/2010 11:24	SOIL	240	ppm	Final	148 19	650.88	12.9	113.18	10.95
619	12/17/2010 11:29	SOIL	240	ppm	Final	148 20	435.12	10.61	103.12	9.16
620	12/17/2010 11:49	SOIL	240	ppm	Final	GBW 7411	2678.3	26.35	189.44	21.63
621	12/17/2010 11:54	SOIL	240	ppm	Final	NIST 2711	1130.23	15.72	84.75	12.86
622	12/17/2010 11:58	SOIL	240	ppm	Final	NIST 2782	508.51	17.49	158.58	15.64
623	12/17/2010 12:03	SOIL	240	ppm	Final	NIST 2702	117.74	7.18	50.43	6.21
624	12/17/2010 12:08	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.42	< LOD	3.04
625	12/17/2010 12:12	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	403.28	9.67	104.49	8.4
626	12/17/2010 12:16	SOIL	240.08	ppm	Final	PREC SAMP (452 27F)	397.48	9.62	108.82	8.39
627	12/17/2010 12:20	SOIL	240.11	ppm	Final	PREC SAMP (452 27F)	406.71	9.73	100.87	8.42
628	12/17/2010 12:24	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	403.99	9.69	103.81	8.41
629	12/17/2010 12:28	SOIL	240.3	ppm	Final	PREC SAMP (452 27F)	392.86	9.57	109.75	8.36
630	12/17/2010 12:33	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	401.72	9.66	101.44	8.37
631	12/17/2010 12:37	SOIL	240.1	ppm	Final	PREC SAMP (452 27F)	397.66	9.65	115.32	8.46
632	12/17/2010 13:10	SOIL	240	ppm	Final	1096 2	365.32	9.32	31.37	7.55
633	12/17/2010 13:15	SOIL	240	ppm	Final	1096 3	366.63	9.59	29.5	7.76
634	12/17/2010 13:19	SOIL	240	ppm	Final	1096 4	354.76	9.26	28.12	7.48
635	12/17/2010 13:24	SOIL	240	ppm	Final	1096 5	401.29	9.67	23.16	7.77
636	12/17/2010 13:29	SOIL	240	ppm	Final	1096 6	348.46	9.25	25.83	7.46
637	12/17/2010 13:34	SOIL	240	ppm	Final	1096 7	370.54	9.37	24.56	7.53
638	12/17/2010 13:38	SOIL	240	ppm	Final	1096 8	350.94	9.24	22.6	7.41
639	12/17/2010 13:42	SOIL	240	ppm	Final	1096 9	646.73	12.12	22.08	9.69
640	12/17/2010 13:48	SOIL	240	ppm	Final	1096 10	518.54	11	20.08	8.78
641	12/17/2010 13:52	SOIL	240	ppm	Final	1096 11	663.15	12.39	39.61	10.03
642	12/17/2010 13:57	SOIL	240	ppm	Final	1096 12	649.98	12.15	35.62	9.8
643	12/17/2010 14:02	SOIL	240	ppm	Final	1096 13	733.25	13.12	43.93	10.63
644	12/17/2010 14:06	SOIL	240	ppm	Final	1096 14	505.16	11.05	23.81	8.87
645	12/17/2010 14:11	SOIL	240	ppm	Final	1096 15	629.35	12.12	40.13	9.81
646	12/17/2010 14:16	SOIL	240	ppm	Final	1096 16	519.52	11.22	37.28	9.1
647	12/17/2010 14:21	SOIL	240	ppm	Final	1096 17	561.23	11.61	29.55	9.34
648	12/17/2010 14:22	SOIL	4.46	ppm	Final	1096 18	409.57	199.4	< LOD	244.54
649	12/17/2010 14:26	SOIL	240	ppm	Final	1096 18	589.44	11.84	34.41	9.56
650	12/17/2010 14:31	SOIL	240	ppm	Final	1096 19	906.87	14.56	56.82	11.83
651	12/17/2010 14:35	SOIL	240	ppm	Final	1096 20	954.69	14.89	41.36	12
652	12/17/2010 14:41	SOIL	240	ppm	Final	1096 21	567.1	11.6	59.43	9.55
653	12/17/2010 14:45	SOIL	240	ppm	Final	GBW 7411	2679.75	26.18	181.92	21.46
654	12/17/2010 14:51	SOIL	240	ppm	Final	NIST 2711	1131.56	15.7	90.51	12.88
655	12/17/2010 14:55	SOIL	240	ppm	Final	NIST 2782	505.14	17.47	162.78	15.66
656	12/17/2010 15:00	SOIL	240	ppm	Final	NIST 2702	119.76	7.21	48.5	6.2
657	12/17/2010 15:04	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.97
658	12/17/2010 15:05	SOIL	3.43	ppm	Final	SiO2 BLK	429.52	218.81	< LOD	292.2
659	12/17/2010 15:09	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	405.03	9.69	104.19	8.4
660	12/17/2010 15:13	SOIL	240.07	ppm	Final	PREC SAMP (452 27F)	408.89	9.73	106.77	8.46
661	12/17/2010 15:17	SOIL	240.18	ppm	Final	PREC SAMP (452 27F)	409.56	9.74	99.02	8.4
662	12/17/2010 15:21	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	398.88	9.63	109.13	8.4
663	12/17/2010 15:25	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	408.07	9.74	107.84	8.47
664	12/17/2010 15:30	SOIL	240.3	ppm	Final	PREC SAMP (452 27F)	402.46	9.66	108.54	8.42

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
665	12/17/2010 15:34	SOIL	240.37	ppm	Final	PREC SAMP (452 27F)	400.49	9.63	110.4	8.41
666	12/20/2010 9:56	SHUTTER_CAL	56.28	cps	Final					
667	12/20/2010 10:01	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.36	< LOD	2.97
668	12/20/2010 10:06	SOIL	240	ppm	Final	NIST 2782	510.19	17.6	141.78	15.55
669	12/20/2010 10:10	SOIL	240	ppm	Final	NIST 2702	117.03	7.2	48.64	6.2
670	12/20/2010 10:17	SOIL	240	ppm	Final	NIST 2711	1123.01	15.73	87.13	12.88
671	12/20/2010 10:21	SOIL	240	ppm	Final	GBW 7411	2657.23	26.23	196.26	21.55
672	12/20/2010 10:26	SOIL	240.27	ppm	Final	PREC SAMP(452 27F)	406.01	9.71	112.6	8.49
673	12/20/2010 10:31	SOIL	240.3	ppm	Final	PREC SAMP(452 27F)	405.98	9.72	106.99	8.46
674	12/20/2010 10:35	SOIL	240.21	ppm	Final	PREC SAMP(452 27F)	405.2	9.69	108.16	8.44
675	12/20/2010 10:39	SOIL	240.29	ppm	Final	PREC SAMP(452 27F)	409.19	9.73	110.48	8.49
676	12/20/2010 10:43	SOIL	240.21	ppm	Final	PREC SAMP(452 27F)	403.82	9.66	109.5	8.43
677	12/20/2010 10:47	SOIL	240.19	ppm	Final	PREC SAMP(452 27F)	402.53	9.67	105.33	8.41
678	12/20/2010 10:51	SOIL	240.18	ppm	Final	PREC SAMP(452 27F)	407.36	9.69	105.92	8.42
679	12/20/2010 11:10	SOIL	240	ppm	Final	1096 22	480.73	10.87	36.41	8.82
680	12/20/2010 11:14	SOIL	240	ppm	Final	1096 23	622.75	11.85	112.44	10.08
681	12/20/2010 11:18	SOIL	240	ppm	Final	1096 24	620.27	12.05	37.6	9.75
682	12/20/2010 11:23	SOIL	240	ppm	Final	500 F1	209.83	7.64	75.95	6.72
683	12/20/2010 11:28	SOIL	240	ppm	Final	500 F2	236.78	7.92	65.77	6.8
684	12/20/2010 11:33	SOIL	240	ppm	Final	500 F3	179.22	7.21	42.18	6.04
685	12/20/2010 11:37	SOIL	240	ppm	Final	500 F4	207.59	7.57	66.16	6.56
686	12/20/2010 11:41	SOIL	240	ppm	Final	500 F5	259.89	8.2	63.76	7
687	12/20/2010 11:46	SOIL	240	ppm	Final	500 F6	279.28	8.46	84.05	7.37
688	12/20/2010 11:50	SOIL	240	ppm	Final	500 F7	199.67	7.49	82.86	6.66
689	12/20/2010 13:14	SOIL	240	ppm	Final	500 F8	251.51	8.13	77.56	7.07
690	12/20/2010 13:18	SOIL	240	ppm	Final	500 F9	352.17	9.3	98.64	8.11
691	12/20/2010 13:23	SOIL	240	ppm	Final	500 F10	258.86	8.25	65.75	7.06
692	12/20/2010 13:28	SOIL	240	ppm	Final	500 F11	235.53	8.05	83.4	7.09
693	12/20/2010 13:32	SOIL	240	ppm	Final	500 F12	321.51	9.02	98.24	7.91
694	12/20/2010 13:37	SOIL	240	ppm	Final	500 F13	331.05	9.07	96.35	7.92
695	12/20/2010 13:41	SOIL	240	ppm	Final	500 F14	358.92	9.41	94.69	8.16
696	12/20/2010 13:46	SOIL	240	ppm	Final	500 F15	291.28	8.64	93.75	7.59
697	12/20/2010 13:50	SOIL	240	ppm	Final	500 F16	341.68	9.22	89.4	7.98
698	12/20/2010 13:55	SOIL	240	ppm	Final	500 F17	275.49	8.41	90.65	7.39
699	12/20/2010 14:00	SOIL	240	ppm	Final	GBW 7411	2666.03	26.24	205.39	21.59
700	12/20/2010 14:05	SOIL	240	ppm	Final	NIST 2711	1120.27	15.62	96.39	12.84
701	12/20/2010 14:10	SOIL	240	ppm	Final	NIST 2782	504	17.47	146.22	15.48
702	12/20/2010 14:15	SOIL	240	ppm	Final	NIST 2702	124.91	7.31	43.58	6.22
703	12/20/2010 14:19	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.44	< LOD	3.05
704	12/20/2010 14:24	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	405	9.69	111.5	8.46
705	12/20/2010 14:28	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	410.23	9.73	112.54	8.5
706	12/20/2010 14:32	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	410.83	9.76	115.56	8.55
707	12/20/2010 14:36	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	403.31	9.68	117.61	8.5
708	12/20/2010 14:40	SOIL	240.06	ppm	Final	PREC SAMP (452 27F)	403.5	9.67	115.82	8.48
709	12/20/2010 14:44	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	413.03	9.79	106.03	8.5
710	12/20/2010 14:48	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	402.56	9.66	114.41	8.46
711	12/20/2010 14:54	SOIL	240	ppm	Final	500 F18	278.52	8.48	78.08	7.34
712	12/20/2010 14:59	SOIL	240	ppm	Final	500 F19	266.46	8.27	79.01	7.18
713	12/20/2010 15:04	SOIL	240	ppm	Final	500 F20	339.95	9.15	100.55	8.02
714	12/20/2010 15:09	SOIL	240	ppm	Final	500 F22	309.94	8.86	92.52	7.74
715	12/20/2010 15:13	SOIL	240	ppm	Final	500 F23	314.81	8.93	91.81	7.8
716	12/20/2010 15:18	SOIL	240	ppm	Final	500 F24	388.61	9.7	114.35	8.52
717	12/20/2010 15:22	SOIL	240	ppm	Final	500 F25	306.97	8.84	92.64	7.73
718	12/20/2010 15:27	SOIL	240	ppm	Final	500 F26	295.43	8.73	82.6	7.57
719	12/20/2010 15:34	SOIL	240	ppm	Final	500 F27	241.69	8.11	79.5	7.09
720	12/20/2010 15:38	SOIL	240	ppm	Final	500 F28	297.37	8.78	89.46	7.66
721	12/20/2010 15:43	SOIL	240	ppm	Final	500 F29	244.76	8.1	89.06	7.17
722	12/20/2010 15:48	SOIL	240	ppm	Final	500 F30	244.97	8.03	77.57	7
723	12/20/2010 15:52	SOIL	240	ppm	Final	500 F31	101.97	6.18	43.57	5.32
724	12/20/2010 16:01	SOIL	240	ppm	Final	500 F32	266.42	8.35	94.29	7.39
725	12/20/2010 16:06	SOIL	240	ppm	Final	500 F33	249.24	8.12	86.15	7.15
726	12/20/2010 16:10	SOIL	240	ppm	Final	500 F34	331.65	9.12	96.09	7.96
727	12/20/2010 16:18	SOIL	240	ppm	Final	500 F35	116.5	6.41	42.32	5.47
728	12/20/2010 16:22	SOIL	240	ppm	Final	500 F36	236	7.94	78.02	6.94
729	12/20/2010 16:27	SOIL	240	ppm	Final	500 F37	247.37	8.1	83.39	7.11
730	12/20/2010 16:32	SOIL	240	ppm	Final	500 F38	310.65	8.85	80.3	7.63
731	12/20/2010 16:37	SOIL	240	ppm	Final	GBW 7411	2703.76	26.51	186.56	21.74
732	12/20/2010 16:42	SOIL	240	ppm	Final	NIST 2711	1148.26	15.86	89.75	13
733	12/20/2010 16:46	SOIL	240	ppm	Final	NIST 2782	510.71	17.58	159.02	15.7
734	12/20/2010 16:51	SOIL	240	ppm	Final	NIST 2702	123.7	7.28	42.53	6.17
735	12/20/2010 16:56	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.16	< LOD	2.9
736	12/20/2010 16:56	SOIL	2.77	ppm	Final	PREC SAMP (452 27F)	397.27	232.93	< LOD	248.94
737	12/20/2010 17:00	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	413.68	9.81	107.36	8.52
738	12/20/2010 17:04	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	411.1	9.77	106.69	8.49
739	12/20/2010 17:08	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	401.32	9.68	115	8.48
740	12/20/2010 17:13	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	400.55	9.64	112.39	8.44
741	12/20/2010 17:17	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	407.37	9.76	116.13	8.55
742	12/20/2010 17:21	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	405.35	9.74	118.57	8.56
743	12/20/2010 17:25	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	408.98	9.75	111.52	8.51
744	12/23/2010 10:14	SHUTTER_CAL	57.9	cps	Final					
745	12/23/2010 10:25	SOIL	240	ppm	Final	GBW 7411	2651.24	26.26	199.39	21.6
746	12/23/2010 10:29	SOIL	240	ppm	Final	NIST 2711	1119.73	15.66	93.53	12.86
747	12/23/2010 10:34	SOIL	240	ppm	Final	NIST 2782	525.8	17.84	152.7	15.84

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
748	12/23/2010 10:40	SOIL	240	ppm	Final	NIST 2702	121.85	7.27	47.39	6.23
749	12/23/2010 10:44	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.48	< LOD	3.02
750	12/23/2010 10:50	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	400.89	9.64	111.4	8.43
751	12/23/2010 10:54	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	389.48	9.54	111.31	8.35
752	12/23/2010 10:58	SOIL	240.07	ppm	Final	PREC SAMP (452 27F)	398.63	9.64	106.75	8.39
753	12/23/2010 11:02	SOIL	240.18	ppm	Final	PREC SAMP (452 27F)	406.16	9.68	104.09	8.39
754	12/23/2010 11:06	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	399.18	9.63	105.63	8.37
755	12/23/2010 11:10	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	411.26	9.76	112.01	8.52
756	12/23/2010 11:14	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	388.1	9.52	110.65	8.33
757	12/23/2010 11:21	SOIL	240	ppm	Final	500 F39	297.15	8.63	87.88	7.52
758	12/23/2010 13:31	SOIL	240	ppm	Final	500 F40	332.32	9	86.29	7.77
759	12/23/2010 13:37	SOIL	240	ppm	Final	500 F41	283.83	8.47	86.02	7.39
760	12/23/2010 13:41	SOIL	240	ppm	Final	500 B1	215.54	7.73	67.66	6.7
761	12/23/2010 13:46	SOIL	240	ppm	Final	500 B2	132.4	6.74	42.46	5.72
762	12/23/2010 13:51	SOIL	227.52	ppm	Final	500 B3	250.52	8.4	77.52	7.31
763	12/23/2010 13:55	SOIL	240	ppm	Final	500 B4	113.85	6.49	34.78	5.43
764	12/23/2010 14:00	SOIL	240	ppm	Final	500 B5	258.05	8.28	78.56	7.2
765	12/23/2010 14:04	SOIL	240	ppm	Final	500 B6	205.71	7.63	65.04	6.61
766	12/23/2010 14:09	SOIL	240	ppm	Final	500 B7	323.26	9.03	110.14	8.01
767	12/23/2010 14:13	SOIL	240	ppm	Final	500 B8	253.95	8.17	76.02	7.09
768	12/23/2010 14:18	SOIL	240	ppm	Final	500 B9	265.88	8.35	78.33	7.25
769	12/23/2010 14:22	SOIL	240	ppm	Final	500 B10	259.33	8.21	86.66	7.22
770	12/23/2010 14:27	SOIL	240	ppm	Final	500 B11	268.34	8.43	81.51	7.35
771	12/23/2010 14:34	SOIL	240	ppm	Final	500 B12	206.24	7.54	71.82	6.6
772	12/23/2010 14:38	SOIL	240	ppm	Final	500 B13	284.93	8.69	92.14	7.64
773	12/23/2010 14:43	SOIL	240	ppm	Final	500 B14	239.9	8.03	85.07	7.08
774	12/23/2010 14:47	SOIL	240	ppm	Final	500 B15	226.95	7.91	78.06	6.94
775	12/23/2010 14:52	SOIL	240	ppm	Final	500 B16	262.22	8.38	90.57	7.39
776	12/23/2010 14:56	SOIL	240	ppm	Final	500 B17	223.17	7.99	62.41	6.85
777	12/23/2010 15:04	SOIL	240	ppm	Final	GBW 7411	2660.53	26.24	216.1	21.63
778	12/23/2010 15:09	SOIL	240	ppm	Final	NIST 2711	1128.99	15.71	94.76	12.9
779	12/23/2010 15:17	SOIL	240	ppm	Final	NIST 2782	503.6	17.42	153.27	15.53
780	12/23/2010 15:23	SOIL	240	ppm	Final	NIST 2702	123.38	7.25	45.43	6.19
781	12/23/2010 15:27	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.95
782	12/23/2010 15:32	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	394.18	9.55	115.61	8.39
783	12/23/2010 15:36	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	393.8	9.57	105.8	8.33
784	12/23/2010 15:40	SOIL	240.08	ppm	Final	PREC SAMP (452 27F)	394.97	9.57	108.75	8.36
785	12/23/2010 15:44	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	399.05	9.61	102.42	8.33
786	12/23/2010 15:48	SOIL	240.07	ppm	Final	PREC SAMP (452 27F)	405.08	9.68	108.09	8.43
787	12/23/2010 15:52	SOIL	240.2	ppm	Final	PREC SAMP (452 27F)	392.83	9.56	108.97	8.35
788	12/23/2010 15:56	SOIL	240.25	ppm	Final	PREC SAMP (452 27F)	399.05	9.61	108.42	8.38
789	1/4/2011 9:10	SHUTTER_CAL	57.95	cps	Final					
790	1/4/2011 9:12	SHUTTER_CAL	57.99	cps	Final					
791	1/4/2011 9:17	SOIL	240	ppm	Final	GBW 7411	2669.59	26.34	187.76	21.61
792	1/4/2011 9:21	SOIL	240	ppm	Final	NIST 2711	1124.72	15.7	91.79	12.88
793	1/4/2011 9:26	SOIL	240	ppm	Final	NIST 2782	496.86	17.45	166.8	15.7
794	1/4/2011 9:31	SOIL	240	ppm	Final	NIST 2702	126.58	7.36	45.89	6.28
795	1/4/2011 9:35	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.95
796	1/4/2011 9:41	SOIL	240.01	ppm	Final	PREC SAMP (452 27F)	391.17	9.56	109.62	8.36
797	1/4/2011 9:45	SOIL	240.25	ppm	Final	PREC SAMP (452 27F)	401.39	9.65	105	8.38
798	1/4/2011 9:49	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	407.57	9.72	104.49	8.43
799	1/4/2011 9:53	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	401.29	9.64	103.32	8.36
800	1/4/2011 9:57	SOIL	240.35	ppm	Final	PREC SAMP (452 27F)	401.43	9.62	103.53	8.35
801	1/4/2011 10:01	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	404.44	9.66	104.58	8.39
802	1/4/2011 10:05	SOIL	240.17	ppm	Final	PREC SAMP (452 27F)	399.18	9.63	110.37	8.41
803	1/4/2011 10:21	SOIL	240	ppm	Final	500 B18	272.45	8.51	89.37	7.47
804	1/4/2011 10:26	SOIL	240	ppm	Final	500 B19	34.56	5.02	15.88	4.03
805	1/4/2011 10:30	SOIL	240	ppm	Final	500 B20	258.62	8.28	86.49	7.28
806	1/4/2011 10:35	SOIL	240	ppm	Final	500 B21	42.69	5.14	17.18	4.15
807	1/4/2011 10:40	SOIL	240	ppm	Final	500 B22	85.65	6.03	29.11	5.02
808	1/4/2011 10:45	SOIL	240	ppm	Final	500 B23	39.03	4.75	15.56	3.81
809	1/4/2011 10:50	SOIL	240	ppm	Final	500 B24	78.1	5.8	26.67	4.8
810	1/4/2011 10:54	SOIL	240	ppm	Final	500 B25	121.61	6.32	34.38	5.28
811	1/4/2011 10:59	SOIL	240	ppm	Final	500 B26	172.41	7.06	51.01	6.03
812	1/4/2011 11:04	SOIL	240	ppm	Final	500 B27	64.74	5.26	20.23	4.28
813	1/4/2011 11:10	SOIL	240	ppm	Final	500 B28	39.91	4.79	9.91	3.74
814	1/4/2011 11:14	SOIL	240	ppm	Final	500 B29	39.51	5.06	16.64	4.07
815	1/4/2011 11:20	SOIL	240	ppm	Final	500 B30	120.47	6.49	42.66	5.52
816	1/4/2011 11:21	SOIL	2.81	ppm	Final	500 B30	< LOD	223.02	< LOD	206.23
817	1/4/2011 11:25	SOIL	240	ppm	Final	500 B31	99.91	6.12	37.6	5.19
818	1/4/2011 11:30	SOIL	240	ppm	Final	500 B32	39.54	5.06	15.71	4.06
819	1/4/2011 11:34	SOIL	240	ppm	Final	500 B33	34.28	4.88	12.77	3.86
820	1/4/2011 11:38	SOIL	240	ppm	Final	500 B34	124.7	6.56	42.76	5.58
821	1/4/2011 11:43	SOIL	240	ppm	Final	500 B35	321.87	9.05	95.15	7.91
822	1/4/2011 11:47	SOIL	240	ppm	Final	500 B36	276.45	8.52	80.92	7.4
823	1/4/2011 11:52	SOIL	240	ppm	Final	500 B37	274.65	8.5	82.28	7.4
824	1/4/2011 11:56	SOIL	240	ppm	Final	GBW 7411	2663.58	26.21	208.55	21.59
825	1/4/2011 12:01	SOIL	240	ppm	Final	NIST 2711	1119.89	15.62	97.11	12.84
826	1/4/2011 12:06	SOIL	202.46	ppm	Final	NIST 2782	514.69	19.26	150.3	17.11
827	1/4/2011 12:10	SOIL	240	ppm	Final	NIST 2782	515.38	17.65	146.13	15.61
828	1/4/2011 12:14	SOIL	13.27	ppm	Final	NIST 2702	124.06	38.05	< LOD	47.58
829	1/4/2011 12:21	SOIL	240	ppm	Final	NIST 2702	122.39	7.27	48.23	6.24
830	1/4/2011 12:28	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.98

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
831	1/4/2011 12:34	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	405.54	9.69	104.86	8.41
832	1/4/2011 12:38	SOIL	240.31	ppm	Final	PREC SAMP (452 27F)	403.74	9.66	111.02	8.44
833	1/4/2011 12:42	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	395.07	9.6	116.35	8.44
834	1/4/2011 12:46	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	411.07	9.76	111.35	8.52
835	1/4/2011 12:50	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	413.34	9.8	100.38	8.46
836	1/4/2011 12:54	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	401.5	9.68	109.32	8.45
837	1/4/2011 12:58	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	403.26	9.69	111.66	8.46
838	1/4/2011 13:07	SOIL	240	ppm	Final	462 3	496.16	10.95	111.26	9.43
839	1/4/2011 13:12	SOIL	240	ppm	Final	462 5	507.16	11.09	126.02	9.65
840	1/4/2011 13:17	SOIL	186.66	ppm	Final	462 6	478.15	12.45	120.45	10.82
841	1/4/2011 13:22	SOIL	240	ppm	Final	462 7	462.86	10.53	121.94	9.18
842	1/4/2011 13:27	SOIL	240	ppm	Final	462 8	383.07	9.66	97.59	8.36
843	1/4/2011 13:34	SOIL	240	ppm	Final	462 9	491.01	10.82	140.15	9.53
844	1/4/2011 13:34	SOIL	16.28	ppm	Final	462 10	454.82	47.49	101.92	40.84
845	1/4/2011 13:39	SOIL	240	ppm	Final	462 10	489.42	10.84	115.86	9.38
846	1/4/2011 13:43	SOIL	240	ppm	Final	462 11	567.99	11.45	121.51	9.85
847	1/4/2011 14:05	SOIL	240	ppm	Final	462 13	559.95	11.55	124.53	9.96
848	1/4/2011 14:09	SOIL	240	ppm	Final	462 16	482.14	10.83	110.28	9.34
849	1/4/2011 14:14	SOIL	240	ppm	Final	462 18	476.84	10.76	112.26	9.3
850	1/4/2011 14:18	SOIL	240	ppm	Final	462 20	494.48	10.91	119.73	9.46
851	1/4/2011 14:23	SOIL	240	ppm	Final	462 28	87.33	5.85	22.46	4.77
852	1/4/2011 14:27	SOIL	240	ppm	Final	462 31	459.86	10.61	119.92	9.25
853	1/4/2011 14:32	SOIL	240	ppm	Final	GBW 7411	2688.94	26.33	192.01	21.62
854	1/4/2011 14:36	SOIL	240	ppm	Final	NIST 2711	1123.94	15.7	102.03	12.93
855	1/4/2011 14:41	SOIL	240	ppm	Final	NIST 2782	496.1	17.34	180.09	15.76
856	1/4/2011 14:46	SOIL	240	ppm	Final	NIST 2702	124.59	7.32	43.82	6.23
857	1/4/2011 14:51	SOIL	240	ppm	Final	SIO2 BLK	< LOD	4.37	< LOD	2.98
858	1/4/2011 14:55	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	402.58	9.69	109.07	8.45
859	1/4/2011 14:59	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	406.37	9.71	107.16	8.45
860	1/4/2011 15:03	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	395.29	9.6	110.11	8.38
861	1/4/2011 15:07	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	401.62	9.7	113.16	8.48
862	1/4/2011 15:11	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	404.06	9.7	107.13	8.44
863	1/4/2011 15:16	SOIL	240.07	ppm	Final	PREC SAMP (452 27F)	410.67	9.77	107.9	8.5
864	1/4/2011 15:20	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	405.33	9.73	108.08	8.47



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The Trusted Integrator for Sustainable Solutions

14 April 2011

Ms. Ruth Scharr (3HS31)
On-Scene Coordinator (OSC)
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: FMO Pesticide Site - Data Quality Report
EPA Contract No: EP-S3-10-05
Technical Direction Document Nos: WS01-10-07-006 and WS01-10-10-007
Document Control No. W0038.4B.00126

Dear Ms. Scharr:

This report provides a general review of the Weston Solutions Inc. (WESTON) x-ray fluorescence (XRF) analytical data package for the approximately 267 soil samples collected at the FMO Pesticide site in North Whitehall Township, Lehigh County, Pennsylvania, and analyzed on February 1, 2011 through March 21, 2011. The U.S. Environmental Protection Agency (EPA) asked that the samples be analyzed for lead and arsenic using the Niton Model 700 XRF instrument. Relevant results were extracted from the instrument's files, which include more than 20 metals. As part of the XRF quality assurance process, approximately 11 percent of the samples, a total of 29 samples, were sent as DAS R33690 and DAS R33691 to USEPA Region 3 Environmental Science Center of Fort Meade, Maryland, for confirmation analysis through the EPA DAS (Delivery of Analytical Services) Program. EPA validated the DAS reports so this report focuses on the review of the XRF data only.

The samples were analyzed for lead and arsenic by WESTON using the ex-situ variant of EPA SW-846 Method 6200 from "Test Methods for Evaluation Solid Waste", September 1986. The samples were prepared for analysis by drying and sieving to minimize heterogeneity.

The XRF data package was reviewed in accordance with the EPA, "Region III Modifications to National Functional Guidelines for Inorganic Data Review Multi-Media, Multi-Concentration," April 1993, to level IM1 for inorganic analysis. Those guidelines were modified, as appropriate to conform to Method 6200 and the requirements of WESTON's "Field Sampling Plan for the FMO Pesticide Site, North Whitehall Township, Lehigh County, Pennsylvania" (FSP), dated September 21, 2010.

There is a good correlation between the XRF and DAS data, as shown on the spreadsheet "Comparison XRF data.xls" and the linear regression analysis. For lead, the percent differences between the analyses averaged 6.9, with a maximum of 10.8 percent for sample 13BY28. For arsenic, the percent differences averaged 9.5 percent, with a maximum of 25.3 percent for sample 644BY01. The higher arsenic percent differences are associated with the lower



Ms. Ruth Scharr
U.S. Environmental Protection Agency

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concentration results; however, the average percent difference for both lead and arsenic met the project goal of less than 20% and are shown in the linear regression analysis to be very comparable to the offsite laboratory confirmation results.

