

ARCADIS

Appendix F

Background Characterization Report



Appendix F

Background Characterization Report for the HELSTF Area

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Acronyms and Abbreviations

ARCADIS	ARCADIS U.S., Inc
BSL	Background Screening Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ft amsl	Feet above mean sea level
ft bgs	Feet below ground surface
GFPR	Guaranteed Fixed-Price Remediation
GOF	Goodness-of-fit
HELSTF	High Energy Laser Systems Testing Facility
IQR	Inter Quartile Range
mg/kg	Milligrams per kilogram
NMED	New Mexico Environment Department
NAVFAC	Navy Facilities Engineering Command
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SWMU	Solid Waste Management Unit
USEPA	U.S. Environmental Protection Agency
UTL	Upper tolerance limit
WSMR	White Sands Missile Range
95% PI	95 percent of predictive interval

1. Introduction

This Background Characterization Report was prepared by ARCADIS U.S., Inc. (ARCADIS), for the High Energy Laser System Test Facility (HELSTF) at the White Sands Missile Range (WSMR), New Mexico (Figure 1).

This report presents the background data set identified for metals in soil in the HELSTF area, establishes the HELSTF Background Screening Levels (BSLs) for metals in soil, identifies the methodology used to determine whether or not metals concentrations detected in soil are elevated in comparison to background conditions, and presents the results of the comparison of site data collected during the Resource Conservation and Recovery Act (RCRA) Facility Investigations (RFIs) to the background data set.

1.1 Project Objectives

ARCADIS prepared this Background Characterization Report to (1) establish the process for determining background levels of metals in soils within the HELSTF area of WSMR (Figure 2); and (2) compare the background data set to the site data set to determine whether or not metals detected in soil samples collected from the Solid Waste Management Units (SWMUs) are site related or are within naturally occurring levels. Background levels established by the processes described herein were used in the human health and ecological risk assessments performed at WSMR to differentiate potential health and ecological risks associated with naturally occurring constituents from those that are site-related.

This Background Characterization Report was prepared following guidance provided in the following documents:

- Guidance for Comparing Background and Chemical Concentration in Soils for CERCLA Sites (U.S. Environmental Protection Agency [USEPA] 2002a);
- Guidance for Environmental Background Analysis (Naval Facilities Engineering Command [NAVFAC] 2002);
- Engineering Forum Issue Paper. Determination of Background Concentrations of Inorganics in Soils and Sediments at Hazardous Waste Sites (USEPA 1995);
- Role of Background in the CERCLA Cleanup Program (USEPA 2002b); and

- Guidance for Determining Background at VRP Sites (New Mexico Environment Department [NMED] 2000).

1.2 Project Description

Background levels of metals in the top 10 feet of soil were established because this is the interval which human and ecological contact would potentially occur. The background data set was established using samples that were collected within the HELSTF area, but outside the SWMU areas (background samples), and samples that were collected from a reference area located northwest of the HELSTF area (reference samples). In early 2009, supplemental background soil samples were collected in the vicinity of previously collected background samples at the HELSTF area. Additional samples were also collected from the reference area in 2009.

The reference area is located near the HELSTF area and has the same soil types and geological features as the HELSTF area as discussed in Section 1.4. This report presents the methodology that was used to evaluate the background data set, develop the HELSTF-specific BSLs, and the results of the comparison of the background to site data by SWMU. This includes both statistical and graphical methods that have been adapted from relevant guidance.

1.3 Background Information

1.3.1 Site History

WSMR is a U.S. Army installation under the jurisdiction of the U.S. Army Developmental Test Command. The installation is located in the Tularosa Basin of South-Central New Mexico. WSMR is located in Dona Ana, Socorro, Lincoln, Otero, and Sierra counties (Figure 2). The north area is approximately 36 miles wide and 35 miles long. The western extension area is approximately 90 miles long and 15 miles wide. The HELSTF area is located in the south-central portion of WSMR with the reference sampling area located just northeast of the HELSTF area (Figure 3). The installation is active and is currently used for testing long-range missiles. WSMR consists of a large complex of test ranges, launch sites, impact areas, and instrumentation sites along with the support facilities required to develop and test missiles and rockets. In parallel with off-range facilities, WSMR is used as a national range designated for the support of missile development and test programs for the Army, Navy, Air Force, National Aeronautics and Space Administration, and other governmental agencies. Thousands of missile firings, arid operations, and static tests

have been conducted as part of the mission.

The HELSTF is located in the Tularosa Basin of southwestern New Mexico. The Tularosa Basin is a north-south oriented, closed basin at an average elevation above 4,000 feet above mean sea level (ft-amsl). The valley floor consists of ephemeral lakes and alkali flats. A topographic divide defines the boundary between the Tularosa Basin in the north and Hueco Basin to the south. The Tularosa Basin is bounded to the west (from north to south) by the San Andres, Organ, and Franklin mountains, to the southeast by the Otero Platform, to the east by the Sacramento Mountains (Sacramento uplift), and to the northeast by the Sierra Blanca Mountains and the Carrizozo Volcanic Field.

The Tularosa Basin is the result of tectonic rifting (crustal extension) associated with development of the Rio Grande Rift (linear arm of the Basin and Range physiographic province), which began in the region about 35 million years ago (Seager et al. 1984). Faulting events have occurred along the basin-bounding fault systems as recently as the Holocene (more than 10,000 years ago) (Machette et al. 1998).

1.3.2 Bedrock Geology

The geological information presented herein is applicable to both the HELSTF area and the reference area located immediately northwest of the HELSTF area. The San Andres, Organ, and Franklin mountains (San Andres uplift) located west of the HELSTF are composed of more than 5,000 feet of Precambrian-Pennsylvanian age bedrock and Cretaceous-Tertiary intrusive rocks with peaks that rise to nearly 9,000 ft amsl (McLean 1970). The Sacramento and Sierra Blanca mountains (Sacramento uplift) located east of the HELSTF are composed of more than 3,300 feet of Cambrian-Pennsylvanian and Permian age bedrock with peaks reaching elevations of nearly 12,000 ft-amsl (Sierra Blanca Peak) (McLean 1970). The Jarilla Mountains, located approximately 20 miles southeast of the HELSTF, form isolated bedrock outcrops in the valley floor composed of a large Tertiary intrusive body associated with regional extension and rifting.

1.3.3 Cenozoic Tularosa Basin Deposits

Throughout the history of Cenozoic basin sedimentation, rising mountains shed coarse sediment into the rapidly subsiding basin via meandering rivers and alluvial fans. Coarse fluvial and sheetflood sedimentation was interrupted at various times by lacustrine episodes that deposited clays, marls, and siltstones, particularly during

pluvial episodes (extended periods of abundant rainfall) of the Pleistocene. Tularosa Basin deposits range in thickness from less than 1,000 feet (near Alamogordo) to more than 6,000 feet (at the southern basin margin with Hueco Basin). Over geologic time, dissolution and mechanical weathering of Paleozoic sedimentary series in the basin-bounding mountains (e.g., Permian Yeso Formation) provided the source of gypsum and other evaporate minerals in the Tularosa Basin.

Depositional environments responsible for the distribution of Cenozoic basin fill consisted of alluvial fan deposition along the basin margins (proximal facies), a transitional zone of sand and gravel deposition (riverine systems) and clay-dominated, lacustrine, and evaporite deposition in the basin interior (distal facies). However, it should be noted that the spatial distributions of facies within the basin were variable over geologic time and were largely controlled by the rate of tectonic subsidence (i.e., volume available for sediment accommodation), paleoclimate, and sediment load.

Following a period of aridification that began more than 10,000 years ago (last glacial retreat), the most recent of several ancient lakes (Lake Otero) began to dry up, precipitating 10 to 30 feet of gypsiferous evaporites. Around 7,000 years ago, an active eolian deflation basin cut into Lake Otero deposits and redistributed the gypsum to form the present-day dune fields. Alkali Flats and Lake Lucero are the remnant lake bed of ancient Lake Otero. Gypsiferous evaporitic and eolian deposits from this episode are generally encountered within the first 20 feet below ground surface (ft bgs) at the HELSTF.

1.3.4 Surface Geology

The shallow gypsiferous zone varies in lateral thickness from 10 to 35 feet. Therefore, in the 0- to 10-ft-bgs depth interval, which is the focus of this background characterization, only gypsiferous soils are present throughout the HELSTF area and reference sample area.

2. Evaluation of the Background Data Set

2.1 Background and Reference Data Set

A combination of samples collected from areas within the HELSTF that were identified as background and samples collected from an undisturbed area northwest of the HELSTF area were used to develop the background data set for metals in soil. Concentrations representative of naturally occurring metals concentration were

developed to support ongoing assessment activities at the HELSTF to help determine the need for corrective measures. This characterization of naturally occurring metals will focus on the top 10 feet of soil within the HELSTF area, which is where the potential or direct human contact would be expected.

2.1.1 Historical SWMU-Specific Background Data

During Phase I and II RFI sampling activities, 16 SWMU-specific background samples were collected throughout the HELSTF area. These samples were generally collected near the SWMU being investigated, but in areas that appeared to be undisturbed or where there was no record of release. These samples were analyzed for varying lists of metals. A summary of the laboratory analytical results for metals is presented on Table 1. The locations of the background samples are presented on Figure 2.

2.1.2 Historical Reference Data

Six soil borings were advanced in an area located northwest of the HELSTF area that was determined to have the same soil type (gypsum) and was undisturbed. Split spoon samplers were used to collect soil samples every 5 feet. The site engineer logged the samples as they were collected. The lithology of the borehole was recorded. Lithologic logs of boring are provided in Attachment F1. Soil samples collected at the surface, 5 ft bgs, and 10 ft bgs were quantitatively used to characterize background metals concentrations in the gypsum soils.

2.1.3 Supplemental Reference Data

Additional background and reference samples were collected in early 2009 to supplement the background data set collected during earlier RFI activities. A total of 20 soil samples were collected from ten borings advanced in four primary areas: the reference area; near SWMU 146 (Dry Pond); near SWMU 38-39 (Landfills); and near SWMU 144 (Laser Systems Test Center [LSTC] Wastewater Discharge). Background samples collected near SWMUs were collected in the vicinity of previously collected background samples. Two soil samples were collected from each boring at 0 to 0.5 ft bgs and 9.5 to 10 ft bgs. Soil samples were analyzed for RCRA metals, aluminum, calcium, and iron using USEPA SW-846 Method 6010 by Trace Analysis, Inc., located in Midland, Texas. Sample locations are shown on Figure 3. Laboratory analytical data reports and the data validation reports are provided in Attachment F2. Lithologic logs of boring are provided in Attachment F1.

2.2 Background Data Set Evaluation

The background data were evaluated using the following statistical techniques. The data were evaluated using common statistical software programs including ProUCL 4.0 (summary statistics, distribution tests, and outlier tests) and SigmaPlot (box plots, univariate scatter plots, probability plots, and bivariate plots, if needed).

1. Treating censored data;
2. Determining the probability distribution of the data;
3. Computing summary statistics of measured values;
4. Identifying potential outliers; and
5. Determining background ranges.

These statistical tests and procedures are described in detail in the following sections.

2.2.1 Treatment of Censored Data

Prior to statistical testing, it is necessary to treat censored (i.e., nondetect) data. Specific methods for the treatment of censored data are discussed in USEPA guidance on statistical analysis (USEPA 2002a; 2002b; 2006a) and in NAVFAC (2002). Although USEPA (1992) previously recommended substitution methods for treating nondetects (e.g., half the reporting limit), more recently, results of simulation experiments have demonstrated that substitution methods can introduce significant biases in parameter estimation and that more reliable techniques, such as Kaplan Meier statistics, should be used (USEPA 2009). Publicly available, free software developed by the USEPA (e.g., ProUCL version 4.00.04) is now available to implement Kaplan-Meier estimation when calculating 95/95 upper tolerance limit (UTLs). For this analysis, ProUCL 4.00.04 was used to calculate 95/95 UTLs, and nondetect values were included at their respective reporting limits.

2.2.2 Tests for Distribution

Tests for distribution or goodness-of-fit (GOF) testing is performed to determine if parametric or nonparametric statistical methods are most appropriate for calculating BSLs and conducting hypothesis tests and conducting statistical tests for outliers.

Consistent with USEPA guidance (USEPA 2006b), data were evaluated for fits to normal, lognormal, and gamma distributions at an alpha (α)=0.05 significance level. Using USEPA's ProUCL 4 software (USEPA 2009), optimal statistical tests were applied depending on distribution and sample size (e.g., normal and lognormal: Shapiro Wilks for sample size less than or equal to 50 or Lilliefors for sample size greater than 50; gamma: Kolmogorov-Smirnov).

GOF testing can be challenging for left-censored data (i.e., data with nondetects). In general, methods consistent with USEPA (2009) were employed using ProUCL , including evaluating distribution of detects only, and using censored probability plots based on regression on order statistic methods (i.e., extrapolation of nondetects based on probability plots of uncensored data). Guidance on statistical analysis of left-censored data has evolved to reflect results of more thorough testing of the performance of alternative approaches. USEPA (2006a) summarizes the results of numerical experiments with data sets representing a wide range of censoring, sample sizes, and distribution shapes. Previously, it was commonly thought that substitution methods (e.g., using one-half the reporting limit for nondetects) introduced marginal bias. Based on this assumption, USEPA (2006b) and other agencies previously recommended using substitution methods under conditions of moderate censoring (e.g., less than 15 to 20 percent). However, USEPA (2006a) demonstrated through numerical experiments that using one-half the reporting limit clearly does not provide adequate coverage for any distribution and sample size, even for censoring levels as low as 5 percent. Furthermore, the coverage (e.g., 95 percent confidence interval for the mean) derived using one-half the reporting limit deteriorates fast as the censoring intensity increases.

For this reason, nonparametric methods are currently recommended by USEPA (2006a; 2009) for purposes of parameter estimation. For this analysis, left-censored data were evaluated with nonparametric techniques recommended by USEPA that provide results that are robust to nondetects. Nondetects were included at values equal to the reporting limit.

2.2.3 Box-and-Whisker Plots

A box-and-whisker plot, or box plot, shows the 25th, 50th, and 75th percentiles as well as the mean, spread of the data, and extreme values. When data from multiple sampling areas are presented side-by-side for the same constituent, this graphic can help to determine if within-strata and between-strata locations are representative of the same background population. Box plots can also help to identify potential outliers based on

the product of the interquartile range (IQR = 75th – 25th percentiles) and a multiplier (usually 1.5 or 3.0) added to the 75th percentile. Commonly, values that exceed the 75th percentile plus 1.5 times IQR are considered moderate outliers, whereas values that exceed the 75th percentile plus 3.0 times IQR are extreme outliers. Log transformations can sometimes provide a more convenient scaling for visual inspection when one or more data sets have extreme values. Suspected outliers were determined using the IQR approach with a multiplier of 3.0. Box plots for the background data and each SWMU are provided in Attachment F3.

2.2.4 Identification of Outliers

Outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected (USEPA 2006b). A primary step in any statistical analysis of environmental data involves an evaluation of potential outliers (USEPA 2006b; 2009), as described above (i.e., Q-Q plots and box plots). This is particularly important when the objective of the analysis is to establish BSLs because elevated concentrations can introduce bias in summary statistics (e.g., 95/95 UTLs) as well as results of hypothesis testing. Overestimates of the BSLs can reduce the power of statistical tests to identify areas where concentrations are elevated above background conditions.

An outlier may represent a true extreme value from a highly variable data set, or it may represent an erroneous measurement. When data are grouped across strata, consistent differences in the distribution of one or more constituents within a given stratum may indicate that the particular stratum is representative of a different population. A qualitative evaluation of Q-Q plots (Attachment F4) and side-by-side box plots (Attachment F3) was conducted to identify a subset of “suspected outliers”.

2.2.4.1 Statistical Methods

A variety of statistical tests for outliers are available to determine if there is sufficient evidence of the likelihood (probability) that one or more extreme values is inconsistent with the remainder of the data at a specified significance level. Available methods can be classified as either “spatial” or “non-spatial”. Spatial methods account for spatial patterns in the data based on an assumption that samples collected in closer proximity are likely to have more similar concentrations – a concept referred to as positive spatial autocorrelation. Positive spatial autocorrelation is commonly observed for metals in soil in undisturbed areas with a common source (e.g., aerial deposition from a point source).

Non-spatial methods are more commonly used to identify values in a data set that are higher than would be expected by random chance given the overall statistical (rather than spatial) distribution of the sample. Non-spatial methods do not incorporate information on spatial patterns and are typically restricted to samples collected within a specific exposure unit boundary. Methods were applied in accordance with USEPA guidance (USEPA 2006b; USEPA 2009) and include Dixon, Rosner, IQR, and Walsh's test. Specific criteria for the selection of the appropriate test are summarized in footnote 3 of Table 2 and take into account sample size, degree of censoring, and GOF to normal or lognormal distributions.

These outlier tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set. Removing accurate data with large values and failing to remove outliers that arise from erroneous measurement are opposite kinds of errors that can both lead to a distorted estimate of summary statistics (USEPA 2006b). Therefore, the decision to evaluate BSLs with and without statistical outliers in a risk assessment was based on both professional judgment and results of the statistical analysis.

Suspected outliers were identified in the arsenic, copper, potassium, and zinc data sets based on the box-and-whisker plots and visual inspection of the Q-Q plots. The underlying data distribution for each of these metals is parametric; therefore, statistical outlier testing was performed using Dixon's test. Insufficient samples were available to perform Dixon's test on the arsenic data set. Results of Dixon's test identified one potential outlier for copper, one for potassium, and two for zinc. The results of the outlier testing are summarized on Table 2.

2.2.4.2 Graphical Methods

To further evaluate the potential outliers, the geochemical relationship between co-varying inorganics was also evaluated to provide support for keeping or removing a sample that may not be representative of the range of background values or for including a value that is naturally elevated (Myers and Thorbjornsen 2004).

The geochemical association analysis method is based upon the understanding that certain groups of metals are closely associated due to the atomic structures and chemical properties. The distribution of trace metals is controlled by the major chemical constituents of soil including aluminum, iron, and calcium. Depending upon the type of soil present at a site, different relationships were present. The geochemical evaluation method relies on correlations of trace versus major elements, predicated on

the natural elemental associates in soil. Linear trends with positive slopes are expected for scatter plots of specific trace versus major elements in uncontaminated samples. Individual samples that may have been affected by site-related activities are identified by their positions off the trend formed by uncontaminated samples.

In addition to pinpointing which samples may be affected by a release, this technique provides mechanistic explanations for naturally occurring elevated concentrations (Myers and Thorbjornsen 2004). When a sample is affected by site-related arsenic, then it will have an arsenic/iron ratio that differs from the regression line developed from unaffected samples.

The geochemical association analysis relied upon barium for two reasons:

- 1) It exists as a bivalent metal in the environment and therefore would relate to trace metals in a manner similar to calcium; and
- 2) It is a RCRA metal; therefore, most of the samples collected at the site were analyzed for barium.

Concentrations of barium and the metals of interest were plotted on a scatter plot. A least squares regression line that was drawn from the scatter plot illustrates the linear trend exhibited between the two metals. The strength of the relationship is represented by the square of the correlation coefficient (r^2). Strong correlations between barium and copper ($r^2=0.596$) and barium and zinc ($r^2=0.797$) were identified. A 95 percent predictive interval (95% PI) on the regression was drawn to provide a confidence interval on the background population. The 95% PI provides the range within which the trace metal concentrations are expected to fall. The suspected outliers for copper and zinc fall within the 95% PI and, therefore, were not identified as outliers. Potassium was not further evaluated because of its status as an essential nutrient.

A geochemical relationship between arsenic and iron could not be evaluated because the samples in which arsenic was detected were not analyzed for iron, and arsenic was not detected in samples which were analyzed for iron. The decision to retain the potential outlier identified for arsenic was based upon the following rationale:

- Arsenic, copper, and zinc outliers were all detected in the same sample (HLSF-SB-01 at 10.5 ft bgs), which was collected from an undisturbed reference area outside of the HELSTF area. The surficial sample at the same location showed no variation. The results of the geochemical analysis established that the

elevated levels of copper and zinc observed in the sample are the result of a natural anomaly in the mineralogy of the soil in this sample. Therefore, it is likely that the presence of arsenic is also related to the same natural anomaly and is therefore representative of the range of arsenic in background.

2.3 Calculation of BSLs

A summary of the final background data set is presented on Table 3. The BSL was selected based on the characteristic of the data set using criteria consistent with USEPA (2009) guidance. Table 4 summarizes the criteria that results in one of two possible statistics: the 95/95 UTL, or the maximum detected concentration. The UTL, calculation method, and selection of the HELSTF BSL are presented on Table 5.

A UTL provides an interval within which at least a certain portion of the population lies, with a specified probability that the stated interval does indeed “contain” that portion of the population (USEPA 2002). Consistent with USEPA guidance for establishing BSLs (USEPA 1989; 1992; 1998a; 1998b), a one-sided 95 percent confidence interval for the 95th percentile (95/95 UTL) is used in this analysis. The 95/95 UTL is the appropriate statistic for calculating a BSL when the intended use of the BSL is to compare data from undisturbed areas (i.e., background or reference locations) with data from potentially impacted areas (USEPA 1992). A minimum of eight samples and five detects is needed in the background data set in order to calculate a 95/95 UTL (USEPA 2009). If an insufficient number of detects are available for GOF testing, the BSL may be approximated by the maximum detected concentration in the background data set. Table 4 summarizes the criteria for selecting the most reliable method of UTL calculation, in accordance with USEPA (2009), depending on sample size, degree of censoring, the GOF results, and skewness (as determined by the standard deviation of the natural logarithm of the detects). The UTL was selected from among five possible methods: normal UTL, lognormal UTL, gamma UTL, Kaplan-Meier UTL, or nonparametric UTL. In general, normal and gamma 95/95 UTLs tend to yield the lowest values and the nonparametric UTL usually equates to the maximum detect. In addition, it is not uncommon for one of the parametric 95/95 UTLs to exceed the maximum detect in the background data set. This is more likely when the data set is small and/or the variance is high. The use of 95/95 UTLs in these cases introduces a source of uncertainty, but when the distribution fit is reasonable, this extrapolation may be preferable to scaling back to the maximum of a sample, which is an inherently unstable statistic. Both values are considered to determine if the choice may affect the overall findings of the background evaluation.

2.4 Comparison of BSLs to Regional Background

As a point of reference, maximum concentrations of metals in the soil final background data sets were compared to published values applicable to the soil type and general region. The background concentrations of metals in soil at the HELSTF were compared to ranges observed in soils characteristic of those found at the Site: mined gypsum (Energy & Environmental Research Center 2007), dessert sands (Kabata-Pendias and Pendias 1984 as cited by USEPA 1995), New Mexico soil/sediment (Zumlot et al. undated). The comparison of the final background data sets to regional background levels of metals in soil is presented on Table 6. The maximum values included in the background data set for the HELSTF fall within the range of naturally occurring metals levels published.

3. Comparison of Background to Site Data

After the background data set was finalized, it was compared to site data to identify those sites where concentrations may be elevated above background. Because it is unusual for all samples at a site to be elevated above background, specific locations impacted by the site release can be differentiated from those locations that have concentrations consistent with background conditions.

Three lines of evidence were used to determine whether or not metals concentrations detected in site samples are within naturally occurring ranges: 1) simple comparison; 2) geochemical association analysis; and 3) graphical evaluation.

If the simple comparison described in Section 3.1 indicates that site concentrations are not within background levels, the geochemical relationship may be evaluated to determine if site concentrations are similar to background as described in Section 3.2. In addition, graphical methods such as those described in Section 0 may be useful to garner an understanding of the distribution of site data as it relates to the background data. Each of these methods is briefly described below.

3.1 Simple Methods for Comparison

Simple comparisons were used for the initial screening of site data. For the initial screening, maximum constituent concentrations at a site were compared to the parametric or nonparametric UTL. In using a tolerance limit for background comparisons, a site sample was considered for additional evaluation when its concentration exceeded the UTL of the background data set. A summary of the metals

and number of detections that are greater than the HELSTF BSLs is presented in Table 7.

3.2 Geochemical Evaluation

Geochemical relationships can be used to identify soil contaminant inputs and sources. An overview of these studies is provided in recent guidance from the Navy (NAVFAC 2002). Potential normalizers include aluminum and iron. For this site, aluminum and iron data are available for the background data set but not for the SWMUs. However, the barium data set for background and SWMUs is comparatively large. The correlation is very strong between aluminum and barium ($r^2 = 0.88$, Attachment F5, Figure 1) as well as iron and barium ($r^2 = 0.83$, Attachment F5, Figure 4) suggesting that similar natural variability in site conditions, such as particle size, is likely influencing iron, aluminum, and barium concentrations. Naturally occurring background metals typically are part of the aluminosilicate (i.e., clay) mineral structure, and a regression of background metals versus aluminum concentrations will produce an approximately straight line. This regression relationship can be generated on a regional basis using ambient or reference site soil chemistry data. If metals concentrations in site samples are greater than those predicted by the regression, then the elevated concentration may be due to an additional (and possibly site-related anthropogenic) source (NAVFAC 2002). However, because aluminum and iron data are largely unavailable for the SWMUs, barium was used as a surrogate to develop the geochemical regressions.

NAVFAC (2002) suggests using a log-log regression between paired reference and trace metal concentrations. An upper-bound background concentration can be defined by the highest concentration in the background data set that is within the 95% PI. With a sufficiently large sample, it is expected that results for some sample locations will fall outside the 95% PI. These may be considered "outliers", especially if the overall correlation is high. Concentrations from site samples that exceed the background screening level, but are within the 95% PI, are considered to be within the expected range of background concentrations for soils that share similar geochemical properties. Concentrations from site samples that exceed the background screening level and are greater than the 95% PI are considered elevated and indicative of a potential site-related source.

Bivariate plots can be used to detect outliers throughout the range of concentrations, rather than just at the tails of the distribution. In addition, these plots can provide insight as to whether or not elevated concentrations of metals reflect variability in

geochemical properties of soils. As noted in Navy guidance on coefficients of determination (<http://www.ert2.org/BackgroundAnalysisSediment/tool.aspx>) a range of r^2 values can be used to appropriately characterize the degree of association. This is because the fit of the regression will depend on statistical properties of the data set (e.g., presence of outliers, variance, and sample size) and soil properties of the site (e.g., mineralogy). Both factors can influence the magnitude of the r^2 between one site and the next. Therefore, a tiered characterization as noted below was applied:

r^2	r	Association
$0.50 \bullet r^2 < 0.70$	$0.71 \bullet r < 0.84$	moderate
$0.70 \bullet r^2 < 0.90$	$0.84 \bullet r < 0.95$	strong
$0.90 \bullet r^2$	$0.95 \bullet r$	very strong

This provides one line of evidence in establishing the background data set and summary statistics. The strength of this line of evidence can still be tied back to the r^2 value, and allows for an appropriate level of consideration of the data context (e.g., sample size, variance, mineralogy) versus an arbitrary selection of r^2 .

Background samples for a given metal are presented on a single scatter plot. A least squares regression line drawn from the scatter plot illustrates the linear trend exhibited between the two metals. A 95% PI on the regression was drawn to provide a confidence interval on the background population. The 95% PI provides the range within which the trace metal concentrations are expected to fall. Site data were overlaid on the scatter plot. Site samples that fall above 95% PI are concluded to be elevated above background concentrations.

Relationships between barium and the following metals were established for the background data set and used to compare to the site samples: chromium ($r^2=0.878$), lead ($r^2=0.835$), mercury ($r^2=0.297$), and zinc ($r^2=0.635$). A geochemical relationship for arsenic could not be established; thus, graphical methods as described in Section 3.3 were used to supplement the comparison to the BSL.

3.3 Graphical Methods

Probability plots (i.e., Q-Q plots) were used to provide a comprehensive view of the characteristics of the data set. These plots are particularly useful, because they allow the analyst to visualize the data, and in doing so provide a greater understanding of the

spatial distribution of the data. NAVFAC (2002) guidance states the data points that fall along a straight line on cumulative probability plots are likely to represent one population generally interpreted as natural conditions, whereas data points that deviate from a straight line are outliers that may be indicative of a different population that could be related to soils types or site-related impacts. In general, when data are drawn from one population, the cumulative probability versus concentration plot shows a straight line. When there are multiple, overlapping populations, this type of plot produces gentle curves, or multiple connected lines with different slopes. One soil type is represented by samples in the background data set; thus, deviations were interpreted to indicate site-related impacts

3.4 SWMU-Specific Comparisons to Background Data Set

Tables 7 and 8 summarize the comparison of the background data set to the site data by SWMU. Table 7 summarizes the metals and number of detections above the HELSTF BSL and Table 8 identifies which of the metals detected above the BSL were determined to be elevated or not elevated based on additional lines of evidence as described in Sections 3.2 and 3.3. The following subsections present the metals data in soil by SWMU and summarize the results of the comparison to background.

3.4.1 SWMUs 23 and 24

In the top 10 feet of soil, where the potential for direct contact with human and ecological receptors exists, two soil samples were collected in 1992 and analyzed for chromium and silver. In 1993, four additional soil samples were collected and analyzed for arsenic, barium, cadmium, lead, and selenium. Arsenic was the only metal detected with concentrations ranging from 0.52 to 1.2 milligrams per kilogram (mg/kg). Detected arsenic levels were less than the HELSTF BSL (2.8 mg/kg). Therefore, metals levels in soil at this SWMU are consistent with background conditions.

3.4.2 SWMU 25

In 1993, two site samples were collected and analyzed for arsenic, barium, cadmium, chromium, lead, and selenium. Arsenic was the only metal detected and was reported in one sample (CFW-3 SB7-8-10) at a concentration of 0.063 mg/kg. The detected arsenic concentration was less than the HELSTF BSL (2.8 mg/kg). Therefore, metals concentrations are consistent with background conditions.

3.4.3 SWMU 26

Five soil samples were collected between 0 and 10 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, chromium, hexavalent chromium, lead, mercury, and selenium. With the exception of arsenic, metals concentrations detected were less than the HELSTF BSLs. Arsenic was detected in three of the five samples at concentrations ranging from 2.1 to 4.7 mg/kg. Although some detected concentrations are greater than the BSL (2.8 mg/kg), they are less than the maximum concentration of arsenic detected in the background samples (6.58 mg/kg) and fall below the point of inflection on the Q-Q plot (Attachment F4, Figure 13). Thus, arsenic concentrations in soil at this SWMU were considered to be consistent with background conditions.

3.4.4 SWMU 27-30

No surface soil data have been collected because the former lagoons are still in place and contain a liner.

3.4.5 SWMUs 31-32

Three soil samples were collected from 0.5 to 1 ft bgs and analyzed for arsenic, barium, cadmium, chromium, lead, potassium, selenium, silver, sodium, and zinc. With the exception of zinc detected in one sample, metals concentrations were less than their HELSTF BSLs. The zinc concentration detected in the sample collected from HLSF-SB-031 was 43 mg/kg, which is greater than the HELSTF BSL of 20.9 mg/kg. Therefore, the geochemical relationship between zinc and barium was evaluated. The concentration of zinc in relation to the barium concentration falls above the 95% PI (Attachment F5, Figure 8) and, therefore, the zinc level in this sample was determined to be elevated relative to background levels.

3.4.6 SWMU 33-34

Metals were not associated with the operational history of this site; therefore, soil samples were not analyzed for metals.

3.4.7 SWMUs 35-36

One soil sample (HLSF-SB-029) was collected from 0.5 to 1 ft bgs in the 1- to 10-ft-bgs depth interval of interest. The soil sample was analyzed for arsenic, barium, cadmium, chromium, lead, mercury, potassium, selenium, silver, sodium, and zinc. The

concentrations of the detected metals (barium, chromium, potassium, and zinc) were less than their HELSTF BSLs. Therefore, metals concentrations in soil at this SWMU are consistent with background levels.

3.4.8 SWMU 37

One boring was advanced and two soil samples were collected in the depth interval of interest (HWM17SO05 at 5 ft bgs and HMW17SO10 at 10 ft bgs). Soil samples were analyzed for arsenic, barium, cadmium, lead, selenium, and silver. Arsenic was the only metal detected and occurred in one sample at 0.78 mg/kg. The detected concentration of arsenic is less than the HELSTF BSL and, therefore, metals concentrations are consistent with background conditions.

3.4.9 SWMUs 38-39

A total of 23 soil samples were collected at SWMUs 38 and 39 from the top 10 feet of soil. In 1992, six surface soil samples were collected. In 1993, nine borings were advanced and two samples were collected from each boring at 4 to 6 ft bgs and 8 to 9 ft bgs. In 1994, another boring was advanced and one sample was collected at the surface. Soil samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Arsenic, barium, lead, selenium, and silver were detected at concentrations greater than their HELSTF BSLs.

Arsenic

Arsenic was detected in nine samples at concentrations greater than the HELSTF BSL (2.8 mg/kg). Arsenic concentrations ranged from 9.29 to 17.3 mg/kg, which are greater than the maximum detected concentration of arsenic in the background as well as above the inflection point on the Q-Q plot (Attachment F4, Figure 15). Therefore, arsenic concentrations in soil at SWMUs 38-39 are elevated in comparison to background conditions.

Barium

The concentration of barium (144 mg/kg) was greater than the HELSTF BSL (116 mg/kg) but less than the maximum detected barium concentration in background (194 mg/kg). A review of the Q-Q plot (Attachment F4, Figure 14) shows this result fits the background distribution. Therefore, barium levels in soil at this SWMU were considered to be consistent with background conditions.

Lead

Lead was detected in one sample (39SS03) at a concentration (20 mg/kg) greater than the maximum detected background concentration (14.9 mg/kg). The sample point also fell above the 95% PI in the geochemical analysis with barium (Attachment F5, Figure 5) and, therefore, was elevated in comparison to background conditions. It should be noted, however, that lead was not detected (<23 mg/kg) in the duplicate sample collected.

Selenium

Selenium was detected in six samples at concentrations ranging from 4.51 mg/kg to 11.4 mg/kg. Selenium was not detected in any of the background samples with a reporting limit of 2.0 mg/kg; therefore, a HELSTF BSL could not be developed. The detection of selenium at SWMUs 38-39 was determined to be elevated in comparison to background.

Silver

Silver was detected in two soil samples collected from one boring (3839SB08) at SWMUs 38-39 at concentrations ranging from 32.9 to 38.6 mg/kg. Silver was not detected in any of the background samples (reporting limits of 0.05 to 0.25 mg/kg); therefore, a HELSTF BSL could not be developed. Silver detected at this location at SWMUs 38-39 was determined to be elevated in comparison to background.

3.4.10 SWMU 141

In the top 10 feet of soil at SWMU 141, a total of 31 samples were collected from 20 borings. In 1992, 14 borings were advanced and one sample was collected from each boring. In 1993, ten borings were advanced (SWMU 141 SB-01 through SB-09 and HMW-43) and three samples were collected from each boring generally at 0 to 1, 3 to 4, and 9 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Detected concentrations of arsenic, barium, chromium, lead, mercury, and silver were greater than the HELSTF BSLs.

Arsenic

Arsenic was detected in nine samples at concentrations greater than the HELSTF BSL. Concentrations detected in samples collected from Borings 141B1 through 141B9 and

148SB1 and 148SB9 were less than the maximum detected background arsenic concentration and were below the identified inflection point on the Q-Q plot (Attachment F4, Figure 13). Therefore, arsenic concentrations detected in these samples are consistent with background conditions. Arsenic concentrations detected in samples collected from Boring HMW-43 ranged from 5.48 to 9.64 mg/kg. The concentration detected in the sample collected from Boring HMW-43 at 9 ft bgs was 5.48 mg/kg. This concentration is less than the maximum background concentration and is at or below the point of inflection on the Q-Q plot (Attachment F4, Figure 13). Therefore, it is consistent with background. However, the concentrations detected in the 1- and 3-ft-bgs samples from Boring HMW-43 were 8.56 and 9.64 mg/kg, respectively, which are greater than the maximum concentration of arsenic in the background and are above the identified inflection point on the Q-Q plot (Attachment F4, Figure 13). Therefore, these concentrations are elevated in comparison to background conditions.

Barium

Barium was detected in three samples at concentrations greater than the HELSTF BSL (116 mg/kg), but less than the maximum detected barium concentration in the background data set (194 mg/kg). A review of the Q-Q plot (Attachment F4, Figure 14) shows that these results fit the background data distribution. Therefore, barium levels at SWMU 141 are consistent with background conditions.