The analyst followed the daily routine as established by Method 6200 and WESTON's FSP. The instrument (method) blanks contained no detectable analytes. Sample replicates and continuing calibration standards (blank, low level, intermediate level, and high level) were analyzed as required at the start of each day, after every 20 samples, and at the end of the day to verify precision and accuracy. As documented in the daily summaries reviewed for February 1, 2011 through March 21, 2011 included as "XRF daily calibration logs.zip", there were no irregularities found (all percent differences and %RSDs were less than 20% as stated in Method 6200).

No field duplicates were analyzed.

WESTON recommends that the data be accepted and used in decision-making as if they were DAS or CLP results. No qualifications were made. Please contact me at (603) 656-5434 regarding any aspect of this report.

Very truly yours,

WESTON SOLUTIONS, INC.


Senior Technical Manager

cc: START TDD File

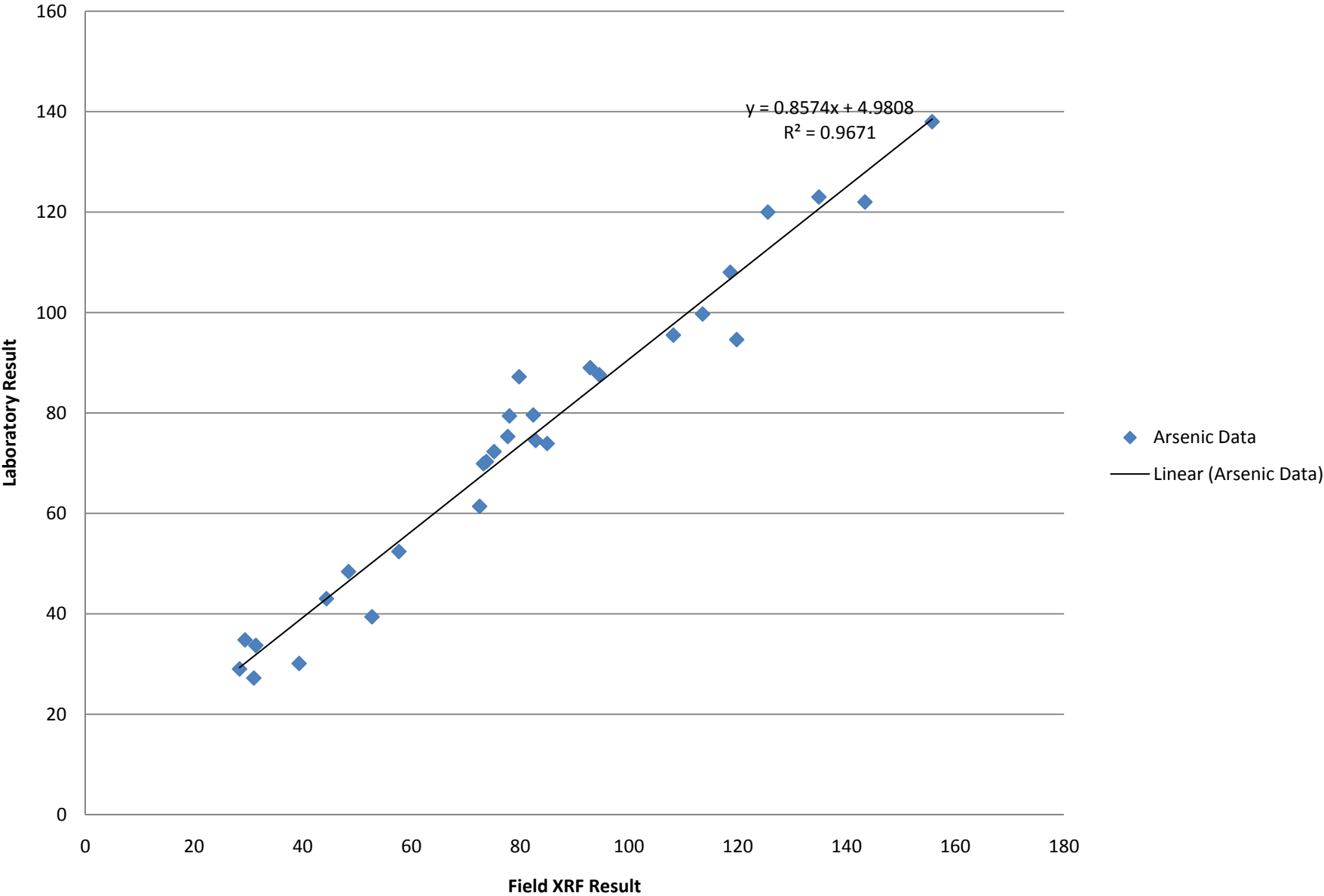
Enclosed: Spreadsheets with Validated Data

SPREADSHEETS WITH VALIDATED DATA

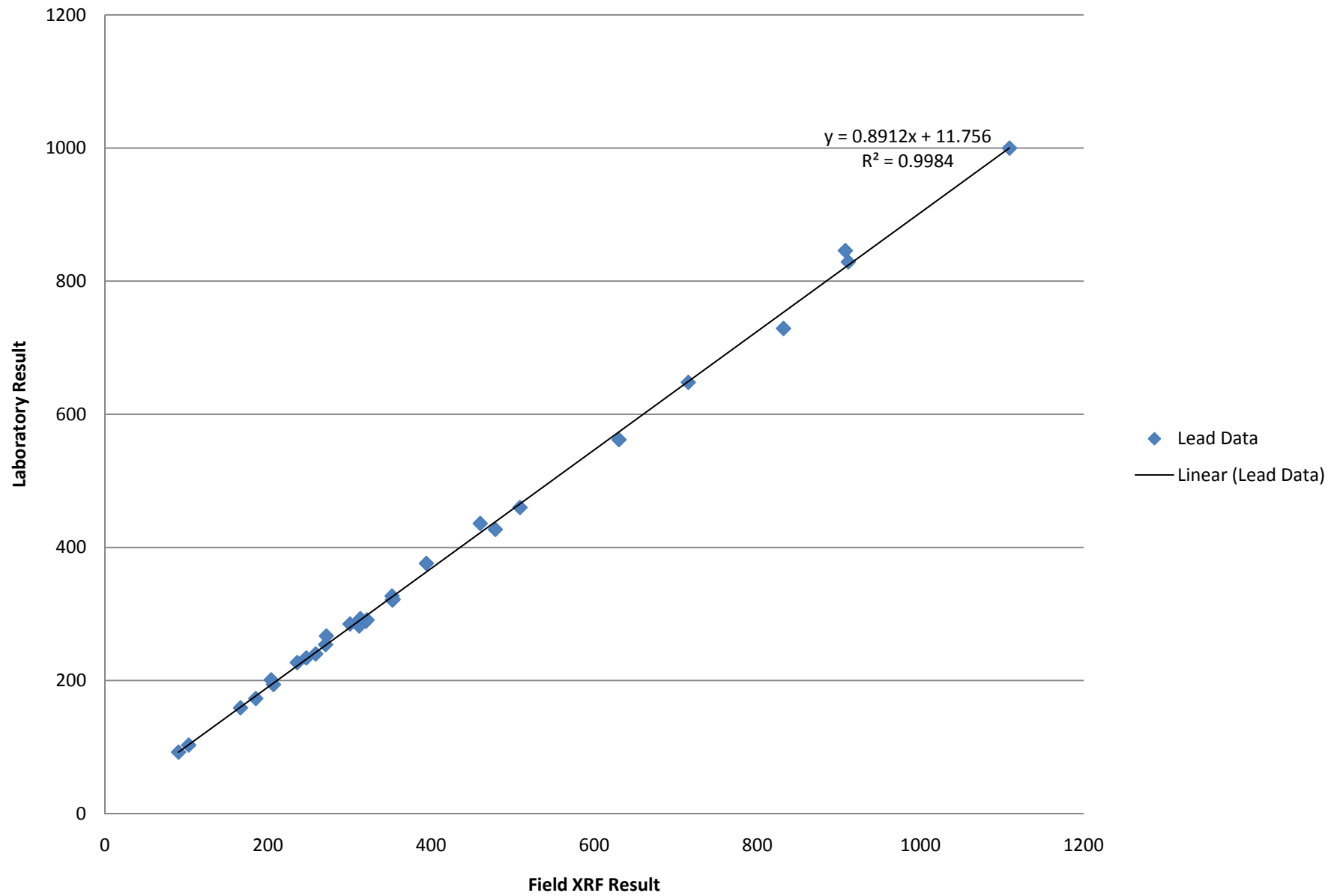
Comparison Between XRF and Laboratory Confirmation Results

Reading No	Time	Duration	SAMPLE	Pb	Pb Error	Lab Confirmati on Result (ug/g)	% D	PB Qualifier	As	As Error	Lab Confirmati on Result (ug/g)	% D	AS Qualifier	Comments
921	2/1/2011 15:45	240	522 FY COMP	102.78	6.04	103	0.214049426		31.35	5.03	33.7	7.4960128		
928	2/1/2011 16:18	240	513 TPA 05	258.55	8.28	240	7.174627732		79.78	7.2	87.2	9.3005766		
963	2/3/2011 11:08	240	506 FY 30	270.62	8.42	254	6.14145296		73.75	7.26	70.3	4.6779661		
996	2/9/2011 16:35	240	13 BY 15	246.99	8.11	234	5.25932224		57.67	6.87	52.4	9.1382001		
1000	2/9/2011 16:53	240	13 BY 19	715.3	12.64	648	9.408639732		143.39	10.85	122	14.917358		
1010	2/9/2011 17:38	240	13 BY 28	630.27	11.92	562	10.83186571		155.75	10.4	138	11.396469		
1049	2/21/2011 14:53	240	13 BY 40	831.97	13.52	729	12.3766482		134.92	11.45	123	8.8348651		
1082	2/24/2011 10:06	240	13 BY 47	319.86	8.9	289	9.647970987		75.18	7.62	72.3	3.8308061		
1094	2/24/2011 11:00	240	603 BY 10	206.81	7.58	194	6.194091195		48.4	6.39	48.4	0		
1095	2/24/2011 11:05	240	603 BY 11	907.81	14.15	846	6.808693449		125.54	11.88	120	4.4129361		
1114	2/24/2011 12:34	240	603 BY 17	300.56	8.76	285	5.177002928		82.38	7.58	79.6	3.3746055		
1117	2/24/2011 12:47	240	603 BY 20	235.87	8	227	3.760546064		84.93	7.06	73.9	12.987166		
1124	2/24/2011 13:20	240	603 BY 26	185.08	7.38	173	6.526907283		118.62	6.96	108	8.952959		
1146	2/24/2011 15:19	240	603 BY 35	166.32	7.2	159	4.401154401		30.98	5.92	27.2	12.20142		
1151	2/24/2011 15:46	240	603 BY 40	352.53	9.41	321	8.943919666		72.51	7.98	61.4	15.322025		
1196	3/3/2011 10:46	240	1197 BY 06	478.77	10.64	427	10.8131253		119.8	9.25	94.6	21.035058		
1274	3/16/2011 13:40	240	1197 BY 25	508.95	10.99	460	9.617840652		44.34	8.96	43	3.0221019		
1314	3/17/2011 10:02	240	1197 BY 38	321.47	9.38	291	9.478333904		39.31	7.7	30.1	23.429153		
1321	3/17/2011 10:51	240	485 BY 5 SUB	90.34	5.93	92.4	2.280274518		29.36	4.92	34.8	18.52861		
1352	3/17/2011 13:11	240	525 BY 16	311.82	8.92	282	9.563209544		73.22	7.62	69.9	4.5342803		
1359	3/17/2011 13:45	240	525 BY 21	394.15	9.8	376	4.604845871		113.53	8.59	99.7	12.181802		
1360	3/17/2011 13:50	240	525 BY 22	352.01	9.42	327	7.104911792		94.52	8.18	87.6	7.3212019		
1392	3/18/2011 9:51	240	525 BY 28	353.53	9.43	322	8.918620768		82.82	8.08	74.5	10.045883		
1393	3/18/2011 9:56	240	644 BY 01	1109.08	15.98	1000	9.835178707		52.72	12.91	39.4	25.265554		
1394	3/18/2011 10:01	240	644 BY 02	911.34	14.33	829	9.035047293		108.15	11.93	95.5	11.696718		
1402	3/18/2011 10:47	240	644 BY 09	460.24	10.59	436	5.266817313		28.35	8.53	29	2.292769		
1444	3/21/2011 11:02	240	419 FY 06	271.57	8.46	267	1.682807379		77.69	7.33	75.3	3.076329		
1472	3/21/2011 13:14	240	419 FY 20	313.28	8.99	293	6.473442288		92.85	7.85	89	4.1464728		
1483	3/21/2011 14:04	240	419 FY 30	203.97	7.59	201	1.456096485		77.99	6.7	79.4	1.8079241		
Average % D							6.86198082		9.4905939					

Arsenic Comparison



Lead Comparison



Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
902	2/1/2011 14:02	SOIL	240	ppm	Final	GBW 7411	2632.5	25.99	204.04	21.39
903	2/1/2011 14:10	SOIL	240	ppm	Final	NIST 2711	1125.76	15.65	92.93	12.85
904	2/1/2011 14:15	SOIL	240	ppm	Final	NIST 2782	501	17.32	160.18	15.52
905	2/1/2011 14:23	SOIL	240	ppm	Final	NIST 2702	119.24	7.2	45.89	6.15
906	2/1/2011 14:29	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.37	< LOD	2.98
907	2/1/2011 14:34	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	400.75	9.61	105.16	8.36
908	2/1/2011 14:38	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	390.16	9.52	111.25	8.34
909	2/1/2011 14:42	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	396.95	9.58	108.17	8.35
910	2/1/2011 14:47	SOIL	240.2	ppm	Final	PREC SAMP (452 27F)	401.06	9.63	110.06	8.41
911	2/1/2011 14:51	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	401.91	9.65	109.99	8.42
912	2/1/2011 14:55	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	390.95	9.52	114.31	8.36
913	2/1/2011 14:59	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	410.22	9.72	98.16	8.39
914	2/1/2011 15:07	SOIL	238.07	ppm	Final	473 BY 01 COMP	197.68	7.48	54.49	6.38
915	2/1/2011 15:12	SOIL	240	ppm	Final	473 BY 03	102.81	6.15	36.6	5.19
916	2/1/2011 15:18	SOIL	240	ppm	Final	473 FY 03	77.51	5.66	26.47	4.69
917	2/1/2011 15:25	SOIL	240	ppm	Final	473 FY COMP	197.31	7.48	47.54	6.31
918	2/1/2011 15:30	SOIL	240	ppm	Final	522 BY 02	138.57	6.78	31.34	5.6
919	2/1/2011 15:36	SOIL	240	ppm	Final	522 BY COMP	89.31	5.86	27.82	4.84
920	2/1/2011 15:40	SOIL	240	ppm	Final	522 FY 05	48.02	5.25	15.88	4.2
921	2/1/2011 15:45	SOIL	240	ppm	Final	522 FY COMP	102.78	6.04	31.35	5.03
922	2/1/2011 15:50	SOIL	240	ppm	Final	522 TPA	84.82	5.69	26.44	4.69
923	2/1/2011 15:55	SOIL	240	ppm	Final	513 TPA 01	252.41	8.16	65.88	6.99
924	2/1/2011 16:00	SOIL	240	ppm	Final	MB 01	< LOD	6.17	< LOD	4.52
925	2/1/2011 16:05	SOIL	240	ppm	Final	513 TPA 02	361.43	9.47	105.11	8.28
926	2/1/2011 16:09	SOIL	240	ppm	Final	513 TPA 03	226.8	7.83	62.14	6.71
927	2/1/2011 16:14	SOIL	240	ppm	Final	513 TPA 04	229.33	7.87	53.19	6.65
928	2/1/2011 16:18	SOIL	240	ppm	Final	513 TPA 05	258.55	8.28	79.78	7.2
929	2/1/2011 16:26	SOIL	240	ppm	Final	506 FY 25	34.17	4.7	18.83	3.81
930	2/1/2011 16:31	SOIL	240	ppm	Final	506 FY 26	352.11	9.28	91.9	8.04
931	2/1/2011 16:35	SOIL	240	ppm	Final	506 FY 27	203.02	7.52	65.64	6.51
932	2/1/2011 16:41	SOIL	240	ppm	Final	506 FY 28	396.74	9.84	93.03	8.46
933	2/1/2011 16:46	SOIL	240	ppm	Final	506 FY 29	304.61	8.76	95.43	7.69
934	2/1/2011 16:51	SOIL	240	ppm	Final	GBW 7411	2675.98	26.31	196.01	21.61
935	2/1/2011 16:56	SOIL	240	ppm	Final	NIST 2711	1120.97	15.61	88.69	12.79
936	2/1/2011 17:00	SOIL	240	ppm	Final	NIST 2782	502.94	17.41	145.81	15.45
937	2/1/2011 17:05	SOIL	240	ppm	Final	NIST 2702	125.99	7.33	44.54	6.24
938	2/1/2011 17:10	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.26	< LOD	2.94
939	2/1/2011 17:15	SOIL	240.11	ppm	Final	PREC SAMP (506 FY 26)	349.1	9.25	98.16	8.07
940	2/1/2011 17:19	SOIL	240.25	ppm	Final	PREC SAMP (506 FY 26)	346.37	9.2	99.41	8.04
941	2/1/2011 17:23	SOIL	240.21	ppm	Final	PREC SAMP (506 FY 26)	350.95	9.25	96.16	8.05
942	2/1/2011 17:28	SOIL	240.01	ppm	Final	PREC SAMP (506 FY 26)	346.87	9.23	101.64	8.08
943	2/1/2011 17:32	SOIL	240.04	ppm	Final	PREC SAMP (506 FY 26)	348.47	9.24	96.35	8.04
944	2/1/2011 17:36	SOIL	240.25	ppm	Final	PREC SAMP (506 FY 26)	338.57	9.1	101.54	7.98
945	2/1/2011 17:40	SOIL	240.04	ppm	Final	PREC SAMP (506 FY 26)	352.51	9.3	94.96	8.07
950	2/3/2011 10:02	SHUTTER_CAL	57.93	cps	Final					
951	2/3/2011 10:09	SOIL	240	ppm	Final	GBW 7411	2672.82	26.34	193.32	21.63
952	2/3/2011 10:14	SOIL	240	ppm	Final	NIST 2711	1126.78	15.71	90.71	12.89
953	2/3/2011 10:19	SOIL	240	ppm	Final	NIST 2782	520.35	17.67	154.38	15.72
954	2/3/2011 10:26	SOIL	240	ppm	Final	NIST 2702	122.15	7.25	43.65	6.17
955	2/3/2011 10:32	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.42	< LOD	2.99
956	2/3/2011 10:38	SOIL	240.2	ppm	Final	PREC SAMP (506 FY 26)	339.59	9.15	101.02	8.01
957	2/3/2011 10:42	SOIL	240.22	ppm	Final	PREC SAMP (506 FY 26)	342.63	9.17	99.09	8.01
958	2/3/2011 10:46	SOIL	240.08	ppm	Final	PREC SAMP (506 FY 26)	343.61	9.2	99.05	8.03
959	2/3/2011 10:50	SOIL	240.2	ppm	Final	PREC SAMP (506 FY 26)	341.19	9.17	102.36	8.04
960	2/3/2011 10:54	SOIL	240.01	ppm	Final	PREC SAMP (506 FY 26)	345.32	9.21	97.97	8.03
961	2/3/2011 10:58	SOIL	240.27	ppm	Final	PREC SAMP (506 FY 26)	349.71	9.25	102.32	8.09
962	2/3/2011 11:02	SOIL	240.28	ppm	Final	PREC SAMP (506 FY 26)	340.11	9.12	102.83	8
963	2/3/2011 11:08	SOIL	240	ppm	Final	506 FY 30	270.62	8.42	73.75	7.26
964	2/3/2011 11:13	SOIL	240	ppm	Final	MB 02	< LOD	6.44	< LOD	4.42
966	2/3/2011 12:57	SOIL	240	ppm	Final	GBW 7411	2642.97	26.08	199.76	21.45
967	2/3/2011 13:03	SOIL	240	ppm	Final	NIST 2711	1104.67	15.48	110.49	12.8
968	2/3/2011 13:22	SOIL	240	ppm	Final	NIST 2782	518.8	17.65	152.58	15.68

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
969	2/3/2011 13:28	SOIL	240	ppm	Final	NIST 2702	122.4	7.24	48.9	6.23
970	2/3/2011 13:33	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.37	< LOD	2.94
971	2/3/2011 13:38	SOIL	240	ppm	Final	PREC SAMP (506 FY 26)	343.19	9.16	97.71	7.99
972	2/3/2011 13:44	SOIL	240.02	ppm	Final	PREC SAMP (506 FY 26)	343.81	9.17	94.37	7.97
973	2/3/2011 13:48	SOIL	240.08	ppm	Final	PREC SAMP (506 FY 26)	346.93	9.22	97.37	8.04
974	2/3/2011 13:52	SOIL	240.03	ppm	Final	PREC SAMP (506 FY 26)	355	9.3	94.97	8.07
975	2/3/2011 13:56	SOIL	240.11	ppm	Final	PREC SAMP (506 FY 26)	347.43	9.22	93.47	8
976	2/3/2011 14:00	SOIL	240.29	ppm	Final	PREC SAMP (506 FY 26)	343.59	9.18	100.83	8.03
977	2/3/2011 14:04	SOIL	240.08	ppm	Final	PREC SAMP (506 FY 26)	345.91	9.2	101.68	8.05
978	2/3/2011 14:09	SOIL	240.02	ppm	Final	PREC SAMP (506 FY 26)	348.09	9.23	102.96	8.08
979	2/9/2011 15:13	SHUTTER_CAL	57.96	cps	Final					
980	2/9/2011 15:18	SOIL	240	ppm	Final	GBW 7411	2670.59	26.33	193.65	21.62
981	2/9/2011 15:22	SOIL	240	ppm	Final	NIST 2711	1110.73	15.57	102.97	12.84
982	2/9/2011 15:27	SOIL	240	ppm	Final	NIST 2782	513.88	17.59	149.27	15.61
983	2/9/2011 15:32	SOIL	240	ppm	Final	NIST 2702	124.77	7.33	43.63	6.23
984	2/9/2011 15:37	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.31	< LOD	2.98
985	2/9/2011 15:42	SOIL	240.27	ppm	Final	PREC SAMP (506 FY 26)	351.41	9.25	89.6	7.99
986	2/9/2011 15:46	SOIL	240.2	ppm	Final	PREC SAMP (506 FY 26)	333.48	9.07	110.7	8.04
987	2/9/2011 15:50	SOIL	240.22	ppm	Final	PREC SAMP (506 FY 26)	347.72	9.21	98.25	8.03
988	2/9/2011 15:54	SOIL	240.3	ppm	Final	PREC SAMP (506 FY 26)	349.63	9.23	98.68	8.05
989	2/9/2011 15:58	SOIL	240.27	ppm	Final	PREC SAMP (506 FY 26)	346.47	9.2	100.55	8.05
990	2/9/2011 16:02	SOIL	240.05	ppm	Final	PREC SAMP (506 FY 26)	344.46	9.16	92.9	7.95
991	2/9/2011 16:06	SOIL	240.21	ppm	Final	PREC SAMP (506 FY 26)	344.37	9.19	102.42	8.05
992	2/9/2011 16:17	SOIL	240	ppm	Final	13 BY 11	183.89	7.08	37.71	5.89
993	2/9/2011 16:22	SOIL	240	ppm	Final	13 BY 12	264.69	8.01	68.2	6.87
994	2/9/2011 16:26	SOIL	240	ppm	Final	13 BY 13	239.33	8.08	59.3	6.87
995	2/9/2011 16:31	SOIL	240	ppm	Final	13 BY 14	117.78	6.23	36.52	5.25
996	2/9/2011 16:35	SOIL	240	ppm	Final	13 BY 15	246.99	8.11	57.67	6.87
997	2/9/2011 16:40	SOIL	240	ppm	Final	13 BY 16	111.71	6.05	22.34	4.92
998	2/9/2011 16:44	SOIL	240	ppm	Final	13 BY 17	662.75	12.11	141.5	10.44
999	2/9/2011 16:48	SOIL	240	ppm	Final	13 BY 18	176.41	7.03	35.95	5.83
1000	2/9/2011 16:53	SOIL	240	ppm	Final	13 BY 19	715.3	12.64	143.39	10.85
1001	2/9/2011 16:57	SOIL	240	ppm	Final	MB 03	< LOD	6.18	< LOD	4.4
1002	2/9/2011 17:02	SOIL	240	ppm	Final	13 BY 20	196.55	7.26	36.33	6.01
1003	2/9/2011 17:06	SOIL	240	ppm	Final	13 BY 21	648.96	12.13	140.54	10.47
1004	2/9/2011 17:11	SOIL	240	ppm	Final	13 BY 22	659.63	12.14	145.77	10.49
1005	2/9/2011 17:15	SOIL	240	ppm	Final	13 BY 23	593.94	11.72	139.25	10.16
1006	2/9/2011 17:20	SOIL	240	ppm	Final	13 BY 24	195.92	7.21	41.45	6.02
1007	2/9/2011 17:25	SOIL	240	ppm	Final	13 BY 25	576.14	11.51	139.65	10.01
1008	2/9/2011 17:29	SOIL	240	ppm	Final	13 BY 26	122.54	6.1	17.64	4.89
1009	2/9/2011 17:33	SOIL	240	ppm	Final	13 BY 27	665.41	12.21	136.16	10.49
1010	2/9/2011 17:38	SOIL	240	ppm	Final	13 BY 28	630.27	11.92	155.75	10.4
1011	2/9/2011 17:42	SOIL	240	ppm	Final	MB 04	< LOD	6.36	< LOD	4.51
1012	2/9/2011 17:47	SOIL	240	ppm	Final	GBW 7411	2687.2	26.22	202.73	21.56
1013	2/9/2011 17:52	SOIL	240	ppm	Final	NIST 2711	1130.19	15.68	102.37	12.92
1014	2/9/2011 17:56	SOIL	240	ppm	Final	NIST 2782	509.62	17.48	151.34	15.54
1015	2/9/2011 18:03	SOIL	240	ppm	Final	NIST 2702	116.64	7.18	46.7	6.15
1016	2/9/2011 18:07	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.32	< LOD	2.95
1017	2/9/2011 18:12	SOIL	240.06	ppm	Final	PREC SAMP (506 FY 26)	354.41	9.28	93.05	8.04
1018	2/9/2011 18:16	SOIL	240.12	ppm	Final	PREC SAMP (506 FY 26)	342.76	9.17	107.67	8.08
1019	2/9/2011 18:20	SOIL	240.29	ppm	Final	PREC SAMP (506 FY 26)	339.81	9.13	104.75	8.03
1020	2/9/2011 18:24	SOIL	240.2	ppm	Final	PREC SAMP (506 FY 26)	350	9.23	97.52	8.04
1021	2/9/2011 18:28	SOIL	240.26	ppm	Final	PREC SAMP (506 FY 26)	343.05	9.17	100.05	8.01
1022	2/9/2011 18:32	SOIL	240.22	ppm	Final	PREC SAMP (506 FY 26)	342.83	9.18	97.32	8.01
1023	2/9/2011 18:36	SOIL	240.16	ppm	Final	PREC SAMP (506 FY 26)	358.24	9.33	93.47	8.08
1024	2/21/2011 12:48	SHUTTER_CAL	57.8	cps	Final					
1025	2/21/2011 12:54	SOIL	240	ppm	Final	GBW 7411	2669.45	26.24	197.64	21.56
1026	2/21/2011 13:01	SOIL	240	ppm	Final	NIST 2711	1115.75	15.63	96	12.84
1027	2/21/2011 13:05	SOIL	240	ppm	Final	NIST 2782	501.32	17.43	153.53	15.54
1028	2/21/2011 13:10	SOIL	240	ppm	Final	NIST 2702	117.4	7.17	45.83	6.14
1029	2/21/2011 13:17	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.42	< LOD	2.98
1030	2/21/2011 13:23	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	401.82	9.67	107.63	8.42

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1031	2/21/2011 13:27	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	396.04	9.6	109.82	8.38
1032	2/21/2011 13:31	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	400.7	9.66	108.54	8.42
1033	2/21/2011 13:35	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	393.02	9.56	108.32	8.34
1034	2/21/2011 13:39	SOIL	240.11	ppm	Final	PREC SAMP (452 27F)	393.77	9.58	112.54	8.39
1035	2/21/2011 13:43	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	401.95	9.64	110	8.42
1036	2/21/2011 13:47	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	404.73	9.67	107.59	8.43
1037	2/21/2011 13:55	SOIL	240	ppm	Final	13 BY 29	586.85	11.54	132.81	9.98
1038	2/21/2011 14:00	SOIL	240	ppm	Final	13 BY 30	563.25	11.47	150.31	10.06
1039	2/21/2011 14:04	SOIL	240	ppm	Final	13 BY 31	619.14	11.73	138.49	10.14
1040	2/21/2011 14:09	SOIL	240	ppm	Final	13 BY 32	491.59	10.85	138.62	9.54
1041	2/21/2011 14:14	SOIL	240	ppm	Final	13 BY 33	650.99	12.15	175.76	10.7
1042	2/21/2011 14:18	SOIL	240	ppm	Final	13 BY 34	567	11.28	112.31	9.65
1043	2/21/2011 14:23	SOIL	240	ppm	Final	13 BY 35	711.07	12.71	198.7	11.25
1044	2/21/2011 14:28	SOIL	240	ppm	Final	13 BY 36	602.06	11.71	156.48	10.26
1045	2/21/2011 14:34	SOIL	240	ppm	Final	13 BY 37	466.08	10.27	144.11	9.11
1046	2/21/2011 14:39	SOIL	240	ppm	Final	MB 05	< LOD	6.35	< LOD	4.56
1047	2/21/2011 14:44	SOIL	240	ppm	Final	13 BY 38	691.18	12.39	152.87	10.72
1048	2/21/2011 14:49	SOIL	240	ppm	Final	13 BY 39	628.95	11.94	175.96	10.55
1049	2/21/2011 14:53	SOIL	240	ppm	Final	13 BY 40	831.97	13.52	134.92	11.45
1050	2/21/2011 14:58	SOIL	240	ppm	Final	13 BY 41	649.62	12.12	162.64	10.59
1051	2/21/2011 15:02	SOIL	240	ppm	Final	13 BY 42	710.07	12.71	175.33	11.12
1052	2/21/2011 15:07	SOIL	240	ppm	Final	13 BY 43	723.5	12.76	169.64	11.1
1053	2/21/2011 15:11	SOIL	240	ppm	Final	13 BY 44	623.65	11.95	167.87	10.51
1054	2/21/2011 15:16	SOIL	240	ppm	Final	13 BY 45	676.75	12.42	148.12	10.74
1055	2/21/2011 15:20	SOIL	240	ppm	Final	13 BY 46	604.99	11.73	158.32	10.28
1056	2/21/2011 15:25	SOIL	240	ppm	Final	MB 06	< LOD	6.36	< LOD	4.58
1057	2/21/2011 15:29	SOIL	240	ppm	Final	GBW 7411	2664.73	26.18	204.56	21.55
1058	2/21/2011 15:35	SOIL	240	ppm	Final	NIST 2711	1133.79	15.69	95.19	12.89
1059	2/21/2011 15:39	SOIL	240	ppm	Final	NIST 2782	523.32	17.76	144.13	15.68
1060	2/21/2011 15:44	SOIL	240	ppm	Final	NIST 2702	122.44	7.26	45.15	6.2
1061	2/21/2011 15:49	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.98
1062	2/21/2011 15:54	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	403.67	9.64	105.44	8.37
1063	2/21/2011 15:58	SOIL	240.15	ppm	Final	PREC SAMP (452 27F)	414.91	9.76	92.67	8.37
1064	2/21/2011 16:02	SOIL	240.32	ppm	Final	PREC SAMP (452 27F)	403.31	9.63	108.38	8.39
1065	2/21/2011 16:06	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	402.72	9.62	111.75	8.41
1066	2/21/2011 16:10	SOIL	240.31	ppm	Final	PREC SAMP (452 27F)	410.2	9.71	105.6	8.43
1067	2/21/2011 16:14	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	402.18	9.62	112.32	8.41
1068	2/21/2011 16:18	SOIL	240.06	ppm	Final	PREC SAMP (452 27F)	405.57	9.68	112.45	8.46
1069	2/24/2011 9:04	SHUTTER_CAL	57.88	cps	Final					
1070	2/24/2011 9:12	SOIL	240	ppm	Final	GBW 7411	2659.03	26.3	207.76	21.66
1071	2/24/2011 9:16	SOIL	240	ppm	Final	NIST 2711	1123.54	15.68	89.78	12.85
1072	2/24/2011 9:21	SOIL	240	ppm	Final	NIST 2782	498.32	17.35	159.6	15.54
1073	2/24/2011 9:26	SOIL	240	ppm	Final	NIST 2702	117.92	7.17	47.71	6.17
1074	2/24/2011 9:31	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.38	< LOD	2.99
1075	2/24/2011 9:35	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	402.17	9.68	107.75	8.43
1076	2/24/2011 9:39	SOIL	240.35	ppm	Final	PREC SAMP (452 27F)	390.73	9.54	111.84	8.36
1077	2/24/2011 9:43	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	396.29	9.61	107.7	8.38
1078	2/24/2011 9:47	SOIL	240.18	ppm	Final	PREC SAMP (452 27F)	396.38	9.62	111.24	8.41
1079	2/24/2011 9:51	SOIL	240.06	ppm	Final	PREC SAMP (452 27F)	395.17	9.59	106.44	8.35
1080	2/24/2011 9:55	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	398.99	9.65	110.37	8.43
1081	2/24/2011 9:59	SOIL	240.3	ppm	Final	PREC SAMP (452 27F)	391.78	9.54	109.4	8.34
1082	2/24/2011 10:06	SOIL	240	ppm	Final	13 BY 47	319.86	8.9	75.18	7.62
1083	2/24/2011 10:10	SOIL	240	ppm	Final	13 BY 48	518.29	11.08	128.36	9.64
1084	2/24/2011 10:15	SOIL	240	ppm	Final	603 BY 01	36.91	4.83	11.26	3.79
1085	2/24/2011 10:19	SOIL	240	ppm	Final	603 BY 02	136.45	6.51	36.8	5.45
1086	2/24/2011 10:24	SOIL	240	ppm	Final	603 BY 03	28.19	4.81	12.4	3.79
1087	2/24/2011 10:29	SOIL	240	ppm	Final	603 BY 04	265.58	8.31	61.67	7.06
1088	2/24/2011 10:33	SOIL	240	ppm	Final	603 BY 05	36.45	4.81	13.79	3.82
1089	2/24/2011 10:38	SOIL	240	ppm	Final	603 BY 06	218.11	7.73	54.21	6.56
1090	2/24/2011 10:42	SOIL	240	ppm	Final	603 BY 07	40.49	4.92	15.68	3.94
1091	2/24/2011 10:47	SOIL	240	ppm	Final	MB 08	< LOD	6.37	< LOD	4.54
1092	2/24/2011 10:52	SOIL	240	ppm	Final	603 BY 08	249.96	8.11	54.59	6.84

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1093	2/24/2011 10:56	SOIL	240	ppm	Final	603 BY 09	37.94	4.87	13.73	3.86
1094	2/24/2011 11:00	SOIL	240	ppm	Final	603 BY 10	206.81	7.58	48.4	6.39
1095	2/24/2011 11:05	SOIL	240	ppm	Final	603 BY 11	907.81	14.15	125.54	11.88
1096	2/24/2011 11:09	SOIL	240	ppm	Final	603 BY 12	371.94	9.54	106.2	8.34
1097	2/24/2011 11:14	SOIL	240	ppm	Final	603 BY 13	222.37	7.87	54.51	6.66
1098	2/24/2011 11:19	SOIL	240	ppm	Final	603 BY 14	182.23	7.26	73.53	6.41
1099	2/24/2011 11:23	SOIL	240	ppm	Final	603 BY 15	99.76	6.02	24.79	4.93
1100	2/24/2011 11:28	SOIL	240	ppm	Final	603 BY 16	53.3	5.16	10.88	4.05
1101	2/24/2011 11:32	SOIL	240	ppm	Final	MB 07	< LOD	6.31	< LOD	4.49
1102	2/24/2011 11:37	SOIL	240	ppm	Final	GBW 7411	2683.86	26.26	189.09	21.55
1103	2/24/2011 11:41	SOIL	240	ppm	Final	NIST 2711	1127.48	15.65	93.44	12.85
1104	2/24/2011 11:46	SOIL	240	ppm	Final	NIST 2782	498.27	17.35	160.53	15.54
1105	2/24/2011 11:51	SOIL	240	ppm	Final	NIST 2702	122.83	7.28	50.48	6.28
1106	2/24/2011 11:55	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.28	< LOD	2.94
1107	2/24/2011 12:00	SOIL	240.31	ppm	Final	PREC SAMP (452 27F)	410.95	9.73	106.16	8.45
1108	2/24/2011 12:04	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	408.63	9.69	105.48	8.41
1109	2/24/2011 12:09	SOIL	240.1	ppm	Final	PREC SAMP (452 27F)	396.2	9.58	110.28	8.37
1110	2/24/2011 12:13	SOIL	240.02	ppm	Final	PREC SAMP (452 27F)	402.4	9.64	111.45	8.42
1111	2/24/2011 12:17	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	406.17	9.67	109.87	8.43
1112	2/24/2011 12:21	SOIL	240.02	ppm	Final	PREC SAMP (452 27F)	404.24	9.67	111.82	8.45
1113	2/24/2011 12:25	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	412.78	9.76	107.84	8.48
1114	2/24/2011 12:34	SOIL	240	ppm	Final	603 BY 17	300.56	8.76	82.38	7.58
1115	2/24/2011 12:39	SOIL	240	ppm	Final	603 BY 18	201.2	7.58	99.24	6.9
1116	2/24/2011 12:43	SOIL	240	ppm	Final	603 BY 19	32.44	4.78	12.02	3.77
1117	2/24/2011 12:47	SOIL	240	ppm	Final	603 BY 20	235.87	8	84.93	7.06
1118	2/24/2011 12:52	SOIL	240	ppm	Final	603 BY 21	47.04	5.1	22.16	4.19
1119	2/24/2011 12:56	SOIL	240	ppm	Final	603 BY 22	215.65	7.81	94.31	7.03
1120	2/24/2011 13:02	SOIL	240	ppm	Final	603 BY 23	31.49	4.75	13.69	3.77
1121	2/24/2011 13:06	SOIL	240	ppm	Final	603 BY 24	347.3	9.38	117.29	8.33
1122	2/24/2011 13:11	SOIL	240	ppm	Final	603 BY 25	35.54	4.85	11.52	3.81
1123	2/24/2011 13:15	SOIL	240	ppm	Final	MB 09	< LOD	6.26	< LOD	4.5
1124	2/24/2011 13:20	SOIL	240	ppm	Final	603 BY 26	185.08	7.38	118.62	6.96
1125	2/24/2011 13:24	SOIL	240	ppm	Final	603 BY 27	38.34	4.87	11.37	3.82
1126	2/24/2011 13:29	SOIL	240	ppm	Final	603 BY 28	253.42	8.31	60.45	7.06
1127	2/24/2011 13:33	SOIL	240	ppm	Final	603 BY 29	35.39	4.84	14.22	3.84
1128	2/24/2011 13:38	SOIL	240	ppm	Final	603 BY 30	155.76	6.97	44.42	5.89
1129	2/24/2011 13:43	SOIL	240	ppm	Final	603 BY 31	35.71	4.84	16.52	3.88
1130	2/24/2011 13:47	SOIL	240	ppm	Final	603 BY 32	141.05	6.7	68.08	5.96
1131	2/24/2011 13:52	SOIL	240	ppm	Final	603 BY 33	219.54	7.81	51.62	6.6
1132	2/24/2011 13:56	SOIL	240	ppm	Final	603 BY 34	241.33	8.11	74.71	7.05
1133	2/24/2011 14:01	SOIL	240	ppm	Final	MB 10	< LOD	6.31	< LOD	4.45
1134	2/24/2011 14:05	SOIL	240	ppm	Final	GBW 7411	2693.84	26.36	213.59	21.72
1135	2/24/2011 14:10	SOIL	240	ppm	Final	NIST 2711	1127.92	15.62	91.5	12.82
1136	2/24/2011 14:20	SOIL	240	ppm	Final	NIST 2782	492.2	17.2	166.44	15.5
1137	2/24/2011 14:37	SOIL	240	ppm	Final	NIST 2702	124.26	7.31	47.82	6.27
1138	2/24/2011 14:43	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.25	< LOD	2.97
1139	2/24/2011 14:47	SOIL	240.11	ppm	Final	PREC SAMP (452 27F)	404.58	9.7	105.21	8.43
1140	2/24/2011 14:51	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	404.18	9.68	104.2	8.41
1141	2/24/2011 14:55	SOIL	240.2	ppm	Final	PREC SAMP (452 27F)	393.86	9.56	106.86	8.34
1142	2/24/2011 14:59	SOIL	240.09	ppm	Final	PREC SAMP (452 27F)	410.71	9.72	99.21	8.39
1143	2/24/2011 15:03	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	391.92	9.55	112.65	8.37
1144	2/24/2011 15:07	SOIL	240.31	ppm	Final	PREC SAMP (452 27F)	393.42	9.54	112.57	8.36
1145	2/24/2011 15:11	SOIL	240.17	ppm	Final	PREC SAMP (452 27F)	389.74	9.55	110.59	8.36
1146	2/24/2011 15:19	SOIL	240	ppm	Final	603 BY 35	166.32	7.2	30.98	5.92
1147	2/24/2011 15:24	SOIL	240	ppm	Final	603 BY 36	252.53	8.27	60.37	7.03
1148	2/24/2011 15:29	SOIL	240	ppm	Final	603 BY 37	372.53	9.63	94.2	8.32
1149	2/24/2011 15:34	SOIL	240	ppm	Final	603 BY 38	130.88	6.52	51.29	5.63
1150	2/24/2011 15:39	SOIL	240	ppm	Final	603 BY 39	519.71	11.15	83.28	9.37
1151	2/24/2011 15:46	SOIL	240	ppm	Final	603 BY 40	352.53	9.41	72.51	7.98
1152	2/24/2011 15:51	SOIL	240	ppm	Final	603 BY 41	276.72	8.63	52.88	7.23
1153	2/24/2011 16:00	SOIL	240	ppm	Final	603 BY 42	422.26	10.15	79.75	8.59
1154	2/24/2011 16:04	SOIL	240	ppm	Final	603 BY 43	238.38	8.04	56.61	6.81

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1155	2/24/2011 16:09	SOIL	240	ppm	Final	MB 11	< LOD		6.34 < LOD	4.41
1156	2/24/2011 16:13	SOIL	240	ppm	Final	603 BY 44	254.77		8.3 63.42	7.08
1157	2/24/2011 16:18	SOIL	240	ppm	Final	603 BY 45	177.26		7.28 51.72	6.21
1158	2/24/2011 16:22	SOIL	240	ppm	Final	603 BY 46	267.69		8.45 57.29	7.13
1159	2/24/2011 16:26	SOIL	240	ppm	Final	1197 TPA 01	430.17		10.32 64.69	8.61
1160	2/24/2011 16:31	SOIL	240	ppm	Final	1197 TPA 02	363.97		9.61 71.72	8.14
1161	2/24/2011 16:36	SOIL	240	ppm	Final	1197 TPA 03	408.69		10.14 92.99	8.71
1162	2/24/2011 16:41	SOIL	240	ppm	Final	1197 TPA 04	521.58		11.13 141.92	9.77
1163	2/24/2011 16:45	SOIL	240	ppm	Final	1197 TPA 05	414.43		10.17 75.73	8.59
1164	2/24/2011 16:50	SOIL	240	ppm	Final	MB 12	< LOD		6.37 < LOD	4.46
1165	2/24/2011 16:54	SOIL	240	ppm	Final	GBW 7411	2700.81		26.47 192.65	21.73
1166	2/24/2011 16:58	SOIL	240	ppm	Final	NIST 2711	1124.14		15.68 110.16	12.96
1167	2/24/2011 17:03	SOIL	240	ppm	Final	NIST 2782	503.72		17.42 153.13	15.52
1168	2/24/2011 17:08	SOIL	240	ppm	Final	NIST 2702	121.67		7.26 43.15	6.16
1169	2/24/2011 17:13	SOIL	240	ppm	Final	SiO2 BLK	< LOD		4.29 < LOD	2.97
1170	2/24/2011 17:18	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	397.31		9.61 104.68	8.35
1171	2/24/2011 17:22	SOIL	240.01	ppm	Final	PREC SAMP (452 27F)	402.28		9.64 101.19	8.34
1172	2/24/2011 17:26	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	397.71		9.63 107.51	8.39
1173	2/24/2011 17:30	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	398.05		9.6 108.16	8.37
1174	2/24/2011 17:34	SOIL	240	ppm	Final	PREC SAMP (452 27F)	391.11		9.54 108.73	8.33
1175	2/24/2011 17:38	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	397.96		9.6 103.52	8.34
1176	2/24/2011 17:42	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	400.13		9.64 104.1	8.37
1177	3/3/2011 8:34	SHUTTER_CAL	57.95	cps	Final					
1178	3/3/2011 8:39	SOIL	240	ppm	Final	GBW 7411	2648.09		26.14 213.03	21.55
1179	3/3/2011 8:45	SOIL	240	ppm	Final	NIST 2711	1115.84		15.65 93.59	12.85
1180	3/3/2011 8:49	SOIL	240	ppm	Final	NIST 2782	514.93		17.64 150.52	15.67
1181	3/3/2011 8:54	SOIL	240	ppm	Final	NIST 2702	118		7.19 43.9	6.13
1182	3/3/2011 8:59	SOIL	240	ppm	Final	SiO2 BLK	400.86		9.6 99.23	8.31
1183	3/3/2011 9:07	SOIL	240	ppm	Final	SiO2 BLK	< LOD		4.34 < LOD	2.93
1184	3/3/2011 9:12	SOIL	240	ppm	Final	PREC SAMP (452 27F)	403.92		9.64 106.95	8.39
1185	3/3/2011 9:16	SOIL	240.31	ppm	Final	PREC SAMP (452 27F)	409.45		9.68 106.45	8.41
1186	3/3/2011 9:20	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	404.94		9.65 110.12	8.42
1187	3/3/2011 9:24	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	407.26		9.65 103.42	8.37
1188	3/3/2011 9:28	SOIL	240.15	ppm	Final	PREC SAMP (452 27F)	406.22		9.66 105.29	8.39
1189	3/3/2011 9:33	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	407.36		9.67 108.89	8.42
1190	3/3/2011 9:37	SOIL	240.06	ppm	Final	PREC SAMP (452 27F)	400.9		9.6 112.42	8.4
1191	3/3/2011 10:19	SOIL	240	ppm	Final	1197 BY 01	348.32		9.52 73.89	8.09
1192	3/3/2011 10:24	SOIL	240	ppm	Final	1197 BY 02	312.14		9.01 68.4	7.66
1193	3/3/2011 10:30	SOIL	240	ppm	Final	1197 BY 03	251.26		8.45 33.96	6.92
1194	3/3/2011 10:35	SOIL	240	ppm	Final	1197 BY 04	302.57		8.87 67.79	7.55
1195	3/3/2011 10:39	SOIL	240	ppm	Final	1197 BY 05	268.19		8.49 32.88	6.93
1196	3/3/2011 10:46	SOIL	240	ppm	Final	1197 BY 06	478.77		10.64 119.8	9.25
1197	3/3/2011 10:51	SOIL	240	ppm	Final	1197 BY 07	346.1		9.24 86.67	7.97
1198	3/3/2011 10:55	SOIL	240	ppm	Final	1197 BY 08	426.39		10.24 60.45	8.52
1199	3/3/2011 11:00	SOIL	240	ppm	Final	1197 BY 09	285.91		8.85 67.73	7.55
1200	3/3/2011 11:04	SOIL	240	ppm	Final	MB 13	< LOD		6.57 < LOD	4.57
1201	3/3/2011 11:09	SOIL	240	ppm	Final	1197 BY 10	391.41		9.84 70.07	8.28
1202	3/3/2011 11:16	SOIL	240	ppm	Final	1197 BY 11	343.71		9.37 54.24	7.81
1203	3/3/2011 11:21	SOIL	240	ppm	Final	1197 BY 12	445.12		10.27 70.4	8.6
1204	3/3/2011 11:25	SOIL	240	ppm	Final	1197 BY 13	338.58		9.37 35.4	7.65
1205	3/3/2011 11:30	SOIL	240	ppm	Final	1197 BY 14	375.74		9.61 57.48	8
1206	3/3/2011 11:34	SOIL	240	ppm	Final	1197 BY 15	269.03		8.29 38.13	6.81
1207	3/3/2011 11:39	SOIL	240	ppm	Final	1197 BY 16	236.23		7.99 38.28	6.61
1208	3/3/2011 11:43	SOIL	240	ppm	Final	1197 BY 17	448.44		10.42 35.27	8.45
1209	3/3/2011 11:48	SOIL	240	ppm	Final	1197 BY 18	448.94		10.33 57.93	8.55
1210	3/3/2011 11:52	SOIL	240	ppm	Final	MB 14	< LOD		6.49 < LOD	4.67
1211	3/3/2011 11:57	SOIL	240	ppm	Final	GBW 7411	2689.03		26.29 190.72	21.58
1212	3/3/2011 12:02	SOIL	240	ppm	Final	NIST 2711	1130.17		15.69 100.41	12.92
1213	3/3/2011 12:07	SOIL	240	ppm	Final	NIST 2782	490.46		17.22 155.33	15.41
1214	3/3/2011 12:11	SOIL	240	ppm	Final	NIST 2702	131.1		7.44 43.15	6.31
1215	3/3/2011 12:16	SOIL	240	ppm	Final	SiO2 BLK	< LOD		4.33 < LOD	2.94
1216	3/3/2011 12:21	SOIL	240.23	ppm	Final	PREC SAMP (452 27F)	400.87		9.6 101.89	8.32

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1217	3/3/2011 12:25	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	402.02	9.61	106.56	8.36
1218	3/3/2011 12:29	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	395.06	9.58	117.17	8.42
1219	3/3/2011 12:33	SOIL	240.3	ppm	Final	PREC SAMP (452 27F)	396.62	9.56	108.61	8.34
1220	3/3/2011 12:37	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	402.24	9.62	101.87	8.33
1221	3/3/2011 12:41	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	404.95	9.67	107.95	8.42
1222	3/3/2011 12:44	SOIL	175.15	ppm	Final	PREC SAMP (452 27F)	396.45	11.23	104.47	9.77
1223	3/3/2011 12:48	SOIL	240	ppm	Final	PREC SAMP (452 27F)	399.69	9.62	105.75	8.37
1233	3/3/2011 13:42	SOIL	240	ppm	Final	MB 16	< LOD	6.51	< LOD	4.62
1243	3/3/2011 14:32	SOIL	240	ppm	Final	MB 16	< LOD	6.51	< LOD	4.61
1244	3/3/2011 14:37	SOIL	240	ppm	Final	GBW 7411	2697.67	26.38	192.26	21.65
1245	3/3/2011 14:41	SOIL	240	ppm	Final	NIST 2711	1137.98	15.71	84.01	12.84
1246	3/3/2011 14:46	SOIL	240	ppm	Final	NIST 2782	502.63	17.42	159.97	15.6
1247	3/3/2011 14:51	SOIL	240	ppm	Final	NIST 2702	121.71	7.27	43.46	6.18
1255	3/16/2011 9:25	SHUTTER_CAL	55.89	cps	Final					
1256	3/16/2011 9:31	SOIL	240	ppm	Final	GBW 7411	2662	26.21	204.16	21.56
1257	3/16/2011 9:36	SOIL	240	ppm	Final	NIST 2711	1119.1	15.63	92.74	12.83
1258	3/16/2011 9:41	SOIL	240	ppm	Final	NIST 2782	498.31	17.32	156.52	15.49
1259	3/16/2011 9:58	SOIL	240	ppm	Final	NIST 2702	125.04	7.3	39.94	6.15
1260	3/16/2011 10:04	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.34	< LOD	3
1261	3/16/2011 10:10	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	404.49	9.67	108.14	8.42
1262	3/16/2011 10:14	SOIL	240.06	ppm	Final	PREC SAMP (452 27F)	399.88	9.62	108.21	8.39
1263	3/16/2011 10:18	SOIL	240.09	ppm	Final	PREC SAMP (452 27F)	411.37	9.73	101.19	8.42
1264	3/16/2011 10:22	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	404.84	9.67	102.49	8.38
1265	3/16/2011 10:26	SOIL	240.3	ppm	Final	PREC SAMP (452 27F)	401.81	9.62	109.03	8.39
1266	3/16/2011 10:30	SOIL	240.2	ppm	Final	PREC SAMP (452 27F)	395.97	9.57	109.51	8.36
1267	3/16/2011 10:34	SOIL	240.2	ppm	Final	PREC SAMP (452 27F)	397.94	9.59	109.41	8.37
1268	3/16/2011 13:00	SOIL	240	ppm	Final	1197 BY 19	444.91	10.51	38.04	8.55
1269	3/16/2011 13:17	SOIL	240	ppm	Final	1197 BY 20	415.12	10.25	68.99	8.6
1270	3/16/2011 13:22	SOIL	240	ppm	Final	1197 BY 21	340.12	9.14	24.08	7.36
1271	3/16/2011 13:27	SOIL	240	ppm	Final	1197 BY 22	472.37	10.81	39.2	8.8
1272	3/16/2011 13:31	SOIL	240	ppm	Final	1197 BY 23	438.83	10.36	34.67	8.4
1273	3/16/2011 13:35	SOIL	240	ppm	Final	1197 BY 24	465.81	10.64	45.36	8.71
1274	3/16/2011 13:40	SOIL	240	ppm	Final	1197 BY 25	508.95	10.99	44.34	8.96
1275	3/16/2011 13:44	SOIL	240	ppm	Final	1197 BY 26	365.54	9.33	31.2	7.57
1276	3/16/2011 13:48	SOIL	240	ppm	Final	1197 BY 27	558.01	11.47	56.49	9.42
1277	3/16/2011 13:53	SOIL	240	ppm	Final	MB 15	< LOD	6.4	< LOD	4.56
1278	3/16/2011 13:58	SOIL	240	ppm	Final	1197 BY 28	701.21	12.64	24	10.12
1279	3/16/2011 14:02	SOIL	240	ppm	Final	1197 BY 29	880.8	14.27	47.94	11.55
1280	3/16/2011 14:07	SOIL	240	ppm	Final	1197 BY 30	794.03	13.52	47.7	10.96
1281	3/16/2011 14:12	SOIL	240	ppm	Final	1197 BY 31	483.31	10.86	42.04	8.85
1282	3/16/2011 14:16	SOIL	240	ppm	Final	1197 BY 32	713.05	12.88	32.65	10.36
1283	3/16/2011 14:21	SOIL	240	ppm	Final	1197 BY 33	493.47	10.84	52.38	8.91
1284	3/16/2011 14:25	SOIL	240	ppm	Final	1197 BY 34	505.91	10.98	42.7	8.95
1285	3/16/2011 14:29	SOIL	240	ppm	Final	1197 BY 35	421.32	10.18	41.44	8.31
1286	3/16/2011 14:34	SOIL	240	ppm	Final	1197 BY 36	318.22	9.21	30.51	7.48
1287	3/16/2011 14:39	SOIL	240	ppm	Final	MB 16	< LOD	6.56	< LOD	4.5
1288	3/16/2011 14:44	SOIL	240	ppm	Final	GBW 7411	2658.05	26.22	229.16	21.67
1289	3/16/2011 14:48	SOIL	240	ppm	Final	NIST 2711	1130.97	15.67	95.84	12.88
1290	3/16/2011 14:54	SOIL	240	ppm	Final	NIST 2782	514.72	17.52	137.82	15.43
1291	3/16/2011 14:58	SOIL	240	ppm	Final	NIST 2702	120.24	7.24	45.91	6.19
1292	3/16/2011 15:03	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.33	< LOD	2.98
1293	3/16/2011 15:08	SOIL	240.11	ppm	Final	PREC SAMP (452 27F)	394.91	9.56	114.85	8.39
1294	3/16/2011 15:12	SOIL	240.15	ppm	Final	PREC SAMP (452 27F)	392.63	9.54	118.7	8.4
1295	3/16/2011 15:16	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	399.17	9.61	117.35	8.45
1296	3/16/2011 15:20	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	401.89	9.63	111.08	8.42
1297	3/16/2011 15:24	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	404.73	9.65	110.92	8.43
1298	3/16/2011 15:28	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	401.25	9.6	111.49	8.4
1299	3/16/2011 15:32	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	398.27	9.6	111.77	8.39
1300	3/17/2011 9:00	SHUTTER_CAL	57.91	cps	Final					
1301	3/17/2011 9:04	SOIL	240	ppm	Final	GBW 7411	2665.87	26.31	193.75	21.6
1302	3/17/2011 9:09	SOIL	240	ppm	Final	NIST 2711	1112.16	15.6	95.65	12.82
1303	3/17/2011 9:14	SOIL	240	ppm	Final	NIST 2782	498.99	17.37	149.74	15.46