Chromium

Chromium was detected in one sample, HMW-43 at 3 ft bgs, at a concentration (19.3 mg/kg) greater than the HELSTF BSL (10.7 mg/kg). The concentration of chromium falls above the 95% PI (Attachment F5, Figure 2) on the geochemical analysis plot with barium and therefore is elevated in comparison to background conditions.

Lead

Lead was detected in two soil samples, HMW-43 at 3 ft bgs and SWMU 148 SB-01, at concentrations greater than the HELSTF BSL (8.1 mg/kg). The lead concentration detected in HMW-43 falls above the 95% PI on the geochemical analysis plot with barium (Attachment F5, Figure 5) and therefore was determined to be elevated in comparison to background conditions. The concentration of lead in SWMU 148 SB-01 at 1 ft bgs (8.17 mg/kg) is just slightly greater than the HELSTF BSL (8.1 mg/kg).

However the lead concentration is less than the maximum detected concentration of lead in the background (14.9 mg/kg) and falls below the 95% PI. Therefore, lead at this location is consistent with background conditions.

Mercury

Mercury was detected in one sample [0143MW43(009.0)] at a concentration (0.0386 mg/kg) greater than the HELSTF BSL (0.031 mg/kg). However, the concentration is less than the maximum detected concentration of mercury in background (0.0528 mg/kg) and falls below the 95% PI (Attachment F5, Figure 6). Therefore, the levels of mercury present in soil at SWMU 148 are consistent with background conditions.

Silver

Silver was detected in seven soil samples collected at SWMU 141 at concentrations ranging from 8.84 to 74.6 mg/kg. Silver was not detected in any of the background samples which had reporting limits ranging from 0.05 to 0.25 mg/kg; therefore, a HELSTF BSL could not be developed. Silver concentrations detected at SWMU 141 are elevated in comparison to background.

3.4.11 SWMU 142

A total of 23 soil samples were collected from the top 10 feet of soil at SWMU 142. In 1990, four borings were advanced and three samples were collected from each boring at approximately 1, 5, and 10 ft bgs. In 1992, another boring was advanced and two samples were collected at 5 and 10 ft bgs. In 1993, two borings were advanced and two samples were collected from each boring at 3 to 5 ft bgs and 8 to 10 ft bgs. A third boring was installed in 1993 (CFW-4) and samples were collected at 2, 4, 6, 8, and 10 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, lead, mercury, selenium, and silver.

Arsenic

Arsenic was detected in 14 samples at concentrations greater than the HELSTF BSL (2.8 mg/kg). Arsenic reported in the three samples collected from Boring CFW-4 ranged from non-detect to 4.7 mg/kg, with two of them falling above the HELSTF BSL. These concentrations are less than the maximum detected arsenic concentration in background and are below the inflection point on the Q-Q plot (Attachment F4,

Figure 13). Therefore, arsenic at this location was determined to be consistent with background. Arsenic concentrations detected in the samples collected from the East Bore, North Bore, South Bore, and West Bore ranged from 13 mg/kg to 53 mg/kg. These concentrations are greater than the maximum detected concentration of arsenic in background (6.5 mg/kg) and are above the inflection point on the Q-Q plot. Therefore, arsenic concentrations in these borings are elevated in comparison to background conditions.

Barium

Barium was detected in 14 samples at concentrations ranging from 45 to 330 mg/kg. The HELSTF BSL for barium is 116 mg/kg and the maximum detected concentration of barium in the background data set was 194 mg/kg. Barium was only detected in two samples at concentrations greater than the maximum background concentration. The Q-Q plot of barium for all samples (Attachment F4, Figure 14) was reviewed and no inflection point was identified and the barium distribution was linear. The two barium detections above the maximum background concentration fall on the regression line indicating the data fit the background data distribution and it is unlikely that they represent a separate population (i.e., anthropogenic source). In addition, the maximum detected barium concentration is less than the regional barium average in New Mexico soils (990 mg/kg) (Table 6). Based on the above factors, barium concentrations at SWMU 142 are consistent with background conditions.

Lead

Lead was detected in 15 samples at concentrations ranging from 1.2 mg/kg to 23 mg/kg. The HELSTF BSL for lead is 8.1 mg/kg and the maximum detected concentration of lead in the background data set was 14.9 mg/kg. The concentration of lead in nine of the samples was less than the maximum detected concentration in background. In addition, a review of the geochemical association with barium shows that all of the detected lead concentrations fall within the 95% PI based on the associated barium concentration. Therefore, lead concentrations at the site are consistent with background conditions.

Selenium

Selenium was detected in 12 samples at concentrations ranging from 3.0 mg/kg to 95 mg/kg. Selenium was not detected in any of the background samples which had a reporting limit of 2.0 mg/kg; therefore, a HELSTF BSL could not be developed. The

detection of selenium at SWMU 142 was determined to be elevated in comparison to background.

3.4.12 SWMU 143

A total of ten samples were collected at SWMU 143 from the top 10 feet of soil. In 1992, five borings were advanced (143B1, 143B2, 143B3, HMW11, and HMW17). Two soil samples were collected from Borings 143B1 and HMW17 at 5 and 10 ft bgs. One sample was collected from Borings 143B2, 143B3, and HMW11 at 10 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, chromium, lead, selenium, and silver. The maximum detected concentrations of arsenic, barium, chromium, hexavalent chromium, lead, mercury, and silver were greater than their HELSTF BSLs.

Arsenic

Arsenic was detected in three samples at concentrations greater than the HELSTF BSL. Arsenic concentrations detected in samples collected from Boring HMW-43 ranged from 5.48 to 9.64 mg/kg. The concentration detected in the sample collected at from HMW-43 at 9 ft bgs was 5.48 mg/kg. This concentration is less than the maximum background concentration and is at or below the point of inflection on the Q-Q plot. Therefore, the arsenic concentration at 9 ft bgs in Boring HMW-43 is consistent with background conditions. However, the concentrations detected in the 1- and 3-ft-bgs samples were 8.56 and 9.64 mg/kg, respectively, which are greater than the maximum concentration of arsenic in the background and are above the identified inflection point on the Q-Q plot (Attachment F4, Figure 13). Therefore, arsenic concentrations in the samples collected at 1 and 3 ft bgs are elevated in comparison to background conditions.

Barium

Only one detection of barium (179 mg/kg) was greater than the HELSTF BSL (116 mg/kg); however, it is less than the maximum detected barium concentration in background (194 mg/kg) and, therefore, was determined to be naturally occurring.

Chromium

Chromium was detected in one sample, HMW-43 at 3 ft bgs, at a concentration (19.3 mg/kg) greater than the HELSTF BSL (10.7 mg/kg). The concentration of

chromium falls above the 95% PI on the geochemical analysis plots with barium and, therefore, is elevated in comparison to background conditions.

Hexavalent Chromium

Hexavalent chromium was detected in three samples at concentrations (1.1 to 14 mg/kg) greater than the HELSTF BSL (0.031 mg/kg). There were insufficient data to perform a comparative or geochemical associated evaluation. Therefore, the concentration of hexavalent chromium at SWMU 143 is considered to be elevated in comparison to background.

Lead

Lead was detected in one sample, HMW-43 at 3 ft bgs, at a concentration (19.3 mg/kg) greater than the HELSTF BSL (8.1 mg/kg). The lead concentration detected in HMW-43 falls above the 95% PI on the geochemical analysis plots with barium (Attachment F5, Figure 5) and, therefore, is elevated in comparison to background conditions.

Mercury

Mercury was detected in one sample [0143MW43(009.0)] at a concentration (0.0386 mg/kg) greater than the HELSTF BSL (0.031 mg/kg). However, the concentration is less than the maximum detected concentration of mercury in background 0.0528 mg/kg and falls below the 95% PI (Attachment F5, Figure 6). Therefore, the levels of mercury present in soil at SWMU 143 are consistent with background conditions.

Silver

Silver was detected in three soil samples collected from one boring (HMW-143) at SWMU 148 at concentrations ranging from 8.84 to 16.7 mg/kg. Silver was not detected in any of the background samples which had reporting limits ranging from 0.05 to 0.25 mg/kg; therefore, a HELSTF BSL could not be developed. Silver concentrations detected at SWMU 143 are elevated in comparison to background.

3.4.13 SWMU 144

Two soil samples were collected from the top 10 feet of soil at SWMU 144. Samples 144B1SO10 and HMW7SO10 were both collected at 10 ft bgs in 1992 and analyzed for arsenic, barium, cadmium, lead, selenium, and silver. Arsenic and barium were the only metals detected. Detected arsenic concentrations ranged from 0.71 to 2.1 mg/kg, which is less than the HELSTF BSL of 2.8 mg/kg. Barium concentrations ranged from 67 to 100 mg/kg, which are less than the HELSTF BSL of 116 mg/kg. Therefore, metals concentrations at SWMU 144 are consistent with background levels.

3.4.14 SWMU 145

Two soil samples were collected from the top 10 feet of soil at SWMU 145. Sample 145SE1 was collected at the surface and HMW-09 was collected at 10 ft bgs. Both samples were analyzed for arsenic, barium, cadmium, lead, selenium, and silver. Arsenic was detected in both samples at 0.78 and 0.52 [dup 0.53] mg/kg, respectively. Lead was detected in the sample collected at 145SE1 at a concentration of 6 mg/kg. Detected concentrations of arsenic and lead are less than their HELSTF BSLs and, therefore, metals concentrations in soils at SWMU 145 are consistent with background conditions.

3.4.15 SWMU 146

A total of 11 soil samples were collected from the top 10 feet of soil at SWMU 146. In 1992, four borings were advanced and samples were collected at 3 ft bgs. These soil samples were analyzed for arsenic, barium, cadmium, lead, mercury, and silver. In 2006, five additional borings were advanced and samples were collected from 0.5 to 1 ft bgs. These soil samples were analyzed for the metals listed above as well as chromium, potassium, sodium, and zinc. Detected concentrations of all metals except selenium were less than their HELSTF BSLs. Selenium was detected in one sample (146S2SO03) at a concentration of 2.2 mg/kg. Selenium was not detected in any of the background samples which had a reporting limit of 2.0 mg/kg; therefore, a HELSTF BSL could not be developed. The detection of selenium in soils at SWMU 148 is elevated in comparison to background.

3.4.16 SWMU 147

One boring was advanced and two soil samples were collected from the top 10 feet of soil at SWMU 147; one at 5 ft bgs and one at 10 ft bgs. Soil samples were analyzed

for arsenic, barium, cadmium, lead, selenium, and silver. Arsenic, which was detected in Sample 147B1SO05 at 0.73 mg/kg (which is less than the HELSTF BSL of 2.8 mg/kg), was the only metal detected. Therefore, metals concentrations in soil at SWMU 147 are consistent with background conditions.

3.4.17 SWMU 148

A total of 43 soil samples have been collected in the top 10 feet of soil at SWMU 148. In 1992, four borings were advanced (141B9, 141B13, 141B14, and HMW-11) In 1993, ten borings were advanced (SWMU 14 SB-01 through SB-09 and HMW-43) and three samples were collected from each boring generally at 0 to 1, 3 to 4 and 9 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Detected concentrations of arsenic, barium, chromium, lead, mercury, and silver were greater than the HELSTF BSLs. Only one detection of barium (179 mg/kg) was greater than the HELSTF BSL (116 mg/kg); however, it was less than the maximum detected barium concentration in background (194 mg/kg) and, therefore, consistent with background conditions.

Arsenic

Arsenic was detected in 12 samples at concentrations greater than the HELSTF BSL. Concentrations detected in Borings SB-01 through SB-09 were less than the maximum detected background arsenic concentration and were below the identified inflection point on the Q-Q plot (Attachment F4, Figure 13). Therefore, concentrations detected in these samples are consistent with background conditions. Arsenic concentrations detected in samples collected from Boring HMW-43 ranged from 5.48 to 9.64 mg/kg. The concentration detected in the sample collected from HMW-43 at 9 ft bgs was 5.48 mg/kg. This concentration is less than the maximum background concentration and is at or below the point of inflection on the Q-Q plot. Therefore, it is consistent with background conditions. However, the concentrations detected in the 1-and 3-ft-bgs samples were 8.56 and 9.64 mg/kg, respectively, which are greater than the maximum concentration of arsenic in the background and are above the identified inflection point on the Q-Q plot. Therefore, arsenic concentrations in samples from 1 and 3 ft bgs are elevated in comparison to background conditions.

Chromium

Chromium was detected in one sample, HMW-43 at 3 ft bgs, at a concentration (19.3 mg/kg) greater than the HELSTF BSL (10.7 mg/kg). The concentration of

chromium falls above the 95% PI on the geochemical analysis plots with barium (Attachment F5, Figure 2) and, therefore, is elevated in comparison to background conditions.

Lead

Lead was detected in two samples, HMW-43 at 3 ft bgs and SWMU 148 SB-01, at concentrations greater than the HELSTF BSL (8.1 mg/kg), respectively. The concentration of lead detected in HMW-43 falls above the 95% PI on the geochemical analysis plots with barium (Attachment F5, Figure 5) and, therefore, is elevated in comparison to background conditions. The concentration of lead in SWMU 148 SB-01 at 1 ft bgs (8.17 mg/kg) is just slightly greater than the HELSTF BSL (8.1 mg/kg). This lead concentration is less than the maximum detected concentration of lead in background (14.9 mg/kg) and falls below the 95% PI. Therefore, lead at this location is consistent with background conditions.

Mercury

Mercury was detected in two samples at concentrations greater than the HELSTF BSL (0.031 mg/kg). However, both concentrations are less than the maximum detected concentration of mercury in background (0.0528 mg/kg) and both fall below the 95% PI (Attachment F5, Figure 6). Therefore, the concentrations of mercury detected in soil at SWMU 148 are consistent with background conditions.

Silver

Silver was detected in 12 soil samples collected at SWMU 148 at concentrations ranging from 8.84 to 74.8 mg/kg. Silver was not detected in any of the background samples which had reporting limits ranging from 0.05 to 0.25 mg/kg; therefore, a HELSTF BSL could not be developed. Silver concentrations detected at SWMU 148 are elevated in comparison to background.

3.4.18 SWMU 149

Two soil samples were collected from the top 10 feet of soil. One boring was advanced (HMW-17) and two samples were collected, one at 5 ft bgs and one at 10 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, lead, mercury, selenium, and silver. Only arsenic and barium were detected and concentrations were

less than their HELSTF BSLs. Therefore, metals present in soils at SWMU 149 are consistent with background conditions.

3.4.19 SWMU 150

A total of nine soil samples were collected at SWMU 150 from the top 10 feet. Six samples were collected in 1992. Samples were collected at 150S1 and 150S6 at 1 ft bgs. At 150S2, samples were collected at 1 and 2 ft bgs. One sample was collected from 150S4 at 2 ft bgs and one sample was collected from 150S4 at 3 ft bgs. Three additional samples were collected in 2006 (HLSF-0085-SB-007, SB-008, and SB-009) at 0.5 to 1 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, lead, mercury, selenium, and silver. In addition, the three samples collected in 2006 were analyzed for chromium. Lead, mercury, and silver were detected in samples at concentrations greater than the HELSTF BSLs.

Lead was detected in four samples (HLSF-0085-SB-007, SB-008, SB-009, and 150S1SO01) at concentrations greater than the HELSTF BSL. Further evaluation of lead using the geochemical association analysis indicates the lead concentrations detected in all four samples fall above the 95% PI (Attachment F5, Figure 5) and therefore, are elevated in comparison to background. No further geochemical evaluation of mercury or silver could be performed due to a lack of detections. Lacking further evidence, the concentrations of mercury and silver are elevated in comparison to background conditions.

3.4.20 SWMU 151-152

Two borings were advanced (151B1 and 152B1) and two samples were collected from each boring at 5 and 10 ft bgs. Soil samples were analyzed for arsenic, cadmium, lead, selenium, and silver. Cadmium, lead, selenium, and silver were not detected in the soil samples. Arsenic was detected in one sample at a concentration (0.94 mg/kg) less than the HELSTF BSL (2.8 mg/kg). Therefore, metals in soil at SWMUs 151 and 152 are not elevated in comparison to background conditions.

3.4.21 SWMU 154

A total of 16 soil samples were collected from the top 10 feet of soil at SWMU 154. One sample, HCF-02, was collected from 0 to 5 ft bgs in 1992 and analyzed for 18 metals. Two additional borings were advanced in 1992 (HMW-10 and HMW-13) and one sample was collected from each at 10 ft bgs. These samples were analyzed

for arsenic, barium, cadmium, lead, selenium, and silver. In 1993, four borings were advanced. Two samples, each, were collected from CFW-02 and CFW-03 at 3 to 5 ft bgs and 8 to 10 ft bgs. Two samples, each, were collected from HCF-SW300 and WSW-300 at 0 to 5 ft bgs and 5 to 10 ft bgs. Soil samples were analyzed for arsenic, barium, cadmium, chromium, lead, selenium, and silver. In 1994, six borings were advanced and a sample was collected from each boring at 10 ft bgs.

Aluminum, arsenic, barium, chromium, iron, potassium, and sodium were detected in soil samples at concentrations less than their HELSTF BSLs and, therefore, are consistent with background conditions. Copper was detected in two samples (DRW-05 and DRW-06) at concentrations (7 mg/kg) greater than its BSL (6 mg/kg) and just slightly greater than the maximum detected concentration of copper in the background data set (6.41 mg/kg). Further geochemical evaluation could not be performed because DRW-05 was not analyzed for barium and the reporting limit for barium was elevated in DRW-06 such that barium was not detected. Similarly, lead was detected in six samples (DRW-01 through DRW-06) at concentrations (14 to 30 mg/kg) greater than the HELSTF BSL (8.1 mg/kg). Further geochemical evaluation of lead could not be performed due to missing and/or elevated barium data. Zinc was detected in one sample (HCF-02) at a concentration (27 mg/kg) greater than its HELSTF BSL (20.9 mg/kg). The geochemical association evaluation with barium shows that it falls within the 95% PI (Attachment F5, Figure 8) and, therefore, was determined to be naturally occurring.

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Background Characterization Report

Table F1. Summary of Metals in Background Soil Samples

Location ID: Sample Depth (ft): Date Collected:	Units	141BG1 2 04/30/92	142BG 1 04/06/92	143BG1 2 05/04/92	144BG1 10 05/06/92	144BK1 4 - 4.5 02/10/92	145BG1 2 04/30/92	146BKG 0 03/18/92	148BG1 2 04/30/92	149BG 2 04/06/92	150BG1 3 02/16/92
Metals											
Aluminum	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/kg	0.540	0.450 U	0.500 U	0.510 U	0.480 U	0.620	1.10	0.460 U	0.600	1.90
Barium	mg/kg	92.0 U	92.0 U	93.0 U	100 U	110 U	96.0 U	97.0 U	89.0 U	100 U	170
Cadmium	mg/kg	2.30 U	2.30 U	2.30 U	2.60 U	2.60 U	2.40 U	2.40 U	2.20 U	2.50 U	2.50 U
Calcium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexavalent Chromium	mg/kg	NA	NA	0.0310	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	mg/kg	23.0 U	23.0 U	23.0 U	26.0 U	26.0 U	24.0 U	24.0 U	22.0 U	25.0 U	25.0 U
Mercury	mg/kg	0.100 U	0.0900 U	0.100 U	0.0800 U	0.100 U	0.0900 U	0.100 U	0.100 U	0.0700 U	0.0800 U
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	0.500 U	0.450 U	0.500 U	0.510 U	0.480 U	0.490 U	0.520 U	0.460 U	0.470 U	0.480 U
Silver	mg/kg	4.60 U	4.60 U	4.70 U	5.20 U	5.30 U	4.80 U	4.90 U	4.50 U	5.10 U	5.10 U
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Location ID: Sample Depth (ft): Date Collected:	Units	151BG 2 04/06/92	152BG 2 04/04/92	154BG 2 04/06/92	3334BG 1 04/04/92	3334BG 2 04/04/92	3839HA01 0 01/07/94	HLSF-BKGD-SB-001 0 - 0.5 03/16/09	HLSF-BKGD-SB-001 9.5 - 10 03/16/09	HLSF-BKGD-SB-002 0 - 0.5 03/16/09	HLSF-BKGD-SB-002 9.5 - 10 03/16/09
Metals											
Aluminum	mg/kg	NA	NA	NA	NA	NA	NA	3,800	1,480	930	1,830
Arsenic	mg/kg	0.620	0.530 U	0.550 U	NA	NA	2.80	2.00 U	2.00 U	2.00 U	2.00 U
Barium	mg/kg	110 U	100 U	99.0 U	NA	NA	194	49.4	21.8	22.0	37.8
Cadmium	mg/kg	2.70 U	2.50 U	2.50 U	NA	NA	5.81	0.200 U	0.200 U	0.200 U	0.200 U
Calcium	mg/kg	NA	NA	NA	NA	NA	NA	123,000	160,000	189,000	166,000
Chromium	mg/kg	NA	NA	NA	NA	NA	26.4 U	5.61	2.24	1.65	2.07
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexavalent Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	NA	NA	NA	NA	NA	NA	4,760	1,380	1,150	1,840
Lead	mg/kg	27.0 U	25.0 U	25.0 U	NA	NA	14.9	1.00 U	1.00 U	1.00 U	1.00 U
Mercury	mg/kg	0.100 U	0.100 U	0.0800 U	NA	NA	0.0528 J	0.0101 J	0.0400 U	0.00804 J	0.0400 U
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	0.510 U	0.530 U	0.550 U	NA	NA	2.64 U	2.00 U	2.00 U	2.00 U	2.00 U
Silver	mg/kg	5.50 U	5.00 U	5.00 U	NA	NA	26.4 UJ	0.250 U	0.250 U	0.250 U	0.250 U
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Background Characterization Report

Table F1. Summary of Metals in Background Soil Samples

Location ID: Sample Depth (ft): Date Collected:	Units	HLSF-BKGD-SB-003 0 - 0.5 03/16/09	HLSF-BKGD-SB-003 9.5 - 10 03/16/09	HLSF-BKGD-SB-004 0 - 0.5 03/16/09	HLSF-BKGD-SB-004-DUP 0 - 0.5 03/16/09	HLSF-BKGD-SB-004 9.5 - 10 03/16/09	HLSF-BKGD-SB-005 0 - 0.5 03/16/09	HLSF-BKGD-SB-005 9.5 - 10 03/16/09	HLSF-BKGD-SB-006 0 - 0.5 03/16/09	HLSF-BKGD-SB-006 9.5 - 10 03/16/09	HLSF-BKGD-SB-007 0 - 0.5 03/17/09
Metals											
Aluminum	mg/kg	730	2,380	7,770	7,840	2,920	875	2,340	860	960	8,840
Arsenic	mg/kg	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Barium	mg/kg	19.9	48.3	64.9	65.2	53.0	21.8	57.2	25.4	28.5	65.2
Cadmium	mg/kg	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Calcium	mg/kg	181,000	164,000	104,000	93,500	153,000	149,000	157,000	137,000	173,000	37,000
Chromium	mg/kg	1.31	2.79	9.33	8.08	3.32	1.32	2.61	1.76	0.500 U	8.24
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexavalent Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	880	2,210	7,270	7,730	2,650	1,090	2,060	1,110	816	9,030
Lead	mg/kg	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	4.19
Mercury	mg/kg	0.0107 J	0.0400 U	0.0192 J	0.0187 J	0.0400 U	0.0120 J	0.0400 U	0.0178 J	0.0400 U	0.00513 J
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Silver	mg/kg	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Location ID: Sample Depth (ft): Date Collected:	Units	HLSF-BKGD-SB-007 9.5 - 10 03/17/09	HLSF-BKGD-SB-008 0 - 0.5 03/17/09	HLSF-BKGD-SB-008-DUP 0 - 0.5 03/17/09	HLSF-BKGD-SB-008 9.5 - 10 03/17/09	HLSF-BKGD-SB-009 0 - 0.5 03/17/09	HLSF-BKGD-SB-009 9.5 - 10 03/17/09	HLSF-BKGD-SB-010 0 - 0.5 03/17/09	HLSF-BKGD-SB-010 9.5 - 10 03/17/09	HLSF-BKGD-SB-011 0 - 0.5 03/17/09	HLSF-BKGD-SB-011 9.5 - 10 03/17/09
Metals											
Aluminum	mg/kg	1,910	10,400	4,930	4,650	5,050	1,530	4,130	1,360	830	650
Arsenic	mg/kg	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Barium	mg/kg	29.2	87.3	51.2	54.6	52.4	38.9	46.6	24.9	23.7	15.1
Cadmium	mg/kg	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.0590 J	0.200 U	0.200 U	0.200 U
Calcium	mg/kg	177,000	128,000	139,000	133,000	153,000	168,000	142,000	161,000	148,000	157,000
Chromium	mg/kg	2.16	15.5	7.69	7.48	5.03	1.62	5.62	0.500 U	0.557	0.500 U
Copper	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexavalent Chromium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	mg/kg	1,750	8,600	4,000	3,810	4,660	1,300	4,550	1,350	970	640
Lead	mg/kg	1.00 U	3.13	1.00 U	1.00 U	1.00 U	1.00 U	1.96	1.00 U	1.00 U	1.00 U
Mercury	mg/kg	0.0400 U	0.0142 J	0.0400 U	0.0400 U	0.00618 J	0.0400 U	0.0190 J	0.0400 U	0.0102 J	0.0400 U
Potassium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	mg/kg	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Silver	mg/kg	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U
Sodium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Table F1. Summary of Metals in Background Soil Samples

Location ID: Sample Depth (ft): Date Collected:	Units	HLSF-BKGD-SB-012 0 - 0.5 03/17/09	HLSF-BKGD-SB-012 9.5 - 10 03/17/09	HLSF-BKGD-SB-012-DUP 9.5 - 10 03/17/09	HLSF-SB-001 0.5 - 1 11/01/06	HLSF-SB-001 10 - 10.5 11/01/06	HLSF-SB-002 0.5 - 1 10/16/06	HLSF-SB-002 10 - 10.5 10/13/06	HLSF-SB-003 0.5 - 1 10/20/06	HLSF-SB-003 10 - 10.5 10/20/06	HLSF-SB-004 0.5 - 1 10/20/06
Metals											
Aluminum	mg/kg	11,800	1,460	1,390	NA	NA	NA	NA	NA	NA	NA
Arsenic	mg/kg	2.00 U	2.00 U	2.00 U	2.00 U	6.58	1.00 U	1.00 U	2.00 U	2.00 U	2.00 U
Barium	mg/kg	111	31.1	28.0	21.4	94.5	17.8	44.2	14.1	18.4	9.48
Cadmium	mg/kg	0.151 J	0.200 U	0.200 U	0.100 U	0.100 U	0.500 U	0.500 U	0.100 U	0.100 U	0.100 U
Calcium	mg/kg	65,500	144,000	156,000	NA	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	11.9	0.500 U	1.37	0.500 U	7.22	1.07	2.39	0.858	1.31	1.19
Copper	mg/kg	NA	NA	NA	0.500 U	6.41	2.18	2.48	2.17	0.697	1.79
Hexavalent Chromium	mg/kg	NA	NA	NA	5.00 U	5.00 U	0.400 U	0.400 U	5.00 U	5.00 U	5.00 U
Iron	mg/kg	11,200	1,290	1,260	NA	NA	NA	NA	NA	NA	NA
Lead	mg/kg	1.00 U	1.00 U	1.00 U	1.00 U	12.8	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Mercury	mg/kg	0.0229 J	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U
Potassium	mg/kg	NA	NA	NA	325	2,180	176	618	227	376	198
Selenium	mg/kg	2.00 U	2.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver	mg/kg	0.250 U	0.250 U	0.250 U	0.0500 U	0.0500 U	0.200 U	0.200 U	0.0500 U	0.0500 U	0.0500 U
Sodium	mg/kg	NA	NA	NA	243	2,070	290	455	381	652	205
Zinc	mg/kg	NA	NA	NA	3.17	17.4	7.48	18.1	2.82	2.76	2.64

Location ID: Sample Depth (ft): Date Collected:	Units	HLSF-SB-004 10 - 10.5 10/20/06	HLSF-SB-004-DUP 10 - 10.5 10/20/06	HLSF-SB-005 0.5 - 1 10/19/06	HLSF-SB-005 10 - 10.5 10/19/06	HLSF-SB-006 0.5 - 1 10/19/06	HLSF-SB-006 10 - 10.5 10/19/06
Metals							
Aluminum	mg/kg	NA	NA	NA	NA	NA	NA
Arsenic	mg/kg	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Barium	mg/kg	18.9	18.7	9.75	26.8	16.7	24.8
Cadmium	mg/kg	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Calcium	mg/kg	NA	NA	NA	NA	NA	NA
Chromium	mg/kg	1.48	1.42	0.500 U	2.18	0.500 U	0.500 U
Copper	mg/kg	0.813	0.793	0.877	1.29	1.16	0.692
Hexavalent Chromium	mg/kg	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Iron	mg/kg	NA	NA	NA	NA	NA	NA
Lead	mg/kg	1.44	1.61	1.00 U	1.62	1.00 U	2.11
Mercury	mg/kg	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U	0.0400 U
Potassium	mg/kg	430	447	121	419	129	678
Selenium	mg/kg	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver	mg/kg	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Sodium	mg/kg	998	1,080	333	1,880	219	2,090
Zinc	mg/kg	2.87	2.79	2.00 U	2.79	2.00 U	3.55

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Table F2. Outlier Evaluation

Group	Analyte	n	% NDs	# Suspected Outliers ^{1,2}	Distribution ³	Statistical Outlier Test ⁴	# Statistical Outliers	Statistical Outliers	
								Value ⁴	Sample
BACKGROUND DATASET									
Metals	Arsenic	50	84%	1	N/G/LN	NA	1	6.58 ⁵	HLSF-SB-001(10 - 10.5)
	Copper	12	8%	1	N/G/LN	Dixon's	1	6.41	HLSF-SB-001(10 - 10.5)
	Potassium	12	0%	1	N/G/LN	Dixon's	1	2,180	HLSF-SB-001(10 - 10.5)
	Zinc	12	17%	2	LN	Dixon's ⁶	2	17.1, 18.4	HLSF-SB-001(10 - 10.5), HLSF-SB-002(10 - 10.5)

Abbreviations:

n = sample size (detects + nondetects)

NA = not applicable

% NDs = percent nondetects

IQR = interquartile range (75th - 25th percentiles)

Notes:

¹ Initial suspected outlier screening performed using the upper 75th percentile + 3 x IQR. [IQR = Interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)].

² The number of suspected outliers were determined for each constituent by comparing the number of sample results exceeding the upper 75th percentile + 3 x IQR threshold value and based on visual inspection of Q-Q plots.

³ Distribution assessed by goodness-of-fit tests with nondetects determined by regression on order statistics (ROS) and excluding suspected outliers using ProUCL 4.0 at a 95% confidence level ($\alpha = 0.05$) Data sets with 100% FOD utilize standard Shapiro-Wilks/Lilliefors/Kolmogorov-Smirnov tests based on data distribution

Distributions:

Normal (N): data set follows a normal distribution based on Shapiro Wilks Test ($n \leq 50$) or Lilliefors Test ($n > 50$)

Gamma (G): data set follows a gamma distribution based on Kolmogorov-Smirnov Test

Lognormal (Ln): data set follows a lognormal distribution based on Shapiro Wilks Test ($n \leq 50$) or Lilliefors Test ($n > 50$)

Nonparametric (NP): data set is not normal, lognormal, or gamma; or fewer than 5 detects

⁴ Statistical test for confirming outliers selected based on sample size, degree of censoring, and distribution of the dataset excluding suspected outliers:

Dixon's: $n < 25$, %ND $< 15\%$, normal/lognormal

Rosner's: $n \leq 25$, %ND $< 15\%$, normal/lognormal

IQR: $n < 60$, %ND $\leq 15\%$, nonparametric

⁵ The suspected outlier was not evaluated as nondetects were observed in the upper tail, as displayed on the Q-Q plot.

⁶ Dixon's test was used to evaluate multiple suspected outliers by testing the lowest suspected outlier.

Reference:

U.S. Environmental Protection Agency. 2007. ProUCL Version 4.0 Technical Guide. Office of Research and Development. EPA/600/R-07/041. April.

Table F3. Data Summary for Background Soil Samples

Group	Analyte	Dataset ¹	Sample Size			Min Detect ²	Max Detect ²	Mean ^{2,3}	SD ^{2,3}	Distribution ^{3,4}		Distribution for BSL ⁵
			# Detects	N	FOD %					Detects Only Method	ROS Method	
Metals	Aluminum	Full Dataset	24	24	100%	650	11,800	3,200	3,020	G/Ln	--	Gamma
	Arsenic	Full Dataset	8	50	16%	0.54	6.58	0.85	0.94	G/Ln	N/G/Ln	Normal
	Barium	Full Dataset	38	50	76%	9.48	194	42	35.9	Ln	G/Ln	Gamma
	Cadmium	Full Dataset	3	50	6%	0.059	5.81	NA	NA	NA	NA	NA
	Calcium	Full Dataset	24	24	100%	37,000	189,000	145,000	35,100	NP	--	Nonparametric
	Chromium	Full Dataset	29	37	78%	0.557	11.9	3.1	3.1	Ln	N/Ln	Normal
	Copper	Full Dataset	11	12	92%	0.692	6.41	1.8	1.5	G/Ln	Ln	Lognormal
		excluding outlier(s)	10	11	91%	0.692	2.48	1.3	0.65	N/G/Ln	N/G/Ln	Normal
	Hexavalent Chromium	Full Dataset	1	13	8%	0.031	0.031	NA	NA	NA	NA	NA
	Iron	Full Dataset	24	24	100%	640	11,200	3,100	2,870	Ln	--	Lognormal
	Lead	Full Dataset	8	50	16%	1.525	14.9	2.3	2.8	G/Ln	N/Ln	Normal
	Mercury	Full Dataset	13	50	26%	0.00513	0.0528	0.014	0.0084	G/Ln	Ln	Lognormal
	Potassium	Full Dataset	12	12	100%	121	2,180	490	562	G/Ln	--	Gamma
		excluding outlier(s)	11	11	100%	121	678	337	190	N/G/Ln	--	Normal
	Selenium	Full Dataset	0	50	0%	ND	ND	NA	NA	NA	NA	NA
	Silver	Full Dataset	0	50	0%	ND	ND	NA	NA	NA	NA	NA
	Sodium	Full Dataset	12	12	100%	205	2,090	821	756	G/Ln	--	Gamma
	Zinc	Full Dataset	10	12	83%	2.64	18.1	5.7	5.5	NP	Ln	Lognormal
		excluding outlier(s)	8	10	80%	2.64	7.48	3.3	1.4	NP	Ln	Lognormal

Abbreviations:

-- = not applicable (100% detects)
 BSL = background screening level
 FOD = frequency of detection

GOF = goodness-of-fit
 KM = Kaplan-Meier
 N = sample size

NA = not applicable (insufficient detects)
 ROS = regression on order statistics
 SD = standard deviation

Notes:

- Identification of statistical outliers described in Table 5.
- Concentrations are in units of milligrams per kilogram (mg/kg).
- Mean, SD and GOF results only reported for analytes with less than 8 total observations or less than 5 detected observations (U.S. Environmental Protection Agency [USEPA], 2007).
 For censored datasets, the mean and standard deviation are based on Kaplan-Meier methods.
- Distribution assessed by GOF tests based on detected values only and ROS estimates for nondetects conducted using ProUCL 4.0 at a 95% confidence level (α = 0.05).
 Distributions:
 Normal (N): dataset follows a normal distribution, according to the Lilliefors test.
 Gamma (G): dataset follows a gamma distribution, according to the Kolmogorov-Smirnov test.
 Lognormal (Ln): dataset follows a lognormal distribution, according to the Lilliefors test.
 Nonparametric (NP): dataset does not follow any of the three distributions noted above.
- Distribution for BSL based on the following hierarchy for GOF test results based on ROS Method: normal > gamma > lognormal > nonparametric. Refer to Table 2 for upper tolerance limit selection criteria.

References:

USEPA. 2007. ProUCL Version 4.0 Technical Guide. Office of Research and Development. EPA/600/R-07/041. April.