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1304	3/17/2011 9:18	SOIL		240 ppm	Final	NIST 2702	117.45	7.17	47.49	6.16
1305	3/17/2011 9:23	SOIL		240 ppm	Final	SiO2 BLK	< LOD	4.27	< LOD	2.94
1306	3/17/2011 9:28	SOIL		240.06 ppm	Final	PREC SAMP (452 27F)	404.27	9.66	101.11	8.36
1307	3/17/2011 9:32	SOIL		240.12 ppm	Final	PREC SAMP (452 27F)	403.16	9.65	104.31	8.38
1308	3/17/2011 9:36	SOIL		240.3 ppm	Final	PREC SAMP (452 27F)	403.24	9.63	109.23	8.4
1309	3/17/2011 9:40	SOIL		240.04 ppm	Final	PREC SAMP (452 27F)	405.05	9.69	109.8	8.45
1310	3/17/2011 9:44	SOIL		240.05 ppm	Final	PREC SAMP (452 27F)	401.07	9.65	114.3	8.45
1311	3/17/2011 9:48	SOIL		240.05 ppm	Final	PREC SAMP (452 27F)	408.3	9.72	106.8	8.45
1312	3/17/2011 9:52	SOIL		240.22 ppm	Final	PREC SAMP (452 27F)	408.7	9.72	101.32	8.41
1313	3/17/2011 9:58	SOIL		240 ppm	Final	1197 BY 37	388.2	9.91	40.77	8.1
1314	3/17/2011 10:02	SOIL		240 ppm	Final	1197 BY 38	321.47	9.38	39.31	7.7
1315	3/17/2011 10:17	SOIL		240 ppm	Final	1197 BY 39	386.36	9.88	38.67	8.06
1316	3/17/2011 10:22	SOIL		240 ppm	Final	485 TPA	139.6	6.71	59.15	5.87
1317	3/17/2011 10:32	SOIL		240 ppm	Final	485 GA	26.54	4.44	8.97	3.44
1318	3/17/2011 10:38	SOIL		240 ppm	Final	485 FY 3 SUB	105.69	6.23	27.87	5.14
1319	3/17/2011 10:43	SOIL		240 ppm	Final	485 FY COMP	92.83	5.85	26.9	4.83
1320	3/17/2011 10:47	SOIL		240 ppm	Final	485 BY COMP	100.45	6.02	28.79	4.98
1321	3/17/2011 10:51	SOIL		240 ppm	Final	485 BY 5 SUB	90.34	5.93	29.36	4.92
1322	3/17/2011 10:56	SOIL		240 ppm	Final	MB 17	< LOD	6.48	< LOD	4.55
1323	3/17/2011 11:01	SOIL		240 ppm	Final	525 BY 01	176.7	7.25	56.32	6.24
1324	3/17/2011 11:05	SOIL		240 ppm	Final	525 BY 02	286.82	8.71	71.82	7.46
1325	3/17/2011 11:10	SOIL		240 ppm	Final	525 BY 03	214.33	7.81	58.96	6.68
1326	3/17/2011 11:14	SOIL		240 ppm	Final	525 BY 04	238.81	8.14	61.09	6.94
1327	3/17/2011 11:18	SOIL		240 ppm	Final	525 BY 05	254.07	8.21	88.51	7.24
1328	3/17/2011 11:23	SOIL		240 ppm	Final	525 BY 06	278.8	8.67	75.88	7.48
1329	3/17/2011 11:28	SOIL		240 ppm	Final	525 BY 07	396.82	10.17	95.8	8.77
1330	3/17/2011 11:32	SOIL		240 ppm	Final	525 BY 08	357.68	9.48	86.78	8.15
1331	3/17/2011 11:37	SOIL		240 ppm	Final	525 BY 09	235.86	8.07	59.42	6.87
1332	3/17/2011 11:41	SOIL		240 ppm	Final	MB 18	< LOD	6.42	< LOD	4.57
1333	3/17/2011 11:46	SOIL		240 ppm	Final	GBW 7411	2702.2	26.49	195.5	21.75
1334	3/17/2011 11:51	SOIL		240 ppm	Final	NIST 2711	1133.97	15.7	99.77	12.92
1335	3/17/2011 11:56	SOIL		240 ppm	Final	NIST 2782	513.04	17.5	151.49	15.55
1336	3/17/2011 12:00	SOIL		240 ppm	Final	NIST 2702	118.94	7.19	49.6	6.19
1337	3/17/2011 12:05	SOIL		240 ppm	Final	SiO2 BLK	< LOD	4.36	< LOD	2.97
1338	3/17/2011 12:10	SOIL		240 ppm	Final	PREC SAMP (452 27F)	393.88	9.54	112.28	8.35
1339	3/17/2011 12:14	SOIL		240.21 ppm	Final	PREC SAMP (452 27F)	400.26	9.6	108.85	8.38
1340	3/17/2011 12:18	SOIL		240.13 ppm	Final	PREC SAMP (452 27F)	394.61	9.56	114.2	8.39
1341	3/17/2011 12:22	SOIL		240.27 ppm	Final	PREC SAMP (452 27F)	396.32	9.56	117.18	8.41
1342	3/17/2011 12:26	SOIL		240.27 ppm	Final	PREC SAMP (452 27F)	396.17	9.59	113.61	8.41
1343	3/17/2011 12:30	SOIL		240.03 ppm	Final	PREC SAMP (452 27F)	396.84	9.6	108.1	8.36
1344	3/17/2011 12:34	SOIL		240.08 ppm	Final	PREC SAMP (452 27F)	404.94	9.67	107.49	8.41
1345	3/17/2011 12:38	SOIL		240.04 ppm	Final	PREC SAMP (452 27F)	407.14	9.68	108.15	8.43
1346	3/17/2011 12:43	SOIL		240 ppm	Final	525 BY 10	280.63	8.68	84.92	7.56
1347	3/17/2011 12:47	SOIL		240 ppm	Final	525 BY 11	275.34	8.56	71.19	7.35
1348	3/17/2011 12:52	SOIL		240 ppm	Final	525 BY 12	289.86	8.67	75.03	7.45
1349	3/17/2011 12:57	SOIL		240 ppm	Final	525 BY 13	285.65	8.72	80.09	7.54
1350	3/17/2011 13:01	SOIL		240 ppm	Final	525 BY 14	274.58	8.58	92.19	7.56
1351	3/17/2011 13:06	SOIL		240 ppm	Final	525 BY 15	292.48	8.72	79.04	7.53
1352	3/17/2011 13:11	SOIL		240 ppm	Final	525 BY 16	311.82	8.92	73.22	7.62
1353	3/17/2011 13:16	SOIL		240 ppm	Final	525 BY 17	323.34	9.12	88.06	7.9
1354	3/17/2011 13:21	SOIL		240 ppm	Final	525 BY 18	348.89	9.36	98.52	8.16
1355	3/17/2011 13:25	SOIL		233 ppm	Final	525 BY 19	< LOD	6.58	< LOD	4.58
1356	3/17/2011 13:30	SOIL		240 ppm	Final	MB 19	< LOD	6.46	< LOD	4.52
1357	3/17/2011 13:35	SOIL		240 ppm	Final	525 BY 19	320.37	9.09	97.52	7.96
1358	3/17/2011 13:40	SOIL		240 ppm	Final	525 BY 20	294.13	8.77	86.52	7.63
1359	3/17/2011 13:45	SOIL		240 ppm	Final	525 BY 21	394.15	9.8	113.53	8.59
1360	3/17/2011 13:50	SOIL		240 ppm	Final	525 BY 22	352.01	9.42	94.52	8.18
1361	3/17/2011 13:54	SOIL		240 ppm	Final	525 BY 23	172.65	7.2	55.15	6.19
1362	3/17/2011 13:59	SOIL		240 ppm	Final	525 BY 24	337.55	9.26	93.75	8.05
1363	3/17/2011 14:03	SOIL		240 ppm	Final	525 BY 25	294.55	8.76	80.91	7.58
1364	3/17/2011 14:07	SOIL		240 ppm	Final	525 BY 26	321.91	9.1	97.14	7.97
1365	3/17/2011 14:12	SOIL		240 ppm	Final	525 BY 27	311.04	8.92	81.83	7.7

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1366	3/17/2011 14:16	SOIL	240	ppm	Final	MB 20	< LOD		6.4 < LOD	4.6
1367	3/17/2011 14:21	SOIL	240	ppm	Final	GBW 7411	2651.85	26.11	208.91	21.5
1368	3/17/2011 14:26	SOIL	240	ppm	Final	NIST 2711	1127.06	15.63	101.07	12.88
1369	3/17/2011 14:30	SOIL	240	ppm	Final	NIST 2782	503.56	17.42	148.22	15.47
1370	3/17/2011 14:35	SOIL	240	ppm	Final	NIST 2702	117.96	7.2	44.99	6.15
1371	3/17/2011 14:40	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.28 < LOD		2.91
1372	3/17/2011 14:44	SOIL	240.18	ppm	Final	PREC SAMP (452 27F)	395.28	9.59	111.88	8.39
1373	3/17/2011 14:48	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	407.59	9.71	105.16	8.43
1374	3/17/2011 14:52	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	402.47	9.69	109.44	8.45
1375	3/17/2011 14:57	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	395.24	9.62	115.08	8.44
1376	3/17/2011 15:01	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	403.36	9.67	108.11	8.42
1377	3/17/2011 15:05	SOIL	240.02	ppm	Final	PREC SAMP (452 27F)	401.53	9.67	108.83	8.43
1378	3/17/2011 15:09	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	397.58	9.61	108.96	8.38
1379	3/18/2011 8:50	SHUTTER_CAL	58.04	cps	Final					
1380	3/18/2011 8:55	SOIL	240	ppm	Final	GBW 7411	2642.77	26.23	221.63	21.65
1381	3/18/2011 9:01	SOIL	240	ppm	Final	NIST 2711	1119.59	15.64	89.04	12.82
1382	3/18/2011 9:07	SOIL	240	ppm	Final	NIST 2782	497.24	17.39	161.25	15.6
1383	3/18/2011 9:12	SOIL	240	ppm	Final	NIST 2702	118.26	7.21	47.53	6.18
1384	3/18/2011 9:16	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.28 < LOD		2.95
1385	3/18/2011 9:21	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	397.41	9.6	106.79	8.36
1386	3/18/2011 9:25	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	397.89	9.62	101.91	8.34
1387	3/18/2011 9:29	SOIL	240.02	ppm	Final	PREC SAMP (452 27F)	398.97	9.65	109.9	8.43
1388	3/18/2011 9:33	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	396.38	9.62	105.75	8.37
1389	3/18/2011 9:37	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	396.71	9.63	107.12	8.38
1390	3/18/2011 9:41	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	399.98	9.66	109.54	8.43
1391	3/18/2011 9:45	SOIL	240.28	ppm	Final	PREC SAMP (452 27F)	392.09	9.57	106.2	8.33
1392	3/18/2011 9:51	SOIL	240	ppm	Final	525 BY 28	353.53	9.43	82.82	8.08
1393	3/18/2011 9:56	SOIL	240	ppm	Final	644 BY 01	1109.08	15.98	52.72	12.91
1394	3/18/2011 10:01	SOIL	240	ppm	Final	644 BY 02	911.34	14.33	108.15	11.93
1395	3/18/2011 10:06	SOIL	240	ppm	Final	644 BY 03	381.8	9.72	67.65	8.18
1396	3/18/2011 10:11	SOIL	240	ppm	Final	644 BY 04	197.85	7.46	51	6.32
1397	3/18/2011 10:23	SOIL	240	ppm	Final	644 BY 05	179.98	7.23	33.65	5.96
1398	3/18/2011 10:28	SOIL	240	ppm	Final	644 BY 06	177.08	7.23	31.7	5.94
1399	3/18/2011 10:33	SOIL	240	ppm	Final	644 BY 07	364.55	9.59	45.29	7.89
1400	3/18/2011 10:37	SOIL	240	ppm	Final	644 BY 08	149.52	6.89	21.3	5.55
1401	3/18/2011 10:42	SOIL	240	ppm	Final	MB 21	< LOD	6.51 < LOD		4.55
1402	3/18/2011 10:47	SOIL	240	ppm	Final	644 BY 09	460.24	10.59	28.35	8.53
1403	3/18/2011 10:51	SOIL	240	ppm	Final	644 BY 10	136.44	6.7	27.05	5.47
1404	3/18/2011 12:03	SOIL	240	ppm	Final	644 BY 11	74.49	5.46	16.31	4.37
1405	3/18/2011 12:07	SOIL	240	ppm	Final	644 BY 12	178.65	7.12	20.94	5.73
1406	3/18/2011 12:12	SOIL	240	ppm	Final	644 BY 13	734.87	13.06	25.24	10.46
1407	3/18/2011 12:17	SOIL	240	ppm	Final	644 BY 14	144.2	6.66	21.92	5.38
1408	3/18/2011 12:21	SOIL	240	ppm	Final	644 BY 15	899.87	14.34	41.99	11.56
1409	3/18/2011 12:26	SOIL	240	ppm	Final	644 BY 16	382.72	9.63	21.11	7.72
1410	3/18/2011 12:31	SOIL	240	ppm	Final	MB 22	< LOD	6.34 < LOD		4.62
1411	3/18/2011 12:35	SOIL	240	ppm	Final	GBW 7411	2643.91	26.09	206.33	21.48
1412	3/18/2011 12:40	SOIL	240	ppm	Final	NIST 2711	1136.37	15.72	89.36	12.88
1413	3/18/2011 12:45	SOIL	240	ppm	Final	NIST 2782	513.44	17.56	159.25	15.69
1414	3/18/2011 12:49	SOIL	240	ppm	Final	NIST 2702	120.35	7.25	50.22	6.25
1415	3/18/2011 12:54	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.29 < LOD		2.98
1416	3/18/2011 12:59	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	400.1	9.64	108.26	8.41
1417	3/18/2011 12:59	SOIL	3.64	ppm	Final	PREC SAMP (452 27F)	527.22	235.97 < LOD		285.36
1418	3/18/2011 13:03	SOIL	240.03	ppm	Final	PREC SAMP (452 27F)	409.65	9.75	108.49	8.49
1419	3/18/2011 13:07	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	399.68	9.67	111.79	8.45
1420	3/18/2011 13:11	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	404.46	9.71	99.71	8.39
1421	3/18/2011 13:15	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	405.15	9.72	109.88	8.48
1422	3/18/2011 13:19	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	409.14	9.75	100.46	8.43
1423	3/18/2011 13:23	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	402.47	9.7	111.92	8.47
1424	3/18/2011 13:27	SOIL	240.19	ppm	Final	PREC SAMP (452 27F)	401.88	9.69	111.46	8.46
1425	3/21/2011 9:40	SHUTTER_CAL	55.95	cps	Final					
1426	3/21/2011 9:45	SOIL	240	ppm	Final	GBW 7411	2649.25	26.17	204.83	21.54
1427	3/21/2011 9:50	SOIL	240	ppm	Final	NIST 2711	1115.57	15.62	109.11	12.91

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1428	3/21/2011 9:55	SOIL	240	ppm	Final	NIST 2782	489.97	17.24	162.06	15.5
1429	3/21/2011 9:59	SOIL	240	ppm	Final	NIST 2702	117.44	7.19	49.4	6.2
1430	3/21/2011 10:00	SOIL	2.09	ppm	Final	SiO2	< LOD	146.64	< LOD	78.35
1431	3/21/2011 10:04	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.38	< LOD	2.97
1432	3/21/2011 10:09	SOIL	240.11	ppm	Final	PREC SAMP (452 27F)	406.01	9.66	103.69	8.38
1433	3/21/2011 10:13	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	405.8	9.66	105.15	8.39
1434	3/21/2011 10:17	SOIL	240.09	ppm	Final	PREC SAMP (452 27F)	416.41	9.77	105.74	8.48
1435	3/21/2011 10:21	SOIL	240.04	ppm	Final	PREC SAMP (452 27F)	419.01	9.82	103.75	8.5
1436	3/21/2011 10:25	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	407.5	9.7	111.25	8.47
1437	3/21/2011 10:29	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	417.18	9.79	103.3	8.47
1438	3/21/2011 10:33	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	395.33	9.57	116.51	8.41
1439	3/21/2011 10:40	SOIL	240	ppm	Final	419 FY 01	64.84	5.4	21.47	4.41
1440	3/21/2011 10:44	SOIL	240	ppm	Final	419 FY 02	50.97	5.16	16.07	4.14
1441	3/21/2011 10:49	SOIL	240	ppm	Final	419 FY 03	41.87	4.92	10.33	3.85
1442	3/21/2011 10:53	SOIL	240	ppm	Final	419 FY 04	275.34	8.53	84.44	7.44
1443	3/21/2011 10:57	SOIL	240	ppm	Final	419 FY 05	246.49	8.22	87.61	7.25
1444	3/21/2011 11:02	SOIL	240	ppm	Final	419 FY 06	271.57	8.46	77.69	7.33
1445	3/21/2011 11:06	SOIL	240	ppm	Final	419 FY 07	274.51	8.52	82.99	7.42
1446	3/21/2011 11:11	SOIL	240	ppm	Final	419 FY 08	263.69	8.36	81.67	7.29
1447	3/21/2011 11:15	SOIL	240	ppm	Final	419 FY 09	288.53	8.66	97.15	7.65
1448	3/21/2011 11:20	SOIL	240	ppm	Final	MB 23	< LOD	6.4	< LOD	4.53
1449	3/21/2011 11:25	SOIL	240	ppm	Final	419 FY 10	270.65	8.52	79.14	7.39
1450	3/21/2011 11:29	SOIL	240	ppm	Final	419 FY 11	324.53	9.14	97.49	8
1451	3/21/2011 11:34	SOIL	240	ppm	Final	419 FY 12	314.73	9.04	98.03	7.93
1452	3/21/2011 11:38	SOIL	240	ppm	Final	419 FY 13	276.05	8.56	87.96	7.5
1453	3/21/2011 11:42	SOIL	240	ppm	Final	419 FY 14	233.35	8.12	72.58	7.05
1454	3/21/2011 11:47	SOIL	240	ppm	Final	419 FY 15	78.35	5.72	22.47	4.68
1455	3/21/2011 11:51	SOIL	240	ppm	Final	419 FY 16	203.1	7.73	71.23	6.75
1456	3/21/2011 11:56	SOIL	240	ppm	Final	419 FY 17	309.49	8.95	92.81	7.82
1457	3/21/2011 12:00	SOIL	240	ppm	Final	419 FY 18	278.41	8.57	85.28	7.48
1458	3/21/2011 12:05	SOIL	240	ppm	Final	MB 24	< LOD	6.54	< LOD	4.71
1459	3/21/2011 12:10	SOIL	240	ppm	Final	GBW 7411	2682.87	26.25	188.94	21.54
1460	3/21/2011 12:14	SOIL	240	ppm	Final	NIST 2711	1117.98	15.64	102.81	12.89
1461	3/21/2011 12:19	SOIL	240	ppm	Final	NIST 2782	502.21	17.44	154.85	15.56
1462	3/21/2011 12:24	SOIL	240	ppm	Final	NIST 2702	125.02	7.31	42.8	6.21
1463	3/21/2011 12:28	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.35	< LOD	2.96
1464	3/21/2011 12:33	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	397.44	9.61	105.63	8.35
1465	3/21/2011 12:37	SOIL	240.27	ppm	Final	PREC SAMP (452 27F)	401.55	9.66	107.61	8.41
1466	3/21/2011 12:41	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	401.78	9.66	107.99	8.41
1467	3/21/2011 12:45	SOIL	240.02	ppm	Final	PREC SAMP (452 27F)	397.42	9.63	109.81	8.4
1468	3/21/2011 12:49	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	401.8	9.68	107.69	8.43
1469	3/21/2011 12:53	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	403.83	9.69	108.89	8.45
1470	3/21/2011 12:57	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	400.52	9.66	109.15	8.43
1471	3/21/2011 13:09	SOIL	240	ppm	Final	419 FY 19	339.23	9.32	99.16	8.14
1472	3/21/2011 13:14	SOIL	240	ppm	Final	419 FY 20	313.28	8.99	92.85	7.85
1473	3/21/2011 13:18	SOIL	240	ppm	Final	419 FY 21	292.35	8.73	77.1	7.52
1474	3/21/2011 13:23	SOIL	240	ppm	Final	419 FY 22	298.25	8.83	91.59	7.72
1475	3/21/2011 13:27	SOIL	240	ppm	Final	419 FY 23	287.29	8.68	88.2	7.59
1476	3/21/2011 13:32	SOIL	240	ppm	Final	419 FY 24	363.23	9.55	102.15	8.34
1477	3/21/2011 13:37	SOIL	240	ppm	Final	419 FY 25	245.11	8.15	78.51	7.12
1478	3/21/2011 13:41	SOIL	240	ppm	Final	419 FY 26	295.7	8.75	82.17	7.58
1479	3/21/2011 13:46	SOIL	240	ppm	Final	419 FY 27	232	8	67.62	6.9
1480	3/21/2011 13:50	SOIL	240	ppm	Final	MB 25	< LOD	6.33	< LOD	4.47
1481	3/21/2011 13:55	SOIL	240	ppm	Final	419 FY 28	266.96	8.41	85.42	7.36
1482	3/21/2011 13:59	SOIL	240	ppm	Final	419 FY 29	224.42	7.94	91.33	7.09
1483	3/21/2011 14:04	SOIL	240	ppm	Final	419 FY 30	203.97	7.59	77.99	6.7
1484	3/21/2011 14:08	SOIL	240	ppm	Final	419 FY 31	232.47	7.96	68.58	6.87
1485	3/21/2011 14:13	SOIL	240	ppm	Final	419 FY 32	234.59	8.03	88.4	7.12
1486	3/21/2011 14:17	SOIL	240	ppm	Final	419 FY 33	200.47	7.63	68.73	6.65
1487	3/21/2011 14:22	SOIL	240	ppm	Final	419 FY 34	193.48	7.51	67.45	6.54
1488	3/21/2011 14:26	SOIL	240	ppm	Final	419 FY 35	194.06	7.55	72.39	6.63
1489	3/21/2011 14:31	SOIL	240	ppm	Final	419 FY 36	214.32	7.7	68.99	6.69

Reading No	Time	Type	Duration	Units	Sequence	SAMPLE	Pb	Pb Error	As	As Error
1490	3/21/2011 14:35	SOIL	240	ppm	Final	MB 26	< LOD	6.46	< LOD	4.62
1491	3/21/2011 14:39	SOIL	240	ppm	Final	GBW 7411	2688.02	26.35	209.85	21.7
1492	3/21/2011 14:44	SOIL	240	ppm	Final	NIST 2711	1127.82	15.71	107.69	12.97
1493	3/21/2011 14:49	SOIL	240	ppm	Final	NIST 2782	506.48	17.53	168.2	15.78
1494	3/21/2011 14:53	SOIL	240	ppm	Final	NIST 2702	128.58	7.39	43.41	6.27
1495	3/21/2011 14:58	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.26	< LOD	2.93
1496	3/21/2011 15:02	SOIL	240.26	ppm	Final	PREC SAMP (452 27F)	402.58	9.68	107.02	8.42
1497	3/21/2011 15:06	SOIL	240.21	ppm	Final	PREC SAMP (452 27F)	395.78	9.58	119.01	8.44
1498	3/21/2011 15:10	SOIL	240.05	ppm	Final	PREC SAMP (452 27F)	405.92	9.72	110.12	8.48
1499	3/21/2011 15:14	SOIL	240.17	ppm	Final	PREC SAMP (452 27F)	404.93	9.7	107.45	8.44
1500	3/21/2011 15:18	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	403.57	9.68	106.33	8.42
1501	3/21/2011 15:23	SOIL	240.14	ppm	Final	PREC SAMP (452 27F)	401.84	9.66	111.55	8.44
1502	3/21/2011 15:27	SOIL	240.22	ppm	Final	PREC SAMP (452 27F)	406.65	9.73	108.81	8.48
1503	3/21/2011 15:32	SOIL	240	ppm	Final	419 FY 37	206.18	7.72	77.91	6.81
1504	3/21/2011 15:37	SOIL	240	ppm	Final	419 FY 38	186.46	7.5	65.6	6.53
1505	3/21/2011 15:41	SOIL	240	ppm	Final	419 FY 39	156.33	7.03	54.2	6.06
1506	3/21/2011 15:45	SOIL	240	ppm	Final	419 FY 40	277.06	8.62	92.76	7.6
1507	3/21/2011 15:50	SOIL	240	ppm	Final	MB 27	< LOD	6.33	< LOD	4.5
1508	3/21/2011 15:54	SOIL	240	ppm	Final	GBW 7411	2662.43	26.15	198.77	21.5
1509	3/21/2011 16:00	SOIL	240	ppm	Final	NIST 2711	1114.89	15.61	99.55	12.85
1510	3/21/2011 16:05	SOIL	240	ppm	Final	NIST 2782	506.64	17.59	151.83	15.64
1511	3/21/2011 16:10	SOIL	240	ppm	Final	NIST 2702	124.03	7.3	44.28	6.21
1512	3/21/2011 16:14	SOIL	240	ppm	Final	SiO2 BLK	< LOD	4.31	< LOD	2.96
1513	3/21/2011 16:19	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	407.52	9.72	105.91	8.45
1514	3/21/2011 16:23	SOIL	240.3	ppm	Final	PREC SAMP (452 27F)	402.77	9.67	107.43	8.42
1515	3/21/2011 16:27	SOIL	240.13	ppm	Final	PREC SAMP (452 27F)	401.75	9.68	110.23	8.45
1516	3/21/2011 16:31	SOIL	240.12	ppm	Final	PREC SAMP (452 27F)	399.86	9.65	111.93	8.44
1517	3/21/2011 16:35	SOIL	240.25	ppm	Final	PREC SAMP (452 27F)	397.28	9.63	108.88	8.41
1518	3/21/2011 16:39	SOIL	240.29	ppm	Final	PREC SAMP (452 27F)	409.18	9.74	100.7	8.43
1519	3/21/2011 16:43	SOIL	240.06	ppm	Final	PREC SAMP (452 27F)	406.04	9.72	111.78	8.49



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12 July 2011

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1650 Arch Street
Philadelphia, PA 19103-2029

Subject: FMO Pesticide Site - Data Quality Report
EPA Contract No: EP-S3-10-05
Technical Direction Document Nos: WS01-10-07-006 and WS01-10-10-007
Document Control No. W0038.4B.00126

Dear Ms. Scharr:

This report provides a general review of the Weston Solutions Inc. (WESTON) x-ray fluorescence (XRF) analytical data package for the approximately 195 soil samples collected at the FMO Pesticide site in North Whitehall Township, Lehigh County, Pennsylvania, and analyzed on April 27, 2011 through May 20, 2011. The U.S. Environmental Protection Agency (EPA) asked that the samples be analyzed for lead and arsenic using the Niton Model 700 XRF instrument. Relevant results were extracted from the instrument's files, which include more than 20 metals. As part of the XRF quality assurance process, approximately 10 percent of the samples, a total of 18 samples, were sent as Case 41285, SDG MC00F1 to USEPA Region 3 Environmental Science Center of Fort Meade, Maryland, for confirmation analysis through the EPA DAS (Delivery of Analytical Services) Program. EPA validated the DAS reports so this report focuses on the review of the XRF data only.

The samples were analyzed for lead and arsenic by WESTON using the ex-situ variant of EPA SW-846 Method 6200 from "Test Methods for Evaluation Solid Waste", September 1986. The samples were prepared for analysis by drying and sieving to minimize heterogeneity.

The XRF data package was reviewed in accordance with the EPA, "Region III Modifications to National Functional Guidelines for Inorganic Data Review Multi-Media, Multi-Concentration," April 1993, to level IM1 for inorganic analysis. Those guidelines were modified, as appropriate to conform to Method 6200 and the requirements of WESTON's "Field Sampling Plan for the FMO Pesticide Site, North Whitehall Township, Lehigh County, Pennsylvania" (FSP), dated September 21, 2010.

There is a good correlation between the XRF and DAS data, as shown on the spreadsheet "Comparison XRF data.xls" and the linear regression analysis. For lead, the percent differences between the analyses averaged 7 percent with a maximum of 28.2 percent for sample 1096 PES FY 25. For arsenic, the percent differences averaged 19 percent with a maximum of 43.8 percent for sample 1096 PES FY 25. The average percent difference for both lead and arsenic met the



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project goal of less than 20% and are shown in the linear regression analysis to be very comparable to the offsite laboratory confirmation results.

The analyst followed the daily routine as established by Method 6200 and WESTON's FSP. The instrument (method) blanks contained no detectable analytes. Sample replicates and continuing calibration standards (blank, low level, intermediate level, and high level) were analyzed as required at the start of each day, after every 20 samples, and at the end of the day to verify precision and accuracy. As documented in the daily summaries reviewed for April 27, 2011 through May 20, 2011 included as "XRF daily calibration logs.zip", there were no irregularities found (all percent differences and %RSDs were less than 20% as stated in Method 6200).

No field duplicate results were analyzed.

WESTON recommends that the data be accepted and used in decision-making as if they were DAS or CLP results. No qualifications were made. Please contact me at (603) 656-5434 regarding any aspect of this report.

Very truly yours,

WESTON SOLUTIONS, INC.