Table F4. Decision Tree for 95/95 Upper Tolerance Limits

Sample Size	Censoring	Distribution ¹	Skewness ²	Statistic Used for UTL ³
All	Detects < 5	NA	NA	NA
n < 8	All	NA	NA	NA
n • 8	Detects • 5 FOD = 100%	N	NA	Normal 95/95 UTL
		N and LN		
		N and LN and G		
		LN	NA	Lognormal 95/95 UTL
	G	NA	Gamma 95/95 UTL	
		LN and G		
Detects • 5 FOD < 100%	not N, LN, or G	NA	Nonparametric 95/95 UTL ⁴	
	N, LN, or G	NA	Kaplan-Meier 95/95 UTL	
	not N, LN, or G	Mild	Kaplan-Meier 95/95 UTL	
		Moderate to High	Nonparametric 95/95 UTL ⁴	

Abbreviations:

95/95 UTL = one-sided upper 95 percent confidence limit for the 95th percentile

BSL = background screening level

FOD = frequency of detection

n = sample size

Notes:

¹ Distribution assessed by goodness-of-fit tests based on detected values only conducted using ProUCL 4.0 at a 95% confidence level (• = 0.05).

Distributions:

Normal (N): dataset follows a normal distribution, according to the Shapiro-Wilk test.

Gamma (G): dataset follows a gamma distribution, according to the Kolmogorov-Smirnov test.

Lognormal (Ln): dataset follows a lognormal distribution, according to the Shapiro-Wilk test.

Nonparametric (NP): dataset does not follow any of the three distributions noted above.

² Skewness estimated using the standard deviation of the log-transformed data (detects only) (•). Datasets with ••1.0 are considered mildly skewed, whereas datasets with •>1.0 are considered moderately to highly skewed (U.S. Environmental Protection Agency [USEPA], 2007).

³ Statistics calculated with ProUCL Version 4.0, except the Gamma UTL, which is calculated in Excel using exact method based on Guenther (1972).

⁴ Nonparametric UTL is based on a rank-ordered value (typically the maximum detect) that achieves the coverage and confidence coefficient for a given sample size. The ranks are unlikely to match these parameters exactly. Values presented are based on ranks from Table A-5 of Conover (1999), which correspond to minimum sample sizes needed to achieve the specified parameters. ProUCL selects the rank-ordered value that most closely matches the parameters (max detect or second highest value), even if the rank yields a lower coverage or confidence coefficient.

References:

Conover, W.J. 1999. Practical Nonparametric Statistics. Third Edition. John Wiley & Sons.

Guenther, W.C. 1972. Tolerance Intervals for Univariate Distributions. Naval Research Logistics Quarterly. 19:309-333.

USEPA. 2007. ProUCL Version 4.0 Technical Guide. Office of Research and Development. EPA/600/R-07/041. April.

Table F5. Summary of HELSTF Background Screening Levels^{1,2}

Group	Analyte	Dataset	N	FOD %	Distribution ³	Skewness ⁴	Maximum Detect	Mean	SD	95/95 UTL	UTL Method ⁶	Final BSL ^{6,7}	
												Value	Note
Metals	Aluminum	full dataset	24	100%	Gamma	0.88	11,800	3,200	3,020	12,000	Gamma 95/95UTL	12,000	A*
	Arsenic	full dataset	50	16%	Normal	0.85	6.58	0.85	0.94	2.8	KM 95/95UTL	2.8	A
	Barium	full dataset	50	76%	Gamma	0.70	194	42	35.9	116	KM 95/95UTL	116	A
	Cadmium	full dataset	50	6%	NA	NA	5.81	NA	NA	NA	NA	5.8	B
	Calcium	full dataset	24	100%	Nonparametric	0.35	189,000	145,000	35,100	189,000	NP 95/95UTL	189,000	A
	Chromium	full dataset	37	78%	Normal	0.81	11.9	3.1	3.1	9.7	KM 95/95UTL	9.7	A
	Copper	full dataset	12	92%	Lognormal	0.65	6.41	1.8	1.5	6	KM 95/95UTL	6	A
		excluding outlier(s)	11	91%	Normal	0.47	2.48	1.3	0.65	3.2	KM 95/95UTL	3.2	A
	Hexavalent Chromium	full dataset	13	8%	NA	NA	0.031	NA	NA	NA	NA	0.031	B
	Iron	full dataset	24	100%	Lognormal	0.81	11,200	3,100	2,870	14,800	Lognormal 95/95UTL	14,800	A*
	Lead	full dataset	50	16%	Normal	0.84	14.9	2.3	2.8	8.1	KM 95/95UTL	8.1	A
	Mercury	full dataset	50	26%	Lognormal	0.59	0.0528	0.014	0.0084	0.031	KM 95/95UTL	0.031	A
	Potassium	full dataset	12	100%	Gamma	0.78	2,180	490	562	2,260	Gamma 95/95UTL	2,260	A*
		excluding outlier(s)	11	100%	Normal	0.57	678	337	190	872	Normal 95/95UTL	872	A
	Selenium	full dataset	50	0%	NA	NA	ND	NA	NA	NA	NA	NA	C
	Silver	full dataset	50	0%	NA	NA	ND	NA	NA	NA	NA	NA	C
	Sodium	full dataset	12	100%	Gamma	0.86	2,090	821	756	3,880	Gamma 95/95UTL	3,880	A*
	Zinc	full dataset	12	83%	Lognormal	0.73	18.1	5.7	5.5	20.9	KM 95/95UTL	20.9	A*
		excluding outlier(s)	10	80%	Lognormal	0.32	7.48	3.3	1.4	7.4	KM 95/95UTL	7.4	A

Abbreviations:

95/95 UTL = one-sided upper 95 percent confidence limit for the 95th percentile
 * = 95/95 UTL > maximum detect, which introduces a source of uncertainty
 BSL = background screening level
 FOD = frequency of detection

GOF = goodness-of-fit
 KM = Kaplan-Meier
 N = sample size
 NA = not applicable (insufficient detects)

ROS = regression on order statistics
 SD = standard deviation

Notes:

- Concentrations are in units of milligrams per kilogram (mg/kg).
- Background screening levels are not calculated for analytes with less than 8 total observations or less than 5 detected observations (U.S. Environmental Protection Agency [USEPA], 2007).
- Distribution assessed by goodness-of-fit tests based on detected values only conducted using ProUCL 4.0 at a 95% confidence level (* = 0.05).
Distributions:
 Normal (N): data set follows a normal distribution, according to the Shapiro-Wilk test.
 Gamma (G): data set follows a gamma distribution, according to the Kolmogorov-Smirnov test.
 Lognormal (Ln): data set follows a lognormal distribution, according to the Shapiro-Wilk test.
 Nonparametric (NP): data set does not follow any of the three distributions noted above.
- Skewness estimated using the standard deviation of the log-transformed data (detects only) (*). Datasets with •• 1.0 are considered mildly skewed, whereas datasets with • >1.0 are moderately to highly skewed (USEPA, 2007). See Table 2B for how skewness informs the choice of UTL methods.
- UTL Method selected based on criteria outlined in Table 2. Gamma UTL calculated using Guenther's method (Guenther, 1972).
- There is uncertainty in establishing BSLs based on 95/95 UTL values that exceed the maximum detected concentration. If the goodness-of-fit testing suggests a good fit to normal, lognormal, or gamma distributions, or if the data are mildly skewed (standard deviation of log-transformed • 1.0), the UTL is considered plausible.
- Final BSL selected in accordance with decision tree in Table 2. Notes indicate basis for BSL: A = 95/95 UTL; B = maximum detected concentration; C = BSL not defined because FOD=0%.

References:

Guenther, W.C. 1972. Tolerance Intervals for Univariate Distributions. Naval Research Logistics Quarterly. 19:309-333.
 USEPA. 2007. ProUCL Version 4.0 Technical Guide. Office of Research and Development. EPA/600/R-07/041. April.

Table F6. Comparison of HELSTF Background Screening Levels to Regional Background Levels

Analyte	Maximum Detect	95/95 UTL	Mined Gypsum	Light Dessert Soil	New Mexico Sediment
Aluminum	11,800	12,000	NA	NA	50,700
Arsenic	6.58	2.8	0.19 - 3.0	6.5	NA
Barium	194	116	NA	835	549
Cadmium	5.81	NA	<2 - 0.5	NA	NA
Calcium	189,000	189,000	181,000 - 213,000	NA	19,200
Chromium	11.9	9.7	8.7 - 30.5	60	33.93
Copper	6.41	6	<4 - 29.8	24	19.41
Hexavalent Chromium	0.031	NA	NA	NA	NA
Iron	11,200	14,800	380 - 7,400	NA	21,100
Lead	14.9	8.1	<5	23	16.58
Mercury	0.0528	0.031	0.00044 - 0.025	0.06	NA
Potassium	2,180	2,260	76 - 4,400	NA	15,200
Selenium	ND	NA	11.3 - 21.1	0.5	NA
Silver	ND	NA	NA	NA	NA
Sodium	2,090	3,880	760 - 3,500	NA	8,600
Zinc	18.1	20.9	13.1 - 27.5	52.5	61.2

NA - Not available.

UTL - Upper Tolerance Level.

Table F7. Background Exceedance Summary for Soil

	DataSet	Total Exceedances	Aluminum	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Hexavalent Chromium	Iron	Lead	Mercury	Potassium	Selenium ³	Silver ³	Sodium	Zinc
1	SWMU-023-24	0	•	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2	SWMU-025	0	•	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3	SWMU-026	2	•	2	<BSL	•	•	<BSL	•	•	•	<BSL	•	•	•	•	•	•
4	SWMU-031-32	1	•	•	<BSL	•	•	<BSL	•	•	•	<BSL	•	<BSL	•	•	<BSL	1
5	SWMU-033-34	0	•	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6	SWMU-035-36	0	•	•	<BSL	•	•	<BSL	•	•	•	•	•	<BSL	•	•	•	<BSL
7	SWMU-037	0	•	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8	SWMU-038-39	19	•	9	1	•	•	•	•	•	•	1	<BSL	•	6	2	•	•
9	SWMU-141	20	•	6	3	•	•	1	•	•	•	2	1	•	•	7	•	•
10	SWMU-142	50	•	14	12	<BSL	•	<BSL	•	•	•	12	•	•	12	•	•	•
11	SWMU-143	13	•	3	1	•	•	1	•	3	•	1	1	•	•	3	•	•
12	SWMU-144	0	•	<BSL	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•
13	SWMU-145	0	•	<BSL	•	•	•	•	•	•	•	<BSL	•	•	•	•	•	•
14	SWMU-146	1	•	<BSL	<BSL	<BSL	•	<BSL	•	•	•	<BSL	•	<BSL	1	•	<BSL	<BSL
15	SWMU-147	0	•	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•	•
16	SWMU-148	31	•	12	2	•	•	1	•	•	•	2	2	•	•	12	•	•
17	SWMU-149	0	•	<BSL	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•
18	SWMU-150	10	•	<BSL	<BSL	•	•	<BSL	•	•	•	4	3	•	•	3	•	•
19	SWMU-151-152	0	•	<BSL	•	•	•	•	•	•	•	•	•	•	•	•	•	•
20	SWMU-154	9	<BSL	<BSL	<BSL	•	•	<BSL	2	•	<BSL	6	•	<BSL	•	•	<BSL	1

Notes:

- = No data collected for given analyte/SWMU
- < BSL = maximum detected value less than the background screening level (BSL), or all values less than the reporting limit.
- ¹ Red cells indicate the number of detected values that exceed the BSL
- ² BSLs are based on the full background dataset (0-10 ft bgs).
- ³ BSLs could not be established for silver and selenium since all background samples were below the minimum detection limit. Therefore, the exceedance value indicates the number of detects in the given dataset.

Background Characterization Report

Table F8. Summary of Geochemical Evaluation

SWMU	Metal	Maximum	UTL	# Greater than UTL	Geochemical Evaluation	Q-Q Plot Evaluation	Conclusion	Remarks
26	Arsenic	4.7	6.6	2	NA	NA	Not Elevated	Insufficient data available to run comparative analysis; however, both detects are less than the maximum background concentrations. Therefore, it was determined that arsenic levels at this site are not elevated.
31/32	Zinc	27	20.9	1	1>95PI	NA	Elevated	Geochemical evaluation provides evidence that zinc distribution is not similar to background.
38/39	Arsenic	17.5	2.8	9	NA	9>Inflection point • 5.4 mg/kg	Elevated	All arsenic concentrations are greater than the inflection point on the Q-Q plot.
	Barium	144	116	1	NA	Single population	Not Elevated	Data are consistent with background.
	Lead	<23 [20]	8.1	1	1<95PI	NA	Elevated	39SS03 falls above the 95% PI on the geochemical analysis plot with barium.
	Selenium	11.4	NC	6	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
	Silver	38.6	NC	2	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
141	Arsenic	9.64	2.8	6	NA	Inflection point • 5.4 mg/kg: 4<inflection 2>inflection	Elevated	Arsenic levels detected in two samples collected at HMW-43 (1 and 3 ft bgs) were greater than the inflection point on the Q-Q plot.
	Barium	179	116	4	NA	Single population	Not Elevated	Data consistent with background.
	Chromium	19.3	9.7	1	1>95PI	NA	Elevated	Geochemical evaluation provides evidence that chromium detected in HMW-43 is elevated in comparison to background conditions.
	Lead	14.7	8.1	2	1>95PI	NA	Elevated	Lead detected in HMW-43 is above the 95% PI; however, the lead concentration in SWMU 148 SB-01 (8.17 mg/kg) falls below the 95% PI and is only slightly greater than the UTL and well below the maximum lead concentration in background.

Background Characterization Report

Table F8. Summary of Geochemical Evaluation

SWMU	Metal	Maximum	UTL	# Greater than UTL	Geochemical Evaluation	Q-Q Plot Evaluation	Conclusion	Remarks
	Silver	74.6	NC	7	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
142	Arsenic	53	2.8	14	NA	Inflection point • 5.4 mg/kg: 2<background 12>background	Elevated	Arsenic levels in samples collected at CFW-4 are consistent with background conditions; however, levels detected in the North, South, East, and West Borings are elevated.
	Barium	330	116	12	NA	Single population	Not Elevated	Data consistent with background.
	Lead	23	8.1	12	12<95PI	NA	Not Elevated	Nine of the twelve detections were less than the maximum background concentration and all 12 fell below the 95% PI in the geochemical analysis.
	Selenium	95	NC	12	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
143	Arsenic	9.64	2.8	3	NA	1 points greater than the Inflection point • 5.4 mg/kg	Elevated	Arsenic levels detected in two samples collected at HMW-43 (1 and 3 ft bgs) were greater than the inflection point on the Q-Q plot.
	Barium	179	116	1	NA	Single population	Not Elevated	Data consistent with background.
	Chromium	19.3	9.7	1	1>95PI	NA	Elevated	Geochemical evaluation provides evidence that chromium detected in HMW-43 is elevated in comparison to background conditions.
	Chromium	14	0.031	3	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
	Lead	14.7	8.1	1	1>95PI	NA	Elevated	Geochemical evaluation provides evidence that lead detected in HMW-43 is elevated in comparison to background conditions.
	Mercury	0.0386	0.031	1	1<95PI	NA	Not Elevated	The mercury detection above the BSL is less than the maximum detected background concentration of mercury. In addition, the geochemical analysis indicates that mercury is similar to background.

Background Characterization Report

Table F8. Summary of Geochemical Evaluation

SWMU	Metal	Maximum	UTL	# Greater than UTL	Geochemical Evaluation	Q-Q Plot Evaluation	Conclusion	Remarks
	Silver	16.7	NC	3	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
146	Selenium	2.2	NC	1	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
148	Arsenic	9.64	2.8	12	NA	2 points greater than the Inflection point • 5.4 mg/kg	Elevated	Arsenic levels detected in two samples collected at HMW-43 (1 and 3 ft bgs) was greater than the inflection point on the Q-Q plot.
	Barium	179	116	2	NA	Single population	Not Elevated	Data consistent with background.
	Chromium	19.3	9.7	1	1>95PI	NA	Elevated	Geochemical evaluation provides evidence that chromium distribution is not similar to background.
	Lead	14.7	8.1	2	1>95PI	NA	Elevated	Lead detected in HMW-43 is above the 95% PI; however, the lead concentration in SWMU 148 SB-01 (8.17 mg/kg) falls below the 95% PI and is only slightly greater than the UTL and well below the maximum lead concentration in background.
	Mercury	0.474	0.031	2	2<95PI	NA	Not Elevated	Both detections above the BSL are less than the maximum detected background concentration of mercury. In addition, the geochemical analysis indicates that mercury is similar to background.
	Silver	74.8	NC	12	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
150	Lead	58	8.1	4	4>95PI	NA	Elevated	Geochemical evaluation provides evidence that lead distribution is not similar to background.
	Mercury	0.3	0.031	3	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
	Silver	7.6	NC	3	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
154	Copper	7	6	2	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.

Table F8. Summary of Geochemical Evaluation

SWMU	Metal	Maximum	UTL	# Greater than UTL	Geochemical Evaluation	Q-Q Plot Evaluation	Conclusion	Remarks
	Lead	30	8.1	6	NA	NA	Elevated	Insufficient data to run comparative or geochemical analysis.
	Zinc	27	20.9	1	1<95PI	NA	Not Elevated	Geochemical evaluation provides evidence that zinc distribution is similar to background.

Notes:

¹ Concentrations are in units of milligrams per kilogram (mg/kg).

95% PI 95 percent predictive interval.

BSL Background Screening Level.

NA

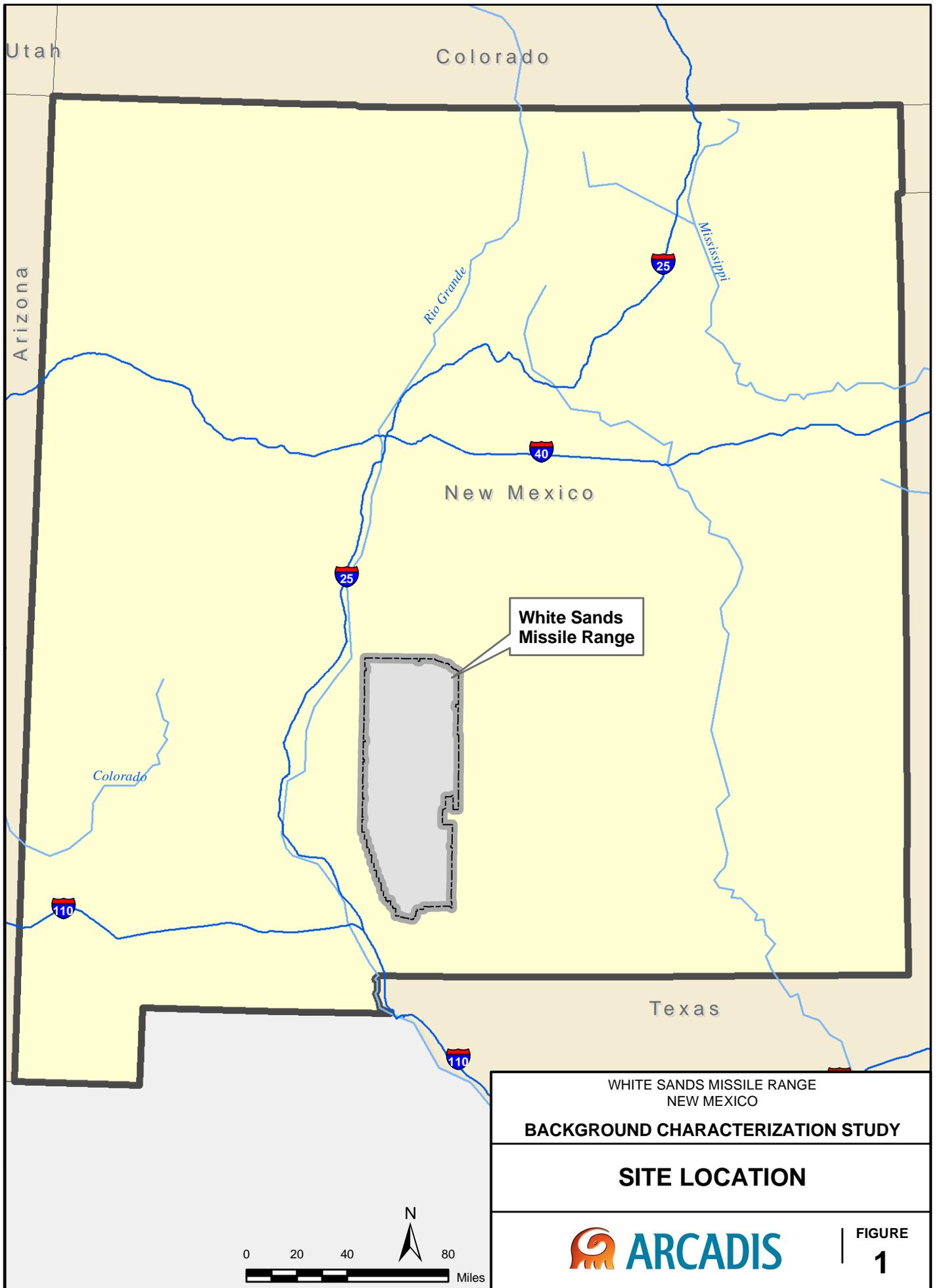
NC

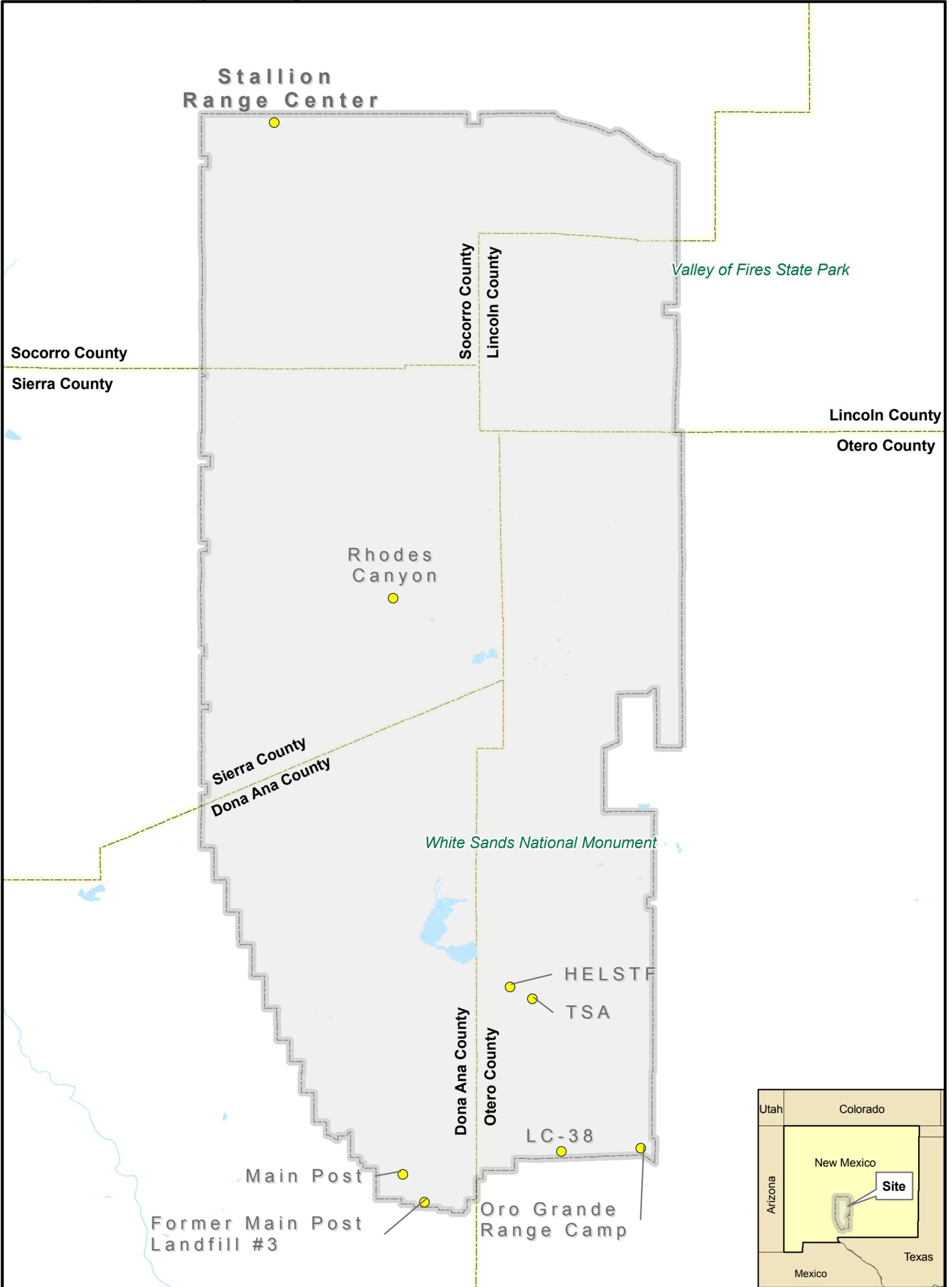
Q-Q

SWMU Solid Waste Management Unit.

UTL Upper Tolerance Level.

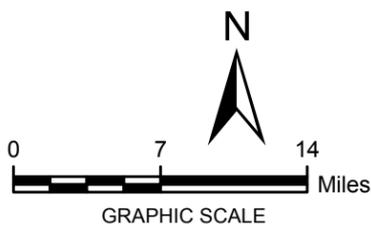
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Project (Project #)
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Legend

- County Boundary
- White Sands Missile Range Boundary
- Water Body
- National Park or Forest
- State Park or Forest

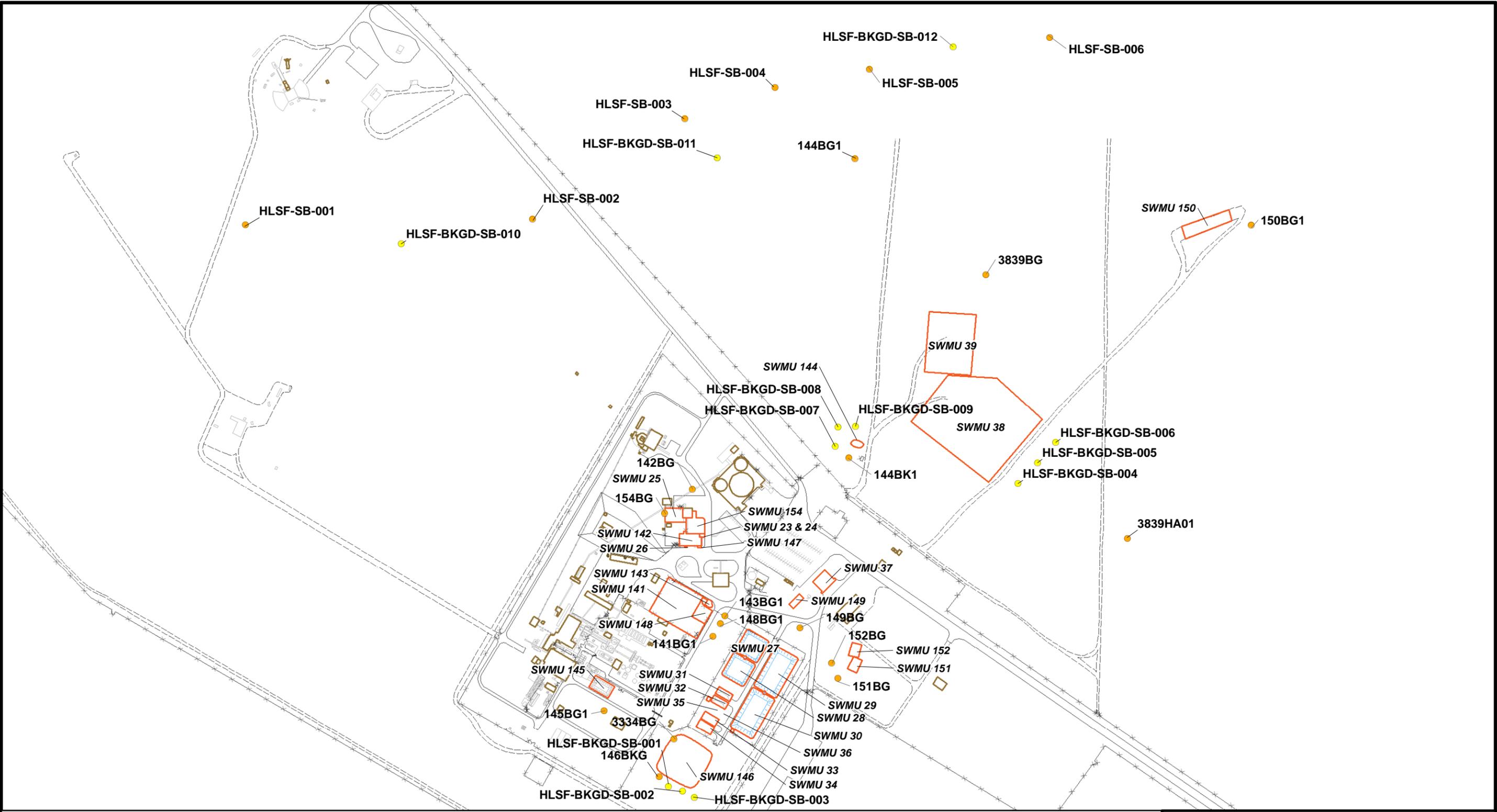


WHITE SANDS MISSILE RANGE
 NEW MEXICO
 BACKGROUND CHARACTERIZATION STUDY

HELSTF LOCATION

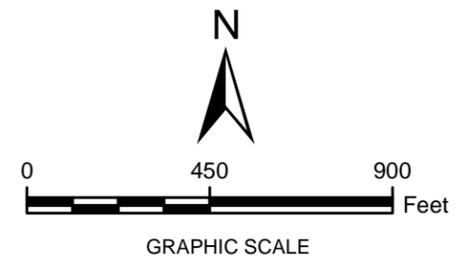
ARCADIS | **FIGURE 2**

CITY: DIV/GRP: DB: LD: PIC: PM: TM: TR:
 Project (Project File):
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LEGEND

- MARCH 2009 BACKGROUND SOIL SAMPLE LOCATIONS
- BACKGROUND SOIL SAMPLE LOCATIONS
- ▭ AREA OF CONCERN
- SITE FEATURES
- ▭ BUILDING
- ▭ DRAINAGE POND/LAGOON
- ××× FENCE
- RAIL ROAD
- PAVED ROAD
- - - DIRT ROAD



WHITE SANDS MISSILE RANGE
 NEW MEXICO
 BACKGROUND CHARACTERIZATION STUDY

**HELSTF STUDY AREAS AND
 BACKGROUND SAMPLE LOCATIONS**



ARCADIS

Attachment F1

Background and Reference Sample
Boring Logs

DRILLING LOG		DIVISION		INSTALLATION		HOLE No.		SHEET No.	
1. PROJECT HELSTF Phase III RFI				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)					
2. LOCATION (Coordinates or Station)				12. MANUFACTURER'S DESIGNATION OF DRILL					
3. DRILLING AGENCY				13. TOTAL No. OF OVERBURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
4. HOLE No. (As shown on drawing title and file number) SB-01				14. TOTAL NUMBER CORE BOXES					
5. NAME OF DRILLER Raba Kistner				15. ELEVATION GROUND WATER					
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Inclined _____ Degrees from Vertical				16. DATE HOLE 11-01-06		STARTED 0745		COMPLETED 1100	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE					
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING					
9. TOTAL DEPTH OF HOLE 50'		10. SIZE AND TYPE OF BIT 6" ϕ HSA		19. SIGNATURE OF INSPECTOR <i>J. Thompson</i>					
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g			
						Blow Count			
	5	ML	Gypsum silt	50	SB-001 (0.5-1.0)	Dry	100	1 ft	
	10	ML	Gyp. silt light brown silt	100	SB-001 (10-10.5)	Moist	17		
	15	CL-ML SP-SM	silty clay w 5% gyp crystals fine sand w/ silt @ 16.5	100	—	Moist	44		
	20	CL-ML	silty clay (brown) w/ 20% gyp cry.	100	SB-001 (20-20.5)	Moist	45		
	25	CL-ML	silty clay (brown) 10% gyp cry.	100	—	Moist Dry @ 26.7'	47		
	30	ML	silt (brown) w/ 5% gyp cry.	100	SB-001 (30-30.5)	Dry	75		
	35	SP	very fine sand	50	SB-101 (30-30.5)	Dry	105		
	40	SP	v. fine sand w/ some silt	70	SB-001 (40-40.5)	Dry	64		

DRILLING LOG (Continuation Sheet)		INSTALLATION	HOLE No. SB-01	SHEET No. 2 OF 2
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1. PROJECT HELSTF Phase III RFI	11. ELEVATION OF TOP HOLE
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ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	45	SP	v. fine sand w/ some silt	60	-	Dry 110
	50	SP SC	v. fine sand w/ silt clayey sand @ 49.5'	70	SB-001 (49.5-50)	Moist 74

Blow
Count

DRILLING LOG		DIVISION	INSTALLATION	HOLE No.	SHEET No.	
1. PROJECT HELSTF Phase II RFI			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
2. LOCATION (Coordinates or Station)			12. MANUFACTURER'S DESIGNATION OF DRILL			
3. DRILLING AGENCY			13. TOTAL No. OF OVERBURDEN SAMPLES TAKEN		DISTURBED	UNDISTURBED
4. HOLE No. (As shown on drawing title and file number) SB-02			14. TOTAL NUMBER CORE BOXES			
5. NAME OF DRILLER Raba Kistner			15. ELEVATION GROUND WATER			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Inclined _____ Degrees from Vertical			16. DATE HOLE 10-13-06	STARTED 1015	COMPLETED 1445	
7. THICKNESS OF OVERBURDEN			17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK			18. TOTAL CORE RECOVERY FOR BORING			
9. TOTAL DEPTH OF HOLE 50'		10. SIZE AND TYPE OF BIT 6" ϕ HSA		19. SIGNATURE OF INSPECTOR <i>J. Thompson</i>		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	5	ML	Gypsum silt	75	-	Dry 24
	10	ML	Gypsum silt w/ some crystals	100	SB-002 (10-10.5)	Dry 105
	15	ML	Gypsum silt	100	-	Dry 111
	20	ML	Gypsum silt w/ some fine sand	100	SB-002 (20-20.5)	Dry 74
	25	CL-ML	silty clay (brown) ml w/ gyp crystals	100	-	Dry 44
	30	CL-ML	silty clay	100	SB-002 (30-30.5)	Dry 47
	35	CL-ML	silty clay w/ some gyp crystals	100	-	Dry 46
	40	SM	silty sand	100	SB-002 (40-40.5)	Dry 128

Blow
Count

1. PROJECT HELSTP Phase III RFI	11. ELEVATION OF TOP HOLE
---	---------------------------

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	45	SM ML	silty sands to 46.7' gyp silt w/ crystals	100	-	Dry 126
	50	CL	clay (brown) w/ gyp cry.	100	SB-002 (49.5-50)	Moist 48

*Blow
Count*

DRILLING LOG		DIVISION		INSTALLATION		HOLE No.		SHEET No.	
1. PROJECT HELSTR Base III RFI				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)					
2. LOCATION (Coordinates or Station)				12. MANUFACTURER'S DESIGNATION OF DRILL					
3. DRILLING AGENCY				13. TOTAL No. OF OVERBURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
4. HOLE No. (As shown on drawing title and file number) SB-03				14. TOTAL NUMBER CORE BOXES					
5. NAME OF DRILLER Raba Kistner				15. ELEVATION GROUND WATER					
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Inclined _____ Degrees from Vertical				16. DATE HOLE 10-20-66		STARTED 1400		COMPLETED 1750	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE					
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING					
9. TOTAL DEPTH OF HOLE 50'		10. SIZE AND TYPE OF BIT 6" ϕ HSA		19. SIGNATURE OF INSPECTOR F. Thompson					
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g			
	5	ML	Gypsilts	60	-	dry	63		
	10	ML	Gyp silt	60	SB-003 (10.0-10.5) 10.5	dry	63		
	15	ML	Gyp silt	90	-	dry	157		
	20	ML	Gyp silt	80	SB-003 (20.0-20.5)	dry slightly moist @ 22'	112		
	25	CL-ML	silty clay (brown) w/ 5% gyp crystals	100	-	moist dry @ 27'	31		
	30	CL-ML	silty clay (brown) w/ 40% gyp crystals	100	SB-003 (30.0-30.5)	dry	110		
	35	CL-ML	silty clay (brown) w/ some gyp crystals	100	-	slightly moist to dry	93		
	40	CL-ML SP	silty clay (brown) v. fine sands @ 41'	100	SB-003 (40.0-40.5)	moist dry	78		

Blow
Count

DRILLING LOG (Continuation Sheet)		INSTALLATION	HOLE No. SB-03	SHEET No. 2 OF 2
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1. PROJECT HELSTF Phase III RFI	11. ELEVATION OF TOP HOLE
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ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	45	SP	v. fine sand	60	-	dry refusal @ 1.5'
	50	SP	v fine sand w/ gyp cry @ 49'	80	SB-003 (49.5-50.0)	slight moist @ 48.5 refusal @ 1.5'

Blow
Count

DRILLING LOG		DIVISION		INSTALLATION		HOLE No.	SHEET No.
1. PROJECT <i>HELSTF Phase III RFI</i>				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
2. LOCATION (Coordinates or Station)				12. MANUFACTURER'S DESIGNATION OF DRILL			
3. DRILLING AGENCY				13. TOTAL No. OF OVERBURDEN SAMPLES TAKEN		DISTURBED	UNDISTURBED
4. HOLE No. (As shown on drawing title and file number) <i>SB-04</i>				14. TOTAL NUMBER CORE BOXES			
5. NAME OF DRILLER <i>Rabea Kristner</i>				15. ELEVATION GROUND WATER			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Inclined _____ Degrees from Vertical				16. DATE HOLE <i>10-20-06</i>	STARTED <i>1000</i>	COMPLETED <i>~ 1400</i>	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING			
9. TOTAL DEPTH OF HOLE <i>50'</i>		10. SIZE AND TYPE OF BIT <i>6" Ø HSA</i>		19. SIGNATURE OF INSPECTOR <i>J. Thompson</i>			
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) <i>Blow Count</i> g	
	5	ML	Gypsum silt	70	-	dry	56
	10	ML	Gypsum silt	80	SB-004 (10.0-10.5)	dry	73
	15	ML	Gyp. silt	100	-	dry moist @ 15.7'	90
	20	ML	Gyp. silt	100	SB-004 (20.0-20.5)	moist dry @ 21'	72
	25	CL	clay (brown) w/ 20% gyp. crystals	100	-	moist	46
	30	CL-ML	silty clay (brown) w/ 10% gyp cry	100	SB-004 (30.0-30.5)	dry	55
	35	SP ML CL-ML SP	fine sand silt w/ gyp cry. @ 35.5' silty clay (brown) @ 35.8' fine sand @ 36.2'	90	-	dry moist dry	54
	40	SP	v. fine sand	60	SB-004 (40.0-40.5)	dry	refusal @ 1.2'

DRILLING LOG (Continuation Sheet)		INSTALLATION	HOLE No. SB-04	SHEET No. 2 OF 2
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1. PROJECT HELSTF Phase III RFI	11. ELEVATION OF TOP HOLE
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ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	45	SP	v. fine sand	40	—	dry refusal @ 0.5'
	50	ML CL	silt w/ sand clay (brown)	80	SB-04 (49.5-50.0)	added ~ 2 gal water to lift cuttings mbist @ 48' 58

Blow
Count

DRILLING LOG		DIVISION		INSTALLATION		HOLE No.	SHEET No.
1. PROJECT <i>HELSTF Phase III RFI</i>		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)					
2. LOCATION (Coordinates or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL					
3. DRILLING AGENCY		13. TOTAL No. OF OVERBURDEN SAMPLES TAKEN		DISTURBED	UNDISTURBED		
4. HOLE No. (As shown on drawing title and file number) <i>SB-05</i>		14. TOTAL NUMBER CORE BOXES					
5. NAME OF DRILLER <i>Raba Kistner</i>		15. ELEVATION GROUND WATER					
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Inclined _____ Degrees from Vertical		16. DATE HOLE <i>10-19-06</i>	STARTED <i>1330</i>	COMPLETED <i>10-20-06 1000</i>			
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE					
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING					
9. TOTAL DEPTH OF HOLE <i>50'</i>		10. SIZE AND TYPE OF BIT <i>6" ϕ HSA</i>		19. SIGNATURE OF INSPECTOR <i>J. Thompson</i>			
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
	5	ML	Gypsum silt	70	—	dry 51	
	10	ML	Gyp. silt	95	SB-005 (10.0-10.5)	dry 95	
	15	ML	Gyp. silt	95	—	dry to v. slight moisture 95	
	20	CL	clay (brown) w/ 10% gyp. crystals	95	SB-005 (20.0-20.5)	dry 61	
	25	CL	clay (brown) w/ 40% gyp. crystals	95	—	slightly moist 61	
	30	CL	clay (brown) w/ 20% gyp. crystals	95	SB-005 (30.0-30.5)	slightly moist 53	
	35	CL	clay (brown) w/ 10% gyp. crystals	100	—	moist 42	
	40	SP	v. fine sand	95	SB-005 (40.0-40.5)	dry 115 @ 1.5'	

1. PROJECT HEL STF Phase III RFI	11. ELEVATION OF TOP HOLE
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ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
	45	SP CL	v. fine sand clay (brown) @ 46'	100	-	moist	45 47
	50	CL SP CL	clay (brown) v. fine sand @ 48.2' clay (brown) @ 48.5'	95	SB-005 (49.5-50.0)	moist	44

*Blow
Count*

DRILLING LOG		DIVISION		INSTALLATION		HOLE No.		SHEET No.	
1. PROJECT HELSTF Phase III RFI				11. DATUM FOR ELEVATION SHOWN (TBM or MSL)					
2. LOCATION (Coordinates or Station)				12. MANUFACTURER'S DESIGNATION OF DRILL					
3. DRILLING AGENCY				13. TOTAL No. OF OVERBURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
4. HOLE No. (As shown on drawing title and file number) SB-06				14. TOTAL NUMBER CORE BOXES					
5. NAME OF DRILLER Raba Kistner				15. ELEVATION GROUND WATER					
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Inclined _____ Degrees from Vertical				16. DATE HOLE 10-19-06		STARTED 0855		COMPLETED 1330	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE					
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING					
9. TOTAL DEPTH OF HOLE 50'		10. SIZE AND TYPE OF BIT 6" ϕ HSA		19. SIGNATURE OF INSPECTOR <i>J. Thompson</i>					
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g			
						Blow Count			
	5	ML	Gypsum silt	50	SB-006 (0.5-1)	Surface sample from 50' N of SB-06			
	10	ML	Gyp silt	100	SB-006 (10-10.5)	Dry to 11' Moist 11-12			
	15	ML	Gyp silt	90	-	Dry			
	20	CL	clay (brown) w/ 40% gyp crystals	100	SB-006 (20-20.5)	Moist			
	25	CL SP	clay 20% gyp cry to 26.6' very fine sand	100	-	Moist			
	30	CL	clay w/ 5% gyp crystals	100	SB-006 (30-30.5)	moist			
	35	CL	clay w/ 10% gyp crystals	100	-	moist			
	40	CL SP	clay to 40.8' fine sand to 42'	90	SB-006 (40-40.5)	Moist			

1. PROJECT HELSTF Ph III RFI	11. ELEVATION OF TOP HOLE
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ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (description) d	% CORE RECOVERY e	BOX OR SAMPLE NUMBER f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	45.48	CL	clay 45-45.5	100	—	moist
		SP	v. fine sand to 45.7			
		CL	clay to 47			41
	50	SP	fine sand 48-48.5			
		CL	clay w/ some sand to 50'	100	SB-006 (49.5-50)	moist
						47

*Blow
Count*

ARCADIS

Attachment F2

Supplemental Reference Sample
Laboratory and Data Validation
Reports

Certifications

WBENC: 237019

HUB: 1752439743100-86536

DBE: VN 20657

NCTRCA WFWB38444Y0909

NELAP Certifications

Lubbock: T104704219-08-TX

El Paso: T104704221-08-TX

Midland: T104704392-08-TX

LELAP-02003

LELAP-02002

Kansas E-10317

Analytical and Quality Control Report

Brad Davis
Zia Engineering & Environmental
Bldg. 1538, Room 111
P. O. Box 352
Las Cruces, NM, 88011

Report Date: March 23, 2009

Work Order: 9031805



Project Name: HELSTF Background Soil
Project Number: HELSTF Background Soil

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
190525	HLSF-BKGD-SB-010-(0.0-0.5)	soil	2009-03-17	12:58	2009-03-18
190526	HLSF-BKGD-SB-010-(9.5-10.0)	soil	2009-03-17	13:00	2009-03-18
190527	HLSF-BKGD-SB-007-(0.0-0.5)	soil	2009-03-17	08:00	2009-03-18
190528	HLSF-BKGD-SB-007-(9.5-10.0)	soil	2009-03-17	09:35	2009-03-18
190529	HLSF-BKGD-SB-009-(0.0-0.5)	soil	2009-03-17	11:48	2009-03-18
190530	HLSF-BKGD-SB-009-(9.5-10.0)	soil	2009-03-17	12:20	2009-03-18
190531	HLSF-BKGD-SB-008-(0.0-0.5)	soil	2009-03-17	09:55	2009-03-18
190532	HLSF-BKGD-SB-108-(0.0-0.5)	soil	2009-03-17	10:40	2009-03-18
190533	HLSF-BKGD-SB-008-(9.5-10.0)	soil	2009-03-17	00:40	2009-03-18
190534	HLSF-BKGD-SB-011-(0.0-0.5)	soil	2009-03-17	13:45	2009-03-18
190535	HLSF-BKGD-SB-011-(9.5-10.0)	soil	2009-03-17	14:00	2009-03-18
190536	HLSF-BKGD-SB-012-(0.0-0.5)	soil	2009-03-17	14:20	2009-03-18
190537	HLSF-BKGD-SB-012-(9.5-10.0)	soil	2009-03-17	14:45	2009-03-18
190538	HLSF-BKGD-RB-002	water	2009-03-17	13:25	2009-03-18
190539	HLSF-BKGD-SB-112-(9.5-10.0)	soil	2009-03-17	14:45	2009-03-18
190541	HLSF-BKGD-SB-004-(0.0-0.5)	soil	2009-03-16	12:45	2009-03-18
190542	HLSF-BKGD-SB-104-(0.0-0.5)	soil	2009-03-16	12:45	2009-03-18
190543	HLSF-BKGD-SB-004-(9.5-10.0)	soil	2009-03-16	13:15	2009-03-18
190544	HLSF-BKGD-SB-003-(9.5-10.0)	soil	2009-03-16	12:00	2009-03-18
190545	HLSF-BKGD-SB-003-(0.0-0.5)	soil	2009-03-16	11:20	2009-03-18

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
190546	HLSF-BKGD-SB-002-(0.0-0.5)	soil	2009-03-16	10:03	2009-03-18
190547	HLSF-BKGD-SB-002-(9.5-10.0)	soil	2009-03-16	11:10	2009-03-18
190548	HLSF-BKGD-SB-001-(0.0-0.5)	soil	2009-03-16	08:50	2009-03-18
190549	HLSF-BKGD-SB-001-(9.5-10.0)	soil	2009-03-16	09:50	2009-03-18
190550	HLSF-BKGD-SB-005-(0.0-0.5)	soil	2009-03-16	13:25	2009-03-18
190551	HLSF-BKGD-SB-005-(9.5-10.0)	soil	2009-03-16	13:52	2009-03-18
190552	HLSF-BKGD-RB-001	water	2009-03-16	14:06	2009-03-18
190553	HLSF-BKGD-SB-006-(0.0-0.5)	soil	2009-03-16	14:05	2009-03-18
190554	HLSF-BKGD-SB-006-(9.5-10.0)	soil	2009-03-16	14:40	2009-03-18

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 143 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.



Dr. Blair Leftwich, Director

Standard Flags

B - The sample contains less than ten times the concentration found in the method blank.

Case Narrative

Samples for project HELSTF Background Soil and HELSTF Background Soil were received by TraceAnalysis, Inc. on 2009-03-18 and 2009-03-18 and assigned to work orders 9031805 and 9031807 respectively. Samples for work order 9031805 were received intact at a temperature of 0.3 deg. C. Samples for work order 9031807 were received intact at a temperature of 0.5 deg. C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Ag, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Ag, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Ag, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Ag, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Al, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Al, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Al, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Al, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
As, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
As, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
As, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
As, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Ba, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Ba, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Ba, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Ba, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Ca, Total	S 6010B	49352	2009-03-18 at 17:44	57805	2009-03-20 at 09:05
Ca, Total	S 6010B	49354	2009-03-18 at 17:47	57874	2009-03-23 at 13:49
Ca, Total	S 6010B	49355	2009-03-18 at 17:48	57867	2009-03-23 at 11:47
Ca, Total	S 6010B	49389	2009-03-20 at 08:45	57875	2009-03-23 at 13:51
Cd, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Cd, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Cd, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Cd, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Cr, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Cr, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Cr, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Cr, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Fe, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Fe, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Fe, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Fe, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Hg, Total	S 7470A	49379	2009-03-19 at 16:18	57816	2009-03-20 at 11:09
Hg, Total	S 7471A	49380	2009-03-19 at 16:36	57825	2009-03-20 at 13:32
Hg, Total	S 7471A	49380	2009-03-19 at 16:36	57829	2009-03-20 at 13:58
Hg, Total	S 7471A	49381	2009-03-19 at 16:36	57837	2009-03-20 at 14:45
Pb, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Pb, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Pb, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Pb, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52
Se, Total	S 6010B	49352	2009-03-18 at 17:44	57778	2009-03-19 at 11:02
Se, Total	S 6010B	49354	2009-03-18 at 17:47	57872	2009-03-23 at 13:30
Se, Total	S 6010B	49355	2009-03-18 at 17:48	57871	2009-03-23 at 13:27
Se, Total	S 6010B	49389	2009-03-20 at 08:45	57838	2009-03-20 at 14:52

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work orders 9031805 and 9031807 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Analytical Report

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		4130	mg/Kg	10	2.50

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		46.6	mg/Kg	1	1.00

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		142000	mg/Kg	100	100

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		5.62	mg/Kg	1	0.500

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		4550	mg/Kg	10	0.500

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		1.96	mg/Kg	1	1.00

Sample: 190525 - HLSF-BKGD-SB-010-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1360	mg/Kg	10	2.50

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		24.9	mg/Kg	1	1.00

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		161000	mg/Kg	100	100

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		<0.500	mg/Kg	1	0.500

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1350	mg/Kg	10	0.500

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190526 - HLSF-BKGD-SB-010-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		8840	mg/Kg	10	2.50

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		65.2	mg/Kg	1	1.00

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		37000	mg/Kg	10	100

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		8.24	mg/Kg	1	0.500

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		9030	mg/Kg	10	0.500

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		4.19	mg/Kg	1	1.00

Sample: 190527 - HLSF-BKGD-SB-007-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1910	mg/Kg	10	2.50

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		29.2	mg/Kg	1	1.00

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		177000	mg/Kg	100	100

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		2.16	mg/Kg	1	0.500

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1750	mg/Kg	10	0.500

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190528 - HLSF-BKGD-SB-007-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		5050	mg/Kg	10	2.50

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		52.4	mg/Kg	1	1.00

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		153000	mg/Kg	100	100

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		5.03	mg/Kg	1	0.500

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		4660	mg/Kg	10	0.500

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190529 - HLSF-BKGD-SB-009-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1530	mg/Kg	10	2.50

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		38.9	mg/Kg	1	1.00

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		168000	mg/Kg	100	100

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		1.62	mg/Kg	1	0.500

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1300	mg/Kg	10	0.500

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190530 - HLSF-BKGD-SB-009-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		10400	mg/Kg	100	2.50

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		87.3	mg/Kg	1	1.00

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		128000	mg/Kg	100	100

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		15.5	mg/Kg	1	0.500

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		8600	mg/Kg	10	0.500

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		3.13	mg/Kg	1	1.00

Sample: 190531 - HLSF-BKGD-SB-008-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		4930	mg/Kg	10	2.50

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		51.2	mg/Kg	1	1.00

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		139000	mg/Kg	100	100

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		7.69	mg/Kg	1	0.500

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		4000	mg/Kg	10	0.500

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190532 - HLSF-BKGD-SB-108-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		4650	mg/Kg	10	2.50

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		54.6	mg/Kg	1	1.00

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		133000	mg/Kg	100	100

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		7.48	mg/Kg	1	0.500

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		3810	mg/Kg	10	0.500

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190533 - HLSF-BKGD-SB-008-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		830	mg/Kg	1	2.50

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		23.7	mg/Kg	1	1.00

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		148000	mg/Kg	100	100

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		0.557	mg/Kg	1	0.500

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		970	mg/Kg	10	0.500

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190534 - HLSF-BKGD-SB-011-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		650	mg/Kg	1	2.50

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		15.1	mg/Kg	1	1.00

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		157000	mg/Kg	100	100

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		<0.500	mg/Kg	1	0.500

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		640	mg/Kg	1	0.500

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190535 - HLSF-BKGD-SB-011-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		11800	mg/Kg	100	2.50

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		111	mg/Kg	1	1.00

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		65500	mg/Kg	10	100

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		11.9	mg/Kg	1	0.500

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		11200	mg/Kg	100	0.500

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190536 - HLSF-BKGD-SB-012-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1460	mg/Kg	10	2.50

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		31.1	mg/Kg	1	1.00

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		144000	mg/Kg	100	100

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		<0.500	mg/Kg	1	0.500

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1290	mg/Kg	10	0.500

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190537 - HLSF-BKGD-SB-012-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.00500	mg/L	1	0.00500

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		<0.0500	mg/L	1	0.0500

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<0.0100	mg/L	1	0.0100

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		<0.00500	mg/L	1	0.00500

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57805 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		1.29	mg/L	1	1.00

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.00200	mg/L	1	0.00200

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		0.0310	mg/L	1	0.00500

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		0.175	mg/L	1	0.0100

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7470A Prep Method: N/A
QC Batch: 57816 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49379 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.000200	mg/L	1	0.000200

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<0.00500	mg/L	1	0.00500

Sample: 190538 - HLSF-BKGD-RB-002

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<0.0200	mg/L	1	0.0200

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1390	mg/Kg	10	2.50

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		28.0	mg/Kg	1	1.00

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		156000	mg/Kg	100	100

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		1.37	mg/Kg	1	0.500

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1260	mg/Kg	1	0.500

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190539 - HLSF-BKGD-SB-112-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49355 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		7770	mg/Kg	10	2.50

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		64.9	mg/Kg	1	1.00

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		104000	mg/Kg	100	100

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		9.33	mg/Kg	1	0.500

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		7270	mg/Kg	10	0.500

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190541 - HLSF-BKGD-SB-004-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		7840	mg/Kg	10	2.50

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		65.2	mg/Kg	1	1.00

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		93500	mg/Kg	100	100

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		8.08	mg/Kg	1	0.500

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		7730	mg/Kg	10	0.500

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190542 - HLSF-BKGD-SB-104-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		2920	mg/Kg	10	2.50

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		53.0	mg/Kg	1	1.00

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		153000	mg/Kg	100	100

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		3.32	mg/Kg	1	0.500

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		2650	mg/Kg	10	0.500

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49380 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190543 - HLSF-BKGD-SB-004-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		2380	mg/Kg	10	2.50

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		48.3	mg/Kg	1	1.00

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		164000	mg/Kg	100	100

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		2.79	mg/Kg	1	0.500

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		2210	mg/Kg	10	0.500

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190544 - HLSF-BKGD-SB-003-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		730	mg/Kg	10	2.50

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		19.9	mg/Kg	1	1.00

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		181000	mg/Kg	100	100

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		1.31	mg/Kg	1	0.500

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		880	mg/Kg	10	0.500

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190545 - HLSF-BKGD-SB-003-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		930	mg/Kg	10	2.50

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		22.0	mg/Kg	1	1.00

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		189000	mg/Kg	100	100

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		1.65	mg/Kg	1	0.500

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1150	mg/Kg	10	0.500

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190546 - HLSF-BKGD-SB-002-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1830	mg/Kg	10	2.50

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		37.8	mg/Kg	1	1.00

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		166000	mg/Kg	100	100

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		2.07	mg/Kg	1	0.500

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1840	mg/Kg	10	0.500

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190547 - HLSF-BKGD-SB-002-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		3800	mg/Kg	10	2.50

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		49.4	mg/Kg	1	1.00

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		123000	mg/Kg	100	100

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		5.61	mg/Kg	1	0.500

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		4760	mg/Kg	10	0.500

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190548 - HLSF-BKGD-SB-001-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		1480	mg/Kg	10	2.50

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		21.8	mg/Kg	1	1.00

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		160000	mg/Kg	100	100

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		2.24	mg/Kg	1	0.500

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1380	mg/Kg	10	0.500

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190549 - HLSF-BKGD-SB-001-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		875	mg/Kg	10	2.50

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		21.8	mg/Kg	1	1.00

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		149000	mg/Kg	100	100

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		1.32	mg/Kg	1	0.500

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1090	mg/Kg	10	0.500

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190550 - HLSF-BKGD-SB-005-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		2340	mg/Kg	10	2.50

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		57.2	mg/Kg	1	1.00

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		157000	mg/Kg	100	100

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		2.61	mg/Kg	1	0.500

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		2060	mg/Kg	10	0.500

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190551 - HLSF-BKGD-SB-005-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.00500	mg/L	1	0.00500

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		<0.0500	mg/L	1	0.0500

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<0.0100	mg/L	1	0.0100

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		<0.00500	mg/L	1	0.00500

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57805 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		1.45	mg/L	1	1.00

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.00200	mg/L	1	0.00200

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		0.0310	mg/L	1	0.00500

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		0.170	mg/L	1	0.0100

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7470A Prep Method: N/A
QC Batch: 57816 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49379 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.000200	mg/L	1	0.000200

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<0.00500	mg/L	1	0.00500

Sample: 190552 - HLSF-BKGD-RB-001

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3010A
QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<0.0200	mg/L	1	0.0200

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		860	mg/Kg	10	2.50

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		25.4	mg/Kg	1	1.00

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		137000	mg/Kg	100	100

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		1.76	mg/Kg	1	0.500

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		1110	mg/Kg	10	0.500

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190553 - HLSF-BKGD-SB-006-(0.0-0.5)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49354 Sample Preparation: 2009-03-18 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ag, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Silver		<0.250	mg/Kg	1	0.250

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Al, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Aluminum		960	mg/Kg	1	2.50

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: As, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Arsenic		<2.00	mg/Kg	1	2.00

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ba, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Barium		28.5	mg/Kg	1	1.00

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Ca, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57875 Date Analyzed: 2009-03-23 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Calcium		173000	mg/Kg	100	100

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cd, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Cadmium		<0.200	mg/Kg	1	0.200

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Cr, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Chromium		<0.500	mg/Kg	1	0.500

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Fe, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Iron		816	mg/Kg	1	0.500

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Hg, Total Analytical Method: S 7471A Prep Method: N/A
QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 Sample Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	RL Result	Units	Dilution	RL
Total Mercury		<0.0400	mg/Kg	1	0.0400

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Pb, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Lead		<1.00	mg/Kg	1	1.00

Sample: 190554 - HLSF-BKGD-SB-006-(9.5-10.0)

Laboratory: Lubbock
Analysis: Se, Total Analytical Method: S 6010B Prep Method: S 3050B
QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 Sample Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	RL Result	Units	Dilution	RL
Total Selenium		<2.00	mg/Kg	1	2.00

Method Blank (1) QC Batch: 57778

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

method blank continued ...

Parameter	Flag	MDL Result	Units	RL
Parameter	Flag	MDL Result	Units	RL
Total Mercury		<0.00408	mg/Kg	0.04

Method Blank (1) QC Batch: 57837

QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
Prep Batch: 49381 QC Preparation: 2009-03-19 Prepared By: TP

Parameter	Flag	MDL Result	Units	RL
Total Mercury		<0.00408	mg/Kg	0.04

Method Blank (1) QC Batch: 57838

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	MDL Result	Units	RL
Total Silver		<0.0662	mg/Kg	0.25

Method Blank (1) QC Batch: 57838

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Parameter	Flag	MDL Result	Units	RL
Total Aluminum		<0.275	mg/Kg	2.5

Method Blank (1) QC Batch: 57838

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Laboratory Control Spike (LCS-1)

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium	1.09	mg/L	1	1.00	<0.00105	109	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium	1.09	mg/L	1	1.00	<0.00105	109	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium	0.241	mg/L	1	0.250	<0.000303	96	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium	0.241	mg/L	1	0.250	<0.000303	96	85 - 115	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium	0.107	mg/L	1	0.100	<0.000583	107	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium	0.103	mg/L	1	0.100	<0.000583	103	85 - 115	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum	1.14	mg/L	1	1.00	0.077	106	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum	1.15	mg/L	1	1.00	0.077	107	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic	0.505	mg/L	1	0.500	<0.00448	101	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic	0.505	mg/L	1	0.500	<0.00448	101	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium	0.847	mg/L	1	1.00	<0.00105	85	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium	0.848	mg/L	1	1.00	<0.00105	85	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium	0.225	mg/L	1	0.250	<0.000303	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium	0.225	mg/L	1	0.250	<0.000303	90	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium	0.111	mg/L	1	0.100	0.033	78	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium	0.112	mg/L	1	0.100	0.033	79	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron	0.565	mg/L	1	0.500	0.147	84	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron	0.571	mg/L	1	0.500	0.147	85	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead	0.422	mg/L	1	0.500	<0.00326	84	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead	0.423	mg/L	1	0.500	<0.00326	85	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57778 Date Analyzed: 2009-03-19 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium	0.707	mg/L	1	0.500	0.205	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium	0.702	mg/L	1	0.500	0.205	99	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 189984

QC Batch: 57805 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49352 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Calcium	439	mg/L	10	50.0	388	102	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Calcium	438	mg/L	10	50.0	388	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190538

QC Batch: 57816 Date Analyzed: 2009-03-20 Analyzed By: TP
 Prep Batch: 49379 QC Preparation: 2009-03-19 Prepared By: TP

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury	0.000958	mg/L	1	0.00100	<0.0000329	96	75 - 121

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury	0.00100	mg/L	1	0.00100	<0.0000329	100	75 - 121	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 49380

QC Batch: 57825 Date Analyzed: 2009-03-20 Analyzed By: TP
 Prep Batch: 49380 QC Preparation: 2009-03-19 Prepared By: TP

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury	0.534	mg/Kg	1	0.500	0.019	103	86.9 - 113

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury	0.528	mg/Kg	1	0.500	0.019	102	86.9 - 113	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190534

QC Batch: 57829 Date Analyzed: 2009-03-20 Analyzed By: TP
 Prep Batch: 49380 QC Preparation: 2009-03-19 Prepared By: TP

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury	0.542	mg/Kg	1	0.500	0.0102	106	86.9 - 113

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury	0.554	mg/Kg	1	0.500	0.0102	109	86.9 - 113	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190544

QC Batch: 57837 Date Analyzed: 2009-03-20 Analyzed By: TP
 Prep Batch: 49381 QC Preparation: 2009-03-19 Prepared By: TP

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Mercury	0.516	mg/Kg	1	0.500	<0.00408	103	86.9 - 113

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Mercury	0.512	mg/Kg	1	0.500	<0.00408	102	86.9 - 113	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver	12.0	mg/Kg	1	12.5	<0.0662	96	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver	11.8	mg/Kg	1	12.5	<0.0662	94	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum	1060	mg/Kg	1	100	960	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum	1050	mg/Kg	1	100	960	90	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic	43.1	mg/Kg	1	50.0	<0.557	86	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic	51.2	mg/Kg	1	50.0	<0.557	102	75 - 125	17	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium	122	mg/Kg	1	100	28.5	94	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium	124	mg/Kg	1	100	28.5	96	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium	21.6	mg/Kg	1	25.0	<0.0272	86	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium	22.6	mg/Kg	1	25.0	<0.0272	90	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium	10.8	mg/Kg	1	10.0	<0.0582	108	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium	10.8	mg/Kg	1	10.0	<0.0582	108	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron	860	mg/Kg	1	50.0	816	88	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron	865	mg/Kg	1	50.0	816	98	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead	51.4	mg/Kg	1	50.0	<0.207	103	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead	50.5	mg/Kg	1	50.0	<0.207	101	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57838 Date Analyzed: 2009-03-20 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium	50.4	mg/Kg	1	50.0	<0.624	101	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium	51.3	mg/Kg	1	50.0	<0.624	103	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57867 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Calcium	¹ 142000	mg/Kg	100	5000	142000	0	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Calcium	² 142000	mg/Kg	100	5000	142000	0	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver	11.5	mg/Kg	1	12.5	<0.0662	92	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

¹Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

²Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver	11.1	mg/Kg	1	12.5	<0.0662	89	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum	4220	mg/Kg	10	100	4130	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum	4230	mg/Kg	10	100	4130	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic	49.8	mg/Kg	1	50.0	<0.557	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic	45.8	mg/Kg	1	50.0	<0.557	92	75 - 125	8	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

continued ...

matrix spikes continued ...

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium	140	mg/Kg	1	100	46.6	93	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium	142	mg/Kg	1	100	46.6	95	75 - 125	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium	22.4	mg/Kg	1	25.0	0.059	89	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium	24.7	mg/Kg	1	25.0	0.059	98	75 - 125	10	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium	14.6	mg/Kg	1	10.0	5.62	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium	14.3	mg/Kg	1	10.0	5.62	87	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron	4600	mg/Kg	10	50.0	4550	100	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron	4600	mg/Kg	10	50.0	4550	100	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead	50.1	mg/Kg	1	50.0	1.96	96	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead	54.6	mg/Kg	1	50.0	1.96	105	75 - 125	9	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190525

QC Batch: 57871 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49355 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium	45.9	mg/Kg	1	50.0	<0.624	92	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium	46.7	mg/Kg	1	50.0	<0.624	93	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Silver	11.2	mg/Kg	1	12.5	<0.0662	90	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Silver	11.2	mg/Kg	1	12.5	<0.0662	90	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Aluminum	³ 7770	mg/Kg	10	100	7770	0	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Aluminum	⁴ 7780	mg/Kg	10	100	7770	10	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Arsenic	46.6	mg/Kg	1	50.0	<0.557	93	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

³Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

⁴Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Arsenic	45.8	mg/Kg	1	50.0	<0.557	92	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Barium	148	mg/Kg	1	100	64.9	83	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Barium	143	mg/Kg	1	100	64.9	78	75 - 125	3	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Cadmium	21.2	mg/Kg	1	25.0	<0.0272	85	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Cadmium	20.3	mg/Kg	1	25.0	<0.0272	81	75 - 125	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

continued ...

matrix spikes continued ...

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Chromium	20.8	mg/Kg	1	10.0	9.33	115	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Chromium	19.6	mg/Kg	1	10.0	9.33	103	75 - 125	6	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Iron	⁵ 7260	mg/Kg	10	50.0	7270	-20	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Iron	⁶ 7270	mg/Kg	10	50.0	7270	0	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Lead	52.6	mg/Kg	1	50.0	<0.207	105	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Lead	50.9	mg/Kg	1	50.0	<0.207	102	75 - 125	3	20

⁵Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

⁶Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57872 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Selenium	42.6	mg/Kg	1	50.0	<0.624	85	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Selenium	42.7	mg/Kg	1	50.0	<0.624	85	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190541

QC Batch: 57874 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49354 QC Preparation: 2009-03-18 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Calcium	⁷ 104000	mg/Kg	100	5000	104000	0	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Calcium	⁸ 104000	mg/Kg	100	5000	104000	0	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 190554

QC Batch: 57875 Date Analyzed: 2009-03-23 Analyzed By: RR
 Prep Batch: 49389 QC Preparation: 2009-03-20 Prepared By: KV

Param	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Calcium	⁹ 173000	mg/Kg	100	5000	173200	-4	75 - 125

⁷ Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

⁸ Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

⁹ Matrix spike recoveries out of control limits due to matrix spike being diluted out. Use LCS/LCSD to demonstrate analysis is under control.

DATA VALIDATION CHECKLIST

White Sands HELSTF Background Soil

ARCADIS, Inc.
3850 N. Causeway Blvd.
Suite 1600
Metairie, LA 70002
Tel. (504) 832-4174
Fax. (504) 832-2145

Environmental
Project:
White Sands

Project Number:
GP08WSMR.00SW.
OC009

Sample Team:	ARCADIS
Sample Matrix:	Soil
Analytical Laboratory:	Trace Analysis – Lubbock, TX
Laboratory Work Order No.:	9031805
Lab Project Manager:	Blaire Leftwich
Analyses:	Metals – 6010B and Mercury - 7471
QA Reporting Level:	ARCADIS, Level II
ARCADIS Project Manager:	Laurie Rodriguez

Analytical data were evaluated in accordance with applicable USEPA SW-846 method requirements, “USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review” (July 2002), analytical method control criteria, and professional judgment. National Functional Guidelines were used primarily to determine applicable qualification.

The data verification was performed at a Level II and included review of data package completeness, laboratory control samples and method blanks, matrix spike precision and accuracy, surrogate recoveries, and holding time compliance. Laboratory calculations were not verified. Only QA/QC results and analytical data associated with analytes/compounds of interest were reviewed for this validation. Field sampling documentation was not reviewed as a component of this validation.

Only QA/QC results and analytical data associated with analytes/compounds of interest were reviewed for this validation.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The following samples were included in this data validation:

SDG Number	Sample ID	Sample Date	Parent Sample
9031805	HLSF-BKGD-SB-010-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-010-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-SB-007-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-007-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-SB-009-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-009-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-SB-008-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-108-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-008-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-SB-011-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-011-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-SB-012-(0.0-0.5)	03/17/09	
9031805	HLSF-BKGD-SB-012-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-RB-002	03/17/09	
9031805	HLSF-BKGD-SB-112-(9.5-10.0)	03/17/09	
9031805	HLSF-BKGD-SB-004-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-104-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-004-(9.5-10.0)	03/16/09	
9031805	HLSF-BKGD-SB-003-(9.5-10.0)	03/16/09	
9031805	HLSF-BKGD-SB-003-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-002-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-002-(9.5-10.0)	03/16/09	
9031805	HLSF-BKGD-SB-001-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-001-(9.5-10.0)	03/16/09	
9031805	HLSF-BKGD-SB-005-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-005-(9.5-10.0)	03/16/09	
9031805	HLSF-BKGD-RB-001	03/16/09	
9031805	HLSF-BKGD-SB-006-(0.0-0.5)	03/16/09	
9031805	HLSF-BKGD-SB-006-(9.5-10.0)	03/16/09	

I. GENERAL INFORMATION

ITEMS REVIEWED	REPORTED/REVIEWED		EXCEPTIONS NOTED		GENERAL COMMENTS NOTED		ITEM NOT REQUIRED
	NO	YES	NO	YES	NO	YES	
1. Chain of Custody	X			X	X		
2. Sampling dates and times		X	X		X		
3. Sample type on COC	X			X	X		
4. Field QC samples		X	X		X		
5. Case Narrative		X	X		X		
6. Sample Receipt Condition		X	X			X	

“Exceptions Noted” = If an exception was noted in the Case Narrative this will be checked in the affirmative.

“General Comments Noted” = If there are other comments associated with Data Quality (not necessarily noted in the Case Narrative) this will be checked in the affirmative.

The following field QC samples were collected and included in this SDG:

Date Collected	QC Sample ID	Associated Samples	QC Type	SDG Number
03/16/09	HLSF-BKGD-RB-001	Samples collected 03/16/09	Rinsate Blank	9031805
03/17/09	HLSF-BKGD-RB-002	Samples collected 03/17/09	Rinsate Blank	9031805

1 & 3. A chain of custody was not provided with the data package.

6. The samples were received below the recommended temperature at 0.3 and 0.5 degrees C. No qualification is necessary since none of the samples were frozen.

II. METALS

ITEMS REVIEWED	REPORTED/REVIEWED		EXCEPTIONS NOTED		GENERAL COMMENTS NOTED		ITEM NOT REQUIRED
	NO	YES	NO	YES	NO	YES	
1. Holding times		X	X		X		
2. Reporting limits		X	X			X	
3. Blanks							
A. Method Blanks		X	X		X		
B. Equipment/Rinsate Blank		X	X			X	
4. Laboratory control sample (LCS) (%R)		X	X		X		
5. Matrix spike (MS) (%R)		X	X			X	
6. MSD (%R)		X	X			X	
7. MS/MSD (RPD)		X	X			X	
8. Field Duplicate Comparison (RPD)							X

%R - percent recovery

RPD - relative percent difference

MSD- Matrix Spike Duplicate

"Exceptions Noted" = If an exception was noted in the accompanying case narrative or by the validator this will be checked in the affirmative where data qualification was applied.