Senior Technical Manager

cc: START TDD File

Enclosure: Spreadsheets with Validated Data

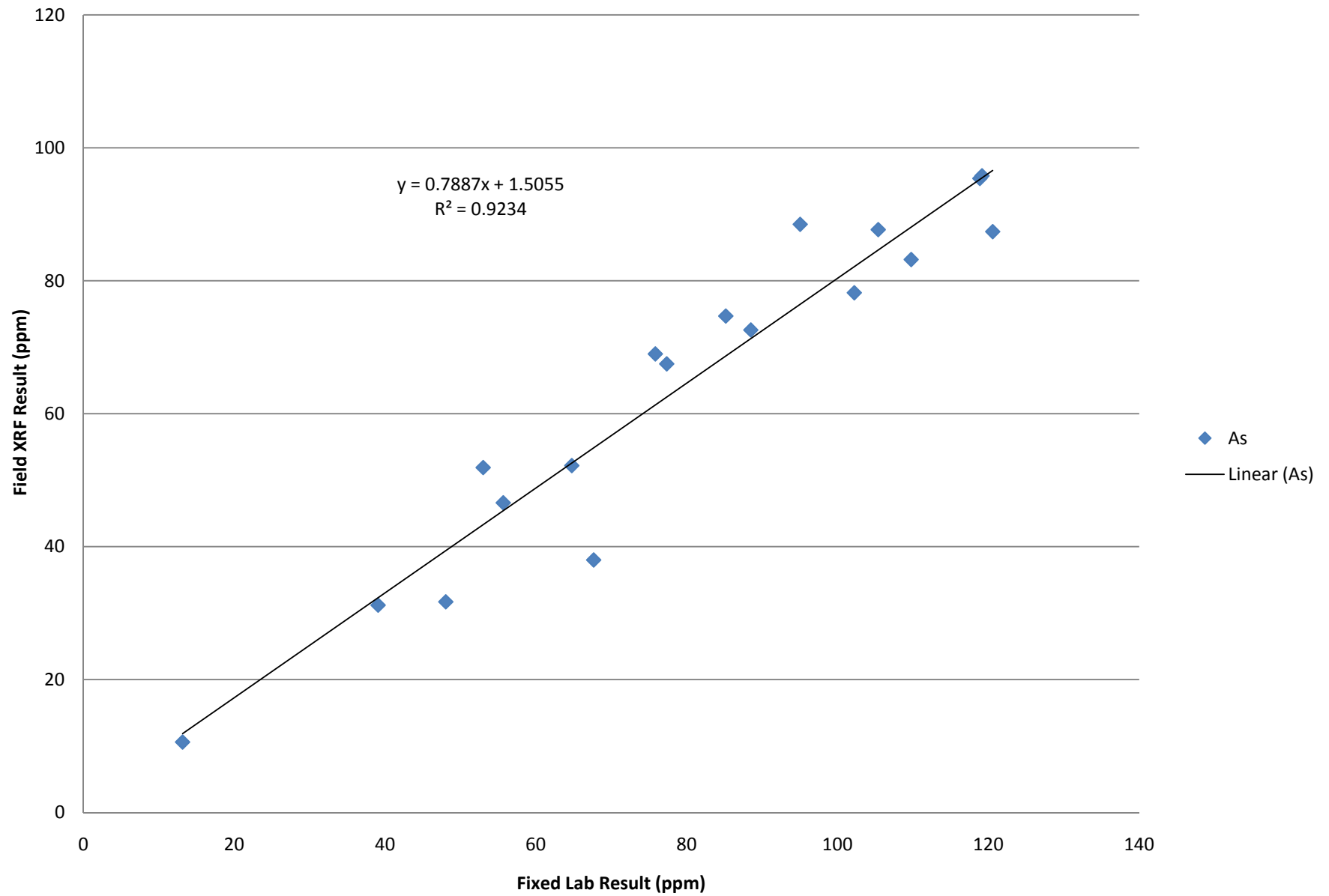
Reading No	Time	Type	Duration	Units	Sigma Value	Sequence	SAMPLE	Pb	Pb Error	As	As Error	Lab Pb	Lab As	%D Pb	%D As	
1546	4/27/2011 7:33	SHUTTER_CAL	55.92	cps		2	Final									
1547	4/27/2011 7:39	SOIL	240	ppm		2	Final	SIO2 BLK	< LOD	4.35	< LOD	2.97				
1548	4/27/2011 7:43	SOIL	240	ppm		2	Final	NIST 2702	117.91	7.15	47.01	6.12				
1549	4/27/2011 7:48	SOIL	240	ppm		2	Final	NIST 2782	506.27	17.39	146.08	15.41				
1550	4/27/2011 7:59	SOIL	240	ppm		2	Final	NIST 2711	1120.19	15.63	102.68	12.88				
1551	4/27/2011 8:10	SOIL	240	ppm		2	Final	GBW 7411	2669.93	26.08	186.95	21.4				
1552	4/27/2011 8:15	SOIL	240.06	ppm		2	Final	PREC SAMP(498 FY39)	264	8.3	86.32	7.28				
1553	4/27/2011 8:20	SOIL	240.28	ppm		2	Final	PREC SAMP(498 FY39)	265.83	8.31	90.05	7.33				
1554	4/27/2011 8:24	SOIL	240.04	ppm		2	Final	PREC SAMP(498 FY39)	268.5	8.35	85.75	7.31				
1555	4/27/2011 8:28	SOIL	240.23	ppm		2	Final	PREC SAMP(498 FY39)	264.15	8.32	84.43	7.28				
1556	4/27/2011 8:32	SOIL	240.29	ppm		2	Final	PREC SAMP(498 FY39)	267.48	8.32	87.67	7.31				
1557	4/27/2011 8:36	SOIL	240.33	ppm		2	Final	PREC SAMP(498 FY39)	264.28	8.29	86.51	7.27				
1558	4/27/2011 8:40	SOIL	240	ppm		2	Final	PREC SAMP(498 FY39)	268.22	8.35	83.21	7.29				
1559	4/27/2011 8:44	SOIL	240	ppm		2	Final	498 FY39	273.02	8.39	89.27	7.37				
1560	4/27/2011 8:46	SOIL	82.98	ppm		2	Final	498 FY40	286.81	14.86	85.18	12.93	271	74.7	5.512360099	12.3033576
1561	4/27/2011 8:50	SOIL	240	ppm		2	Final	498 FY40	282.19	8.5	89.02	7.45				
1562	4/27/2011 8:54	SOIL	240	ppm		2	Final	498 FY41	215.58	7.58	69.53	6.59				
1563	4/27/2011 8:57	SOIL	130.5	ppm		2	Final	498 FY42	273.09	11.59	104.65	10.36				
1564	4/27/2011 9:01	SOIL	240	ppm		2	Final	498 FY42	280.49	8.57	97.46	7.59				
1565	4/27/2011 11:18	SOIL	240	ppm		2	Final	498 FY43	309.83	8.82	87.51	7.67				
1566	4/27/2011 11:23	SOIL	240	ppm		2	Final	498 FY44	162.51	6.87	50.16	5.86				
1567	4/27/2011 11:28	SOIL	240	ppm		2	Final	PREC SAMP(498 FY44) DUP	152.63	6.69	48.48	5.72				
1568	4/27/2011 11:40	SOIL	240	ppm		2	Final	498 MB01	< LOD	6.43	< LOD	4.58				
1569	4/27/2011 11:45	SOIL	240	ppm		2	Final	SIO2 BLK	< LOD	4.29	< LOD	2.92				
1570	4/27/2011 11:50	SOIL	240	ppm		2	Final	NIST 2711	1117.51	15.58	98.13	12.81				
1571	4/27/2011 11:55	SOIL	240	ppm		2	Final	NIST 2782	499.51	17.27	154.65	15.43				
1572	4/27/2011 11:59	SOIL	240	ppm		2	Final	NIST 2702	119.8	7.19	46.17	6.15				
1573	4/27/2011 12:04	SOIL	240	ppm		2	Final	GBW 7411	2673.47	26.1	190.97	21.42				
1574	4/27/2011 12:09	SOIL	240.11	ppm		2	Final	PREC SAMP(498 FY44)	169.44	6.95	47.59	5.9				
1575	4/27/2011 12:13	SOIL	240.2	ppm		2	Final	PREC SAMP(498 FY44)	164.06	6.85	47.51	5.82				
1576	4/27/2011 12:17	SOIL	240.04	ppm		2	Final	PREC SAMP(498 FY44)	164.78	6.86	51.11	5.87				
1577	4/27/2011 12:21	SOIL	240.14	ppm		2	Final	PREC SAMP(498 FY44)	165.99	6.87	50.56	5.87				
1578	4/27/2011 12:25	SOIL	240.19	ppm		2	Final	PREC SAMP(498 FY44)	156.31	6.74	51.73	5.79				
1579	4/27/2011 12:29	SOIL	240.03	ppm		2	Final	PREC SAMP(498 FY44)	173.16	6.98	42.89	5.87				
1580	4/27/2011 12:33	SOIL	240.21	ppm		2	Final	PREC SAMP(498 FY44)	170.29	6.97	49.6	5.93				
1581	4/29/2011 7:14	SHUTTER_CAL	57.87	cps		2	Final									
1582	4/29/2011 7:19	SOIL	240	ppm		2	Final	GBW 7411	2671.45	26.14	193.33	21.47				
1583	4/29/2011 7:24	SOIL	240	ppm		2	Final	NIST 2711	1096.98	15.44	101.51	12.73				
1584	4/29/2011 7:30	SOIL	240	ppm		2	Final	NIST 2782	500.43	17.35	150.29	15.44				
1585	4/29/2011 7:35	SOIL	240	ppm		2	Final	NIST 2702	124.16	7.24	40.96	6.11				
1586	4/29/2011 7:40	SOIL	240	ppm		2	Final	SIO2 BLK	< LOD	4.38	< LOD	2.98				
1587	4/29/2011 7:45	SOIL	240.04	ppm		2	Final	498 FY 41	228.4	7.77	75.15	6.78				
1588	4/29/2011 7:49	SOIL	240.37	ppm		2	Final	498 FY 41	234.56	7.85	68.57	6.78				
1589	4/29/2011 7:53	SOIL	240.3	ppm		2	Final	498 FY 41	227.54	7.74	71.45	6.72				
1590	4/29/2011 7:57	SOIL	240.03	ppm		2	Final	498 FY 41	231.88	7.8	66.41	6.72				
1591	4/29/2011 8:01	SOIL	240.01	ppm		2	Final	498 FY 41	226.24	7.75	72.52	6.74				
1592	4/29/2011 8:05	SOIL	240.07	ppm		2	Final	498 FY 41	223.26	7.7	74.15	6.71				
1593	4/29/2011 8:09	SOIL	240.31	ppm		2	Final	498 FY 41	229.39	7.76	68.09	6.71				
1594	4/29/2011 8:21	SOIL	240	ppm		2	Final	459 BY 02	116.41	6.17	19.34	4.97				
1595	4/29/2011 8:26	SOIL	240	ppm		2	Final	459 BY 02a	110.14	6.11	18.35	4.91				
1596	4/29/2011 8:34	SOIL	240	ppm		2	Final	459 BY 02 DUP	115.55	6.16	15.07	4.91				
1597	4/29/2011 8:40	SOIL	240	ppm		2	Final	459 BY 03	508.69	10.94	101.99	9.34				
1598	4/29/2011 8:49	SOIL	240	ppm		2	Final	459 BY 04	265.23	8.28	58.25	7				
1599	4/29/2011 8:55	SOIL	240	ppm		2	Final	459 BY 05	609.07	11.97	126.06	10.29				
1600	4/29/2011 9:01	SOIL	240	ppm		2	Final	459 BY 05 DUP	623.31	11.92	120.68	10.19				
1601	4/29/2011 9:08	SOIL	240	ppm		2	Final	459 BY 06	205.51	7.64	49.59	6.45				
1602	4/29/2011 9:15	SOIL	240	ppm		2	Final	459 BY 07	511.19	10.98	87.58	9.27				
1603	4/29/2011 9:19	SOIL	240	ppm		2	Final	459 BY 08 DUP	484.64	10.65	88.5	9.03	464	72.6	4.258831297	17.96610169
1604	4/29/2011 9:25	SOIL	240	ppm		2	Final	459 BY 08	319.75	8.94	83.39	7.72				
1605	4/29/2011 9:30	SOIL	240	ppm		2	Final	459 BY 09	306.85	8.76	79.94	7.56				
1606	4/29/2011 9:40	SOIL	240	ppm		2	Final	459 MB 01	< LOD	6.36	< LOD	4.53				
1607	4/29/2011 9:44	SOIL	240	ppm		2	Final	459 BY 10	222.73	7.72	52.84	6.53				
1608	4/29/2011 9:49	SOIL	240	ppm		2	Final	459 BY 11	413.8	9.97	75.87	8.42				
1609	4/29/2011 9:56	SOIL	240	ppm		2	Final	459 BY 12	264.69	8.34	82.77	7.28				
1610	4/29/2011 10:01	SOIL	240	ppm		2	Final	459 BY 13	346.99	9.34	87.19	8.06				
1611	4/29/2011 10:06	SOIL	240	ppm		2	Final	459 BY 13 DUP	339.26	9.11	73.95	7.76				
1612	4/29/2011 10:11	SOIL	240	ppm		2	Final	459 BY 14	219.96	7.71	64.76	6.65	224	52.2	-1.836697581	19.39468808
1613	4/29/2011 10:15	SOIL	240	ppm		2	Final	459 BY 15	342.17	9.21	94.39	8				
1614	4/29/2011 10:21	SOIL	240	ppm		2	Final	GBW 7411	2679.01	26.21	212.86	21.59				
1615	4/29/2011 10:26	SOIL	240	ppm		2	Final	NIST 2711	1122.48	15.64	85.84	12.8				
1616	4/29/2011 10:31	SOIL	240	ppm		2	Final	NIST 2782	494.33	17.27	159.43	15.48				
1617	4/29/2011 10:35	SOIL	240	ppm		2	Final	NIST 2702	119.55	7.18	42.45	6.09				
1618	4/29/2011 10:41	SOIL	240	ppm		2	Final	SIO2 BLK	< LOD	4.38	< LOD	2.99				
1619	4/29/2011 10:48	SOIL	240.21	ppm		2	Final	PREC SAMP(450 BY 15)	349.15	9.22	93.7	8				
1620	4/29/2011 10:52	SOIL	240.12	ppm		2	Final	PREC SAMP(450 BY 15)	347.93	9.22	94.57	8.01				
1621	4/29/2011 10:56	SOIL	240.26	ppm		2	Final	PREC SAMP(450 BY 15)	344.21	9.17	96.66	7.99				
1622	4/29/2011 11:00	SOIL	240.12	ppm		2	Final	PREC SAMP(450 BY 15)	334.68	9.06	103.12	7.96				
1623	4/29/2011 11:04	SOIL	240.3	ppm		2	Final	PREC SAMP(450 BY 15)	341.89	9.17	99.44	8.02				
1624	4/29/2011 11:08	SOIL	240.3	ppm		2	Final	PREC SAMP(450 BY 15)	339.61	9.15	96.26	7.97				
1625	4/29/2011 11:12	SOIL	240.25	ppm		2	Final	PREC SAMP(450 BY 15)	344.19	9.18	98.77	8.02				
1626	5/6/2011 9:32	SHUTTER_CAL	53.93	cps		2	Final									
1627	5/6/2011 9:38	SOIL	24.07	ppm		2	Final		< LOD	11.18	< LOD	7.66				
1628	5/6/2011 9:39	SOIL	33.33	ppm		2	Final		< LOD	11.14	< LOD	7.51				
1629	5/6/2011 9:45	SOIL	5.45	ppm		2	Final		< LOD	73.43	< LOD	42.13				
1630	5/6/2011 15:33	SHUTTER_CAL	55.9	cps		2	Final									
1631	5/6/2011 15:35	SOIL	5.11	ppm		2	Final		< LOD	173.85	< LOD	132.51				
1632	5/6/2011 15:35	SOIL	4.36	ppm		2	Final		< LOD	190.35	< LOD	137.29				
1633	5/6/2011 15:40	SOIL	29.45	ppm		2	Final		28.1	13.36	< LOD	15.17				
1634	5/6/2011 15:41	SOIL	29.79	ppm		2	Final		167.84							

Reading No	Time	Type	Duration	Units	Sigma Value	Sequence	SAMPLE	Pb	Pb Error	As	As Error	Lab Pb	Lab As	%D Pb	%D As	
1673	5/16/2011 14:31	SOIL	240	ppm	2	Final	459 BY34	320.27	9.17	79.23	7.88					
1674	5/16/2011 14:36	SOIL	240	ppm	2	Final	SIO2 BLK	< LOD	4.32	< LOD	2.95					
1675	5/16/2011 14:47	SOIL	240	ppm	2	Final	GBW 7411	2665.35	26.12	199.12	21.47					
1676	5/16/2011 14:53	SOIL	240	ppm	2	Final	NIST 2711	1107.83	15.46	94.31	12.71					
1677	5/16/2011 14:56	SOIL	240	ppm	2	Final	NIST 2782	507.61	17.43	149.15	15.47					
1678	5/16/2011 15:01	SOIL	240	ppm	2	Final	NIST 2702	118.71	7.14	48.22	6.14					
1679	5/16/2011 15:07	SOIL	240.13	ppm	2	Final	PREC SAMP(459 BY17)	364.29	9.45	77.02	8.04					
1680	5/16/2011 15:11	SOIL	240.29	ppm	2	Final	PREC SAMP(459 BY17)	368.69	9.52	79.5	8.11					
1681	5/16/2011 15:15	SOIL	240.29	ppm	2	Final	PREC SAMP(459 BY17)	365.39	9.47	79.28	8.08					
1682	5/16/2011 15:19	SOIL	240.05	ppm	2	Final	PREC SAMP(459 BY17)	366.56	9.46	81.3	8.09					
1683	5/16/2011 15:23	SOIL	240.2	ppm	2	Final	PREC SAMP(459 BY17)	370.83	9.53	77.33	8.11					
1684	5/16/2011 15:27	SOIL	240.13	ppm	2	Final	PREC SAMP(459 BY17)	375.94	9.58	78.86	8.16					
1685	5/16/2011 15:31	SOIL	240.21	ppm	2	Final	PREC SAMP(459 BY17)	369.39	9.52	82.19	8.14					
1686	5/19/2011 6:19	SHUTTER_CAL	55.97	cps	2	Final										
1687	5/18/2011 6:24	SOIL	240	ppm	2	Final	SIO2 BLK	< LOD	4.31	< LOD	2.95					
1688	5/18/2011 6:29	SOIL	240	ppm	2	Final	GBW 7411	2669.64	26.15	189.35	21.46					
1689	5/18/2011 6:34	SOIL	240	ppm	2	Final	NIST 2702	120.22	7.15	42.4	6.06					
1690	5/18/2011 6:38	SOIL	240	ppm	2	Final	NIST 2782	511.25	17.45	150.97	15.51					
1691	5/18/2011 6:43	SOIL	240	ppm	2	Final	NIST 2711	1096.98	15.42	88.76	12.65					
1692	5/18/2011 6:48	SOIL	240.04	ppm	2	Final	PREC SAMP(459 BY17)	378.71	9.66	78.74	8.22					
1693	5/18/2011 6:52	SOIL	240.23	ppm	2	Final	PREC SAMP(459 BY17)	370.23	9.55	80.1	8.15					
1694	5/18/2011 6:56	SOIL	240.05	ppm	2	Final	PREC SAMP(459 BY17)	375.1	9.61	74.86	8.15					
1695	5/18/2011 7:00	SOIL	240.15	ppm	2	Final	PREC SAMP(459 BY17)	372.22	9.57	80.82	8.17					
1696	5/18/2011 7:04	SOIL	240.02	ppm	2	Final	PREC SAMP(459 BY17)	369.47	9.52	77.49	8.1					
1697	5/18/2011 7:08	SOIL	240.2	ppm	2	Final	PREC SAMP(459 BY17)	375.17	9.6	74.95	8.15					
1698	5/18/2011 7:12	SOIL	240.18	ppm	2	Final	PREC SAMP(459 BY17)	369.88	9.54	80.7	8.15					
1699	5/18/2011 7:18	SOIL	240	ppm	2	Final	459 BY35	163.13	6.95	45.71	5.88					
1700	5/18/2011 7:22	SOIL	240	ppm	2	Final	459 BY36	157.42	6.86	46.1	5.82					
1701	5/18/2011 7:27	SOIL	240	ppm	2	Final	459 BY37	366.19	9.49	76.56	8.07					
1702	5/18/2011 7:41	SOIL	240	ppm	2	Final	459 BY38	207.88	7.59	49.86	6.41					
1703	5/18/2011 7:48	SOIL	240	ppm	2	Final	459 BY39	572.25	11.52	113.78	9.85					
1704	5/18/2011 7:53	SOIL	240	ppm	2	Final	459 BY39 DUP	576.87	11.61	118.87	9.96	521	95.4	9.685024356	19.74425843	
1705	5/18/2011 7:57	SOIL	240	ppm	2	Final	459 BY40	257.93	8.34	49.87	6.98					
1706	5/18/2011 8:05	SOIL	240	ppm	2	Final	459 BY41	412.27	10	86.57	8.54					
1707	5/18/2011 8:27	SOIL	240	ppm	2	Final	459 BY42	363.42	9.55	104.01	8.35					
1708	5/18/2011 8:32	SOIL	240	ppm	2	Final	459 BY43	490.21	10.93	112.22	9.42					
1709	5/18/2011 8:36	SOIL	240	ppm	2	Final	459 BY44	357.53	9.47	86.68	8.14					
1710	5/18/2011 8:45	SOIL	240	ppm	2	Final	459 BY44 DUP	349.58	9.33	85.64	8.03					
1711	5/18/2011 8:50	SOIL	240	ppm	2	Final	459 BY45	362.52	9.43	86.6	8.1					
1712	5/18/2011 9:01	SOIL	240	ppm	2	Final	459 BY46	416.22	9.99	87.94	8.53					
1713	5/18/2011 9:14	SOIL	240	ppm	2	Final	459 MB02	< LOD	6.51	< LOD	4.62					
1714	5/18/2011 9:18	SOIL	240	ppm	2	Final	459 BY47	381.74	9.61	84.47	8.22					
1715	5/18/2011 9:28	SOIL	240	ppm	2	Final	459 BY51	397.14	9.82	85.1	8.38					
1716	5/18/2011 9:34	SOIL	240	ppm	2	Final	459 BY50	395.69	9.92	103.95	8.62					
1717	5/18/2011 9:42	SOIL	240	ppm	2	Final	459 BY49	421.67	10.16	101.09	8.77					
1718	5/18/2011 9:47	SOIL	240	ppm	2	Final	459 BY48	424.99	10.1	111.01	8.79					
1719	5/18/2011 9:51	SOIL	240	ppm	2	Final	SIO2 BLK	< LOD	4.44	< LOD	3.03					
1720	5/18/2011 9:56	SOIL	240	ppm	2	Final	NIST 2702	117.8	7.1	45.8	6.07					
1721	5/18/2011 10:01	SOIL	240	ppm	2	Final	NIST 2711	1102.43	15.41	99.94	12.7					
1722	5/18/2011 10:05	SOIL	240	ppm	2	Final	459 BY52	490.78	17.08	153.74	15.27					
1723	5/18/2011 10:10	SOIL	240	ppm	2	Final	GBW 7411	2631.4	25.87	216.8	21.35					
1724	5/18/2011 10:16	SOIL	240.15	ppm	2	Final	PREC SAMP(459 BY37)	371.96	9.62	79.36	8.2					
1725	5/18/2011 10:20	SOIL	240.22	ppm	2	Final	PREC SAMP(459 BY37)	359.93	9.45	89.1	8.15					
1726	5/18/2011 10:24	SOIL	240.06	ppm	2	Final	PREC SAMP(459 BY37)	355.76	9.4	85.85	8.09					
1727	5/18/2011 10:28	SOIL	240.22	ppm	2	Final	PREC SAMP(459 BY37)	363.13	9.5	80.76	8.12					
1728	5/18/2011 10:32	SOIL	240.22	ppm	2	Final	PREC SAMP(459 BY37)	368.24	9.58	76.73	8.15					
1729	5/18/2011 10:36	SOIL	240.27	ppm	2	Final	PREC SAMP(459 BY37)	366.72	9.52	75.01	8.08					
1730	5/18/2011 10:40	SOIL	240.25	ppm	2	Final	PREC SAMP(459 BY37)	362.66	9.5	83.04	8.1					
1731	5/18/2011 11:41	SOIL	240	ppm	2	Final	459 BY53	327.95	9.12	87.5	7.89					
1732	5/18/2011 11:49	SOIL	240	ppm	2	Final	459 BY53	397.7	9.85	94.65	8.49					
1733	5/18/2011 11:55	SOIL	240	ppm	2	Final	459 BY54	250.9	8.21	75.84	7.13	242	69	3.547229972	9.018987342	
1734	5/18/2011 12:00	SOIL	240	ppm	2	Final	459 BY55	461.3	10.63	97.92	9.1					
1735	5/18/2011 12:05	SOIL	240	ppm	2	Final	459 BY56	375.09	9.59	89.05	8.25					
1736	5/18/2011 12:21	SOIL	240	ppm	2	Final	459 MB04	< LOD	6.42	< LOD	4.57					
1737	5/18/2011 12:26	SOIL	240	ppm	2	Final	459 BY57	381.67	9.71	93.36	8.38					
1738	5/18/2011 12:35	SOIL	240	ppm	2	Final	459 BY58	321.7	9.01	75.77	7.71					
1739	5/18/2011 12:39	SOIL	240	ppm	2	Final	459 BY59	258.2	8.27	87.31	7.27					
1740	5/18/2011 12:55	SOIL	240	ppm	2	Final	459 BY60	316.94	8.99	90.75	7.83					
1741	5/18/2011 13:06	SOIL	240	ppm	2	Final	459 MB05	< LOD	6.43	< LOD	4.59					
1742	5/18/2011 13:11	SOIL	240	ppm	2	Final	459 BY61	364.64	9.51	93.93	8.23					
1743	5/18/2011 13:35	SOIL	240	ppm	2	Final	459 BY62	225.68	7.87	71.69	6.84					
1744	5/18/2011 13:40	SOIL	240	ppm	2	Final	459 BY63	400.51	9.87	96.17	8.51					
1745	5/18/2011 13:56	SOIL	240	ppm	2	Final	459 BY64	255.25	8.24	77.51	7.16					
1746	5/18/2011 14:01	SOIL	240	ppm	2	Final	459 MB06	< LOD	6.36	< LOD	4.58					
1747	5/18/2011 14:11	SOIL	240	ppm	2	Final	459 BY65	384.55	9.81	102.22	8.53	371	78.2	3.523599012	23.49836692	
1748	5/18/2011 14:15	SOIL	240	ppm	2	Final	459 BY65 DUP	396.89	9.93	94.4	8.55					
1749	5/18/2011 14:26	SOIL	240	ppm	2	Final	459 BY66	346.4	9.39	100.77	8.13					
1750	5/18/2011 14:27	SOIL	240	ppm	2	Final	459 MB07	< LOD	6.16	< LOD	4.42					
1751	5/18/2011 14:33	SOIL	240	ppm	2	Final	NIST 2711	1114.05	15.52	95.73	12.76					
1752	5/18/2011 14:48	SOIL	240	ppm	2	Final	NIST 2782	510.44	17.43	151.22	15.51					
1753	5/18/2011 14:53	SOIL	240	ppm	2	Final	NIST 2702	123.17	7.19	43.23	6.11					
1754	5/18/2011 14:59	SOIL	240	ppm	2	Final	GBW 7411	2632.42	25.97	223.34	21.45					
1755	5/18/2011 15:10	SOIL	240	ppm	2	Final	SIO2 BLK	< LOD	4.32	< LOD	3					
1756	5/18/2011 15:16	SOIL	240.2	ppm	2	Final	PREC SAMP(459 FY58)	321.21	9.02	76.27	7.72					
1757	5/18/2011 15:20	SOIL	240.06	ppm	2	Final	PREC SAMP(459 FY58)	322.32	9.04	74.26	7.72					
1758	5/18/2011 15:24	SOIL	240.04	ppm	2	Final	PREC SAMP(459 FY58)	321.8	9.03	83.1	7.79					
1759	5/18/2011 15:28	SOIL	240.19	ppm	2	Final	PREC SAMP(459 FY58)	322.07	9.02	79	7.75					
1760	5/18/2011 15:32	SOIL	240.13	ppm	2	Final	PREC SAMP(459 FY58)	316.6	8.96	77.53	7.69					
1761	5/18/2011 15:36	SOIL	240.23	ppm	2	Final	PREC SAMP(459 FY58)	322.75	9.08	80.43	7.81					
1762	5/18/2011 15:40	SOIL	240.18	ppm	2	Final	PREC SAMP(459 FY58)	324.54	9.06	75.56	7					