"General Comments Noted" = If there are other comments associated with Data Quality (not necessarily noted in the case narrative) this will be checked in the affirmative where data qualification was not warranted.

COMMENTS: The samples were analyzed for Volatiles by Methods 6010B and 7471A. Performance was acceptable, with the following exceptions and notes.

2. Several samples were analyzed at dilutions for aluminum, calcium, and iron due to elevated concentrations.

3B. Calcium, chromium, and iron were detected in both rinsate blanks. The associated field sample results were greater than ten times the blank value for these metals. No qualification is warranted.

5-7. HLSF-BKGD-SB-010-(0.0-0.5) was used for the MS/MSD. The sample concentration for calcium was greater than four times the spike value. No qualification is necessary.

HLSF-BKGD-RB-002 was used for the MS/MSD for the water batch for mercury. The recoveries and RPD were acceptable. This sample is an rinsate blank and the only sample analyzed in the batch was the rinsate blank

HLSF-BKGD-SB-011-(0.0-0.5) and HLSF-BKGD-003-(9.5-10.0) were used for the soil MS/MSD for mercury. The recoveries and RPDs were acceptable.

HLSF-BKGD-SB-006-(9.5-10.0) was used for the soil MS/MSD. The sample concentration for calcium was greater than four times the spike value. No qualification is necessary.

HLSF-BKGD-SB-004-(0.0-0.5) was used for the MS/MSD. The sample concentrations for calcium, iron and aluminum were greater than four times the spike values. No qualification is necessary.

Qualifier Definitions:

J – Result is considered to be estimated at the value reported.

UJ – Result is considered not detected but estimated due to QC deficiencies.

UB – Non-detect at the Reporting Limit or at the concentration reported if greater than the RL due to associated blank contamination.

R – Result is qualified as unusable, data point is rejected.

Explanation/Notes:

Sample ID	Parameter	Result	Units	Qualifier	Bias	Reason
No Qualification Necessary						

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE: _____



DATE: 04/01/09 _____

PEER REVIEW: Jane Kennedy

DATE: 04/05/09 _____

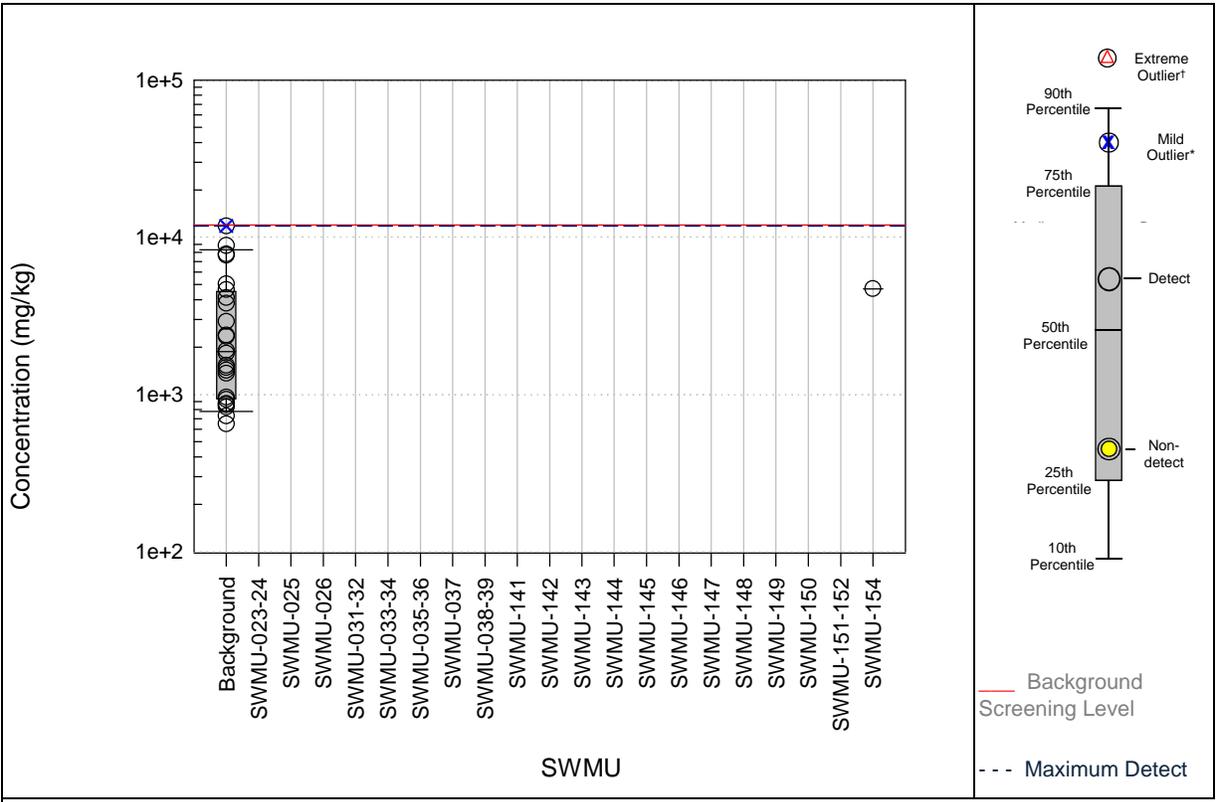
ARCADIS

Attachment F3

Box Plots

Attachment F3: Soil (0-10 ft bgs) Box and Whisker Plots (Logarithmic Scale)

Group	Figure #	Parameter
Inorganics	<u>F3-1</u>	Aluminum
	<u>F3-2</u>	Arsenic
	<u>F3-3</u>	Barium
	<u>F3-4</u>	Cadmium
	<u>F3-5</u>	Calcium
	<u>F3-6</u>	Chromium
	<u>F3-7</u>	Copper
	<u>F3-8</u>	Hexavalent Chromium
	<u>F3-9</u>	Iron
	<u>F3-10</u>	Lead
	<u>F3-11</u>	Mercury
	<u>F3-12</u>	Potassium
	<u>F3-13</u>	Selenium
	<u>F3-14</u>	Silver
	<u>F3-15</u>	Sodium
	<u>F3-16</u>	Zinc



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Aluminum
 White Sands Missile Range, HELSTF, New Mexico

Figure F3-1

SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	0	24	24	NA	NA	650	11800	3198	1870	3023	950	1870	4390
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	0	1	1	NA	NA	4700	4700	4700	4700	ND	4700	4700	4700

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.

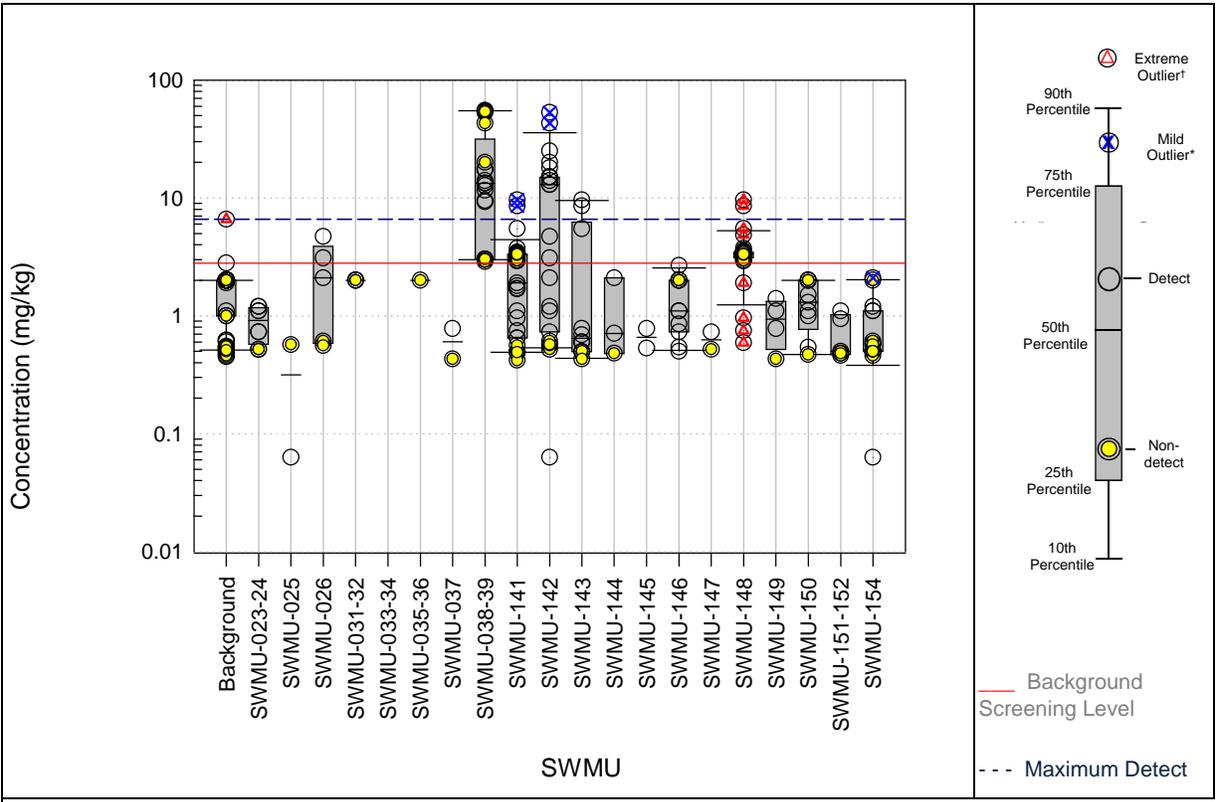


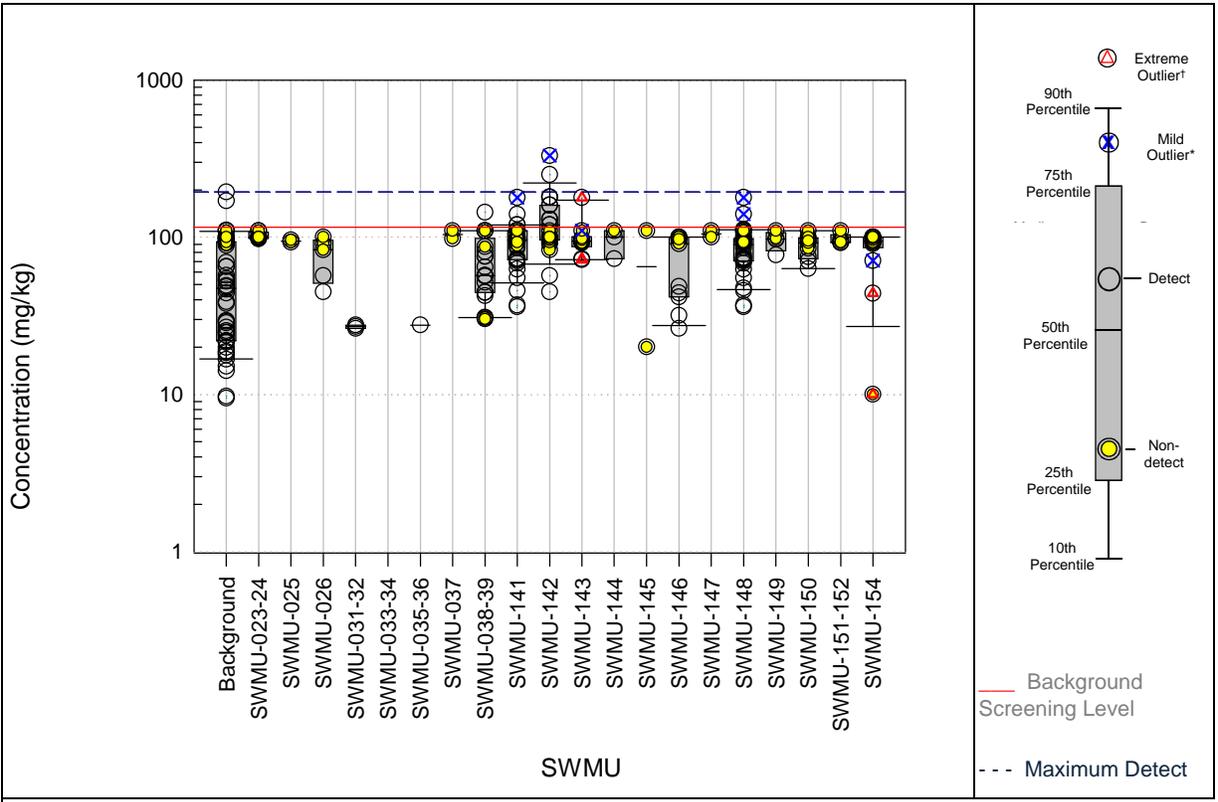
Figure F3-2
Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Arsenic
 White Sands Missile Range, HELSTF, New Mexico

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	42	8	50	0.45	2	0.54	6.58	1.8	0.86	2.1	1.0	2.0	2.0
SWMU-023-24	mg/kg	2	6	8	0.52	0.52	0.73	1.2	1.0	1.1	0.22	0.63	0.92	1.1
SWMU-025	mg/kg	1	1	2	0.57	0.57	0.063	0.063	0.063	0.063	ND	0.32	0.32	0.32
SWMU-026	mg/kg	2	3	5	0.56	0.61	2.1	4.7	3.3	3.1	1.3	0.60	2.1	3.5
SWMU-031-32	mg/kg	3	0	3	2	2	ND	ND	ND	ND	ND	2.0	2.0	2.0
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	2	2	ND	ND	ND	ND	ND	2.0	2.0	2.0
SWMU-037	mg/kg	1	1	2	0.43	0.43	0.78	0.78	0.78	0.78	ND	0.61	0.61	0.61
SWMU-038-39	mg/kg	12	9	21	2.88	55	9.29	17.5	13.2	13.3	2.9	3.0	13.3	25.8
SWMU-141	mg/kg	18	17	35	0.42	3.46	0.65	9.64	2.8	1.7	2.7	0.68	1.9	3.3
SWMU-142	mg/kg	4	19	23	0.52	0.61	0.063	53	14.3	14.0	14.1	0.82	13.0	15.0
SWMU-143	mg/kg	3	7	10	0.43	0.5	0.59	9.64	3.8	0.78	4.1	0.50	0.64	5.5
SWMU-144	mg/kg	1	2	3	0.48	0.48	0.71	2.1	1.4	1.4	0.98	0.54	0.71	1.8
SWMU-145	mg/kg	0	2	2	NA	NA	0.53	0.78	0.66	0.65	0.18	0.65	0.65	0.65
SWMU-146	mg/kg	4	7	11	2	2	0.5	2.68	1.1	0.85	0.75	0.76	1.1	2.0
SWMU-147	mg/kg	1	1	2	0.52	0.52	0.73	0.73	0.73	0.73	ND	0.63	0.63	0.63
SWMU-148	mg/kg	16	16	32	2.96	3.47	0.59	9.64	3.7	3.4	2.5	3.1	3.3	3.5
SWMU-149	mg/kg	1	3	4	0.43	0.43	0.78	1.4	1.1	1.1	0.31	0.61	0.94	1.3
SWMU-150	mg/kg	4	5	9	0.47	2	0.54	1.5	1.1	1.1	0.36	0.88	1.3	2.0
SWMU-151-152	mg/kg	3	2	5	0.46	0.5	0.94	1.1	1.0	1.0	0.11	0.47	0.50	0.98
SWMU-154	mg/kg	11	6	17	0.46	2	0.063	2.1	1.0	1.1	0.68	0.50	0.50	1.1

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
- * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
- = no data
- NA = value not applicable due to frequency of detection
- ND = non-detect
- IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.
 Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale) Barium

Figure F3-3

White Sands Missile Range, HELSTF, New Mexico

SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	12	38	50	89	110	9.48	194	44.5	28.9	40.0	22	47.5	93.0
SWMU-023-24	mg/kg	8	0	8	98	110	ND	ND	ND	ND	ND	99	100	105
SWMU-025	mg/kg	2	0	2	93	96	ND	ND	ND	ND	ND	95	94.5	94.5
SWMU-026	mg/kg	3	2	5	83	100	45	57	51.0	51.0	8.5	54	83.0	93.3
SWMU-031-32	mg/kg	0	3	3	NA	NA	26.3	27.6	27.0	27.0	0.65	26	27.0	27.5
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	0	1	1	NA	NA	27.6	27.6	27.6	27.6	ND	28	27.6	27.6
SWMU-037	mg/kg	2	0	2	98	110	ND	ND	ND	ND	ND	100	104	104
SWMU-038-39	mg/kg	8	13	21	30.2	110	42.4	144	65.5	56.9	26.6	45	57.1	92.8
SWMU-141	mg/kg	13	22	35	88	110	36	179	86.2	79.4	34.0	72	95.5	108
SWMU-142	mg/kg	9	14	23	83	110	45	330	155	145	72.1	97	120	160
SWMU-143	mg/kg	7	3	10	92	110	72	179	108	73.0	61.5	92	94.5	98.0
SWMU-144	mg/kg	1	2	3	110	110	73	100	86.5	86.5	19.1	80	100	108
SWMU-145	mg/kg	2	0	2	20	110	ND	ND	ND	ND	ND	65	65.0	65.0
SWMU-146	mg/kg	6	5	11	91	100	26.3	48.6	38.5	41.7	9.2	42	91.0	99.5
SWMU-147	mg/kg	2	0	2	100	110	ND	ND	ND	ND	ND	110	105	105
SWMU-148	mg/kg	3	30	33	93	110	36	179	84.4	81.4	29.6	71	89.7	97.8
SWMU-149	mg/kg	3	1	4	97	110	77	77	77.0	77.0	ND	87	97.5	104
SWMU-150	mg/kg	6	3	9	85	110	63.1	75.2	69.6	70.6	6.1	74	92.0	98.5
SWMU-151-152	mg/kg	5	0	5	92	110	ND	ND	ND	ND	ND	93	93.0	100
SWMU-154	mg/kg	12	2	14	10	100	44	71	57.5	57.5	19.1	91	94.5	100

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

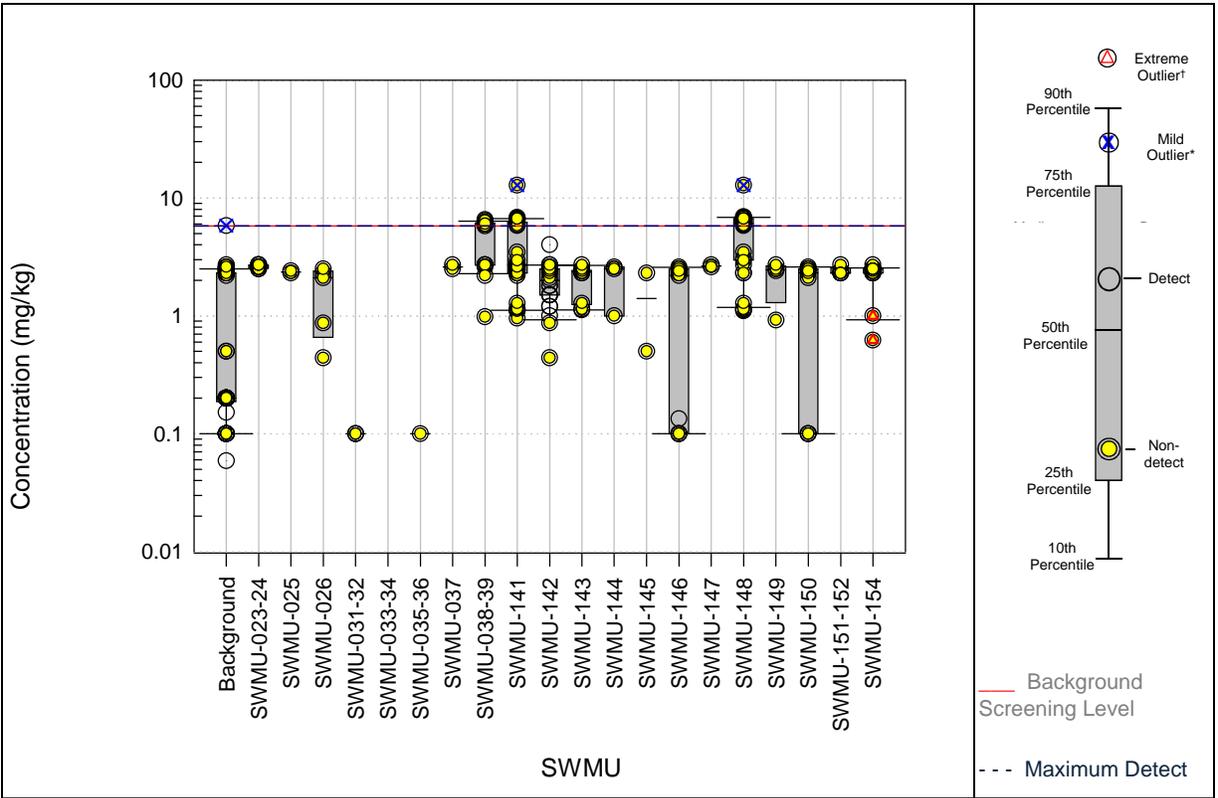
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



**Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Cadmium**
White Sands Missile Range, HELSTF, New Mexico

**Figure
F3-4**

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	47	3	50	0.1	2.7	0.059	5.81	2.0	0.15	3.3	0.20	0.20	2.3
SWMU-023-24	mg/kg	8	0	8	2.5	2.7	ND	ND	ND	ND	ND	2.5	2.7	2.7
SWMU-025	mg/kg	2	0	2	2.3	2.4	ND	ND	ND	ND	ND	2.3	2.3	2.3
SWMU-026	mg/kg	5	0	5	0.44	2.5	ND	ND	ND	ND	ND	0.76	2.1	2.3
SWMU-031-32	mg/kg	3	0	3	0.1	0.1	ND	ND	ND	ND	ND	0.10	0.10	0.10
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	0.1	0.1	ND	ND	ND	ND	ND	0.10	0.10	0.10
SWMU-037	mg/kg	2	0	2	2.5	2.7	ND	ND	ND	ND	ND	2.6	2.6	2.6
SWMU-038-39	mg/kg	21	0	21	0.98	6.55	ND	ND	ND	ND	ND	2.7	6.0	6.1
SWMU-141	mg/kg	35	0	35	0.95	12.8	ND	ND	ND	ND	ND	2.3	2.7	6.2
SWMU-142	mg/kg	11	12	23	0.44	2.7	1	4	1.8	1.5	0.80	1.5	2.0	2.5
SWMU-143	mg/kg	10	0	10	1.12	2.7	ND	ND	ND	ND	ND	1.3	2.3	2.4
SWMU-144	mg/kg	3	0	3	1	2.6	ND	ND	ND	ND	ND	1.4	2.5	2.6
SWMU-145	mg/kg	2	0	2	0.5	2.3	ND	ND	ND	ND	ND	1.4	1.4	1.4
SWMU-146	mg/kg	10	1	11	0.1	2.6	0.134	0.134	0.13	0.13	ND	0.10	2.2	2.5
SWMU-147	mg/kg	2	0	2	2.6	2.7	ND	ND	ND	ND	ND	2.7	2.7	2.7
SWMU-148	mg/kg	32	0	32	1.1	12.8	ND	ND	ND	ND	ND	3.0	6.1	6.7
SWMU-149	mg/kg	4	0	4	0.92	2.7	ND	ND	ND	ND	ND	1.7	2.5	2.6
SWMU-150	mg/kg	9	0	9	0.1	2.6	ND	ND	ND	ND	ND	0.10	2.3	2.5
SWMU-151-152	mg/kg	5	0	5	2.3	2.7	ND	ND	ND	ND	ND	2.3	2.3	2.5
SWMU-154	mg/kg	17	0	17	0.62	2.7	ND	ND	ND	ND	ND	2.3	2.5	2.5

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

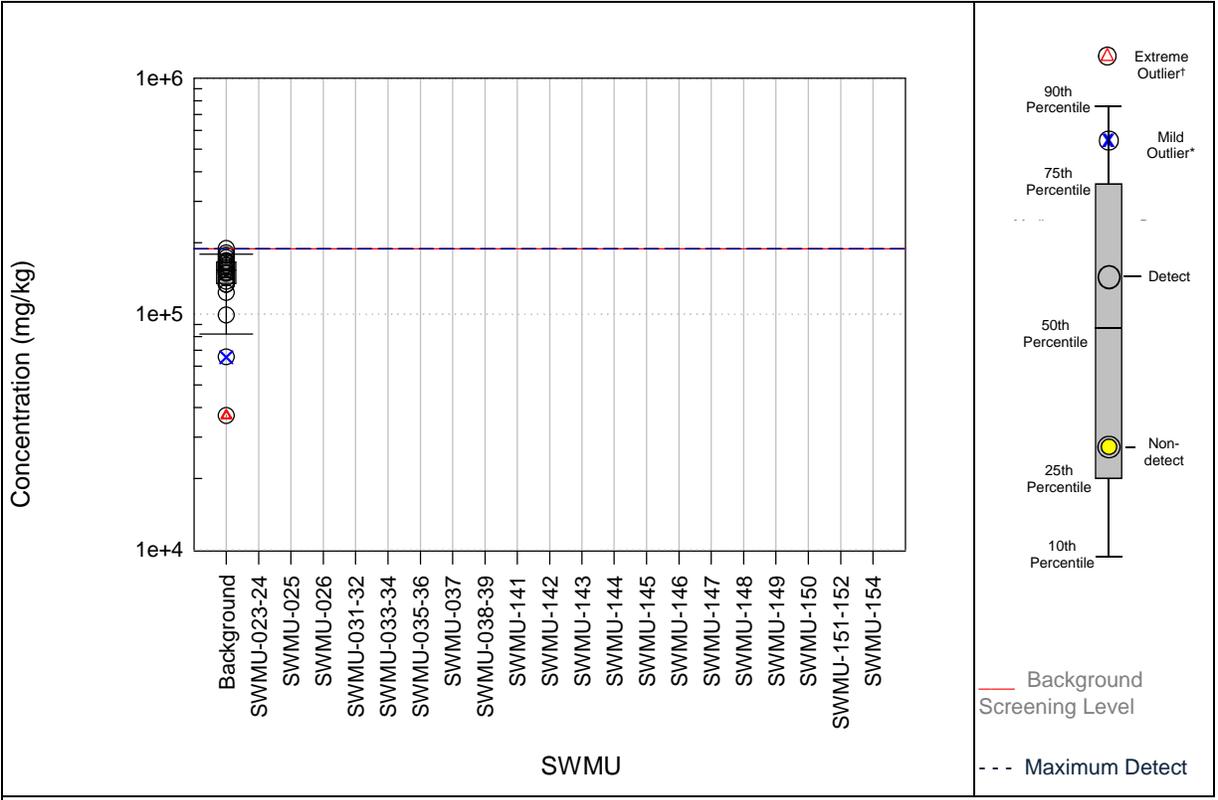
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



ARCADIS Infrastructure, environment, buildings

Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Calcium
 White Sands Missile Range, HELSTF, New Mexico

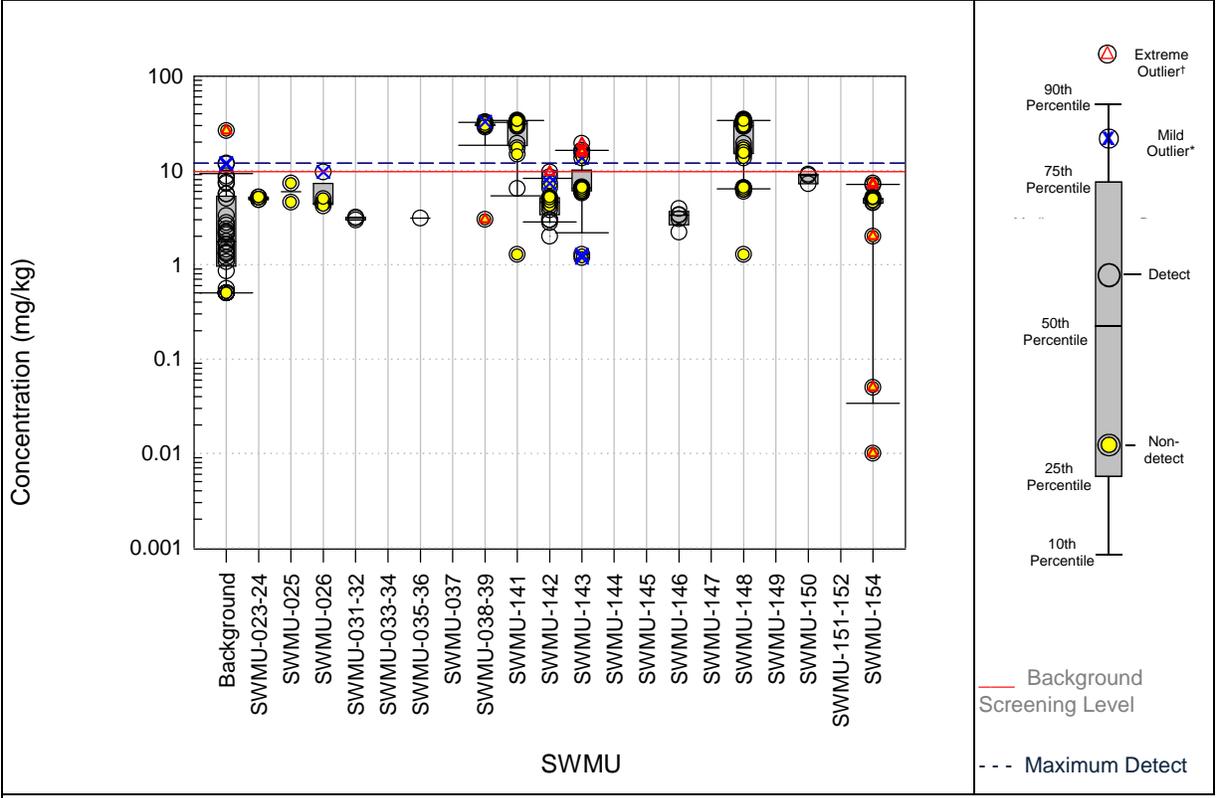
Figure F3-5

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	0	24	24	NA	NA	37000	189000	144823	153000	35061	140000	153000	165000
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
- * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
- = no data
- NA = value not applicable due to frequency of detection
- ND = non-detect
- IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.
 Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Chromium
 White Sands Missile Range, HELSTF, New Mexico

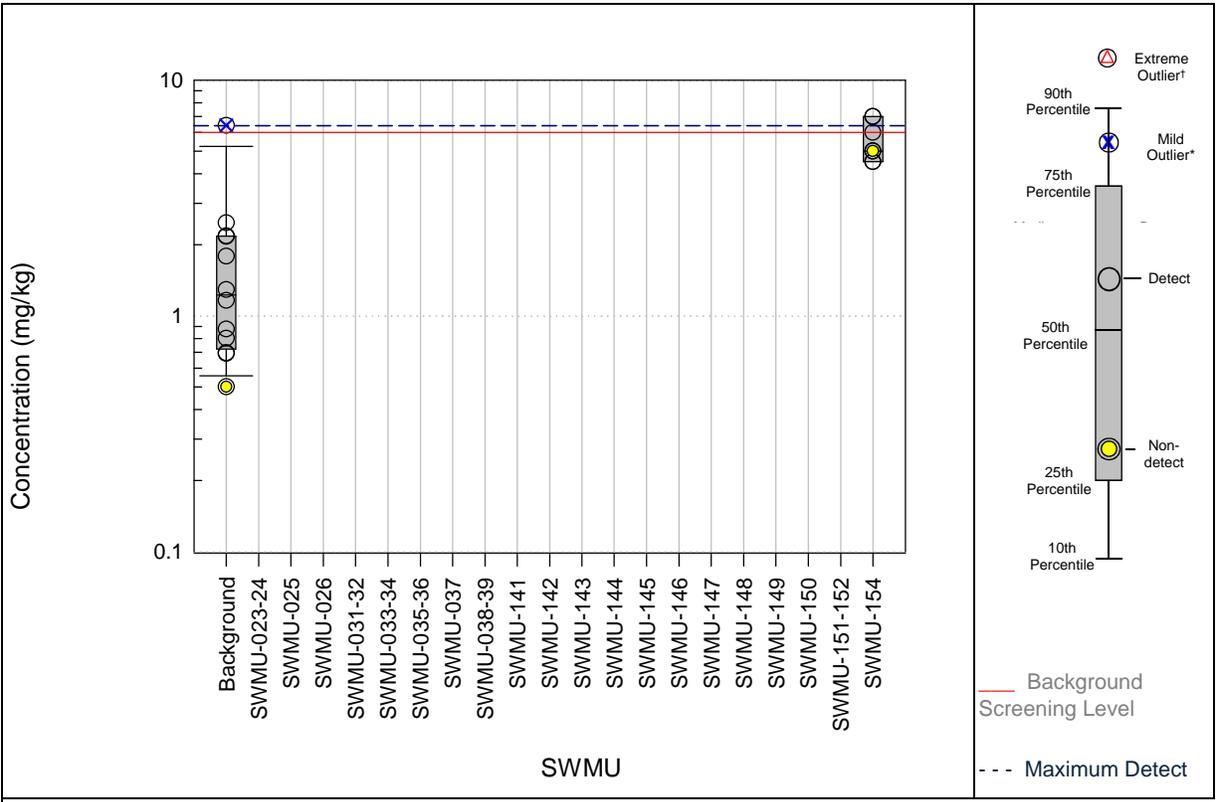
Figure F3-6

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	8	29	37	0.5	26.4	0.557	11.9	3.7	2.2	3.2	1.0	1.8	5.2
SWMU-023-24	mg/kg	4	0	4	4.9	5.2	ND	ND	ND	ND	ND	4.9	5.1	5.2
SWMU-025	mg/kg	2	0	2	4.6	7.3	ND	ND	ND	ND	ND	5.9	5.9	5.9
SWMU-026	mg/kg	3	2	5	4.2	5	4.5	9.6	7.1	7.1	3.6	4.4	4.5	6.2
SWMU-031-32	mg/kg	0	3	3	NA	NA	2.97	3.18	3.1	3.1	0.11	3.0	3.1	3.2
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	0	1	1	NA	NA	3.11	3.11	3.1	3.1	ND	3.1	3.1	3.1
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	mg/kg	15	0	15	3.01	32.8	ND	ND	ND	ND	ND	30	30.2	30.9
SWMU-141	mg/kg	15	2	17	1.28	34.1	6.4	19.3	12.9	12.9	9.1	19	31.0	33.3
SWMU-142	mg/kg	7	14	21	4.2	7.3	2	9.6	4.7	4.5	2.2	3.6	4.6	5.1
SWMU-143	mg/kg	19	2	21	1.19	16.3	6.4	19.3	12.9	12.9	9.1	6.1	6.4	8.4
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	mg/kg	0	5	5	NA	NA	2.21	3.93	3.2	3.3	0.63	2.9	3.3	3.5
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	mg/kg	35	2	37	1.28	34.7	6.4	19.3	12.9	12.9	9.1	15	29.7	32.3
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	mg/kg	0	3	3	NA	NA	7.21	9.06	8.4	8.8	1.0	7.6	8.8	9.0
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	14	1	15	0.01	7.3	7	7	7.0	7.0	ND	4.5	5.0	5.0

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
- * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
- = no data
- NA = value not applicable due to frequency of detection
- ND = non-detect
- IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.
 Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



ARCADIS
Infrastructure, environment, buildings

Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Copper
White Sands Missile Range, HELSTF, New Mexico