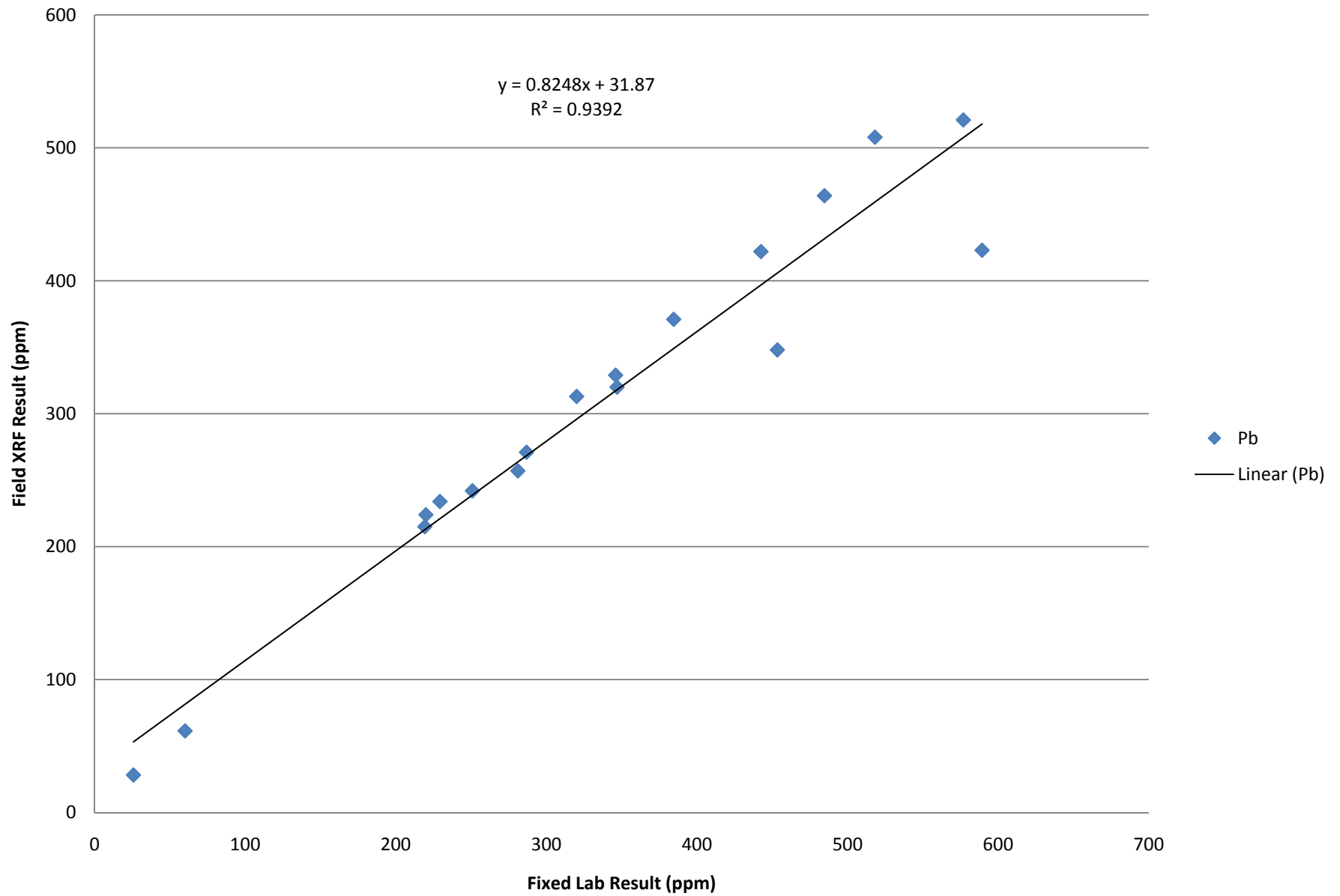
Reading No	Time	Type	Duration	Units	Sigma Value	Sequence	SAMPLE	Pb	Pb Error	As	As Error	Lab Pb	Lab As	%D Pb	%D As		
1800	5/19/2011 12:42	SOIL	240	ppm		2 Final	511 BY SB 05 DUP	25.76	4.51	13.15	3.57	28.2		10.6	-9.472049689	19.39163498	
1801	5/19/2011 12:46	SOIL	240	ppm		2 Final	511 BY COMP	23.4	4.33	12.71	3.42						
1802	5/19/2011 12:51	SOIL	240	ppm		2 Final	511 MB01	< LOD	6.27	LOD	4.49						
1803	5/19/2011 12:56	SOIL	240	ppm		2 Final	511 MB02	< LOD	6.34	LOD	4.62						
1804	5/19/2011 13:03	SOIL	240	ppm		2 Final	424 PES TPA 01	129.27	6.54	34.77	5.47						
1805	5/19/2011 13:08	SOIL	240	ppm		2 Final	424 PES TPA 02	53.16	5.34	20.9	4.27						
1806	5/19/2011 13:13	SOIL	240	ppm		2 Final	424 PES TPA 03	138.08	6.73	38.08	5.64						
1807	5/19/2011 13:19	SOIL	240	ppm		2 Final	424 PES TPA 04	229.28	7.96	55.67	6.76	234	46.6	-2.058618283	16.29243758		
1808	5/19/2011 13:24	SOIL	240	ppm		2 Final	NIST 2711	1114.43	15.52	92.33	12.74						
1809	5/19/2011 13:28	SOIL	240	ppm		2 Final	GBW 7411	2655.89	26.04	199.75	21.41						
1810	5/19/2011 13:33	SOIL	240	ppm		2 Final	NIST 2782	501.14	17.26	162.91	15.49						
1811	5/19/2011 13:38	SOIL	240	ppm		2 Final	NIST 2702	118.65	7.08	43.15	6.03						
1812	5/19/2011 13:44	SOIL	240	ppm		2 Final	SIO2 BLK	< LOD	4.33	LOD	2.96						
1813	5/19/2011 13:50	SOIL	240.15	ppm		2 Final	PREC SAMP (459 BY 58)	332.02	9.34	79.89	7.84						
1814	5/19/2011 13:55	SOIL	240.3	ppm		2 Final	PREC SAMP (459 BY 58)	319.44	8.98	84.11	7.76						
1815	5/19/2011 13:59	SOIL	240.13	ppm		2 Final	PREC SAMP (459 BY 58)	321.55	9.03	83.13	7.79						
1816	5/19/2011 14:03	SOIL	240.29	ppm		2 Final	PREC SAMP (459 BY 58)	322.74	9.03	86.03	7.82						
1817	5/19/2011 14:07	SOIL	240.29	ppm		2 Final	PREC SAMP (459 BY 58)	322.57	9.03	83.16	7.79						
1818	5/19/2011 14:11	SOIL	240.12	ppm		2 Final	PREC SAMP (459 BY 58)	320.9	9.01	81.5	7.76						
1819	5/19/2011 14:15	SOIL	240.26	ppm		2 Final	PREC SAMP (459 BY 58)	323.95	9.06	85.45	7.83						
1820	5/19/2011 14:21	SOIL	240	ppm		2 Final	424 PES TPA 05	53.83	5.19	20.23	4.22						
1821	5/19/2011 14:25	SOIL	240	ppm		2 Final	424 PES TPA 06	58.9	5.31	23.01	4.36						
1822	5/19/2011 14:31	SOIL	240	ppm		2 Final	424 PES TPA 06 DUP	61.7	5.36	21.74	4.38						
1823	5/19/2011 14:36	SOIL	240	ppm		2 Final	424 PES MB 01	< LOD	6.39	LOD	4.57						
1824	5/19/2011 14:41	SOIL	240	ppm		2 Final	1096 PES FY 09	467.06	10.62	26.48	8.54						
1825	5/19/2011 14:46	SOIL	240	ppm		2 Final	1096 PES FY 10	532.93	11.12	25.44	8.92						
1826	5/19/2011 14:51	SOIL	240	ppm		2 Final	1096 PES FY 10 DUP	545.91	11.34	40.61	9.21						
1827	5/19/2011 14:56	SOIL	240	ppm		2 Final	1096 PES FY 11	321.57	9.09	34.03	7.41						
1828	5/19/2011 15:00	SOIL	240	ppm		2 Final	1096 PES FY 12	659.94	12.62	31.42	10.16						
1829	5/19/2011 15:05	SOIL	240	ppm		2 Final	1096 PES FY 13	410.56	9.94	25.98	8						
1830	5/19/2011 15:10	SOIL	240	ppm		2 Final	NIST 2711	1125.38	15.58	90.14	12.78						
1831	5/19/2011 15:15	SOIL	240	ppm		2 Final	GBW 7411	260.31	26.27	189.55	21.56						
1832	5/19/2011 15:30	SOIL	240	ppm		2 Final	NIST 2782	498.37	17.22	160.08	15.44						
1833	5/19/2011 15:34	SOIL	240	ppm		2 Final	NIST 2702	117.77	7.09	46.17	6.07						
1834	5/19/2011 15:40	SOIL	240	ppm		2 Final	SIO2 BLK	< LOD	4.36	LOD	2.99						
1835	5/19/2011 15:46	SOIL	240.07	ppm		2 Final	PREC SAMP (459 BY 58)	314.88	8.93	80.4	7.69						
1836	5/19/2011 15:50	SOIL	240.05	ppm		2 Final	PREC SAMP (459 BY 58)	317.53	8.97	81.89	7.73						
1837	5/19/2011 15:54	SOIL	240.17	ppm		2 Final	PREC SAMP (459 BY 58)	317.16	8.95	84.12	7.74						
1838	5/19/2011 15:58	SOIL	240	ppm		2 Final	PREC SAMP (459 BY 58)	327.08	9.08	80.89	7.8						
1839	5/19/2011 16:02	SOIL	240.25	ppm		2 Final	PREC SAMP (459 BY 58)	330.83	9.13	75.57	7.8						
1840	5/19/2011 16:06	SOIL	240.06	ppm		2 Final	PREC SAMP (459 BY 58)	322.43	9.02	78.99	7.75						
1841	5/19/2011 16:10	SOIL	240.12	ppm		2 Final	PREC SAMP (459 BY 58)	328.12	9.1	79.31	7.8						
1842	5/19/2011 19:16	SOIL	240	ppm		2 Final	1096 PES FY14	417.06	10.42	19.71	8.33						
1843	5/19/2011 19:21	SOIL	240	ppm		2 Final	1096 PES FY15	381.57	9.49	34.85	7.72						
1844	5/19/2011 19:26	SOIL	240	ppm		2 Final	1096 PES FY16	1109.92	16.17	LOD	19.31						
1845	5/19/2011 19:30	SOIL	240	ppm		2 Final	1096 PES FY17	518.22	10.91	48.05	8.91	508	31.7	1.972135387	34.02705515		
1846	5/19/2011 19:35	SOIL	240	ppm		2 Final	1096 MB01	< LOD	6.25	LOD	4.48						
1847	5/19/2011 19:40	SOIL	240	ppm		2 Final	1096 PES FY18	1746.33	19.8	40.51	15.86						
1848	5/19/2011 19:44	SOIL	240	ppm		2 Final	1096 PES FY19	494.66	10.69	31.89	8.63						
1849	5/19/2011 19:48	SOIL	240	ppm		2 Final	1096 PES FY20	1144.53	16.1	33.15	12.9						
1850	5/19/2011 19:53	SOIL	240	ppm		2 Final	1096 PES FY20 DUP	1145.43	15.89	32.76	12.73						
1851	5/19/2011 19:58	SOIL	240	ppm		2 Final	1096 PES FY21	436.63	10	27.03	8.05						
1852	5/19/2011 20:02	SOIL	240	ppm		2 Final	1096 PES FY22	466.97	10.55	20.9	8.44						
1853	5/19/2011 20:06	SOIL	240	ppm		2 Final	1096 PES FY23	402.87	9.63	41.36	7.87						
1854	5/19/2011 20:11	SOIL	240	ppm		2 Final	1096 PES FY24	624.63	11.96	44.63	9.71						
1855	5/19/2011 20:15	SOIL	240	ppm		2 Final	1096 PES FY25	589.33	11.65	67.66	9.63	423	38	28.22357593	43.83683121		
1856	5/19/2011 20:20	SOIL	240	ppm		2 Final	1096 MB02	< LOD	6.28	LOD	4.47						
1857	5/19/2011 20:27	SOIL	240	ppm		2 Final	498 PES FY04	374.36	9.54	114.66	8.41						
1858	5/19/2011 20:33	SOIL	240	ppm		2 Final	498 PES FY06	98.52	6.09	35.98	5.14						
1859	5/19/2011 20:36	SOIL	240	ppm		2 Final	498 PES FY07	308.05	8.83	88.24	7.67						
1860	5/19/2011 20:57	SOIL	240	ppm		2 Final	498 PES FY08	231.85	7.97	83.16	7.02						
1861	5/19/2011 21:01	SOIL	240	ppm		2 Final	498 PES FY09	161.67	7	49.32	5.98						
1862	5/19/2011 21:06	SOIL	240	ppm		2 Final	SIO2 BLK	< LOD	4.28	LOD	2.93						
1863	5/19/2011 21:10	SOIL	240	ppm		2 Final	GBW 7411	2642.78	26	201.01	21.39						
1864	5/19/2011 21:15	SOIL	240	ppm		2 Final	NIST 2702	117.93	7.13	46.4	6.1						
1865	5/19/2011 21:20	SOIL	240	ppm		2 Final	NIST 2782	501.18	17.36	158.9	15.53						
1866	5/19/2011 21:24	SOIL	240	ppm		2 Final	NIST 2711	1109.53	15.49	89.77	12.71						
1867	5/19/2011 21:30	SOIL	240.27	ppm		2 Final	PREC SAMP(1096 PES FY25)	594.35	11.68	57.05	9.58						
1868	5/19/2011 21:34	SOIL	240.18	ppm		2 Final	PREC SAMP(1096 PES FY25)	595.46	11.7	57.45	9.6						
1869	5/19/2011 21:38	SOIL	240.26	ppm		2 Final	PREC SAMP(1096 PES FY25)	597.18	11.71	54.79	9.59						
1870	5/19/2011 21:42	SOIL	240.21	ppm		2 Final	PREC SAMP(1096 PES FY25)	594.03	11.69	65.32	9.65						
1871	5/19/2011 21:46	SOIL	240.27	ppm		2 Final	PREC SAMP(1096 PES FY25)	595.43	11.7	64.8	9.65						
1872	5/19/2011 21:50	SOIL	240.29	ppm		2 Final	PREC SAMP(1096 PES FY25)	600.99	11.76	56.34	9.64						
1873	5/19/2011 21:54	SOIL	240.03	ppm		2 Final	PREC SAMP(1096 PES FY25)	591.19	11.64	62.78	9.59						
1874	5/19/2011 22:03	SOIL	240	ppm		2 Final	498 PES FY10	286.11	8.6	86.1	7.5						
1875	5/19/2011 22:08	SOIL	240	ppm		2 Final	498 PES FY11	289.67	8.61	90.9	7.54						
1876	5/19/2011 22:13	SOIL	240	ppm		2 Final	498 PES FY11 DUP	289.47	8.62	86.03	7.5						
1877	5/19/2011 22:19	SOIL	240	ppm		2 Final	498 PES MB02	< LOD	6.48	LOD	4.59						
1878	5/19/2011 22:24	SOIL	240	ppm		2 Final	498 PES FY12	315.85	8.91	93.68	7.78						
1879	5/19/2011 22:29	SOIL	240	ppm		2 Final	498 PES FY13	251.01	8.16	81.8	7.14						
1880	5/19/2011 22:33	SOIL	240	ppm		2 Final	498 PES FY17	84.57	5.86	30.13	4.89						
1881	5/19/2011 22:38	SOIL	240	ppm		2 Final	498 PES FY18	327.8	9.26	83.88	7.99						
1882	5/19/2011 22:42	SOIL	240	ppm		2 Final	498 PES FY19	79.73	5.72	30.72	4.78						
1883	5/19/2011 22:46	SOIL	240	ppm		2 Final	498 PES FY20	259.35	8.28	80.57	7.22						
1884	5/19/2011 22:51	SOIL	240	ppm		2 Final	498 PES FY21	346.92	9.26	95.04	8.05	320	88.5	7.759714055	6.881313131		
1885	5/19/2011 22:55	SOIL	240	ppm		2 Final	498 PES FY22	235.55	8.11	89.2	7.1						
1886	5/19/2011 23:00	SOIL	240	ppm		2 Final	498 PES FY22										

Reading No	Time	Type	Duration	Units	Sigma Value	Sequence	SAMPLE	Pb	Pb Error	As	As Error	Lab Pb	Lab As	Nb Pb	Nb As	
1927	5/20/2011 2:53	SOIL		240	ppm	2	Final	GBW 7411	2658.47	26.05	199.4				21.42	
1928	5/20/2011 3:01	SOIL		240	ppm	2	Final	NIST 2702	121.86	7.16	46.1				6.12	
1929	5/20/2011 3:05	SOIL		240	ppm	2	Final	NIST 2782	503.19	17.31	153.13				15.43	
1930	5/20/2011 3:10	SOIL		240	ppm	2	Final	NIST 2711	1106.39	15.44	102.44				12.73	
1931	5/20/2011 3:16	SOIL		240.21	ppm	2	Final	PREC SAMP(498 PES FY37)	222.25	7.85	81.82				6.93	
1932	5/20/2011 3:20	SOIL		240.3	ppm	2	Final	PREC SAMP(498 PES FY37)	226.17	7.87	75.3				6.88	
1933	5/20/2011 3:24	SOIL		240.14	ppm	2	Final	PREC SAMP(498 PES FY37)	226.94	7.9	81.82				6.96	
1934	5/20/2011 3:38	SOIL		240.19	ppm	2	Final	PREC SAMP(498 PES FY37)	219.7	7.79	76.42				6.83	
1935	5/20/2011 3:32	SOIL		240	ppm	2	Final	PREC SAMP(498 PES FY37)	228.24	7.92	71.43				6.87	
1936	5/20/2011 3:36	SOIL		240.06	ppm	2	Final	PREC SAMP(498 PES FY37)	224.62	7.87	73.95				6.86	
1937	5/20/2011 3:40	SOIL		240.07	ppm	2	Final	PREC SAMP(498 PES FY37)	228.42	7.9	72.99				6.87	
1938	5/20/2011 5:45	SOIL		240	ppm	2	Final	DISCARD	< LOD	6.59	< LOD				4.58	
1939	5/20/2011 8:31	SHUTTER_CAL		57.91	cps	2	Final									
1940	5/20/2011 8:35	SOIL		240	ppm	2	Final	SiO2 BLK	< LOD	4.24	< LOD				2.96	
1941	5/20/2011 8:40	SOIL		240	ppm	2	Final	GBW 7411	2658	26.08	185.58				21.42	
1942	5/20/2011 8:45	SOIL		240	ppm	2	Final	NIST 2702	121.6	7.19	44.73				6.13	
1943	5/20/2011 8:50	SOIL		240	ppm	2	Final	NIST 2782	498.2	17.23	138.35				15.44	
1944	5/20/2011 8:54	SOIL		240	ppm	2	Final	NIST 2711	1108.54	15.48	92.97				12.72	
1945	5/20/2011 9:10	SOIL		240.15	ppm	2	Final	462 PES FY 03	338.77	9.31	104.62				8.18	
1946	5/20/2011 9:14	SOIL		240.05	ppm	2	Final	462 PES FY 03	339.32	9.32	100.63				8.16	
1947	5/20/2011 9:18	SOIL		240.28	ppm	2	Final	462 PES FY 03	326.47	9.14	110.52				8.11	
1948	5/20/2011 9:22	SOIL		240.05	ppm	2	Final	462 PES FY 03	338.46	9.29	97.7				8.15	
1949	5/20/2011 9:26	SOIL		240.19	ppm	2	Final	462 PES FY 03	335.37	9.27	104.07				8.15	
1950	5/20/2011 9:38	SOIL		240.05	ppm	2	Final	462 PES FY 03	334.93	9.26	99.75				8.1	
1951	5/20/2011 9:34	SOIL		240.28	ppm	2	Final	462 PES FY 03	333.88	9.26	102.58				8.13	
1952	5/20/2011 9:42	SOIL		240	ppm	2	Final	462 PES FY 04	384.24	9.69	110.59				8.49	
1953	5/20/2011 9:49	SOIL		240	ppm	2	Final	462 PES FY 05	462.63	10.51	129.1				9.23	
1954	5/20/2011 9:54	SOIL		240	ppm	2	Final	462 PES FY 06	139.19	6.75	44.65				5.75	
1955	5/20/2011 10:03	SOIL		240	ppm	2	Final	462 PES FY 07	74.98	5.63	34.04				4.77	
1956	5/20/2011 10:08	SOIL		240	ppm	2	Final	462 PES FY 07 DUP	73.06	5.62	35.21				4.77	
1957	5/20/2011 10:13	SOIL		240	ppm	2	Final	462 PES MB 01	< LOD	6.49	< LOD				4.56	
1958	5/20/2011 10:17	SOIL		240	ppm	2	Final	462 PES FY 08	230.73	7.97	56.55				6.77	
1959	5/20/2011 10:23	SOIL		240	ppm	2	Final	462 PES FY 09	212.43	7.87	64.8				6.71	
1960	5/20/2011 10:26	SOIL		240	ppm	2	Final	462 PES FY 10	453.41	10.43	120.57	9.1	348	87.4	23.24827419	27.51098947
1961	5/20/2011 10:31	SOIL		240	ppm	2	Final	462 PES FY 11	325.36	9.2	98.95				8.06	
1962	5/20/2011 10:36	SOIL		240	ppm	2	Final	462 PES FY 12	438.37	10.39	126.12				9.13	
1963	5/20/2011 10:41	SOIL		240	ppm	2	Final	462 PES FY 13	398.78	10.03	119.21				8.82	
1964	5/20/2011 10:46	SOIL		240	ppm	2	Final	462 PES FY 14	161.39	7.16	51.37				6.14	
1965	5/20/2011 11:09	SOIL		240	ppm	2	Final	462 PES FY 15	189.21	7.59	55.03				6.49	
1966	5/20/2011 11:14	SOIL		240	ppm	2	Final	462 PES FY 16	359.87	9.47	90.01				8.17	
1967	5/20/2011 11:18	SOIL		240	ppm	2	Final	462 PES FY 17	319.65	9.1	94.04				7.94	
1968	5/20/2011 11:23	SOIL		240	ppm	2	Final	462 PES FY 17 DUP	307.04	8.9	83.9				7.7	
1969	5/20/2011 11:28	SOIL		240	ppm	2	Final	462 PES MB 02	< LOD	6.39	< LOD				4.52	
1970	5/20/2011 11:33	SOIL		240	ppm	2	Final	462 PES FY 18	122.61	6.47	48.73				5.58	
1971	5/20/2011 11:37	SOIL		240	ppm	2	Final	462 PES FY 19	397.89	9.94	115.94				8.72	
1972	5/20/2011 11:45	SOIL		240	ppm	2	Final	GBW 7411	2658.11	25.98	199.09				21.36	
1973	5/20/2011 11:50	SOIL		240	ppm	2	Final	NIST 2711	1107.49	15.48	94.72				12.73	
1974	5/20/2011 11:54	SOIL		240	ppm	2	Final	NIST 2782	494.94	17.19	154.95				15.35	
1975	5/20/2011 11:58	SOIL		240	ppm	2	Final	NIST 2702	114.01	7.02	45.85				6.01	
1976	5/20/2011 12:04	SOIL		240	ppm	2	Final	SiO2 BLK	< LOD	4.36	< LOD				2.97	
1977	5/20/2011 12:09	SOIL		240.22	ppm	2	Final	PREC SAMP (462 PES FY 13)	408.29	10.09	117.41				8.86	
1978	5/20/2011 12:13	SOIL		240.06	ppm	2	Final	PREC SAMP (462 PES FY 13)	401.62	10.06	121.01				8.86	
1979	5/20/2011 12:18	SOIL		240.07	ppm	2	Final	PREC SAMP (462 PES FY 13)	407.51	10.11	120.46				8.9	
1980	5/20/2011 12:22	SOIL		240.23	ppm	2	Final	PREC SAMP (462 PES FY 13)	404.12	10.04	123.43				8.87	
1981	5/20/2011 12:26	SOIL		240.03	ppm	2	Final	PREC SAMP (462 PES FY 13)	407.53	10.08	116.99				8.84	
1982	5/20/2011 12:30	SOIL		240.14	ppm	2	Final	PREC SAMP (462 PES FY 13)	403.59	10.06	119.34				8.85	
1983	5/20/2011 12:34	SOIL		240.2	ppm	2	Final	PREC SAMP (462 PES FY 13)	411.59	10.14	112.69				8.85	
1984	5/20/2011 12:43	SOIL		240	ppm	2	Final	462 PES FY 20	545.2	11.02	127.56				9.59	
1985	5/20/2011 12:48	SOIL		240	ppm	2	Final	462 PES FY 21	181.65	7.37	59.17				6.36	
1986	5/20/2011 12:52	SOIL		240	ppm	2	Final	462 PES FY 22	287.84	8.82	80.65				7.63	
1987	5/20/2011 12:57	SOIL		240	ppm	2	Final	462 PES FY 23	383.55	9.79	130.98				8.74	
1988	5/20/2011 13:02	SOIL		240	ppm	2	Final	462 PES FY 24	328.09	9.2	141.12				8.4	
1989	5/20/2011 13:07	SOIL		240	ppm	2	Final	462 PES FY 25	614.02	11.91	136.02				10.28	
1990	5/20/2011 13:11	SOIL		240	ppm	2	Final	462 PES FY 26	262.04	8.35	98.47				7.44	
1991	5/20/2011 13:16	SOIL		240	ppm	2	Final	GBW 7411	2660.2	26.04	192.01				21.38	
1992	5/20/2011 13:21	SOIL		240	ppm	2	Final	NIST 2702	112.44	15.53	49.12				12.74	
1993	5/20/2011 13:25	SOIL		240	ppm	2	Final	NIST 2782	486.87	17.03	152.62				15.22	
1994	5/20/2011 13:30	SOIL		240	ppm	2	Final	NIST 2702	118.99	7.12	47.95				6.12	
1995	5/20/2011 13:35	SOIL		240	ppm	2	Final	SiO2 BLK	< LOD	4.32	< LOD				2.97	
1996	5/20/2011 13:40	SOIL		240.19	ppm	2	Final	PREC SAMP (462 PES FY 13)	403.34	10.05	117.27				8.82	
1997	5/20/2011 13:44	SOIL		240.23	ppm	2	Final	PREC SAMP (462 PES FY 13)	413.89	10.17	112.83				8.88	
1998	5/20/2011 13:48	SOIL		240.18	ppm	2	Final	PREC SAMP (462 PES FY 13)	400.28	10.01	113.14				8.76	
1999	5/20/2011 13:52	SOIL		240.1	ppm	2	Final	PREC SAMP (462 PES FY 13)	400.87	10.02	112.15				8.76	
2000	5/20/2011 13:56	SOIL		240.18	ppm	2	Final	PREC SAMP (462 PES FY 13)	393.84	9.96	130.12				8.76	
2001	5/20/2011 14:00	SOIL		240.13	ppm	2	Final	PREC SAMP (462 PES FY 13)	409.8	10.13	105.02				8.8	
2002	5/20/2011 14:04	SOIL		240.3	ppm	2	Final	PREC SAMP (462 PES FY 13)	402.18	10.03	116.64				8.81	
AVERAGE % D=															6.98	19.19

Field XRF vs Fixed Lab Results



Field XRF vs Fixed Lab Results



APPENDIX C

VALIDATED ANALYTICAL RESULTS PACKAGES



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
Environmental Sciences Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

DATE : July 18, 2011

SUBJECT: Region III Data QA Review

FROM: Colleen Walling *Colleen Walling*
Region III ESAT RPO (3EA20)

TO: Ruth Scharr
On-Scene Coordinator (3HS31)

Attached is the inorganic data validation report for the FMO Pesticide site (Case#: 41534; SDG#: MC00G9) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III EAID.

If you have any questions regarding this review, please call me at (410) 305-2763.

Attachment

cc: [REDACTED] (Weston)

TO: #0037 TDF: #07032

OFFICE OF ANALYTICAL SERVICES AND QUALITY ASSURANCE

Lockheed Martin IS&GS – Civil
Energy & Environment
ESAT Region 3
US EPA Environmental Science Center
701 Mapes Road Ft. Meade, MD 20755-5350
Telephone 410-305-3037 Facsimile 410-305-3597



DATE: July 18, 2011

SUBJECT: Level IM2 Inorganic Data Validation for Case 41534
SDG: MC00G9
Site: FMO Pesticide

FROM: Shilpa Udani
Inorganic Data Reviewer

Through: Mahboobeh Mecanic
Senior Data Review Chemist

TO: Colleen Walling
ESAT Region 3 Project Officer

OVERVIEW

Case 41534, Sample Delivery Group (SDG) MC00G9, consisted of thirteen (13) soil samples submitted to A4 Scientific, Inc. (A4) for arsenic (As) and lead (Pb) analysis using ICP-AES methodology. The sample set included one (1) field duplicate pair. Samples were analyzed in accordance with Contract Laboratory Program (CLP) Statement of Work (SOW) ISM01.2 through the Routine Analytical Services (RAS) program.

SUMMARY

Data were validated according to the Region 3 Modifications to the National Functional Guidelines for Inorganic Data Review, level IM2 and is assigned the Superfund Data Validation Level S4VM (Stage_4_Validation_Manual). No problems regarding data usability were noted during the review of this data set. The analytical results for this sample set are summarized on a single Data Summary Form (DSF) in Appendix B.

NOTE

Reported results for As and Pb in the field duplicate pair samples MC00H1/MC00H2 were within the control limits of 35% RPD, $\pm 2XCRQL$.

ATTACHMENTS

INFORMATION REGARDING REPORT CONTENT

APPENDIX A	GLOSSARY OF DATA QUALIFIER CODES
APPENDIX B	DATA SUMMARY FORMS
APPENDIX C	CHAIN OF CUSTODY RECORDS
APPENDIX D	LABORATORY CASE NARRATIVE

DCN: 41534_ MC00G9.IM2

APPENDIX A
Glossary of Qualifier Codes

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of analytes):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unusable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

N = Tentative identification. Consider present.
Special methods may be needed to confirm its presence or absence in future sampling efforts.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low.
Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

APPENDIX B
Data Summary Forms

DATA SUMMARY FORM: INORGANIC

Page __1__ of __1__

Case #: 41534

SDG : MC00G9

Number of Soil Samples : 13

Site :

FMO Pesticide

Number of Water Samples : 0

Lab. :

A4

Sample Number :	MC00G9	MC00H0	MC00H1	MC00H2	MC00H3
Sampling Location : (Prefix : FMO-SS-)	062911-147-BY	062911-147-FY	062911-147-GA	062911-147-GAD	062911-454-BY
Field QC :			Dup. of MC00H2	Dup. of MC00H1	
Matrix :	Soil	Soil	Soil	Soil	Soil
Units :	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Date Sampled :	6/29/2011	6/29/2011	6/29/2011	6/29/2011	6/29/2011
Time Sampled :	17:30	17:25	17:40	17:40	16:45
%Solids :	87.4	83.4	75.0	75.2	80.8
Dilution Factor :	1.0	1.0	1.0	1.0	1.0
ANALYTE	CRQL	Result	Flag	Result	Flag
ARSENIC	1	48.0		41.6	
*LEAD	1	203		151	

Sample Number :	MC00H4	MC00H5	MC00H6	MC00H7	MC00H8
Sampling Location : (Prefix : FMO-SS-)	062911-454-FY	062911-456-BY	062911-456-FY	062911-456-TPA	062911-494-BY
Field QC :					
Matrix :	Soil	Soil	Soil	Soil	Soil
Units :	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Date Sampled :	6/29/2011	6/29/2011	6/29/2011	6/29/2011	6/29/2011
Time Sampled :	16:50	12:41	12:35	12:27	16:11
%Solids :	79.7	82.7	87.0	66.3	79.2
Dilution Factor :	1.0	1.0	1.0	1.0	1.0
ANALYTE	CRQL	Result	Flag	Result	Flag
ARSENIC	1	20.9		60.2	
*LEAD	1	74.6		300	

Sample Number :	MC00H9	MC00J0	MC00J1		
Sampling Location :	062911-494-FY	062911-503-BY	062911-503-FY		
Field QC :					
Matrix :	Soil	Soil	Soil		
Units :	mg/Kg	mg/Kg	mg/Kg		
Date Sampled :	6/29/2011	6/29/2011	6/29/2011		
Time Sampled :	16:05	12:00	11:50		
%Solids :	82.1	77.7	75.8		
Dilution Factor :	1.0	1.0	1.0		
ANALYTE	CRQL	Result	Flag	Result	Flag
ARSENIC	1	57.3		83.1	
*LEAD	1	207		284	

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

To calculate sample quantitation limits: (CRQL * Dilution Factor) / (%Solids/ 100)

Revised 09/99

APPENDIX C

Chain of Custody (COC) Records



**USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record**

Case No: 41534

R

DAS No:

Region: 3		Date Shipped: 7/1/2011		Chain of Custody Record	
Project Code: CT5582	Carrier Name: FedEx	Relinquished By		Sampler Signature:	
Account Code: 2011T03N302DC6CA3PZRS00	Alrbill: 875707674425	(Date / Time)		Received By	
CERCLIS ID: PAN000306719	Shipped to: A4 Scientific			(Date / Time)	
Spill ID: APZ	1544 Sawdust Road	1			
Site Name/State: FMO Pesticide/PA	Suite 505	2			
Project Leader: Erik Armistead	The Woodlands TX 77380	3			
Action: Preliminary Assessment	(281) 292-5277	4			
Sampling Co: Weston Solutions, Inc.					