Figure F3-7

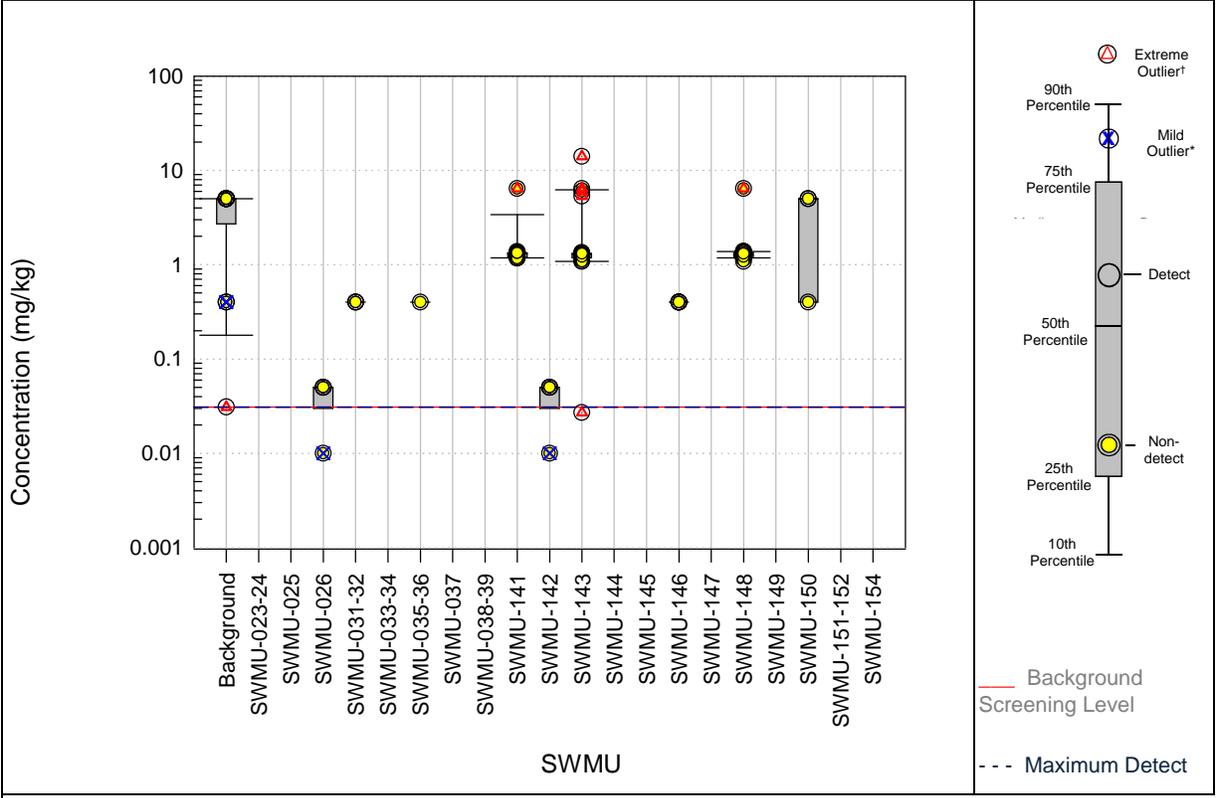
SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	1	11	12	0.5	0.5	0.692	6.41	1.9	1.3	1.6	0.75	1.2	2.2
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	1	6	7	5	5	4.5	7	5.7	5.5	1.2	4.6	5.0	6.8

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
- * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
- = no data
- NA = value not applicable due to frequency of detection
- ND = non-detect
- IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



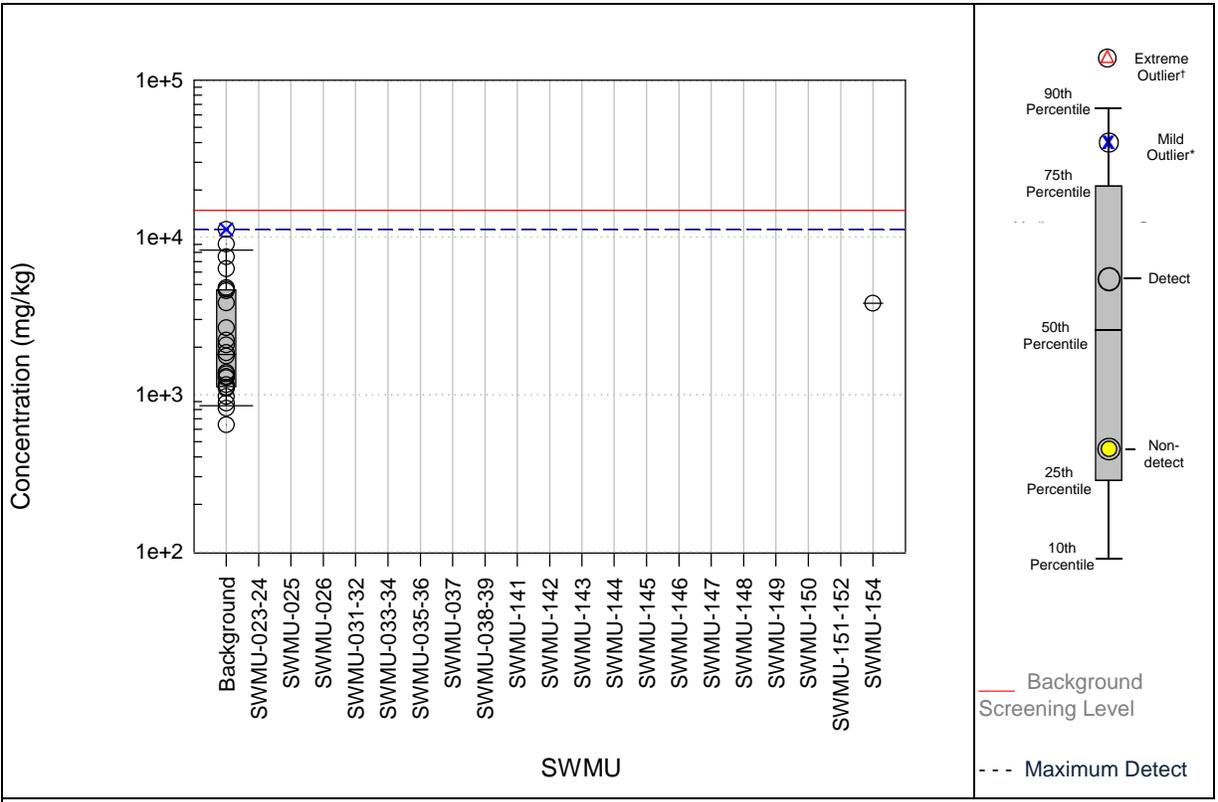
**Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Hexavalent Chromium**
White Sands Missile Range, HELSTF, New Mexico

Figure F3-8

SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	12	1	13	0.4	5	0.031	0.031	0.031	0.031	ND	3.8	5.0	5.0
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	mg/kg	5	0	5	0.01	0.05	ND	ND	ND	ND	ND	0.040	0.050	0.050
SWMU-031-32	mg/kg	3	0	3	0.4	0.4	ND	ND	ND	ND	ND	0.40	0.40	0.40
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	0.4	0.4	ND	ND	ND	ND	ND	0.40	0.40	0.40
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	mg/kg	15	0	15	1.17	6.41	ND	ND	ND	ND	ND	1.2	1.3	1.3
SWMU-142	mg/kg	5	0	5	0.01	0.05	ND	ND	ND	ND	ND	0.040	0.050	0.050
SWMU-143	mg/kg	19	4	23	1.08	6.41	0.027	14	5.1	3.2	6.4	1.2	1.3	1.3
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	mg/kg	5	0	5	0.4	0.4	ND	ND	ND	ND	ND	0.40	0.40	0.40
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	mg/kg	34	0	34	1.08	6.41	ND	ND	ND	ND	ND	1.2	1.3	1.3
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	mg/kg	3	0	3	0.4	5	ND	ND	ND	ND	ND	1.5	5.0	5.0
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
 - * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
 - = no data
 - NA = value not applicable due to frequency of detection
 - ND = non-detect
 - IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)
- Reporting limit is used for non-detects unless otherwise noted.
 Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Iron
 White Sands Missile Range, HELSTF, New Mexico

Figure F3-9

SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	0	24	24	NA	NA	640	11200	3095	1795	2865	1100	1795	4605
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	0	1	1	NA	NA	3800	3800	3800	3800	ND	3800	3800	3800

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

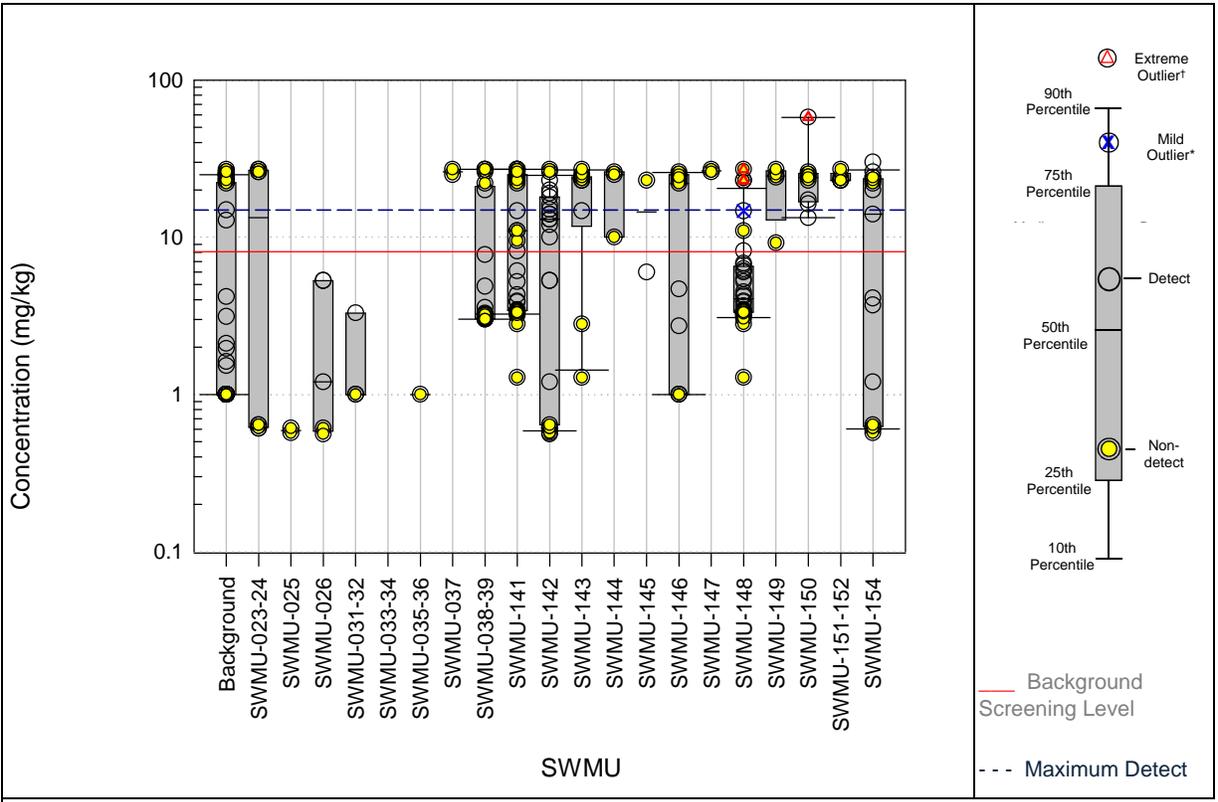
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



ARCADIS Infrastructure, environment, buildings

Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Lead
 White Sands Missile Range, HELSTF, New Mexico

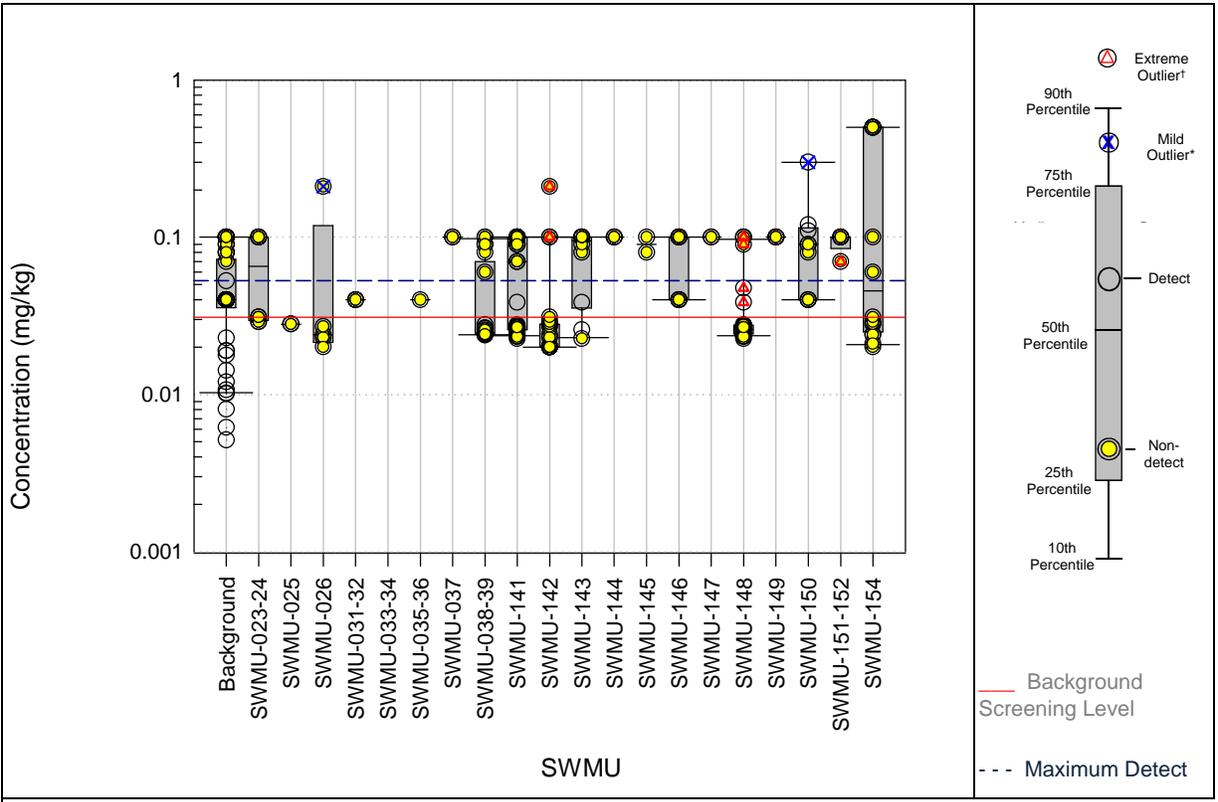
Figure F3-10

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	42	8	50	1	27	1.525	14.9	5.3	2.6	5.4	1.0	1.0	22.0
SWMU-023-24	mg/kg	8	0	8	0.61	27	ND	ND	ND	ND	ND	0.63	13.3	26.5
SWMU-025	mg/kg	2	0	2	0.57	0.61	ND	ND	ND	ND	ND	0.59	0.59	0.59
SWMU-026	mg/kg	2	3	5	0.56	0.61	1.2	5.3	3.9	5.3	2.4	0.60	1.2	5.3
SWMU-031-32	mg/kg	2	1	3	1	1	3.3	3.3	3.3	3.3	ND	1.0	1.0	2.7
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	1	1	ND	ND	ND	ND	ND	1.0	1.0	1.0
SWMU-037	mg/kg	2	0	2	25	27	ND	ND	ND	ND	ND	26	26.0	26.0
SWMU-038-39	mg/kg	16	5	21	3.01	27	3.24	20	7.9	4.9	7.0	3.0	3.2	20.5
SWMU-141	mg/kg	28	7	35	1.28	27	3.87	14.7	6.6	5.2	3.9	3.4	11.0	25.0
SWMU-142	mg/kg	8	15	23	0.56	27	1.2	23	13.3	14.0	5.9	0.78	13.0	17.5
SWMU-143	mg/kg	9	1	10	1.28	27	14.7	14.7	14.7	14.7	ND	15	23.5	24.0
SWMU-144	mg/kg	3	0	3	10	26	ND	ND	ND	ND	ND	14	25.0	25.8
SWMU-145	mg/kg	1	1	2	23	23	6	6	6.0	6.0	ND	15	14.5	14.5
SWMU-146	mg/kg	9	2	11	1	26	2.73	4.69	3.7	3.7	1.4	1.4	22.0	24.8
SWMU-147	mg/kg	2	0	2	26	27	ND	ND	ND	ND	ND	27	26.5	26.5
SWMU-148	mg/kg	17	15	32	1.28	27	3.65	14.7	6.0	5.4	2.7	3.3	4.1	6.5
SWMU-149	mg/kg	4	0	4	9.2	27	ND	ND	ND	ND	ND	17	24.5	26.0
SWMU-150	mg/kg	5	4	9	23	26	13.3	58	26.2	16.8	21.3	17	24.0	25.3
SWMU-151-152	mg/kg	5	0	5	23	27	ND	ND	ND	ND	ND	23	23.0	24.8
SWMU-154	mg/kg	8	9	17	0.57	24	1.2	30	16.2	20.0	10.8	0.63	14.0	23.3

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
- * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
- = no data
- NA = value not applicable due to frequency of detection
- ND = non-detect
- IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.
 Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Mercury
 White Sands Missile Range, HELSTF, New Mexico

Figure F3-11

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	37	13	50	0.04	0.1	0.00513	0.0528	0.016	0.012	0.012	0.040	0.040	0.070
SWMU-023-24	mg/kg	8	0	8	0.029	0.1	ND	ND	ND	ND	ND	0.030	0.065	0.10
SWMU-025	mg/kg	2	0	2	0.028	0.028	ND	ND	ND	ND	ND	0.028	0.028	0.028
SWMU-026	mg/kg	5	0	5	0.02	0.21	ND	ND	ND	ND	ND	0.022	0.024	0.073
SWMU-031-32	mg/kg	3	0	3	0.04	0.04	ND	ND	ND	ND	ND	0.040	0.040	0.040
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	0.04	0.04	ND	ND	ND	ND	ND	0.040	0.040	0.040
SWMU-037	mg/kg	2	0	2	0.1	0.1	ND	ND	ND	ND	ND	0.10	0.10	0.10
SWMU-038-39	mg/kg	19	2	21	0.0239	0.1	0.0265	0.0278	0.027	0.027	0.00092	0.024	0.025	0.065
SWMU-141	mg/kg	33	2	35	0.0227	0.1	0.0258	0.0386	0.032	0.032	0.0091	0.026	0.070	0.10
SWMU-142	mg/kg	23	0	23	0.02	0.21	ND	ND	ND	ND	ND	0.020	0.020	0.028
SWMU-143	mg/kg	8	2	10	0.0227	0.1	0.0258	0.0386	0.032	0.032	0.0091	0.039	0.095	0.10
SWMU-144	mg/kg	3	0	3	0.1	0.1	ND	ND	ND	ND	ND	0.10	0.10	0.10
SWMU-145	mg/kg	2	0	2	0.08	0.1	ND	ND	ND	ND	ND	0.090	0.090	0.090
SWMU-146	mg/kg	11	0	11	0.04	0.1	ND	ND	ND	ND	ND	0.040	0.10	0.10
SWMU-147	mg/kg	2	0	2	0.1	0.1	ND	ND	ND	ND	ND	0.10	0.10	0.10
SWMU-148	mg/kg	29	3	32	0.0227	0.1	0.0258	0.0474	0.037	0.039	0.011	0.024	0.026	0.028
SWMU-149	mg/kg	4	0	4	0.1	0.1	ND	ND	ND	ND	ND	0.10	0.10	0.10
SWMU-150	mg/kg	6	3	9	0.04	0.09	0.11	0.3	0.18	0.12	0.11	0.040	0.090	0.11
SWMU-151-152	mg/kg	5	0	5	0.07	0.1	ND	ND	ND	ND	ND	0.093	0.10	0.10
SWMU-154	mg/kg	16	0	16	0.02	0.5	ND	ND	ND	ND	ND	0.026	0.045	0.50

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

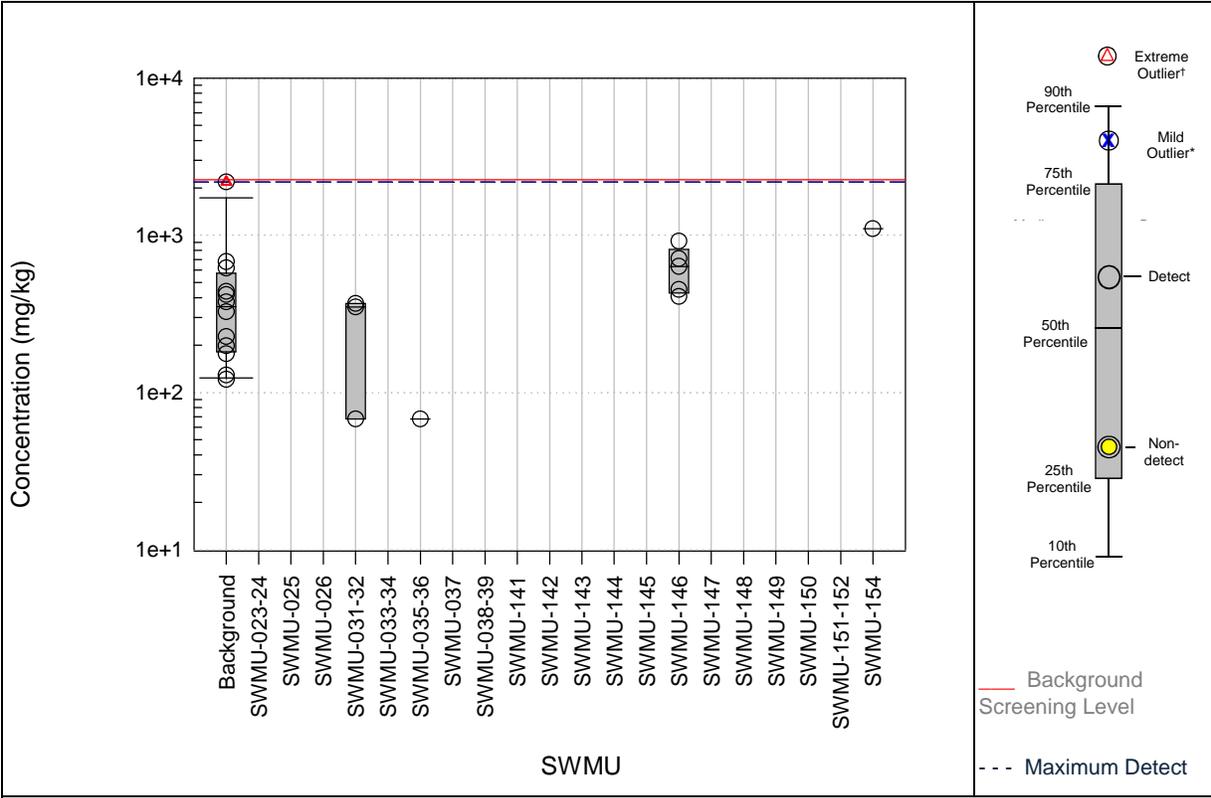
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Potassium

Figure F3-12

White Sands Missile Range, HELSTF, New Mexico

SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	0	12	12	NA	NA	121	2180	490	351	562	190	351	528
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	mg/kg	0	3	3	NA	NA	67.7	368	262	349	168	140	349	363
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	0	1	1	NA	NA	67.7	67.7	67.7	67.7	ND	68	67.7	67.7
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	mg/kg	0	5	5	NA	NA	407	915	623	632	206	440	632	761
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	0	1	1	NA	NA	1100	1100	1100	1100	ND	1100	1100	1100

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

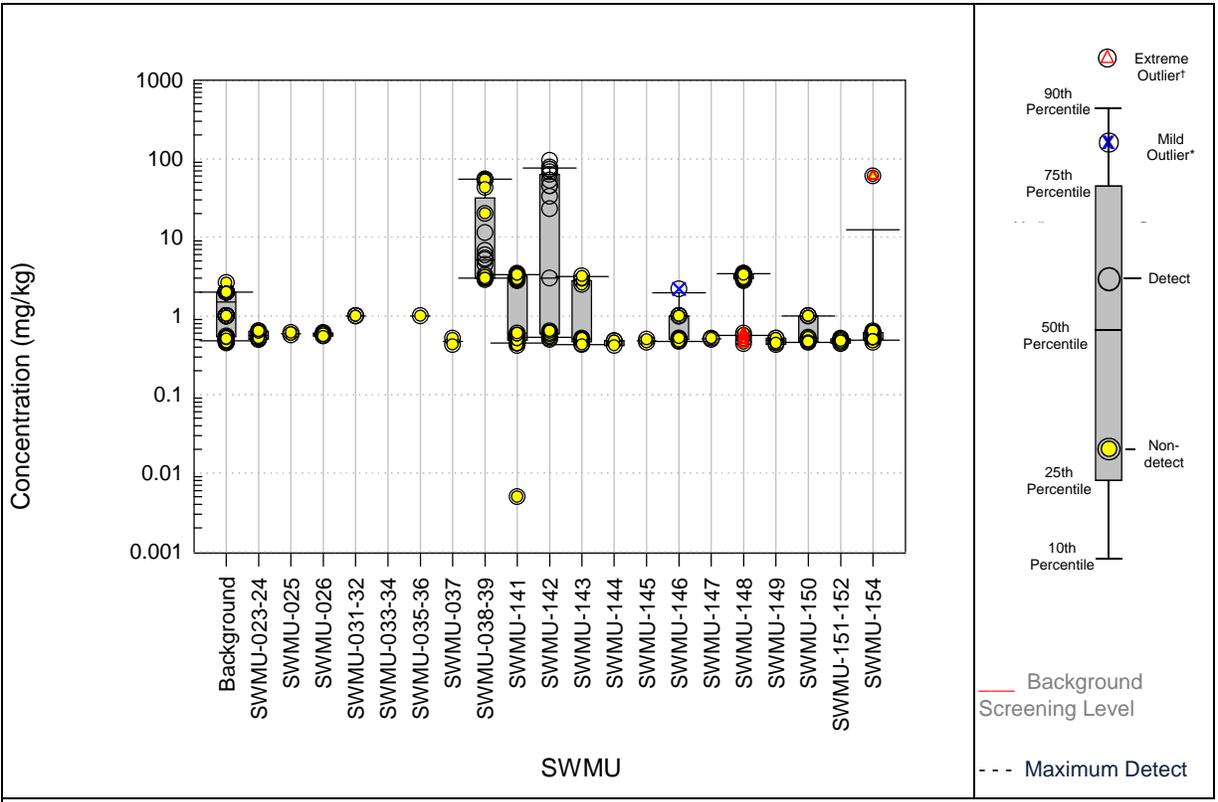
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Selenium
 White Sands Missile Range, HELSTF, New Mexico

Figure F3-13

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	50	0	50	0.45	2.64	ND	ND	ND	ND	ND	0.55	1.5	2.0
SWMU-023-24	mg/kg	8	0	8	0.5	0.64	ND	ND	ND	ND	ND	0.51	0.56	0.63
SWMU-025	mg/kg	2	0	2	0.57	0.61	ND	ND	ND	ND	ND	0.59	0.59	0.59
SWMU-026	mg/kg	5	0	5	0.55	0.61	ND	ND	ND	ND	ND	0.56	0.59	0.60
SWMU-031-32	mg/kg	3	0	3	1	1	ND	ND	ND	ND	ND	1.0	1.0	1.0
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	1	1	ND	ND	ND	ND	ND	1.0	1.0	1.0
SWMU-037	mg/kg	2	0	2	0.43	0.52	ND	ND	ND	ND	ND	0.47	0.47	0.47
SWMU-038-39	mg/kg	15	6	21	2.88	55	4.51	11.4	6.5	5.7	2.5	3.0	5.2	25.8
SWMU-141	mg/kg	35	0	35	0.005	3.46	ND	ND	ND	ND	ND	0.49	0.60	3.2
SWMU-142	mg/kg	11	12	23	0.5	0.64	3	95	54.3	58.0	26.0	0.59	3.0	60.5
SWMU-143	mg/kg	10	0	10	0.43	3.21	ND	ND	ND	ND	ND	0.48	0.51	2.8
SWMU-144	mg/kg	3	0	3	0.42	0.48	ND	ND	ND	ND	ND	0.44	0.48	0.48
SWMU-145	mg/kg	2	0	2	0.46	0.5	ND	ND	ND	ND	ND	0.48	0.48	0.48
SWMU-146	mg/kg	10	1	11	0.47	1	2.2	2.2	2.2	2.2	ND	0.50	1.0	1.0
SWMU-147	mg/kg	2	0	2	0.5	0.52	ND	ND	ND	ND	ND	0.51	0.51	0.51
SWMU-148	mg/kg	32	0	32	0.44	3.47	ND	ND	ND	ND	ND	3.0	3.1	3.3
SWMU-149	mg/kg	4	0	4	0.43	0.52	ND	ND	ND	ND	ND	0.44	0.49	0.52
SWMU-150	mg/kg	9	0	9	0.46	1	ND	ND	ND	ND	ND	0.48	0.52	1.0
SWMU-151-152	mg/kg	5	0	5	0.44	0.52	ND	ND	ND	ND	ND	0.46	0.48	0.50
SWMU-154	mg/kg	17	0	17	0.46	60	ND	ND	ND	ND	ND	0.50	0.51	0.61

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

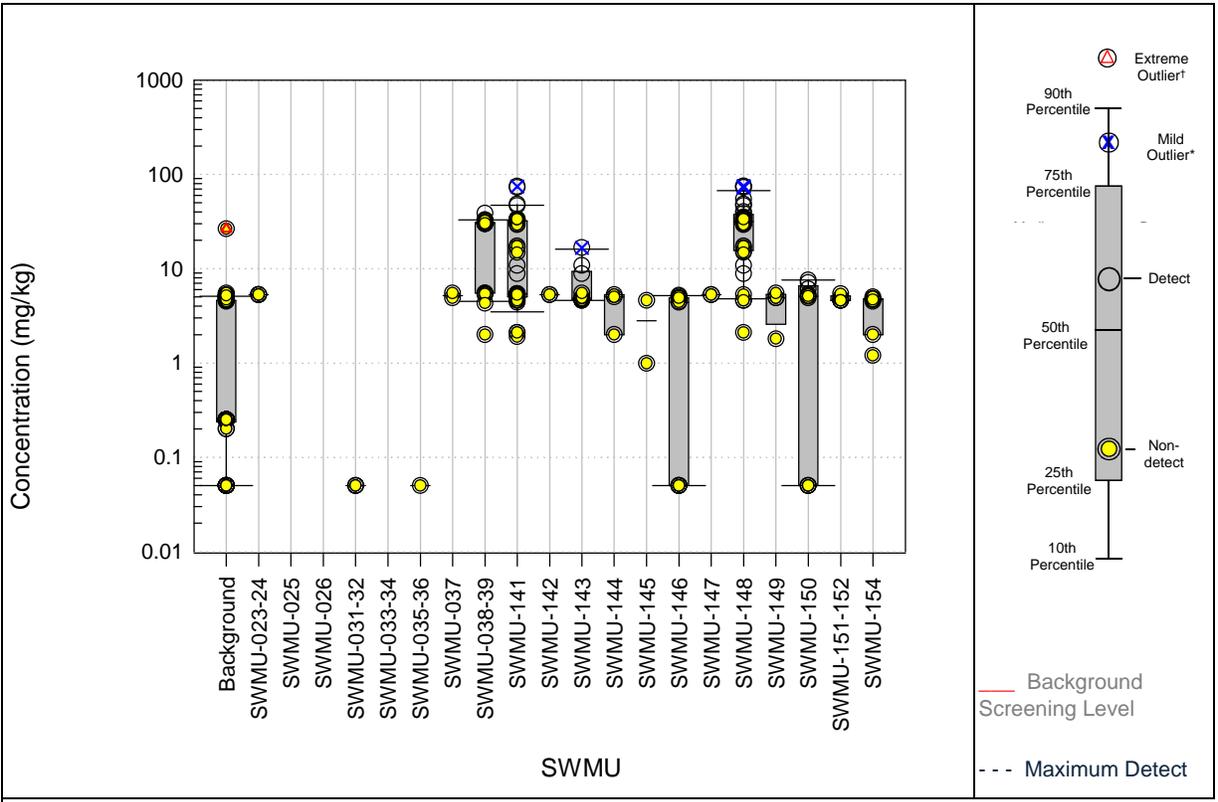
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



ARCADIS Infrastructure, environment, buildings

Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Silver
 White Sands Missile Range, HELSTF, New Mexico

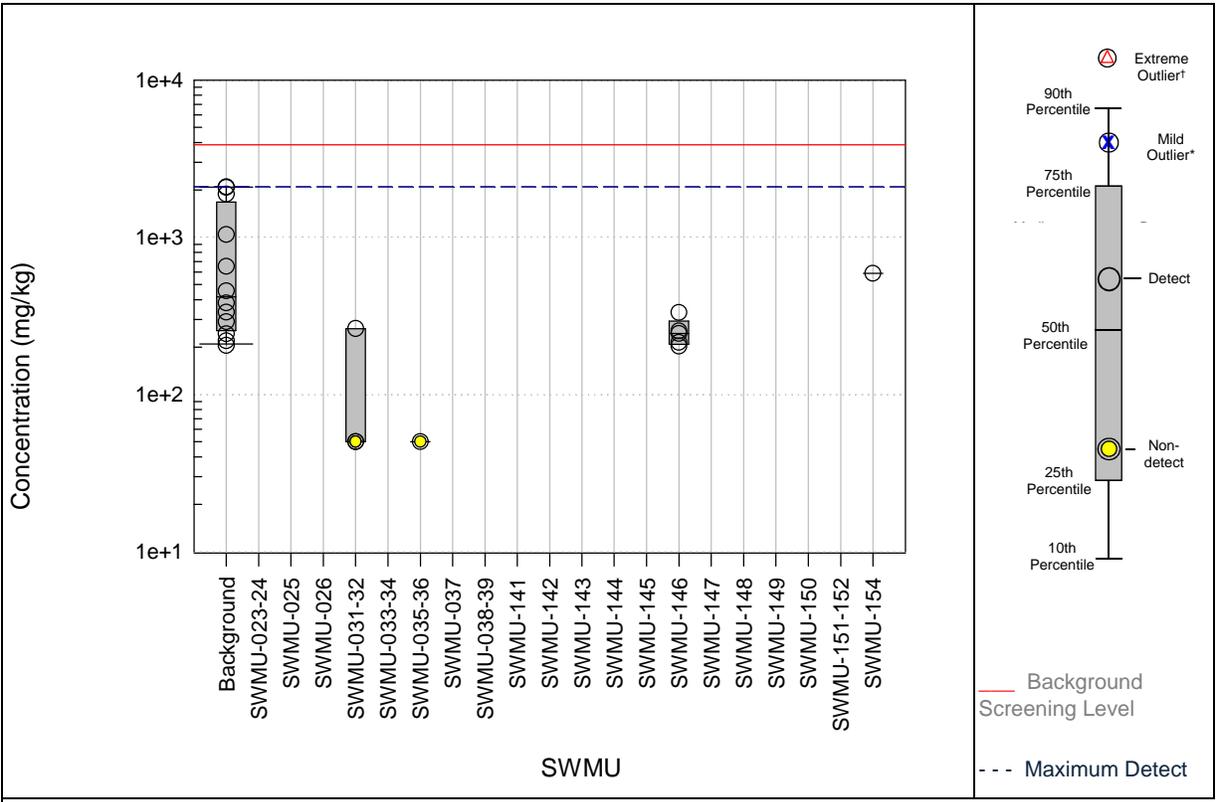
Figure F3-14

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	50	0	50	0.05	26.4	ND	ND	ND	ND	ND	0.25	0.25	4.6
SWMU-023-24	mg/kg	4	0	4	5.3	5.3	ND	ND	ND	ND	ND	5.3	5.3	5.3
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	mg/kg	3	0	3	0.05	0.05	ND	ND	ND	ND	ND	0.050	0.050	0.050
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	0.05	0.05	ND	ND	ND	ND	ND	0.050	0.050	0.050
SWMU-037	mg/kg	2	0	2	4.9	5.5	ND	ND	ND	ND	ND	5.2	5.2	5.2
SWMU-038-39	mg/kg	19	2	21	2	32.8	32.9	38.6	35.8	35.8	4.0	5.5	30.1	30.9
SWMU-141	mg/kg	28	7	35	1.9	33.6	8.84	74.6	39.7	46.4	28.1	5.0	5.4	32.0
SWMU-142	mg/kg	2	0	2	5.3	5.3	ND	ND	ND	ND	ND	5.3	5.3	5.3
SWMU-143	mg/kg	7	3	10	4.6	5.5	8.84	16.7	12.1	10.8	4.1	4.7	4.8	8.8
SWMU-144	mg/kg	3	0	3	2	5.3	ND	ND	ND	ND	ND	2.8	5.0	5.2
SWMU-145	mg/kg	2	0	2	0.99	4.6	ND	ND	ND	ND	ND	2.8	2.8	2.8
SWMU-146	mg/kg	11	0	11	0.05	5.2	ND	ND	ND	ND	ND	0.050	4.4	4.9
SWMU-147	mg/kg	2	0	2	5.3	5.3	ND	ND	ND	ND	ND	5.3	5.3	5.3
SWMU-148	mg/kg	20	12	32	2.1	34.7	8.84	74.8	43.5	43.3	23.4	16	31.5	36.8
SWMU-149	mg/kg	4	0	4	1.8	5.5	ND	ND	ND	ND	ND	3.3	4.9	5.2
SWMU-150	mg/kg	6	3	9	0.05	5.3	6.1	7.6	6.9	7.1	0.76	0.050	5.1	6.3
SWMU-151-152	mg/kg	5	0	5	4.6	5.4	ND	ND	ND	ND	ND	4.6	4.6	5.0
SWMU-154	mg/kg	7	0	7	1.2	5	ND	ND	ND	ND	ND	2.6	4.7	4.8

Notes:

- † Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR
- * Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR
- = no data
- NA = value not applicable due to frequency of detection
- ND = non-detect
- IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.
 Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Sodium

White Sands Missile Range, HELSTF, New Mexico

Figure F3-15

SWMU	Units	Sample Size			ND Range		Detects					Percentiles (All Data)		
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	0	12	12	NA	NA	205	2090	821	418	756	270	418	1460
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	mg/kg	2	1	3	50	50	262	262	262	262	ND	50	50.0	209
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	1	0	1	50	50	ND	ND	ND	ND	ND	50	50.0	50.0
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	mg/kg	0	5	5	NA	NA	203	332	249	244	50.7	210	244	273
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	0	1	1	NA	NA	590	590	590	590	ND	590	590	590

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

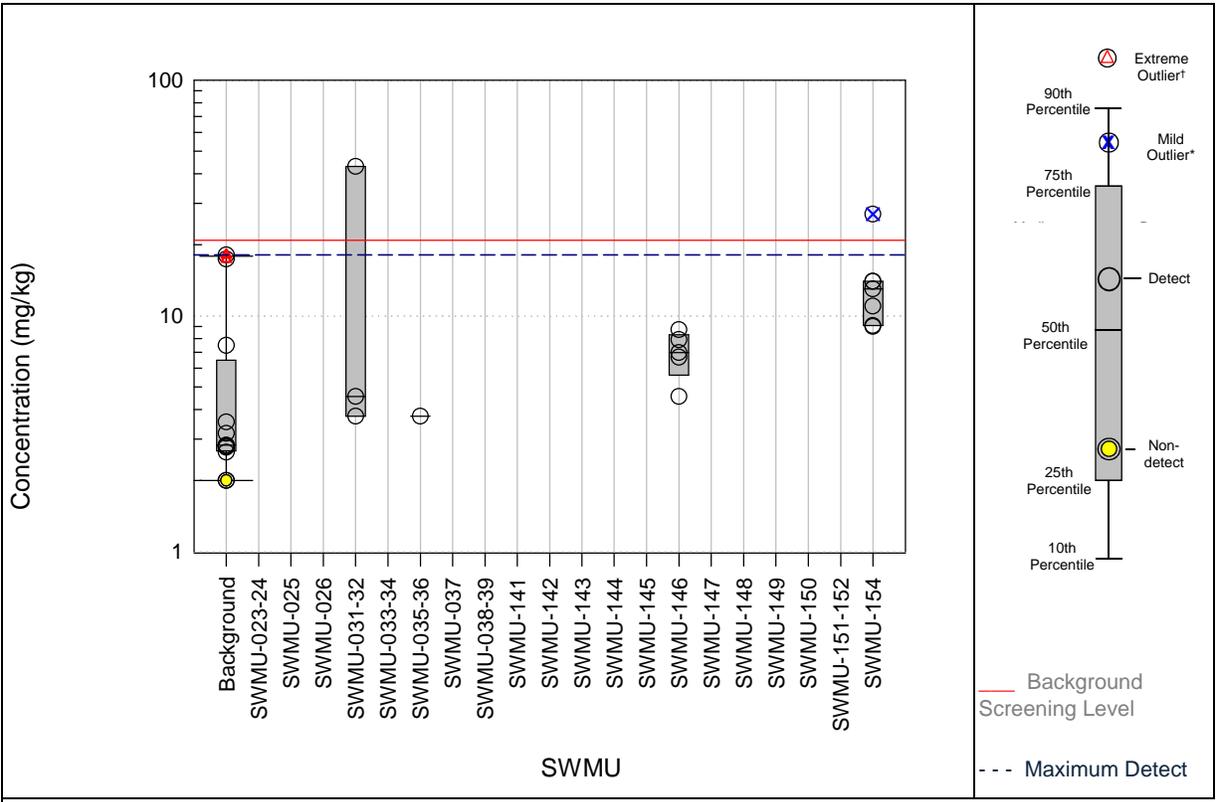
NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.