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	PRESERVATIVE/ BOTTLES	TAG No./	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MC00G9	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	553 (Not preserved) (1)		FMO-SS-062911-147-BY S:	6/29/2011 17:30		-
MC00H0	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	554 (Not preserved) (1)		FMO-SS-062911-147-FY S:	6/29/2011 17:25		-
MC00H1	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	555 (Not preserved) (1)		FMO-SS-062911-147-GAS:	6/29/2011 17:40		-
MC00H2	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	556 (Not preserved) (1)		FMO-SS-062911-147-GAS: D	6/29/2011 17:40		Field Duplicate of MC00H1
MC00H3	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	557 (Not preserved) (1)		FMO-SS-062911-454-BY S:	6/29/2011 16:45		-
MC00H4	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	558 (Not preserved) (1)		FMO-SS-062911-454-FY S:	6/29/2011 16:50		-
MC00H5	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	559 (Not preserved) (1)		FMO-SS-062911-456-BY S:	6/29/2011 12:41		-
MC00H6	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	560 (Not preserved) (1)		FMO-SS-062911-456-FY S:	6/29/2011 12:35		-
MC00H7	Surface Soil (0"-12")/ Dave Scarbo	M/G	CLP As, Pb (21)	561 (Not preserved) (1)		FMO-SS-062911-456-TPAS:	6/29/2011 12:27		-
MC00H8	Surface Soil (0"-12")/ Dave Scarbo	M/C	CLP As, Pb (21)	562 (Not preserved) (1)		FMO-SS-062911-494-BY S:	6/29/2011 16:11		-

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC: MC00J1	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: CLP As, Pb = CLP Arsenic and Lead	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?

TR Number: 3-410194923-070111-0002

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, 15000 Conference Center Dr., Chantilly, VA. 20151-3819 Phone 703/818-4200; Fax 703/818-4602

REGION COPY



USEPA Contract Laboratory Program Inorganic Traffic Report & Chain of Custody Record

Case No: 41534

R

Region: 3	Date Shipped: 7/1/2011	Chain of Custody Record	
Project Code: CT5582	Carrier Name: FedEx	Relinquished By	Sampler Signature:
Account Code: 2011T03N302DC6CA3PZRS00	Airbill: 875707674425	(Date / Time)	Received By
CERCLIS ID: PAN000306719	Shipped to: A4 Scientific 1544 Sawdust Road Suite 505 The Woodlands TX 77380 (281) 292-5277	1	(Date / Time)
Spill ID: APZ		2	
Site Name/State: FMO Pesticide/PA		3	
Project Leader: Erik Armistead		4	
Action: Preliminary Assessment			
Sampling Co: Weston Solutions, Inc.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	PRESERVATIVE/ BOTTLES	TAG No./	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MC00H9	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	563 (Not preserved) (1)		FMO-SS-062911-494-FY S:	6/29/2011 16:05		-
MC00J0	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	564 (Not preserved) (1)		FMO-SS-062911-503-BY S:	6/29/2011 12:00		-
MC00J1	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	565 (Not preserved) (1)		FMO-SS-062911-503-FY S:	6/29/2011 11:50		-

Shipment for Case Complete ? N	Sample(s) to be used for laboratory QC: MC00J1	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: CLP As, Pb = CLP Arsenic and Lead	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

IR Number: 3-410194923-070111-0002

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, 15000 Conference Center Dr., Chantilly, VA. 20151-3819 Phone 703/818-4200; Fax 703/818-4602

REGION COPY

U.S EPA Region III Analytical Request Form

Control #		CT5582		OASQA USE ONLY	
DAS#				RAS # 41534	
PES#				NSF #	
				Analytical TAT 21 days	

41534

Date: 27 June 2011		Site Activity: Removal Assessment (RS)	
Site Name: FMO Pesticide Site		Street Address: 4308 Route 309	
City: Schnecksville		State: PA	
Program: SUPERFUND		Latitude:	
Site ID: 0306719		Longitude:	
Acct #: 2011-T-03-N-302DC6C-A3PZ-RS-00		CERCLIS #: PAN000306719	
Spill ID: A3PZ		Operable Unit: 00	
Site Specific QA Plan Submitted: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (On File)		Title: Abbreviated Sampling Plan Extended Phase II Soil Sampling at the FMO Pesticide Site	
EPA Project Leader: Ruth Scharr		Phone#: 215-814-3191	
Request Preparer: [REDACTED]		Cell Phone #: 215-756-7897	
Site Leader: Erik Armistead		Phone#: 910-420-2729	
Contractor: Weston Solutions, Inc.		Cell Phone #: 484-213-8723	
#Samples: 25		EPA CO/PO: John Robb/Karen (Wodarczyk) Esposito	
Matrix: soil		Parameter: Total Lead & Total Arsenic	
Ship Date From: 01 July 2011		Ship Date To: 29 July 2011	
Unvalidated Data Requested: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		If Yes, TAT Needed: <input type="checkbox"/> 14days <input type="checkbox"/> 7days <input type="checkbox"/> 48hrs <input type="checkbox"/> 24hrs <input checked="" type="checkbox"/> Other (Specify) 21 days	
Validated Data Package Due: <input type="checkbox"/> 42 days <input type="checkbox"/> 30 days <input type="checkbox"/> 14 days <input checked="" type="checkbox"/> Other (Specify) (EDDs will be provided in Region 3 EDD Format) 28 days		Electronic Data Deliverables Required: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (EDDs will be provided in Region 3 EDD Format)	
Notes:			

CRQLs are as follows:

Lead & Arsenic 10 mg/kg

APPENDIX D

Laboratory Case Narrative

USEPA - CLP
COVER PAGE

Lab Name: A4 SCIENTIFIC, INC. Contract: EPW09035
Lab Code: A4 Case No.: 41534 Mod. Ref. No.: _____ SDG No.: MC00G9
SOW No.: ISM01.2

EPA Sample No.	Lab Sample ID
<u>MC00G9</u>	<u>0014335-01</u>
<u>MC00H0</u>	<u>0014335-02</u>
<u>MC00H1</u>	<u>0014335-03</u>
<u>MC00H2</u>	<u>0014335-04</u>
<u>MC00H3</u>	<u>0014335-05</u>
<u>MC00H4</u>	<u>0014335-06</u>
<u>MC00H5</u>	<u>0014335-07</u>
<u>MC00H6</u>	<u>0014335-08</u>
<u>MC00H7</u>	<u>0014335-09</u>
<u>MC00H8</u>	<u>0014335-10</u>
<u>MC00H9</u>	<u>0014335-11</u>
<u>MC00J0</u>	<u>0014335-12</u>
<u>MC00J1</u>	<u>0014335-13</u>
<u>MC00J1D</u>	<u>1070010-DUP2</u>
<u>MC00J1S</u>	<u>1070010-MS2</u>

	(Yes/No)	ICP-AES	ICP-MS
Were ICP-AES and ICP interelement corrections applied?		<u>Yes</u>	_____
Were ICP-AES and ICP background corrections applied?		<u>Yes</u>	_____
If yes, were raw data generated before application of background corrections?		<u>No</u>	_____

The laboratory did not receive any instructions with this SDG to modify the SOW standard laboratory sample preparation procedures (e.g., subsampling). To aid in the determination of data usability with respect to project decisions, any modifications performed are described below.

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: *Sree Geerupalli* Name: ~~XXXXXXXXXX~~ SREE LAKSHMI GEERUPALLI
Date: 7/11/11 Title: Data Reviewer

A4 SCIENTIFIC, INC.

1544 Sawdust Road, Suite 505 • The Woodlands, TX 77380 • Phone (281) 292-5277

Contract #: EPW09035	Case #: 41534	SDG #: MC00G9
----------------------	---------------	---------------

SDG NARRATIVE

SAMPLE RECIEPT & LOGIN

The following samples were received on the dates listed against them. The samples were logged in for analysis as listed.

<u>Client Sample</u>	<u>Lab Sample</u>	<u>Matrix</u>	<u>#Cont.</u>	<u>Received</u>	<u>Analysis</u>	<u>Comments</u>
MC00G9	0014335-01	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	1st Sx
MC00H0	0014335-02	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H1	0014335-03	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H2	0014335-04	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H3	0014335-05	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H4	0014335-06	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H5	0014335-07	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H6	0014335-08	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H7	0014335-09	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H8	0014335-10	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00H9	0014335-11	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00J0	0014335-12	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	
MC00J1	0014335-13	Soil	1	07/02/11 10:51	ISM01.2 ICPAES	MS/Dup

No issues were encountered during sample receive and log in.

ICP-AES

Soil Samples were digested by Hot-Block technique (3050B) and analyzed using a Thermo Electron ICAP6500.

MS and DUP were performed on sample "MC00J1" and they were within the QC limits.

Serial Dilution is performed on sample "MC00J1" and they were within the QC limits.

No problems were encountered during sample preparation or analysis.

A4 SCIENTIFIC, INC.

1544 Sawdust Road, Suite 505 • The Woodlands, TX 77380 • Phone (281) 292-5277

Contract #: EPW09035

Case #: 41534

SDG #: MC00G9

SDG NARRATIVE

The following equations are used for calculation of sample results from raw instrument output data:

ICP-AES

SOIL Samples:

$$\text{Concentration (dry Wt.) (mg/kg)} = \frac{C * V}{W * S} * DF$$

Where,

C = Concentration (mg/L)

V = Final sample volume in Liters (L) (0.1L)

W = Wet sample weight (kg) (0.001kg)

S = % solids/100

DF = Dilution Factor

A4 Scientific1544 Sawdust Road, Suite 505
The Woodlands, TX 77380
281-292-5277

Percent Solids Logbook

Effective	Area	Type	Number-Version	RCN
15-June-2009	WET CHEM	FORM	SFORM03-A	887-1222

DATE IN: 07/05/11 TIME IN: 16:00 TEMP IN: 104°CDATE OUT (1): 07/06/11 TIME OUT (1): 10:00 TEMP OUT (1): 104°CDATE OUT (2): — TIME OUT (2): — TEMP OUT (2): —DATE OUT (3): — TIME OUT (3): — TEMP OUT (3): —SOP: 5SOP03-A Method: ASTMD2216-92/SM2540G/ILM05.4 SOM 1.2 other ISM 01.2Oven ID: A Thermometer ID: SPer-1 02/7/5/11

Pan # A	Lab Sample ID B	Client Sample ID C	Pan Weight (g) D	Pan + Wet Sample (g) E	Pan + Dry Sample #1 (g) F	Pan + Dry Sample #2 (g) F	Pan + Dry Sample #3 (g) F	Percent solids ** I
37	1070031- BLK	PMBLK18	1.804	1.804	1.804	NA	NA	—
80	0014335-D	MC00G9	1.884	8.123	7.335			87.4
34	-02	MC00H0	1.897	8.458	7.372			83.4
21	-03	MC00H1	1.863	8.018	6.477			75.0
15	-04	MC00H2	1.897	8.808	7.094			75.2
63	-05	MC00H3	1.838	8.512	7.229			80.8
62	-06	MC00H4	1.876	8.073	6.818			79.7
80	-07	MC00H5	1.813	8.213	7.106			82.7
330	-08	MC00H6	1.811	8.158	7.336			87.0
104	-09	MC00H7	1.855	8.136	6.022			66.03 ^{7/2}
172	-10	MC00H8	1.846	8.569	7.172			79.2 ⁷⁻⁶⁻¹¹
120	-11	MC00H9	1.858	8.499	7.308			82.1
180	-12	MC00J0	1.886	8.099	6.716			77.7
121	-13	MC00J1	1.821	8.263	6.705			75.8
18	1070031- D&P1	MC00J1D	1.849	8.206	6.716	↓	↓	76.6
RD 07/06/11								

Notes:

Analyst/Date: 7/4 07/6/11Reviewer/Date: 07-07-2011

Final Dry Weight (F) is used when monitored final weights are consistent.

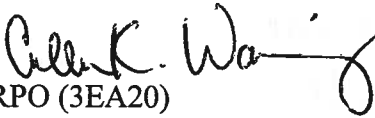
**Percent solids(G) = {(F-D)/(E-D)} * 100



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
Environmental Sciences Center
701 Mapes Road
Fort Meade, Maryland 20755-5350**

DATE : August 17, 2011

SUBJECT: Region III Data QA Review

FROM: Colleen Walling 
Region III ESAT RPO (3EA20)

TO: Ruth Scharr
On-Scene Coordinator (3HS31)

Attached is the inorganic data validation report for the FMO Pesticide site (Case#: 41534; SDG#: MC00L9) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III EAID.

If you have any questions regarding this review, please call me at (410) 305-2763.

Attachment

cc:  (Weston)

TO: #0037 TDF: #08041

OFFICE OF ANALYTICAL SERVICES AND QUALITY ASSURANCE

Lockheed Martin IS&GS – Civil
Energy & Environment
ESAT Region 3
US EPA Environmental Science Center
701 Mapes Road Ft. Meade, MD 20755-5350
Telephone 410-305-3037 Facsimile 410-305-3597



Date: August 16, 2011

Subject: Inorganic Data Validation (IM2 Level)
Case: 41534
SDG: MC00L9
Site: FMO Pesticide

From: Kurt Roby *KR*
Inorganic Data Reviewer

Mahboobeh Mecanic *MM*
Senior Oversight Chemist

To: Colleen Walling
ESAT Region 3 Project Officer

OVERVIEW

Case 41534, Sample Delivery Group (SDG) MC00L9, consisted of four (4) soil samples including one (1) field duplicate pair analyzed for total arsenic (As) and lead (Pb) by ICP-AES. Samples were analyzed by A4 Scientific, Inc. (A4) according to Contract Laboratory Program (CLP) Statement of Work (SOW) ISM01.2 through the Routine Analytical Services (RAS) program.

SUMMARY

Data were validated according to Region 3 Modifications to the National Functional Guidelines for Inorganic Data Review, Level IM2, and is assigned the Superfund Data Validation Label S4VM (Stage_4_Validation_Manual). No problems were detected during the validation of this data set.

NOTES

Relative Percent Differences (RPDs) in the laboratory duplicate analysis were outside contractual control limits [20% RPD, \pm Contract Required Quantitation Limit (CRQL)] for As and Pb. However, RPDs for these analytes were within Region 3 established control limits (35% RPD, $\pm 2 \times$ CRQL) for soil analysis. No data were qualified for these analytes based on laboratory duplicate imprecision.

Reported results for field duplicate pair MC00M1/MC00M2 were within 35% RPD, $\pm 2X$ CRQL for both analytes.

ATTACHMENTS

INFORMATION REGARDING REPORT CONTENT

Appendix A Glossary of Data Qualifier Codes

Appendix B Data Summary Form(s)

Appendix C Chain of Custody Records

Appendix D Laboratory Case Narrative

DCN: 41534_ MC00L9

Appendix A

Glossary of Data Qualifier Codes

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of compounds)

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unusable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

Appendix B

Data Summary Forms

DATA SUMMARY FORM: INORGANIC

Page 1 of 1

Case #: 41534

SDG : MC00L9

Number of Soil Samples : 4

Site :

FMO PESTICIDE

Number of Water Samples : 0

Lab. :

A4

Sample Number :		MC00L9	MC00M0		MC00M1		MC00M2		
Sampling Location : (Prefix : FMO-SS-)		072611-0460-BY	072611-0460-FY		072611-0460-GA		072611-0460-GAD		
Field QC :					Dup. of MC00M2		Dup. of MC00M1		
Matrix :		Soil	Soil		Soil		Soil		
Units :		mg/Kg	mg/Kg		mg/Kg		mg/Kg		
Date Sampled :		07/26/2011	07/26/2011		07/26/2011		07/26/2011		
Time Sampled :		16:30	16:15		16:40		16:41		
% Solids :		82.7	82.4		79.1		77.9		
Dilution Factor :		1.0	1.0		1.0		1.0		
ANALYTE	CRQL	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ARSENIC	1.0	58.8		63.3		44.0		41.3	
LEAD	1.0	209		240		149		131	

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

To calculate sample quantitation limits: (CRQL * Dilution Factor)

Revised 09/99



USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record

Case No: 41534
DAS No:

R

Region: 3	Date Shipped: 7/27/2011	Chain of Custody Record	
Project Code: CT5582	Carrier Name: FedEx	Relinquished By	Sampler Signature:
Account Code: 2011T03N302DC6CA3PZRS00	Airbill: 865628633360	(Date / Time)	Received By (Date / Time)
CERCLIS ID: PAN000306719	Shipped to: A4 Scientific	1	
Spill ID: A3PZ	1544 Sawdust Road	2	
Site Name/State: FMO Pesticide/PA.	Suite 505	3	
Project Leader: Erik Armistead	The Woodlands TX 77380	4	
Action: Preliminary Assessment	(281) 292-5277		
Sampling Co: Weston Solutions, Inc.			

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MC00L9	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	593 (Not preserved) (1)	FMO-SS-072611-0460-BYS	7/26/2011 16:30		
MC00M0	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	594 (Not preserved) (1)	FMO-SS-072611-0460-FYS	7/26/2011 16:15		
MC00M1	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	595 (Not preserved) (1)	FMO-SS-072611-0460-GAS	7/26/2011 16:40		
MC00M2	Surface Soil (0"-12")/ Dave Scerbo	M/C	CLP As, Pb (21)	596 (Not preserved) (1)	FMO-SS-072611-0460-GAS D	7/26/2011 16:41		Field Duplicate of MC00M1

Shipment for Case Complete 7Y	Sample(s) to be used for laboratory QC: MC00M0	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: CLP As, Pb = CLP Arsenic and Lead	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

TR Number: 3-410194923-072711-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, 15000 Conference Center Dr., Chantilly, VA, 20151-3819 Phone 703/818-4200; Fax 703/818-4602

REGION COPY

U.S EPA Region III Analytical Request Form

OASQA USE ONLY			
Control #	CT5582	RAS #	41534
DAS#		NSF #	
PES #		Analytical TAT	21 days

41534

Date: 27 June 2011		Site Activity: Removal Assessment (RS)	
Site Name: FMO Pesticide Site		Street Address: 4308 Route 309	
City: Schnecksville	State: PA	Latitude:	Longitude:
Program: SUPERFUND	Acct. #: 2011-T-03-N-302DC6C-A3PZ-RS-00	CERCLIS #: PAN000306719	
Site ID: 0306719	Spill ID: A3PZ	Operable Unit: 00	
Site Specific QA Plan Submitted: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (On File)		Title: Abbreviated Sampling Plan Extended Phase II Soil Sampling at the FMO Pesticide Site	
EPA Project Leader: Ruth Scharr	Phone#: 215-814-3191	Cell Phone #: 215-756-7897	Date Approved: 24 June 2011
Request Preparer: Christina Schauss	Phone#: 910-420-2729	Cell Phone #: 443-564-6609	E-mail: Scharr.Ruth@epa.gov
Site Leader: Erik Armistead	Phone#: 610-701-3548	Cell Phone #: 484-213-8723	westonsolutions.com
Contractor: Weston Solutions, Inc.	EPA CO/PO: John Robb/Karen (Wodarczyk) Esposito		stonsolutions.com
#Samples: 25	Matrix: soil	Parameter: Total Lead & Total Arsenic	Method: ISM01.2 (ICP-AES)
Ship Date From: 01 July 2011	Ship Date To: 29 July 2011	Org. Validation Level	Inorg. Validation Level IM-2
Unvalidated Data Requested: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If Yes, TAT Needed: <input type="checkbox"/> 14days <input type="checkbox"/> 7days <input type="checkbox"/> 48hrs <input type="checkbox"/> 24hrs <input checked="" type="checkbox"/> Other (Specify) 21 days		34040	
Validated Data Package Due: <input type="checkbox"/> 42 days <input type="checkbox"/> 30 days <input type="checkbox"/> 14 days <input checked="" type="checkbox"/> Other (Specify) (EDDs will be provided in Region 3 EDD Format) 28 days		21/7	
Electronic Data Deliverables Required: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (EDDs will be provided in Region 3 EDD Format)			

Notes:

CRQLs are as follows:

Lead & Arsenic 10 mg/kg

Appendix D

Laboratory Case Narrative

USEPA - CLP

COVER PAGE

Lab Name: A4 SCIENTIFIC, INC.Contract: EPW09035Lab Code: A4 Case No.: 41534 Mod. Ref. No.: _____ SDG No.: MC00L9SOW No.: ISM01.2

EPA Sample No.

MC00L9
MC00M0
MC00M0D
MC00M0S
MC00M1
MC00M2

Lab Sample ID

0014482-01
0014482-02
1080001-DUP2
1080001-MS2
0014482-03
0014482-04Were ICP-AES and ICP interelement
corrections applied?

(Yes/No)

ICP-AES

Yes

ICP-MS

Were ICP-AES and ICP background corrections
applied?

(Yes/No)

YesIf yes, were raw data generated before
application of background corrections?

(Yes/No)

No

The laboratory did not receive any instructions with this SDG to modify the SOW standard laboratory sample preparation procedures (e.g., subsampling). To aid in the determination of data usability with respect to project decisions, any modifications performed are described below.

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature

Signature: *Laxmi Teerupalli*Name: Laxmi TeerupalliDate 08/04/2011Title: Data Reviewer

A4 SCIENTIFIC, INC.

1544 Sawdust Road, Suite 505 • The Woodlands, TX 77380 • Phone (281) 292-5277

Contract #: EPW09035	Case #: 41534	SDG #: MC00L9
----------------------	---------------	---------------

SDG NARRATIVE

SAMPLE RECIEPT & LOGIN

The following samples were received on the dates listed against them. The samples were logged in for analysis as listed.

MC00L9	0014482-01	Soil	1	07/28/11 10:06	ISM01.2 ICPAES	1st Sx
MC00M0	0014482-02	Soil	1	07/28/11 10:06	ISM01.2 ICPAES	MS/Dup
MC00M1	0014482-03	Soil	1	07/28/11 10:06	ISM01.2 ICPAES	
MC00M2	0014482-04	Soil	1	07/28/11 10:06	ISM01.2 ICPAES	Last Sx

No issues were encountered during sample receive and log in.

No other discrepancies or issues were noted during receipt and login.

ICP-AES

Soil Samples were digested by Hot-Block technique (3050B) and analyzed using a Thermo Electron ICAP6500.

MS and DUP were performed on sample "MC00M0" and they were within the QC limits. The RPD is outside the control limit for As & Pb.

Serial Dilution is performed on sample "MC00M0" and they were within the QC limits.

No problems were encountered during sample preparation or analysis.

The following equations are used for calculation of sample results from raw instrument output data:

ICP-AES

SOIL Samples:

$$\text{Concentration (dry Wt.) (mg/kg)} = \frac{C * V}{W * S} * DF$$

Where,

C = Concentration (mg/L)

V = Final sample volume in Liters (L) (0.1L)

W = Wet sample weight (kg) (0.001kg)

S = % solids/100

DF = Dilution Factor

SAMPLE LOG-IN SHEET

14482-A

Lab Name A4SCIENTIFIC		Page <u>1</u> of <u>1</u>
Received By (Print Name) RAJANI NEPAL		Log-in Date <u>7/28/11</u>
Received By (Signature) <u>Rajan</u>		
Case Number <u>41534</u>	Sample Delivery Group No. <u>MC00L9</u>	Mod. Ref. No. <u>NA</u>

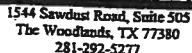
Remarks:	
1. Custody Seal(s)	<u>Present/Absent*</u> <u>Intact/Broken</u>
2. Custody Seal NOS.	<u>NA</u>
3. Traffic Reports/Chain of Custody Records or Packing Lists	<u>Present/Absent*</u>
4. Airbill	<u>Airbill/Sticker Present/Absent*</u>
5. Airbill No.	<u>86562863</u> <u>3360</u>
6. Sample Tags	<u>Present/Absent*</u>
Sample Tag Numbers	<u>Listed/Not Listed on Traffic Report/Chain of Custody Record</u>
7. Sample Condition	<u>Intact/Broken*/Leaking</u>
8. Cooler Temperature Indicator Bottle	<u>Present/Absent*</u>
9. Cooler Temperature	<u>4°C</u>
10. Does information on Traffic Reports/Chain of Custody Records and sample tags agree?	<u>Yes/No*</u>
11. Date Received at Lab	<u>7/28/11</u>
12. Time Received	<u>10:06</u>

Sample Transfer	
Fraction <u>ICP-AES</u>	Fraction <u> </u>
Area# <u>COOLER-A</u>	Area# <u> </u>
By <u>A</u>	By <u> </u>
On <u>7/28/11</u>	On <u> </u>

	EPA Sample #	Aqueous/ Water Sample pH	Corresponding		Remarks: Condition of Sample Shipment, etc.
			Sample Tag #	Assigned Lab #	
1	<u>MC00L9</u>	<u>NA</u>	<u>593</u>	<u>0014482-01</u>	<u>1-80% intact</u>
2	<u>M0</u>	<u>1</u>	<u>594</u>	<u>-02</u>	<u>1</u>
3	<u>M1</u>	<u>1</u>	<u>595</u>	<u>-03</u>	<u>1</u>
4	<u>M2</u>	<u>1</u>	<u>596</u>	<u>-04</u>	<u>1</u>
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

* Contact SMO and attach record of resolution

Reviewed By <u> </u>	Logbook No. <u>NA</u>
Date <u>7/28/11</u>	Logbook Page No. <u>NP</u>



Effective	Area	Type	Number-Version	RCN
15-June-2009	WET CHEM	FORM	5FORM03-A	887-1222

SOP: SSOP03-A Method: ASTM D2216-92/SM2540G/ILM05.4/SOM1.2 other ISM01.2
Oven ID: A Thermometer ID: SPER-1

Pan # A	Lab Sample ID B	Client Sample ID C	Pan Weight (g) D	Pan + Wet Sample (g) E	Pan + Dry Sample #1 (g) F	Pan + Dry Sample #2 (g) F	Pan + Dry Sample #3 (g) F	Percent solids ** I
35	106503-7- BLK1	PMBLK57	1.845	1.845	1.845	NA	NA	—
22	0014482-01	MCDOL9	1.874	8.055	6.984	↓	↓	82.7
104	↓ -02	MCOOM0	1.855	8.626	7.437	↓	↓	82.4
14	↓ -03	MCOOM1	1.899	8.337	6.993	↓	↓	79.1
40	↓ -04	MCOOM2	1.853	8.139	6.751	↓	↓	77.9
102	106503-7- DUP1	MCDOMD	1.834	8.695	7.505	↓	↓	82.7
91	0014485-01	MB9AT1	1.830	8.081	6.695	↓	↓	77.8
210	↓ -02	MB9AT2	1.868	8.581	7.431	↓	↓	82.9
129	106503-7- DUP2	MB9ATID	1.830	8.064	6.748	↓	↓	78.9
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> 7/3 07/30/11 </div>								

Notes:

Final Dry Weight (F) is used when monitored final weights are consistent.

$$^{**}\text{Percent solids}(G) = \{(F-D)/(E-D)\} * 100$$

SAMPLE LOG-IN SHEET

14335-A

Lab Name A4SCIENTIFIC		Page 1 of 1
Received By (Print Name) RAJANI NEPAL		Log-in Date 7/2/11
Received By (Signature) <i>Rajani</i>		
Case Number 41534	Sample Delivery Group No. MC00G19	Mod. Ref. No. NA

Remarks:	
1. Custody Seal(s)	<u>Present/Absent*</u> <u>Intact/Broken</u>
2. Custody Seal NOs.	<u>NA</u>
3. Traffic Reports/Chain of Custody Records or Packing Lists	<u>Present/Absent*</u>
4. Airbill	<u>Airbill/Sticker Present/Absent*</u>
5. Airbill No.	<u>8757076</u> <u>74425</u>
6. Sample Tags	<u>Present/Absent*</u>
Sample Tag Numbers	<u>Listed/Not Listed on Traffic Report/Chain of Custody Record</u>
7. Sample Condition	<u>Intact/Broken*/Leaking</u>
8. Cooler Temperature Indicator Bottle	<u>Present/Absent*</u>
9. Cooler Temperature	<u>4°C</u>
10. Does information on Traffic Reports/Chain of Custody Records and sample tags agree?	<u>Yes/No*</u>
11. Date Received at Lab	<u>4°C</u>
12. Time Received	<u>10:51</u>

	EPA Sample #	Aqueous/ Water Sample pH	Corresponding		Remarks: Condition of Sample Shipment, etc.
			Sample Tag #	Assigned Lab #	
1	MC00G19	NA	553	00014335-01	1-804 mt
2	H0		554	-02	
3	H1		555	-03	
4	H2		556	-04	
5	H3		557	-05	
6	H4		558	-06	
7	H5		559	-07	
8	H6		560	-08	
9	H7		561	-09	
10	H8		562	-10	
11	H9		563	-11	
12	J0		564	-12	
13	J1		565	-13	
14					
15					
16					
17					
18					
19					
20					
21					
22					

Sample Transfer	
Fraction ICP-AES	Fraction
Area# Cooler-A	Area#
By <i>R</i>	By <i>R</i>
On 7/2/11	On 7/2/11

* Contact SMO and attach record of resolution

Reviewed By <i>KRM</i>	Logbook No. NA
Date 7/2/11	Logbook Page No. NA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
Environmental Sciences Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

DATE : September 23, 2011

SUBJECT: Region III Data QA Review

FROM: Colleen Walling *Colleen K. Walling*
Region III ESAT RPO (3EA20)

TO: Ruth Scharr
On-Scene Coordinator (3HS31)

Attached is the inorganic data validation report for the FMO Pesticide site (Case#: 41713; SDG#: MC74B2) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III EAID.

If you have any questions regarding this review, please call me at (410) 305-2763.

Attachment

cc: [REDACTED] (Weston)

TO: #0037 TDF: #09038

OFFICE OF ANALYTICAL SERVICES AND QUALITY ASSURANCE

Lockheed Martin IS&GS – Civil
Energy & Environment
ESAT Region 3
US EPA Environmental Science Center
701 Mapes Road Ft. Meade, MD 20755-5350
Telephone 410-305-3037 Facsimile 410-305-3597



Date: September 22, 2011

Subject: Inorganic Data Validation (IM2 Level)
Case: 41713
SDG: MC74B2
Site: FMO Pesticide

From: Kurt Roby *KR*
Inorganic Data Reviewer

Mahboobeh Mecanic^{AM}
Senior Oversight Chemist

To: Colleen Walling
ESAT Region 3 Project Officer

OVERVIEW

Case 41713, Sample Delivery Group (SDG) MC74B2, consisted of three (3) soil samples including one (1) field duplicate pair analyzed for total arsenic (As) and total lead (Pb) by ICP-AES. Samples were analyzed by Bonner Analytical Testing Company (BONNER) according to Contract Laboratory Program (CLP) Statement of Work (SOW) ISM01.2 through the Routine Analytical Services (RAS) program.

SUMMARY

Data were validated according to Region 3 Modifications to the National Functional Guidelines for Inorganic Data Review, Level IM2, and is assigned the Superfund Data Validation Label S4VM (Stage_4_Validation_Manual). No problems were detected during the validation of this data set.

NOTES

The sample cooler containing all samples had an interior temperature of 9.4°C, which exceeded the required cooler temperature of 4.0°C±2.0°C. Due to thermostability of metals, no data were qualified based on the sample cooler chest temperature.

Reported results for field duplicate pair MC74B3/MC74B4 were within 35% RPD, ± 2X Contract Required Quantitation Limits (CRQLs) for both analytes.

ATTACHMENTS

INFORMATION REGARDING REPORT CONTENT

Appendix A Glossary of Data Qualifier Codes
Appendix B Data Summary Form(s)
Appendix C Chain of Custody Records
Appendix D Laboratory Case Narrative

DCN: 41713_ MC74B2

Appendix A

Glossary of Data Qualifier Codes

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of compounds)

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unusable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

Appendix B

Data Summary Forms

DATA SUMMARY FORM: INORGANIC

Page 1 of 1

Case #: 41713

SDG : MC74B2

Number of Soil Samples : 3

Site :

FMO PESTICIDE

Number of Water Samples : 0

Lab. :

BONNER

Sample Number :		MC74B2		MC74B3		MC74B4			
Sampling Location : (Prefix : FMO-SS-)		082211-136-BY		082211-136-FY		082211-136-FYdup			
Field QC :				Dup. of MC74B4		Dup. of MC74B3			
Matrix :		Soil		Soil		Soil			
Units :		mg/Kg		mg/Kg		mg/Kg			
Date Sampled :		08/22/2011		08/22/2011		08/22/2011			
Time Sampled :		16:05		15:50		15:51			
% Solids :		72.7		67.3		67.6			
Dilution Factor :		1.0		1.0		1.0			
ANALYTE	CRQL	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ARSENIC	1.0	24.7		28.0		27.5			
LEAD	1.0	80.2		91.2		95.4			

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

To calculate sample quantitation limits: (CRQL * Dilution Factor) / (%Solids/ 100)

Revised 09/99

Appendix C

Chain of Custody Records



**USEPA Contract Laboratory Program
Inorganic Traffic Report & Chain of Custody Record**

Case No: 41713

DAS No:

R

Region: 3		Date Shipped: 9/2/2011		Chain of Custody Record	
Project Code: CT5670		Carrier Name: FedEx		Sampler Signature:	
Account Code: 2011T03N302DC6CA2PZRS00		Airbill: 875805542379		Relinquished By (Date / Time)	
CERCLIS ID: PAN000306719		Shipped to: Bonner Analytical Testing Company		Received By (Date / Time)	
Spill ID: APZ				1	
Site Name/State: FMO Pesticide/PA				2	
Project Leader: Erik Armistead				3	
Action: Preliminary Assessment				4	
Sampling Co: Weston Solutions					

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	PRESERVATIVE/ Bottles	TAG No./	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	OC Type
MC74B2	Soil/Sediment/ Jessica Duffy	M/G	AsPb (28)	454 (Not preserved) (1)		FMO-SS-082211-136-BY S:	8/22/2011 16:05		--
MC74B3	Soil/Sediment/ Jessica Duffy	M/G	AsPb (28)	455 (Not preserved) (1)		FMO-SS-082211-136-FY S:	8/22/2011 15:50		--
MC74B4	Soil/Sediment/ Jessica Duffy	M/G	AsPb (28)	456 (Not preserved) (1)		FMO-SS-082211-136-FY S: dup	8/22/2011 15:51		Field Duplicate

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: AsPb = Arsenic/Lead	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment lead?

TR Number: 3-180203777-090211-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, 15000 Conference Center Dr., Chantilly, VA, 20151-3819 Phone 703/818-4200; Fax 703/818-4602

REGION COPY

U.S EPA Region III Analytical Request Form

OASQA USE ONLY			
Control #	CT5670	RAS #	41713
DAS#		NSF #	21 days
PES #		Analytical TAT	

41713

Date: 24 August 2011		Site Activity: Removal Assessment (RS)	
Site Name: FMO Pesticide Site		Street Address: 4308 Route 309	
City: Schnecksville	State: PA	Latitude:	Longitude:
Program: SUPERFUND	Acct. #: 2011-T-03-N-302DC6C-A3PZ-RS-00	CERCLIS #: PAN000306719	
Site ID:	Spill ID: A3PZ	Operable Unit: 00	
Site Specific QA Plan Submitted: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (On File)			
Title: Abbreviated Sampling Plan Extended Phase II Soil Sampling at the FMO Pesticide Site			
EPA Project Leader: Ruth Scharr	Phone#: 215-814-3191	Cell Phone #: 215-756-7897	Date Approved: 24 June 2011
Request Preparer: Christina Schauss	Phone#: 910-420-2729	Cell Phone #: 443-564-6609	E-mail: Scharr.Ruth@epa.gov
Site Leader: Erik Armistead	Phone#: 610-701-3548	Cell Phone #: 484-213-8723	s@westonsolutions.com
Contractor: Weston Solutions, Inc.	EPA CO/PO: John Robb/Karen (Wodarczyk) Esposito		
#Samples: 20	Matrix: soil	Parameter: Total Lead & Total Arsenic	Method: ISM01.2 (ICP-AES)
Ship Date From: 29 August 2011	Ship Date To: 30 September 2011	Org. Validation Level	Inorg. Validation Level IM-2
Unvalidated Data Requested: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If Yes, TAT Needed: <input type="checkbox"/> 14days <input type="checkbox"/> 7days <input type="checkbox"/> 48hrs <input type="checkbox"/> 24hrs <input checked="" type="checkbox"/> Other		(Specify) 21 days	
Validated Data Package Due: <input type="checkbox"/> 42 days <input type="checkbox"/> 30 days <input type="checkbox"/> 21days <input type="checkbox"/> 14 days <input checked="" type="checkbox"/> Other (Specify) (EDDs will be provided in Region 3 EDD Format)		28 days	
Electronic Data Deliverables Required: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (EDDs will be provided in Region 3 EDD Format)			
Notes:			
CRQLs are as follows:			
Lead & Arsenic 10 mg/kg			



RE: Case # 41586

Scerbo, David to: Schauss (Altimari), Christina, Judy Snyder,
Armistead, Erik, Duffy, Jessica

09/16/2011 02:53 PM

Field Duplicates for the two cases are as follows:

41586:

- MC7487, field duplicate of MC7486
- MC74B0, field duplicate of MC74A9

41713:

- MC74B4, field duplicate of MC74B3

Thanks,
Dave

-----Original Message-----

From: Schauss (Altimari), Christina

Sent: Friday, September 16, 2011 2:33 PM

To: Snyder.Judy@epamail.epa.gov; Armistead, Erik; Scerbo, David; Duffy,
Jessica

Subject: FW: Case # 41586

Judy,

41586 attached.

[REDACTED]
Weston Solutions, Inc.
Office 910-420-2729
Cell 443-564-6609

-----Original Message-----

From: Schauss (Altimari), Christina

Sent: Tuesday, August 30, 2011 1:25 PM

To: Snyder.Judy@epamail.epa.gov

Subject: FW: Case # 41586

Judy,

2 Regional TRs attached for samples shipped on Friday from the FMO Pesticide
Site - RAS 41586.

[REDACTED]
Weston Solutions, Inc.
Office 910-420-2729
Cell 443-564-6609

-----Original Message-----

From: Snyder.Judy@epamail.epa.gov [mailto:Snyder.Judy@epamail.epa.gov]

Appendix D

Laboratory Case Narrative

USEPA - CLP
COVER PAGE

Lab Name: Bonner Analytical Testing Contract: EPW09037
 Lab Code: BONNER Case No.: 41713 Mod. Ref. No.: _____ SDG No.: MC74B2
 SOW No.: ISM01.2

EPA Sample No.	Lab Sample ID
<u>MC74B2</u>	<u>1109074-01</u>
<u>MC74B2D</u>	<u>1090802-DUP1</u>
<u>MC74B2S</u>	<u>1090802-MS1</u>
<u>MC74B3</u>	<u>1109074-02</u>
<u>MC74B4</u>	<u>1109074-03</u>

Were ICP-AES and ICP interelement corrections applied?	(Yes/No)	ICP-AES <u>Yes</u>	ICP-MS _____
Were ICP-AES and ICP background corrections applied?	(Yes/No)	<u>Yes</u>	_____
If yes, were raw data generated before application of background corrections?	(Yes/No)	<u>Yes</u>	_____

The laboratory did not receive any instructions with this SDG to modify the SOW standard laboratory sample preparation procedures (e.g., subsampling). To aid in the determination of data usability with respect to project decisions, any modifications performed are described below.

Comments:

 I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature:

Signature:  Name: Brandon G. Beck For Chris Bonner
 Date: 9/15/10 Title: President

Bonner Analytical Testing Company



2703 Oak Grove Road, Hattiesburg, MS 39402
Phone: (601) 264-2854 Fax: (601) 268-7084

SDG NARRATIVE:

SDG Number: MC74B2

Case Number: 41713

Contract Number: EPW09037

Sample Receipt:

On September 3, 2011 we received 3 soils via FedEx air bill 8758 0554 2379. Custody seals were present and intact. Cooler temperature was determined to be 9.4°C. Samples were in good condition except for the following discrepancy.

Issue: The TR/COC lists the TAT as 28 days however, per scheduling the TAT is 21 days.

Resolution: In accordance with previous direction from Region 3, the laboratory will proceed with the turnaround time indicated on the Scheduling Notification Form, note the issue in the SDG Narrative, and proceed with the analysis of the samples. The resolution will be applied to all TR/COCs received for this Case that list an incorrect turnaround time.

Issue: No sample was designated for laboratory QC, or the TR/COC indicated QC is not required however, per scheduling, laboratory QC is required. Resolution: In accordance with previous direction from Region X, the laboratory will select a sample for laboratory QC as long as the sample is not a PE, blank, or rinsate sample and laboratory QC can be performed at full volume. The laboratory will note the issue in the SDG Narrative and proceed with the analysis of the samples.

The lab will select sample MC74B2 as QC.

Metals

No Discrepancies

Mercury

No Discrepancies

Sample Equation:Lab ID 1109074-01EPA Sample # MC74B2Date & Time 9/12/11 @ 15:54

$$\begin{array}{ccccccc}
 \text{Metals: } 179.89 & \mu\text{g/L} & (0.100 \text{ L}) & 100 \% & 1000 \text{ g} & 1 \text{ mg} & \\
 (\text{Analyte } \underline{\text{As}}) & * & * & * & * & * & \\
 & & (1.00 \text{ g}) & 72.7 \% & 1 \text{ kg} & 1000 \mu\text{g} & = 24.7 \text{ mg/kg}
 \end{array}$$

Authorized by


James McGlothlin
Document Control Officer

SAMPLE LOG-IN SHEET

Lab Name <u>BONNER ANALYTICAL TESTING</u>		Page <u>1</u> of <u>1</u>
Received By (Print Name) <u>PATRICIA A. KEN</u>		Log-in Date <u>9-8-11</u>
Received By (Signature) <u>Patricia Aiken</u>		
Case Number <u>411713</u>	Sample Delivery Group No. <u>MC74B2</u>	Mod. Ref. No. <u>N/A</u>

Remarks:		Corresponding				Remarks: Condition of Sample Shipment, etc.
	Present/Absent* Intact/Broken	EPA Sample #	Aqueous/ Water Sample pH	Sample Tag #	Assigned Lab #	
1. Custody Seal(s)	<u>Present/Absent*</u>					
2. Custody Seal NOS.	<u>N/A</u>					
3. Traffic Reports/Chain of Custody Records or Packing Lists	<u>Present/Absent*</u>					
4. Airbill	<u>Airbill/Sticker</u> <u>Present/Absent*</u>					
5. Airbill No.	<u>8758 0554 2319</u> <u>N/A</u>					
6. Sample Tags	<u>Present/Absent*</u>					
Sample Tag Numbers	<u>Listed/Not</u> <u>Listed on</u> <u>Traffic</u> <u>Report/Chain of</u> <u>Custody Record</u>					
7. Sample Condition	<u>Intact/Broken*/</u> <u>Leaking</u>					
8. Cooler Temperature Indicator Bottle	<u>Present/Absent*</u>					
9. Cooler Temperature	<u>9.4°C</u>					
10. Does information on Traffic Reports/Chain of Custody Records and sample tags agree?	<u>Yes/No*</u>					
11. Date Received at Lab	<u>9-3-11</u>					
12. Time Received	<u>11:35</u>					
Sample Transfer						
Fraction	Fraction					
Area#	Area#					
By	By					
On	On					

* Contact SMO and attach record of resolution.

Reviewed By <u>PA</u>	Logbook No. <u>9-8-11</u>
Date <u>9-9-11</u>	Logbook Page No. <u>PA</u>

SDG No:	MC7B42	Case No.:	41713	Batch No.:	1091404
Date Began:	09/08/11	Time Began:	10:10	Temperature Began:	102.0
Date Finished:	09/09/11	Time Finished:	12:02	Temperature Finished:	104.0

[illegible]

Weighed By KLP Date: 9/8/2011
 Analyst: JMM Date: 9/9/2011
 Supervisor: BGB Date: 9/14/2011



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
Environmental Sciences Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

DATE : November 3, 2011

SUBJECT: Region III Data QA Review

FROM: Colleen Walling *Colleen C. Walling*
Region III ESAT RPO (3EA20)

TO: Ruth Scharr
On-Scene Coordinator (3HS31)

Attached is the inorganic data validation report for the FMO Pesticide site (Case#: 41912; SDG#: MC00Z6) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III EAID.

If you have any questions regarding this review, please call me at (410) 305-2763.

Attachment

cc: [REDACTED] (Weston)

TO: #0037 TDF: #11014

OFFICE OF ANALYTICAL SERVICES AND QUALITY ASSURANCE

Lockheed Martin IS&GS – Civil
Energy & Environment
ESAT Region 3
US EPA Environmental Science Center
701 Mapes Road Ft. Meade, MD 20755-5350
Telephone 410-305-3037 Facsimile 410-305-3597

LOCKHEED MARTIN
We never forget who we're working for™



Date: November 3, 2011

Subject: Inorganic Data Validation (IM2 Level)
Case: 41912
SDG: MC00Z6
Site: FMO Pesticide

From: Kurt Roby *KR*
Inorganic Data Reviewer

Mahboobeh Mecanic *AM*
Senior Oversight Chemist

To: Colleen Walling
ESAT Region 3 Project Officer

OVERVIEW

Case 41912, Sample Delivery Group (SDG) MC00Z6, consisted of four (4) soil samples including one (1) field duplicate pair analyzed for arsenic (As) and lead (Pb) by ICP-AES. Samples were analyzed by ChemTech Consulting Group (CHEM) according to Contract Laboratory Program (CLP) Statement of Work (SOW) ISM01.3 (modified) through the Routine Analytical Services (RAS) program. Modification reference number 2199.0 details the specifications and reporting requirements for elevated Contract Required Quantitation Limits (CRQLs) for As and Pb.

SUMMARY

Data were validated according to Region 3 Modifications to the National Functional Guidelines for Inorganic Data Review, Level IM2, and is assigned the Superfund Data Validation Label S4VM (Stage_4_Validation_Manual). No problems were detected during the validation of this data set. Analytical results for all samples are summarized on a single Data Summary Form (DSF).

NOTE

Reported results for field duplicate pairs MC00Z6/MC00Z7 were within 35% RPD, $\pm 2X$ CRQL for both analytes.

ATTACHMENTS

INFORMATION REGARDING REPORT CONTENT

Appendix A Glossary of Data Qualifier Codes

Appendix B Data Summary Form(s)

Appendix C Chain of Custody Records

Appendix D Laboratory Case Narrative

DCN: 41912_MC00Z6

Appendix A

Glossary of Data Qualifier Codes

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of compounds)

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unusable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

Appendix B

Data Summary Forms

DATA SUMMARY FORM: INORGANIC

Page 1 of 1

Case #: 41912

SDG : MC00Z6

Number of Soil Samples : 4

Site :

FMO PESTICIDE

Number of Water Samples : 0

Lab. :

CHEM

Sample Number :		MC00Z6		MC00Z7		MC00Z8		MC00Z9			
Sampling Location : (Prefix : FMO-SS-)		20-BY		20-BYD		20-FY		20-SY			
Field QC :		Dup. of MC00Z7		Dup. of MC00Z6							
Matrix :		Soil		Soil		Soil		Soil			
Units :		mg/Kg		mg/Kg		mg/Kg		mg/Kg			
Date Sampled :		10/18/2011		10/18/2011		10/18/2011		10/18/2011			
Time Sampled :		15:50		16:00		15:40		15:45			
% Solids :		75.3		75.4		76.8		75.8			
Dilution Factor :		1.0		1.0		1.0		1.0			
ANALYTE	CRQL	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
ARSENIC	10	92.9		88.5		84.4		75.4			
LEAD	10	463		410		423		274			

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

To calculate sample quantitation limits: $(CRQL * Dilution Factor) / (\%Solids / 100)$

Revised 09/99

Appendix C

Chain of Custody Records

Region: 3 Project Code: CT5755 Account Code: 2012T03N302DC6CA3PZRS00 CERCLIS ID: PAN000306719 Spill ID: APZ Site Name/State: FMO Pesticide/PA Project Leader: Erik Armistead Action: Preliminary Assessment Sampling Co: Weston Solutions		Date Shipped: 10/19/2011 Carrier Name: FedEx Airbill: 876837925346 Shipped to: ChemTech Consulting Group (CHEMED) 284 Sheffield Street Mountaintside NJ 07092 (908) 789-8900		Chain of Custody Record <table border="1"> <tr> <th>Relinquished By</th> <th>(Date / Time)</th> <th>Sampler Signature:</th> <th>Received By</th> <th>(Date / Time)</th> </tr> <tr><td>1</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td></tr> </table>		Relinquished By	(Date / Time)	Sampler Signature:	Received By	(Date / Time)	1					2					3					4				
Relinquished By	(Date / Time)	Sampler Signature:	Received By	(Date / Time)																										
1																														
2																														
3																														
4																														

INORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE/ Bottles	STATION LOCATION	SAMPLE COLLECT DATE/TIME	ORGANIC SAMPLE No.	QC Type
MC00Z6	Surface Soil (0"-12")/ David Scerbo	M/C	CLP AsPb (7)	726 (Ice Only) (1)	FMO-SS-20-BY	S: 10/18/2011 15:50		-
MC00Z7	Surface Soil (0"-12")/ David Scerbo	M/C	CLP AsPb (7)	727 (Ice Only) (1)	FMO-SS-20-BYD	S: 10/18/2011 16:00		Field Duplicate of MC00Z6
MC00Z8	Surface Soil (0"-12")/ David Scerbo	M/C	CLP AsPb (7)	728 (Ice Only) (1)	FMO-SS-20-FY	S: 10/18/2011 15:40		-
MC00Z9	Surface Soil (0"-12")/ David Scerbo	M/C	CLP AsPb (7)	729 (Ice Only) (1)	FMO-SS-20-SY	S: 10/18/2011 15:45		-

Shipment for Case Complete? N	Sample(s) to be used for laboratory QC: MC00Z8	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: CLP AsPb = CLP As, Pb	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment iced?

U.S EPA Region III Analytical Request Form

Control#	GT5755	QASQA USE ONLY	41912
DAS#		RAS#	
PES#		NSP#	
		Analytical Unit	7/DAYS

41912

Date: 13 October 2011		Site Activity: Removal Assessment (RS)	
Site Name: FMO Pesticide Site		Street Address: 4308 Route 309	
City: Schnecksville	State: PA	Latitude:	Longitude:
Program: SUPERFUND	Acct #: 2012-T-03-N-302DC6C-A3PZ-RS-00	CERCLIS #: PAN000306719	
Site ID: 0306719	Spill ID: A3PZ	Operable Unit: 00	
Site Specific QA Plan Submitted: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (On File)		Date Approved: 24 June 2011	
Title: Abbreviated Sampling Plan Extended Phase II Soil Sampling at the FMO Pesticide Site			
EPA Project Leader: Ruth Scharr	Phone#: 215-814-3191	Cell Phone #: 215-756-7897	E-mail: Scharr.Ruth@epa.gov
Request Preparer: Christina Schauss	Phone#: 910-420-2729	Cell Phone #: 443-564-6609	@westonsolutions.com
Site Leader: Erik Armistead	Phone#: 610-701-3548	Cell Phone #: 484-213-8723	westonsolutions.com
Contractor: Weston Solutions, Inc.		EPA CO/PO: John Robb/Karen (Wodarczyk) Esposito	
#Samples: 6	Matrix: soil	Parameter: Total Lead & Total Arsenic	Method: ISM01.2 (ICP-AES)
Ship Date From: 17 October 2011	Ship Date To: 21 October 2011	Org. Validation Level	Inorg. Validation Level IM-2
Unvalidated Data Requested: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	If Yes, TAT Needed: <input type="checkbox"/> 14days <input checked="" type="checkbox"/> 7days <input type="checkbox"/> 48hrs <input type="checkbox"/> 24hrs <input type="checkbox"/> Other	(Specify)	
Validated Data Package Due: <input type="checkbox"/> 42 days <input type="checkbox"/> 30 days <input checked="" type="checkbox"/> 14 days <input type="checkbox"/> Other (Specify)	(EDDs will be provided in Region 3 EDD Format)		
Electronic Data Deliverables Required: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	(EDDs will be provided in Region 3 EDD Format)		

Notes:

CRQLs are as follows:

Lead & Arsenic 10 ppm

Request for Quote (RFQ) for Modified Analysis

Date: October 17, 2011

Subject: Modification Reference Number: 2199.0

Title: Raised CRQLs for As and Pb

Sample Matrix: Soil

Fraction Affected: ICP-AES

Statement of Work: ISM01.3

Purpose:

The Contractor Laboratory is requested to perform the following modified analyses under the Inorganic Statement of Work (SOW) ISM01.3, based on the additional specifications listed below. Unless specifically modified by this modification, all analyses, Quality Control (QC), and reporting requirements specified in SOW ISM01.3 remain unchanged and in full force and effect. The number of samples requested in this modification is not guaranteed.

Please note that accepting a modified analysis request is voluntary, and that the Laboratory is not required to accept the modified analysis. There will be no adverse effect to the Laboratory for not accepting the modified analysis request. However, once the Laboratory accepts the request for modified analysis, it shall perform the analysis in accordance with this modification and as specified in SOW ISM01.3.

The Laboratory is requested to review the modification described herein, determine whether or not it shall accept the requested modified analyses, and complete the attached response form. The Laboratory shall provide comments in response to the required changes in the designated area, in order to ensure that the modified analysis can be completed in accordance with the specifications described herein.

Modification to the SOW Specifications:

The contract Laboratory shall analyze soil/sediment samples for Arsenic and Lead by ICP-AES as indicated on the Traffic Report/Chain of Custody Record and Laboratory Scheduling Notification form.

The Contract Required Quantitation Limits (CRQLs) for the following analytes have been modified.

Analyte	CRQL (mg/kg)
As	10
Pb	10

A Method Detection Limit (MDL) study, by the preparation and analysis procedures used, is required. The MDLs shall be less than one-half the CRQLs listed above. The raw data must be kept on file at the Laboratory and submitted upon EPA request.

The Initial Calibration shall be performed using a non-blank standard at or below the modified CRQLs for As and Pb.

The calibration and preparation blanks will be evaluated against the modified CRQLs.

For the ICS, the acceptance windows for As and Pb are ± 1 times the modified CRQLs or $\pm 20\%$ of the true value, whichever is greater.

The LCS shall be prepared and analyzed at two times the modified CRQLs for As and Pb.

Reporting Requirements:

Hardcopy and electronic data reporting are required as specified per SOW ISM01.3. All hardcopy and electronic data shall be adjusted to incorporate modified specifications. This includes attaching a copy of the requirements for modified analysis to the SDG Narrative. If specific problems occur with incorporation of the modified analysis into the hardcopy and/or electronic deliverable, the Laboratory shall contact the DASS Manager within the Sample Management Office (SMO) at (703) 818-4233 or via email at CCSSUPPORT@fedcsc.com for resolution.

All samples analyzed for the same fraction within an SDG must be analyzed under the same fractional requirements. The Laboratory shall not include data for the same fraction with different requirements in the same SDG.

The Laboratory shall include the Modification Reference Number 2199.0 on each hardcopy data form under the “Mod. Ref. No:” header appearing on each form as well as the SamplePlusMethod/ClientMethodModificationID element of the electronic deliverable. The Laboratory shall also document the Modification Reference Number and Solicitation Number on the SDG Coversheet and SDG Narrative.

Clarifications/Revisions to the RFQ for Modified Analysis:

Laboratory Name:

Laboratory Comments:

Appendix D

Laboratory Case Narrative

Metals

COVER PAGE

Lab Name: Chemtech Consulting Group Contract: EPW09038
Lab Code: CHEM Case No: 41912 Mod. Ref. No.: 2199.0 SDG No: MC00Z6
SOW No.: ISM01.3

EPA Sample No.	Lab Sample ID
<u>MC00Z6</u>	<u>C4265-01</u>
<u>MC00Z7</u>	<u>C4265-02</u>
<u>MC00Z8</u>	<u>C4265-03</u>
<u>MC00Z8D</u>	<u>C4265-04</u>
<u>MC00Z8S</u>	<u>C4265-05</u>
<u>MC00Z9</u>	<u>C4265-06</u>

		ICP-AES	ICP-MS
Were ICP-AES and ICP-MS interelement corrections applied?	(Yes/No)	<u>YES</u>	<u>N/A</u>
Were ICP-AES and ICP-MS background corrections applied?	(Yes/No)	<u>YES</u>	<u>N/A</u>
If yes, were raw data generated before application of background corrections?	(Yes/No)	<u>NO</u>	<u>N/A</u>

The laboratory did not receive any instructions with this SDG to modify the SOW standard laboratory sample preparation procedures (e.g., subsampling). To aid in the determination of data usability with respect to project decisions, any modifications performed are described below.

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy Data Package and in the electronic data submitted has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Mildred Reyes Name: MILDRED REYES
Date: 10/26/11 Title: DOCUMENT CONTROL OFFICER

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Mountainside, NJ 07092**

SDG NARRATIVE

**USEPA
SDG # MC00Z6
CASE # 41912
CONTRACT # EPW09038
LAB NAME: CHEMTECH CONSULTING GROUP
LAB CODE: CHEM
CHEMTECH PROJECT #C4265
MODIFIED ANALYSIS # MA2199.0**

A. Number of Samples and Date of Receipt

04 Soil Samples were delivered to the laboratory intact on 10/20/11.

B. Parameters

Test requested for METALS CLP4 = Arsenic & Lead.

C. Cooler Temp

Indicator Bottle: Presence/Absence
Cooler: 4°C

D. Detail Documentation (related to Sample Handling Shipping, Analytical Problem, Temp of Cooler etc):

E. Corrective Action taken for above:

F. Analytical Techniques:

All analyses were based on CLP Methodology by method ISM01.3

G. Calculation:

Calculation example for ICP-AES Soil Sample:

Conversion of Results from mg/L or ppm to mg/kg (Dry Weight Basis):

Results reported in Mg/Kg = (Result in mg/L or ppm for ICP-AES) X 1000 X Fraction of %
Solid (100/ % Solid) X Dilution Factor (if any) X Fraction of Sample Amount Taken in ICP-Soil

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Prep.

Example of Fraction of Sample Amount Taken in ICP-AES Soil Prep = $1/10$ (1.0 X10 or 0.50 X 20)

(If 1.0 g of sample taken during Digestion and the Final Volume was made to 100 ml or 0.5 g to Final Volume 50ml)

Or

Example of Fraction of Sample Amount Taken in ICP-AES Soil Prep = $1/10.2$ (1.02 X 10 or 0.51 X 20)

(If 1.02 g of sample taken during Digestion and the Final Volume was made to 100 ml or 0.51 g to Final Volume 50ml)

Etc.

H. QA/ QC

Calibrations met requirements. Interference check met requirements. Blank analyses did not indicate any presence of contamination. Laboratory Control sample was within control limits. Spike sample did meet requirements. Duplicate sample did meet requirements. Serial Dilution did meet requirements.

I certify that the data package is in compliance with the terms and conditions of the contract both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature.

Signature Mildred V. Reyes

Name: Mildred V. Reyes

Date 10/26/11

Title: Document Control Officer

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ISM01.2

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CHEMTECH

QC: L257419

PERCENT SOLIDS

ANALYST: RDJ
DATE: 10-21-11

Lab ID	Client ID	Dish #	Dish Weight (g)	Dish Wt + Sample (g)	Dish Wt + Dry Sample (g)	% Solids
C4265-01	MC00Z6	1	1.19	9.6	7.52	75.3
C4265-02	MC00Z7	2	1.18	9.51	7.46	75.4
C4265-03	MC00Z8	3	1.17	9.56	7.61	76.8
C4265-04	MC00Z8D	4	1.16	9.63	7.74	77.7
C4265-05	MC00Z8S	5	NR	NR	NR	NR
C4265-06	MC00Z9	6	1.19	9.83	7.74	75.8
BLANK	DISH	B1	1.17	1.17	1.17	0.0

OVEN TEMP: 110 °CTIME IN: 10-20-11 17:00uTIME OUT: 10-21-11 9:00 aOVEN TEMP: 106 °CTIME OUT: 10-21-11 9:00 a