Soil (0-10 ft bgs) Box and Whisker Plot (Logarithmic Scale)
Zinc
 White Sands Missile Range, HELSTF, New Mexico

Figure F3-16

SWMU	Units	Sample Size			ND Range		Detects				Percentiles (All Data)			
		NDs	Detects	Total	Min	Max	Min	Max	Mean	Median	SD	25th	50th	75th
Background	mg/kg	2	10	12	2	2	2.64	18.1	6.4	3.0	6.2	2.7	2.8	5.5
SWMU-023-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-031-32	mg/kg	0	3	3	NA	NA	3.75	43	17.1	4.6	22.4	4.0	4.6	33.4
SWMU-033-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-035-36	mg/kg	0	1	1	NA	NA	3.75	3.75	3.8	3.8	ND	3.8	3.8	3.8
SWMU-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-038-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-141	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-143	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-144	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-145	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-146	mg/kg	0	5	5	NA	NA	4.55	8.72	7.0	7.0	1.6	6.1	7.0	8.1
SWMU-147	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-148	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-151-152	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SWMU-154	mg/kg	0	7	7	NA	NA	9	27	13.9	13.0	6.2	9.6	13.0	14.0

Notes:

† Result value is < 25th percentile - 3*IQR or > 75th percentile + 3*IQR

* Result value is < 25th percentile - 1.5*IQR or > 75th percentile + 1.5*IQR

-- = no data

NA = value not applicable due to frequency of detection

ND = non-detect

IQR = interquartile range equals the 3rd quartile (75th percentile) - 1st quartile (25th percentile)

Reporting limit is used for non-detects unless otherwise noted.

Values less than 10 are reported to 2 significant figures. Values greater than 10 are reported to 3 significant figures.

Attachment F4

Cumulative Probability Plots

Attachment F4 - Q-Q PLOTS FOR SOIL

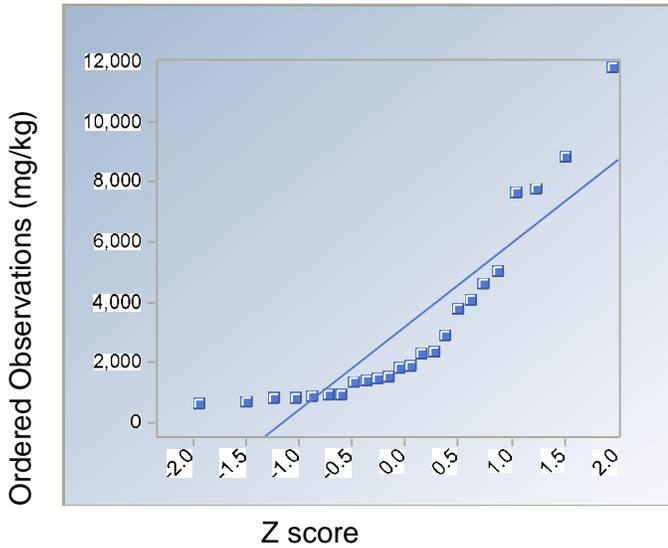
White Sands Missile Range, HELSTF, New Mexico

Area	Parameter Group	Analyte*	Figure #
BACKGROUND	METALS	Aluminum	F4-1
		Arsenic	F4-2
		Barium	F4-3
		Calcium	F4-4
		Chromium	F4-5
		Copper	F4-6
		Iron	F4-7
		Lead	F4-8
		Mercury	F4-9
		Potassium	F4-10
		Sodium	F4-11
		Zinc	F4-12
ALL LOCATIONS	METALS	Arsenic (All Locations)	F4-13
		Barium (All Locations)	F4-14
EXCLUDING BACKGROUND	METALS	Arsenic (Excluding Background)	F4-15
		Barium (Excluding Background)	F4-16

* Plots only generated for constituents with sufficient sample size (i.e., n • 8 and # detects • 5).

Aluminum

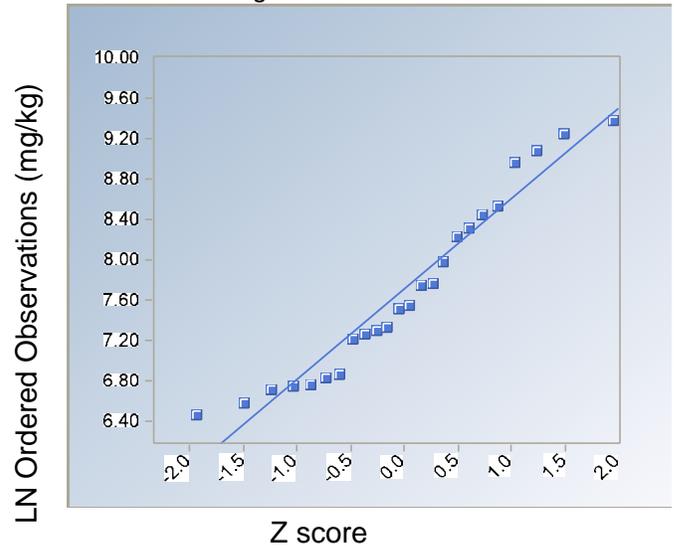
Normal Q-Q Plot



Number of observations = 24
 Number of detects = 24

Data Not Normal, S-W(Full: no NDs)
 Test value = 0.792
 Critical value = 0.916

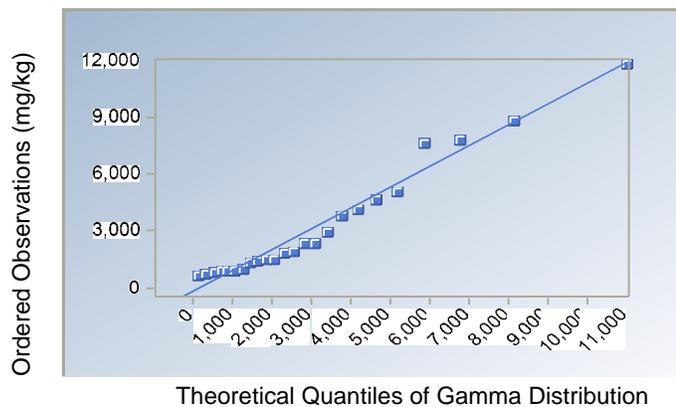
Lognormal Q-Q Plot



- Detect
- Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Full: no NDs)
 Test value = 0.938
 Critical value = 0.916

Gamma Q-Q Plot



Data appear Approximate Gamma Distribution, K-S(Full: no NDs)
 Test value = 0.155
 Critical value = 0.181

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND

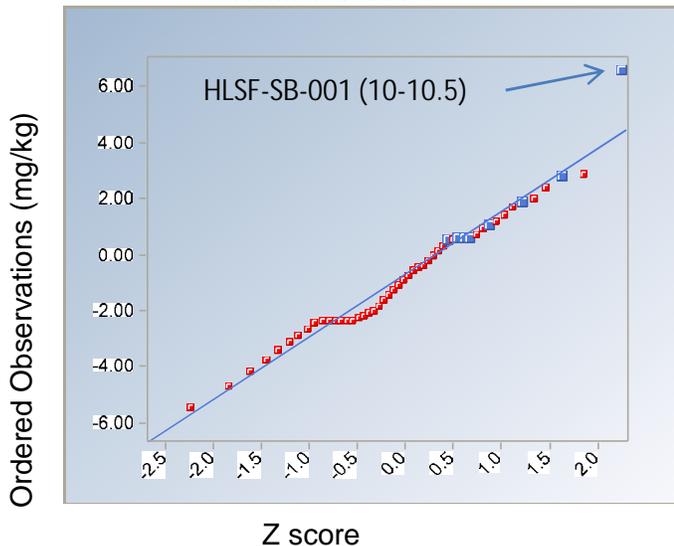
Aluminum



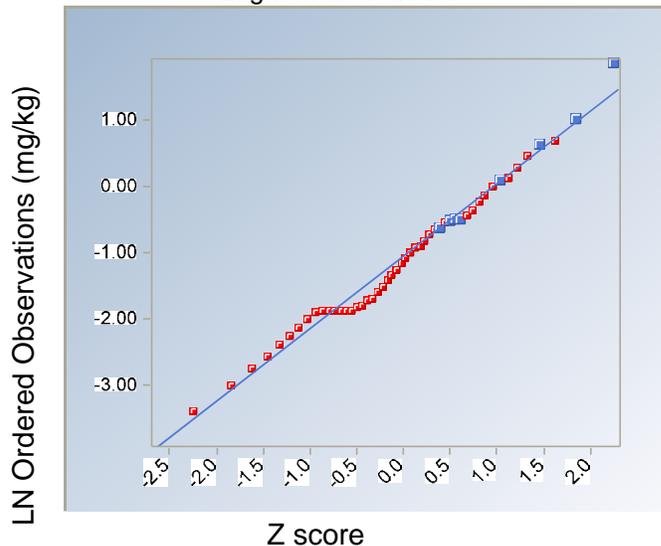
**FIGURE
 F4-1**

Arsenic

Normal Q-Q Plot



Lognormal Q-Q Plot



Number of observations = 50

Number of detects = 8

Data Appear Normal, S-W(Normal ROS)

Test value = 0.974

Critical value = 0.947

Using detects only: Data Not Normal

Test value = 0.702

Critical value = 0.818

• Detect

• Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)

Test value = 0.983

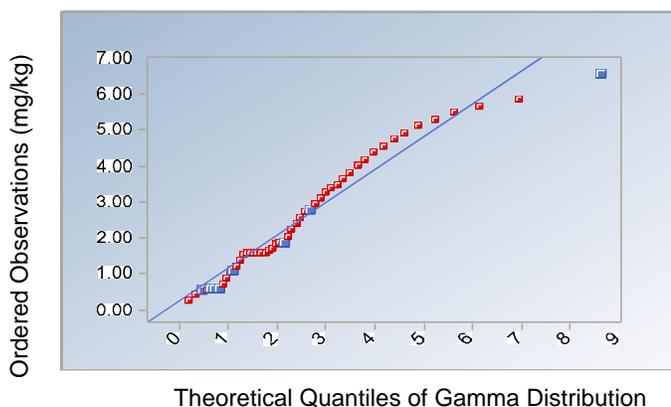
Critical value = 0.947

Using detects only: Data Appear Lognormal

Test value = 0.853

Critical value = 0.818

Gamma Q-Q Plot



Data Appear Gamma Distributed, K-S(Gamma ROS Est.)

Test value = 0.0765

Critical value = 0.127

Using detects only: Data Appear Gamma Distributed

Test value = 0.853

Critical value = 0.818

Notes:

S-W = Shapiro-Wilks

K-S = Kolmogorov-Smirnov

ROS = regression on order statistics.

Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

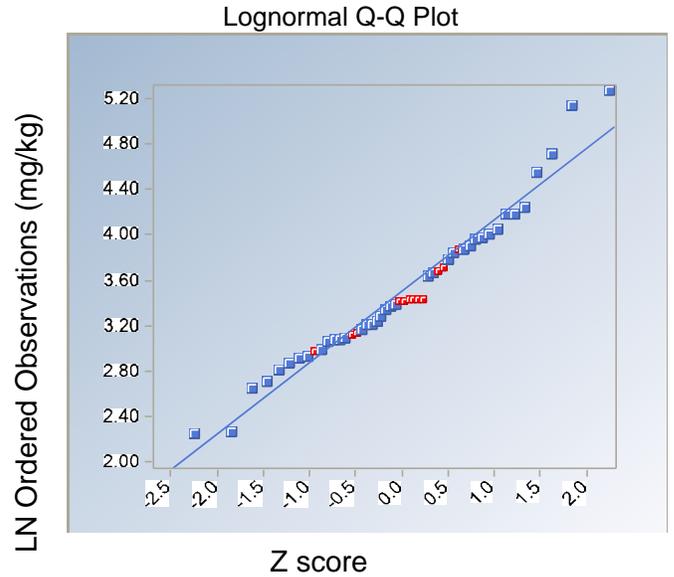
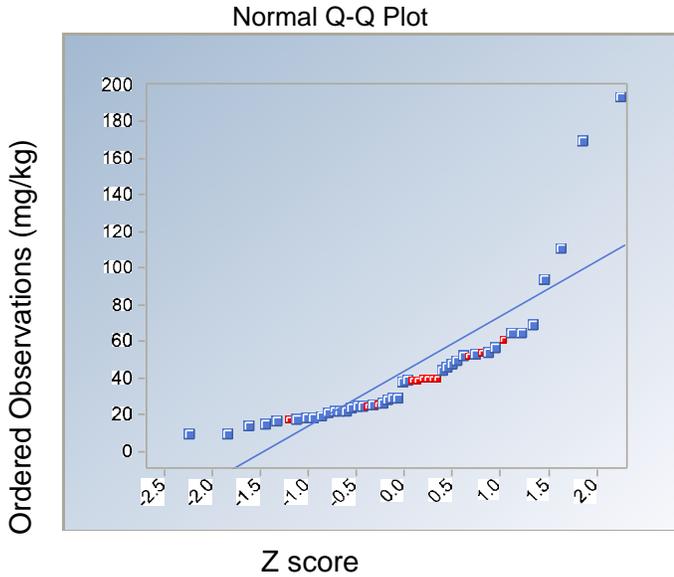
Q-Q PLOTS FOR SOIL - BACKGROUND

Arsenic



**FIGURE
F4-2**

Barium



Number of observations = 50
 Number of detects = 38

Data Not Normal, S-W(Normal ROS)
 Test value = 0.715
 Critical value = 0.947

Using detects only: Data Not Normal
 Test value = 0.718
 Critical value = 0.938

- Detect
- Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)
 Test value = 0.959
 Critical value = 0.947

Using detects only: Data Appear Lognormal
 Test value = 0.961
 Critical value = 0.938

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND

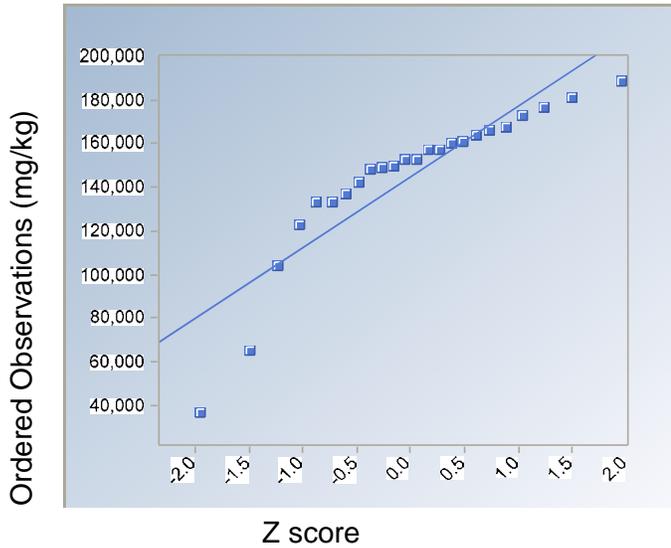
Barium



**FIGURE
 F4-3**

Calcium

Normal Q-Q Plot



Number of observations = 24

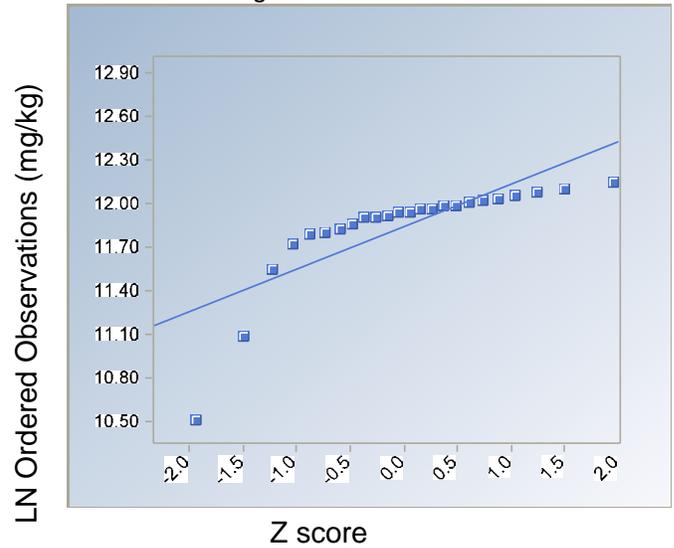
Number of detects = 24

Data Not Normal, S-W(Full: no NDs)

Test value = 0.826

Critical value = 0.916

Lognormal Q-Q Plot



• Detect

• Nondetect (ROS estimate)

Data Not Lognormal, S-W(Full: no NDs)

Test value = 0.661

Critical value = 0.916

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND

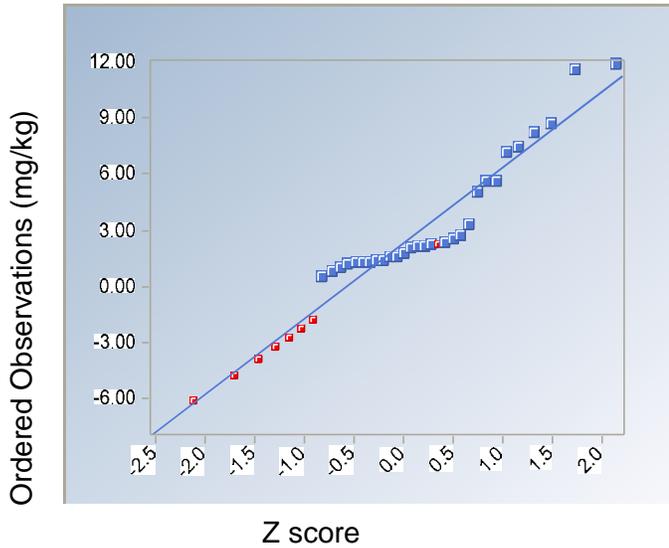
Calcium



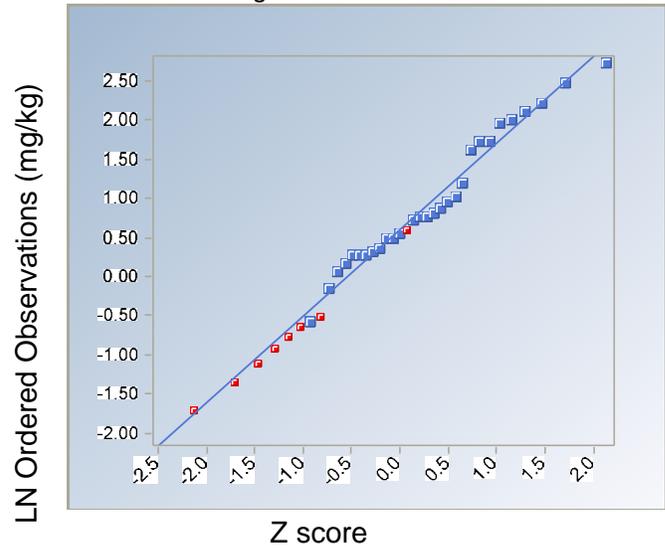
**FIGURE
 F4-4**

Chromium

Normal Q-Q Plot



Lognormal Q-Q Plot



Number of observations = 37

Number of detects = 29

Data Appear Normal, S-W(Normal ROS)

Test value = 0.941

Critical value = 0.936

Using detects only: Data Not Normal

Test value = 0.794

Critical value = 0.926

• Detect

• Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)

Test value = 0.968

Critical value = 0.936

Using detects only: Data Appear Lognormal

Test value = 0.943

Critical value = 0.926

Notes:

S-W = Shapiro-Wilks

K-S = Kolmogorov-Smirnov

ROS = regression on order statistics.

Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

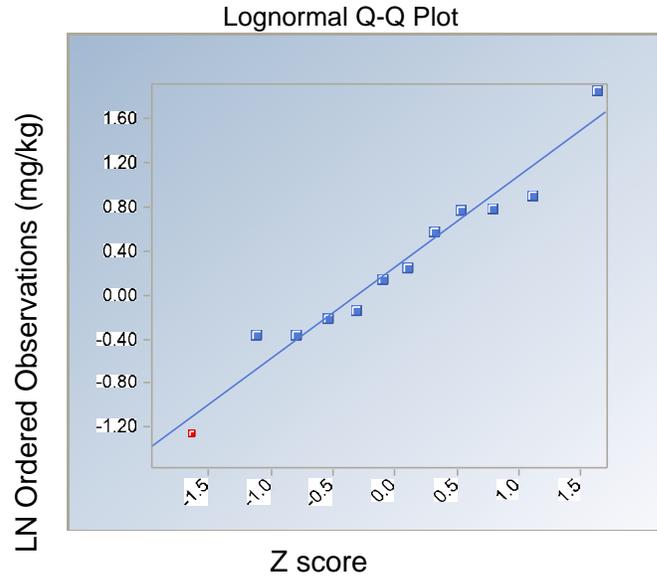
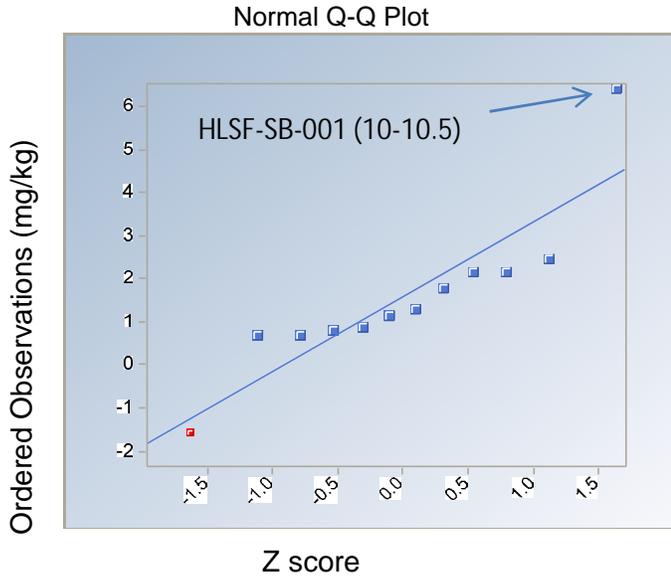
Q-Q PLOTS FOR SOIL - BACKGROUND

Chromium



**FIGURE
F4-5**

Copper



Number of observations = 12

Number of detects = 11

Data Not Normal, S-W(Normal ROS)

Test value = 0.836

Critical value = 0.859

Using detects only: Data Not Normal

Test value = 0.698

Critical value = 0.85

• Detect

• Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)

Test value = 0.972

Critical value = 0.859

Using detects only: Data Appear Lognormal

Test value = 0.913

Critical value = 0.85

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND

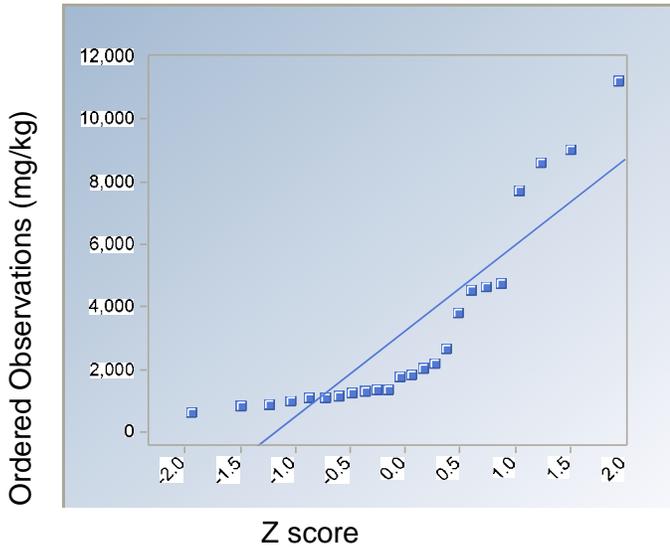
Copper



**FIGURE
F4-6**

Iron

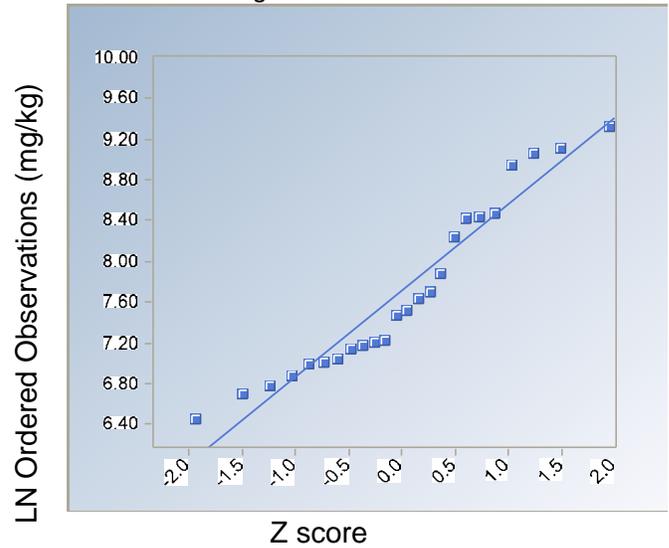
Normal Q-Q Plot



Number of observations = 24
 Number of detects = 24

Data Not Normal, S-W(Full: no NDs)
 Test value = 0.785
 Critical value = 0.916

Lognormal Q-Q Plot



- Detect
- Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Full: no NDs)
 Test value = 0.932
 Critical value = 0.916

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

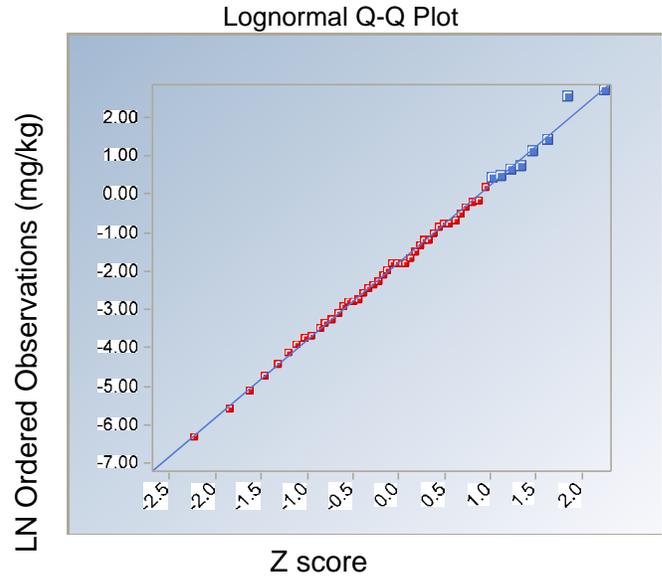
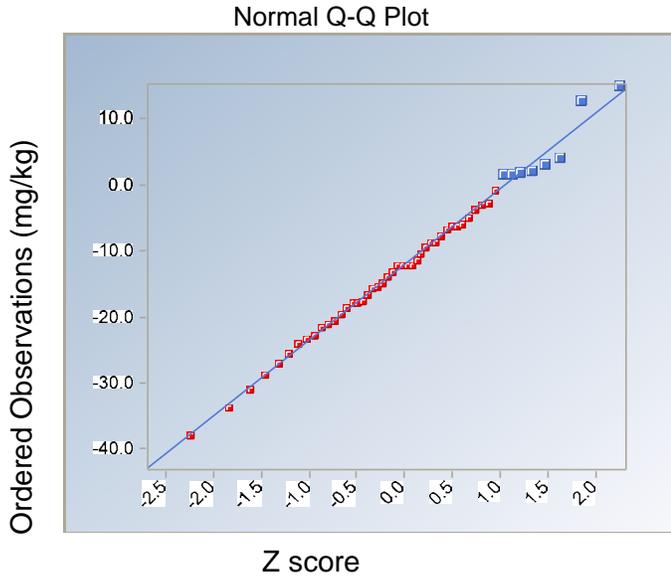
Q-Q PLOTS FOR SOIL - BACKGROUND

Iron



**FIGURE
 F4-7**

Lead



Number of observations = 50
 Number of detects = 8

Data Appear Normal, S-W(Normal ROS)

Test value = 0.99
 Critical value = 0.947

Using detects only: Data Not Normal

Test value = 0.717
 Critical value = 0.818

- Detect
- Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)

Test value = 0.99
 Critical value = 0.947

Using detects only: Data Appear Lognormal

Test value = 0.84
 Critical value = 0.818

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

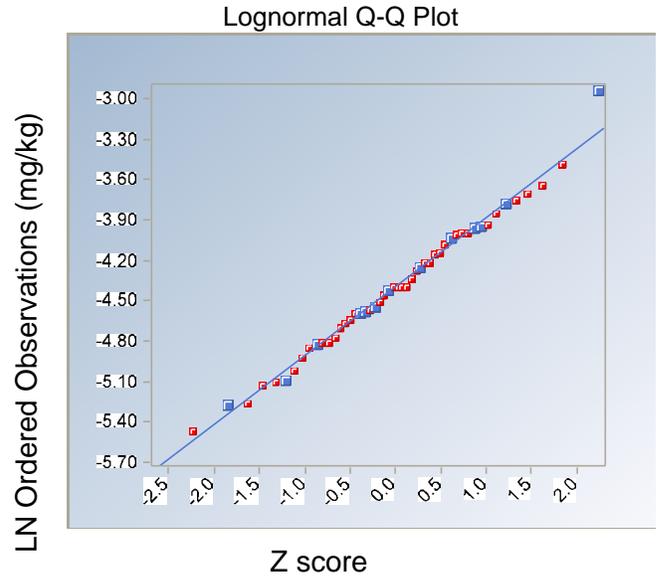
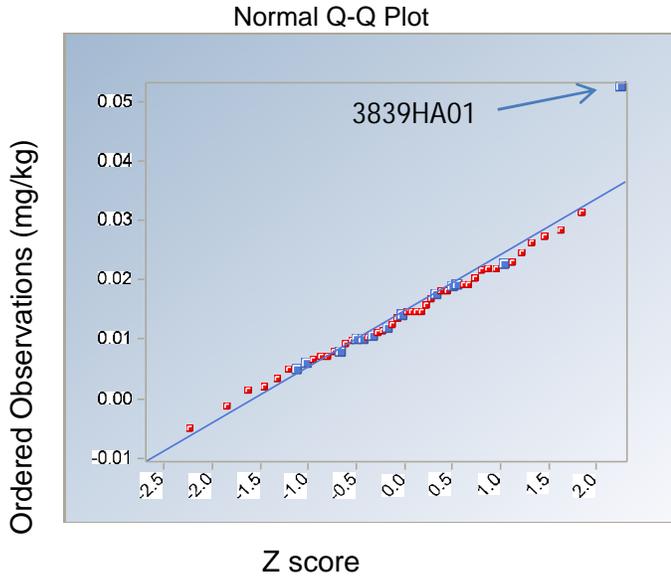
White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND
Lead



FIGURE
F4-8

Mercury



Number of observations = 50
 Number of detects = 13

Data Not Normal, S-W(Normal ROS)
 Test value = 0.946
 Critical value = 0.947

Using detects only: Data Not Normal
 Test value = 0.725
 Critical value = 0.866

• Detect
 • Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)
 Test value = 0.989
 Critical value = 0.947

Using detects only: Data Appear Lognormal
 Test value = 0.96
 Critical value = 0.866

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

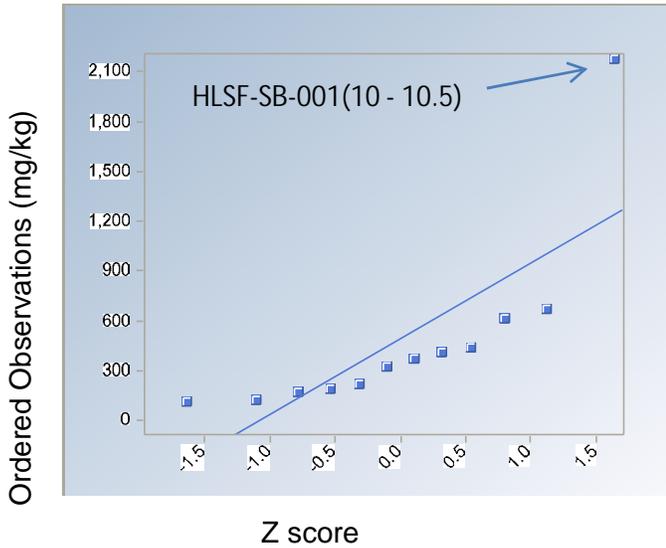
Q-Q PLOTS FOR SOIL - BACKGROUND
Mercury



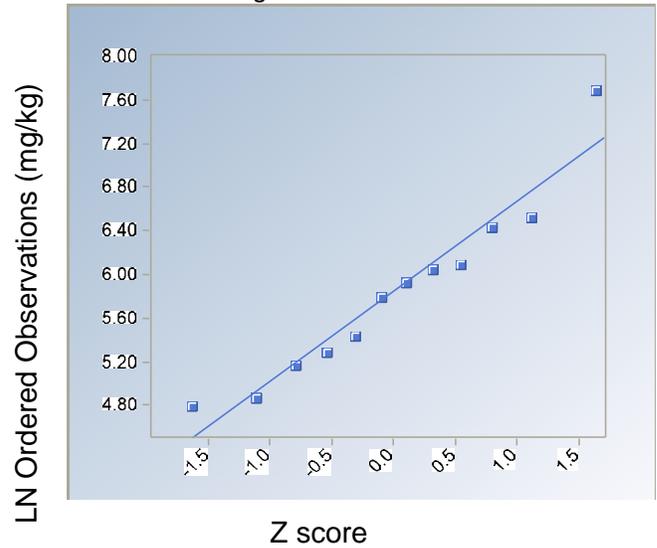
FIGURE
F4-9

Potassium

Normal Q-Q Plot



Lognormal Q-Q Plot



Number of observations = 12

Number of detects = 12

Data Not Normal, S-W(Full: no NDs)

Test value = 0.623

Critical value = 0.859

• Detect

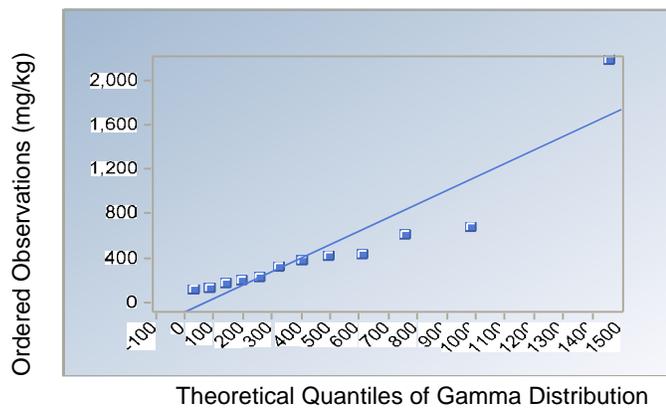
• Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Full: no NDs)

Test value = 0.938

Critical value = 0.859

Gamma Q-Q Plot



Data Appear Gamma Distributed, K-S(Full: no NDs)

Test value = 0.195

Critical value = 0.249

Notes:

S-W = Shapiro-Wilks

K-S = Kolmogorov-Smirnov

ROS = regression on order statistics.

Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND

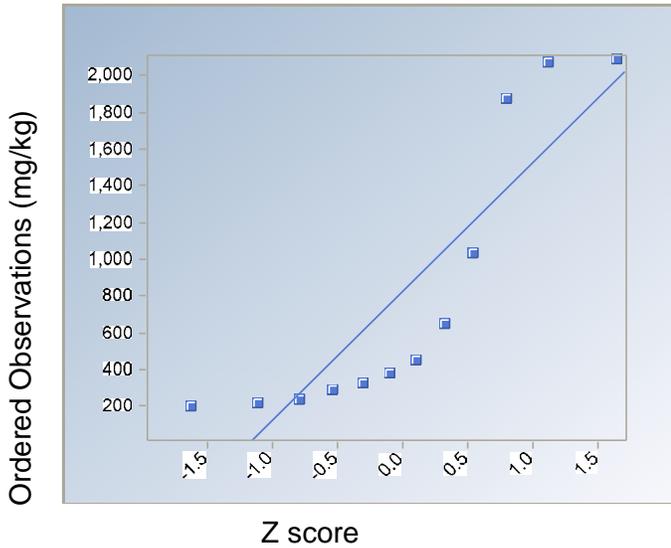
Potassium



**FIGURE
F4-10**

Sodium

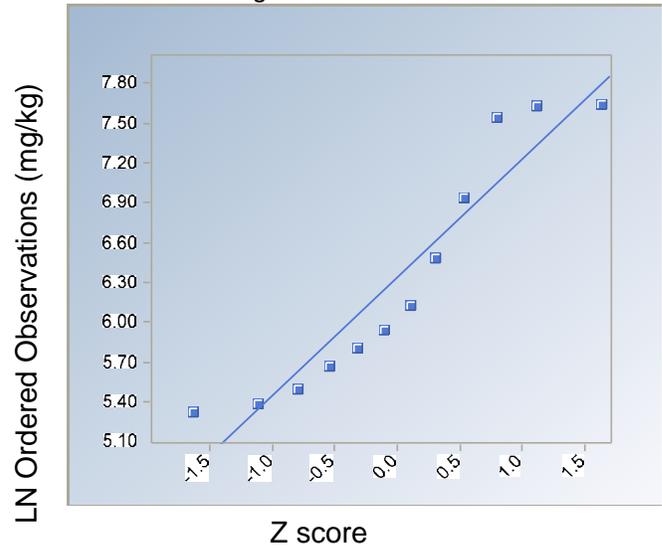
Normal Q-Q Plot



Number of observations = 12
 Number of detects = 12

Data Not Normal, S-W(Full: no NDs)
 Test value = 0.757
 Critical value = 0.859

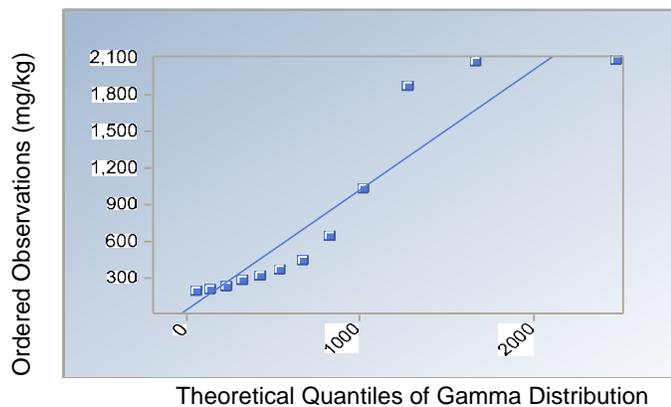
Lognormal Q-Q Plot



- Detect
- Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Full: no NDs)
 Test value = 0.871
 Critical value = 0.859

Gamma Q-Q Plot



Data appear Approximate Gamma Distribution, K-S(Full: no NDs)
 Test value = 0.225
 Critical value = 0.25

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

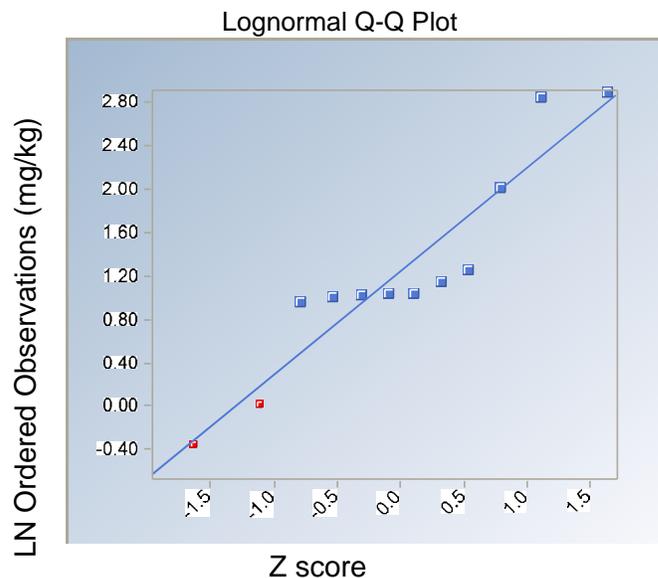
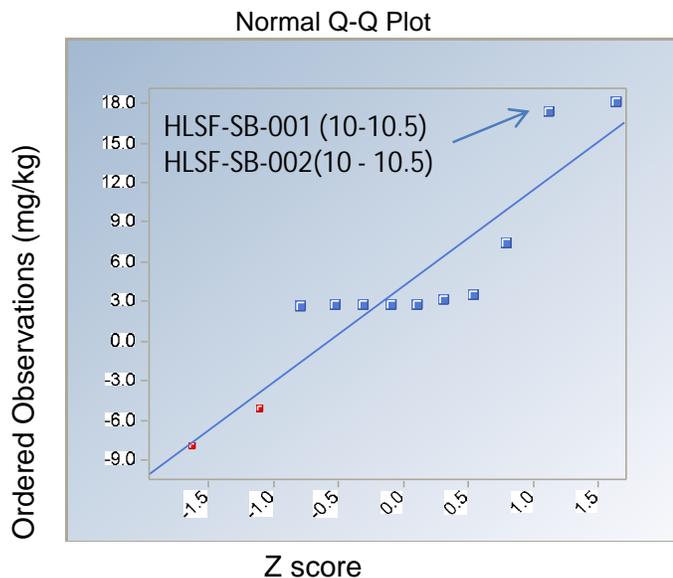
Q-Q PLOTS FOR SOIL - BACKGROUND

Sodium



**FIGURE
 F4-11**

Zinc



Number of observations = 12

Number of detects = 10

Data Not Normal, S-W(Normal ROS)

Test value = 0.85

Critical value = 0.859

Using detects only: Data Not Normal

Test value = 0.637

Critical value = 0.842

- Detect
- Nondetect (ROS estimate)

Data Appear Lognormal, S-W(Normal ROS)

Test value = 0.89

Critical value = 0.859

Using detects only: Data Not Lognormal

Test value = 0.71

Critical value = 0.842

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

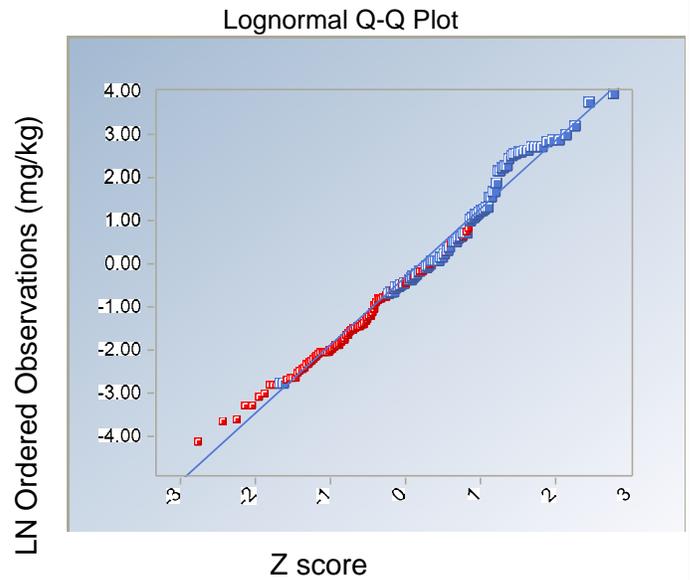
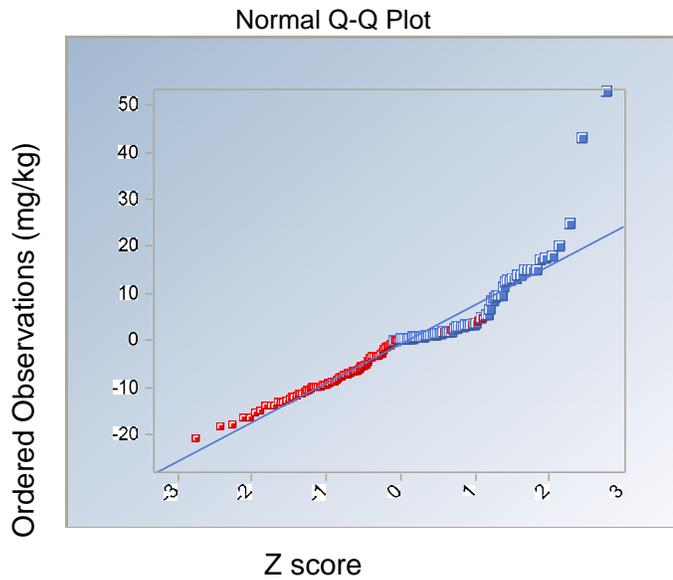
Q-Q PLOTS FOR SOIL - BACKGROUND
Zinc



FIGURE
F4-12

Infrastructure, environment, buildings

Arsenic (All Locations)



Number of observations = 222

Number of detects = 97

Data Not Normal, Lilliefors (Normal ROS)

Test value = 0.153

Critical value = 0.0595

Using detects only: Data Not Normal

Test value = 0.278

Critical value = 0.09

• Detect

• Nondetect (ROS estimate)

Data Not Lognormal, Lilliefors (Normal ROS)

Test value = 0.0655

Critical value = 0.0595

Using detects only: Data Not Lognormal

Test value = 0.104

Critical value = 0.09

Notes:

S-W = Shapiro-Wilks

K-S = Kolmogorov-Smirnov

ROS = regression on order statistics.

Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

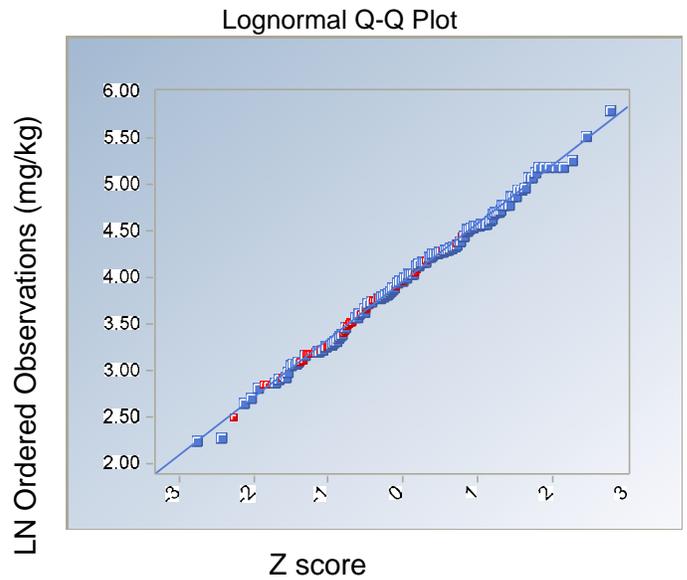
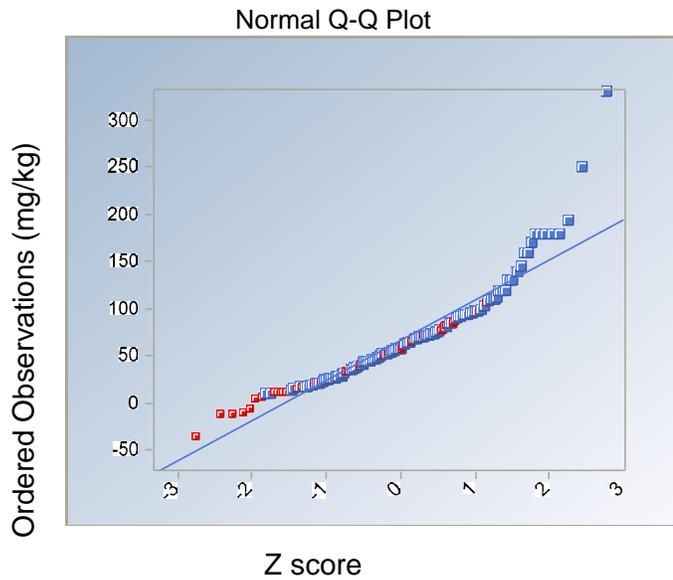
Q-Q PLOTS FOR SOIL - BACKGROUND

Arsenic (All Locations)



**FIGURE
F4-13**

Barium (All Locations)



Number of observations = 220
 Number of detects = 134

Data Not Normal, Lilliefors (Normal ROS)
 Test value = 0.102
 Critical value = 0.0597

Using detects only: Data Not Normal
 Test value = 0.143
 Critical value = 0.0765

• Detect
 • Nondetect (ROS estimate)

Data Appear Lognormal, Lilliefors (Normal ROS)
 Test value = 0.0386
 Critical value = 0.0597

Using detects only: Data Not Lognormal
 Test value = 0.0795
 Critical value = 0.0765

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

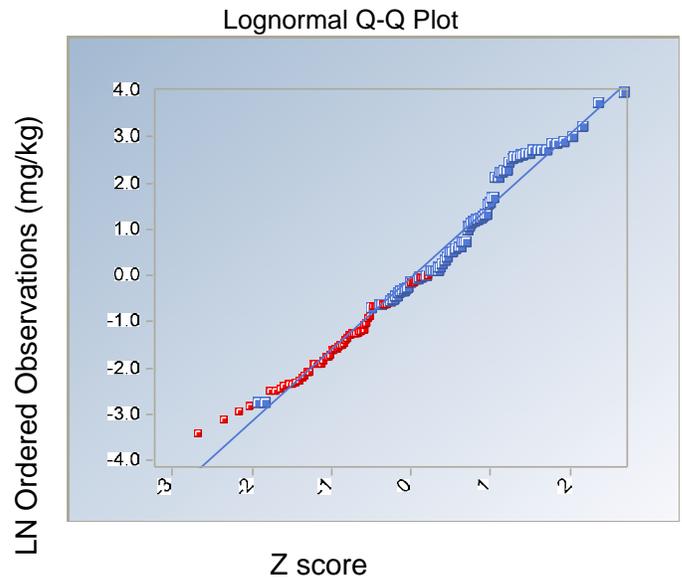
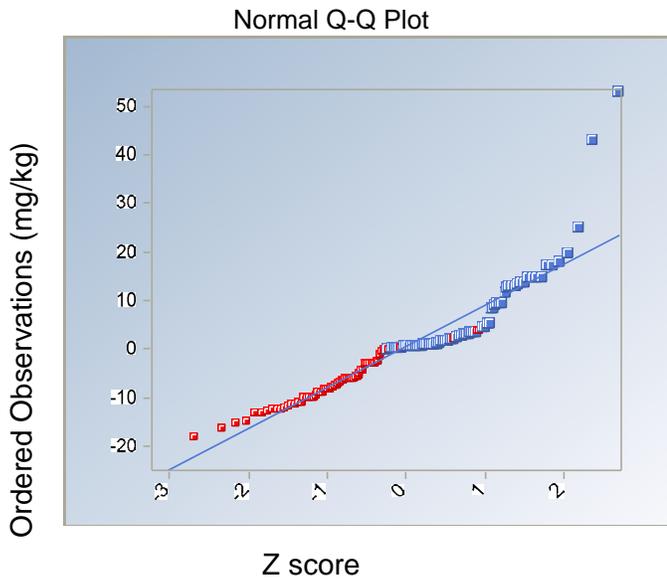
White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND
Barium (All Locations)



FIGURE
F4-14

Arsenic (Excluding Background)



Number of observations = 172

Number of detects = 89

Data Not Normal, Lilliefors (Normal ROS)

Test value = 0.173

Critical value = 0.0676

Using detects only: Data Not Normal

Test value = 0.274

Critical value = 0.0939

• Detect

• Nondetect (ROS estimate)

Data Not Lognormal, Lilliefors (Normal ROS)

Test value = 0.0919

Critical value = 0.0676

Using detects only: Data Not Lognormal

Test value = 0.0956

Critical value = 0.0939

Notes:

S-W = Shapiro-Wilks

K-S = Kolmogorov-Smirnov

ROS = regression on order statistics.

Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

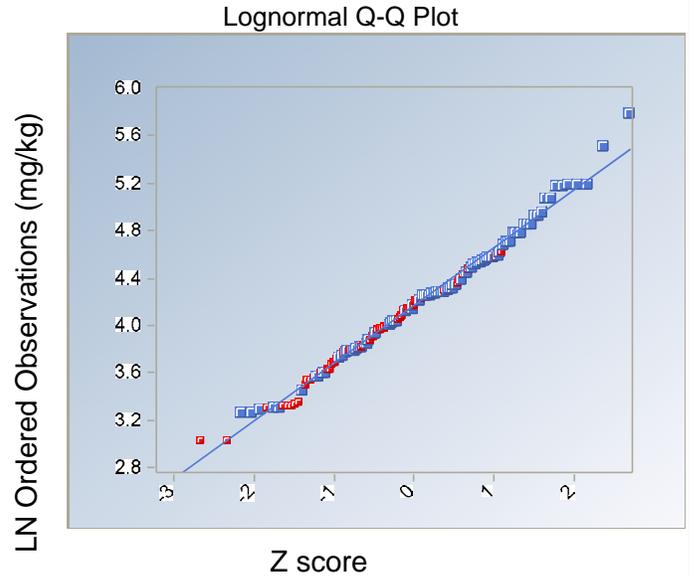
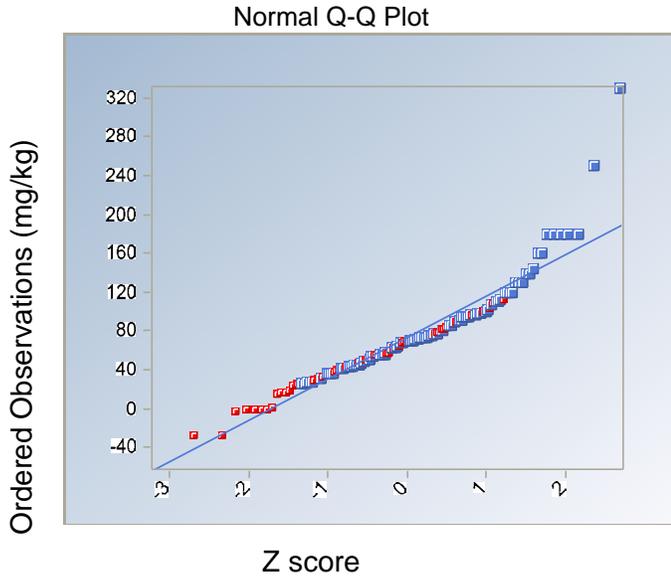
Q-Q PLOTS FOR SOIL - BACKGROUND

Arsenic (Excluding Background)



**FIGURE
F4-15**

Barium (Excluding Background)



Number of observations = 170
 Number of detects = 96

Data Not Normal, Lilliefors (Normal ROS)
 Test value = 0.113
 Critical value = 0.068

Using detects only: Data Not Normal
 Test value = 0.15
 Critical value = 0.0904

• Detect
 • Nondetect (ROS estimate)

Data Appear Lognormal, Lilliefors (Normal ROS)
 Test value = 0.0563
 Critical value = 0.068

Using detects only: Data Appear Lognormal
 Test value = 0.077
 Critical value = 0.0904

Notes:

S-W = Shapiro-Wilks
 K-S = Kolmogorov-Smirnov
 ROS = regression on order statistics.
 Distributional testing conducted in ProUCL 4.0.

White Sands Missile Range, HELSTF, New Mexico
Soil Background Investigation - Data Summary Report

Q-Q PLOTS FOR SOIL - BACKGROUND
Barium (Excluding Background)



FIGURE
F4-16

ARCADIS

Attachment F5

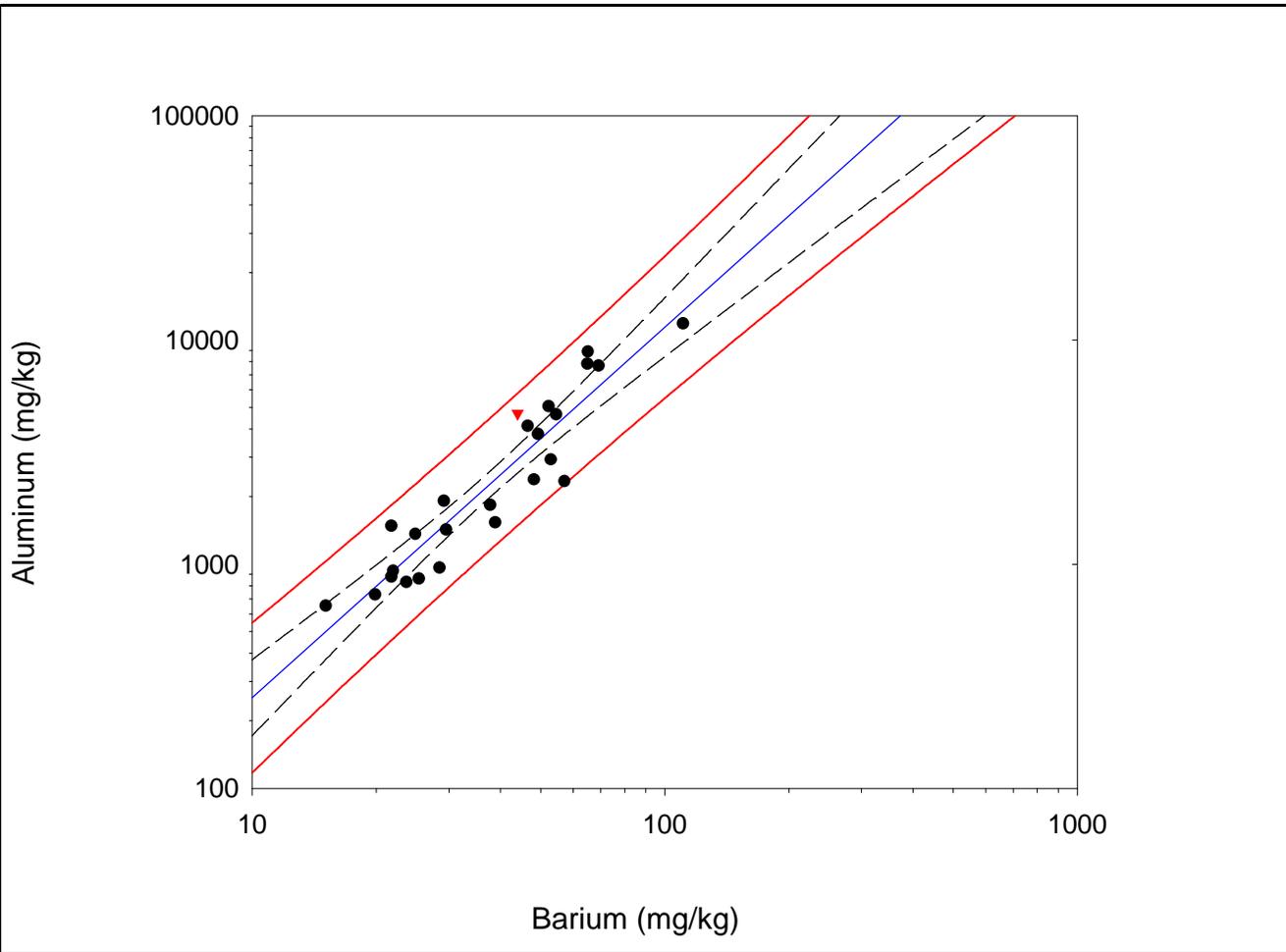
Geochemical Plots

Attachment F5: Barium in Soil Geochemical Regression Plots

Group	Figure #	Parameter	Reference
Inorganics	F5-1	Aluminum	Barium
	F5-2	Chromium	Barium
	F5-3	Copper	Barium
	F5-4	Iron	Barium
	F5-5	Lead	Barium
	F5-6	Mercury	Barium
	F5-7	Potassium	Barium
	F5-8	Zinc	Barium

Notes:

Geochemical plots are developed when at least 4 pairs of samples are detected for each metal in the same sample.



**Barium in Soil Geochemical Regression Plot
Aluminum vs Barium (mg/kg)**
White Sands Missile Range, HELSTF, New Mexico

**Figure
F5-1**

Correlation Coefficient (r) = 0.937
 Regression Coefficient (r^2) = 0.878

Notes:

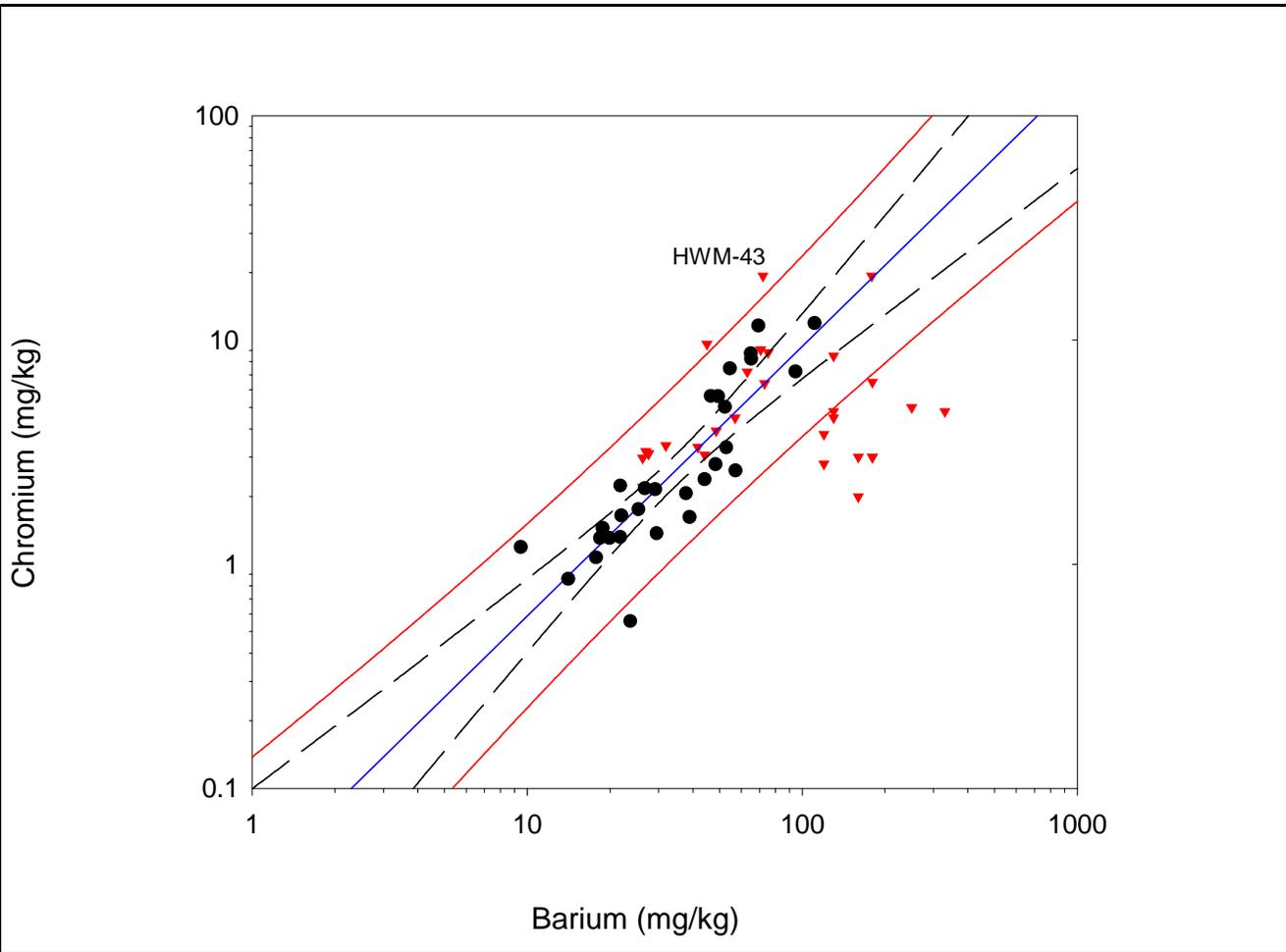
Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Aluminum vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals



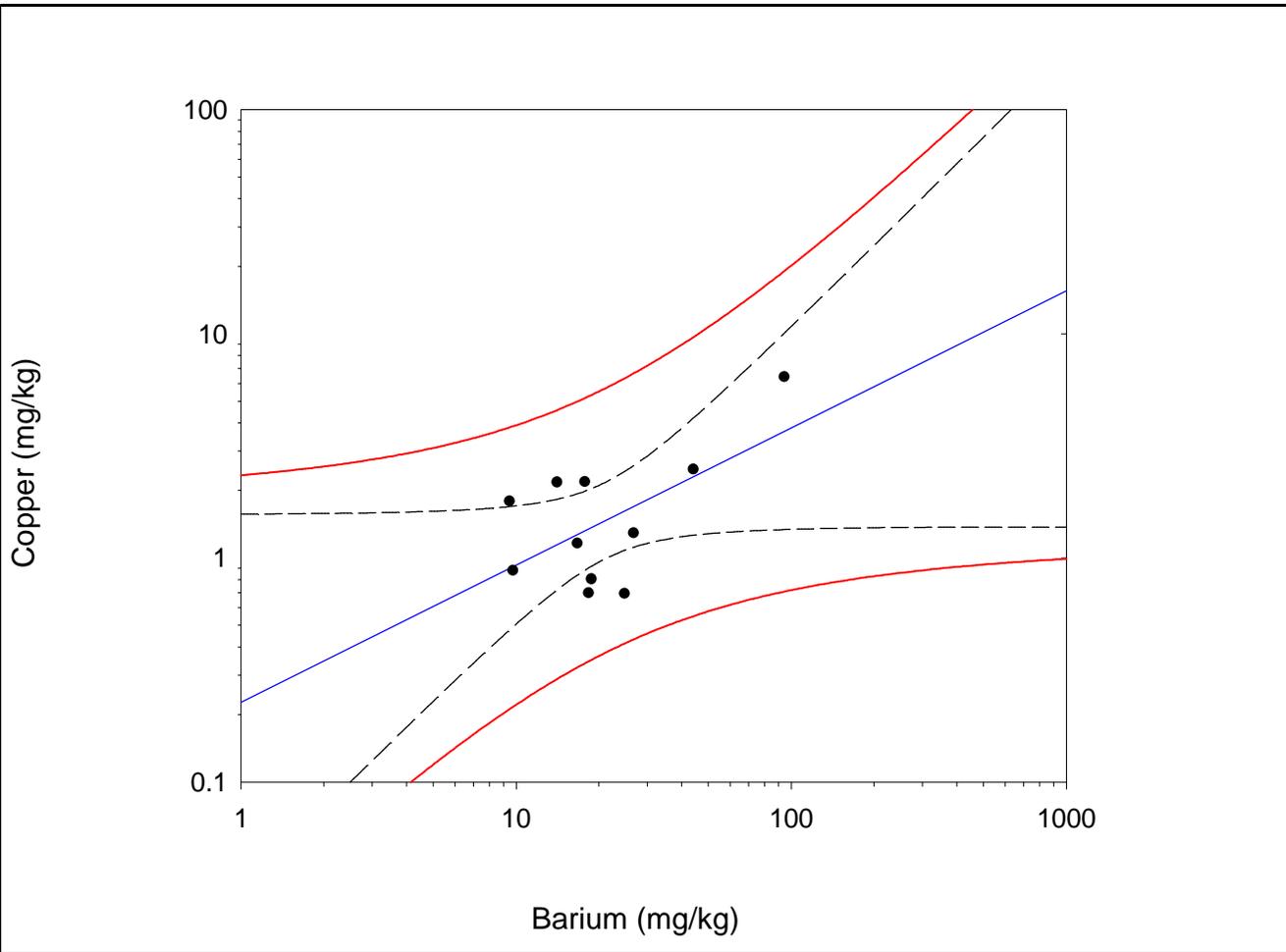
Barium in Soil Geochemical Regression Plot
Chromium vs Barium (mg/kg)
 White Sands Missile Range, HELSTF, New Mexico

Figure F5-2

Correlation Coefficient (r) = 0.865
 Regression Coefficient (r^2) = 0.748

Notes:

- = Background sample
 - ▼ = Site sample
 - = Chromium vs Barium (mg/kg)
 - = 95% confidence intervals
 - = 95% prediction intervals
- Samples exceeding the UTL that have a corresponding barium results are annotated for reference.
 Data include soil samples collected 0-10 feet below ground surface.
 Regression is based on detected background values only.
 Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.



**Barium in Soil Geochemical Regression Plot
Copper vs Barium (mg/kg)**
White Sands Missile Range, HELSTF, New Mexico

**Figure
F5-3**

Correlation Coefficient (r) = 0.596
 Regression Coefficient (r^2) = 0.355

Notes:

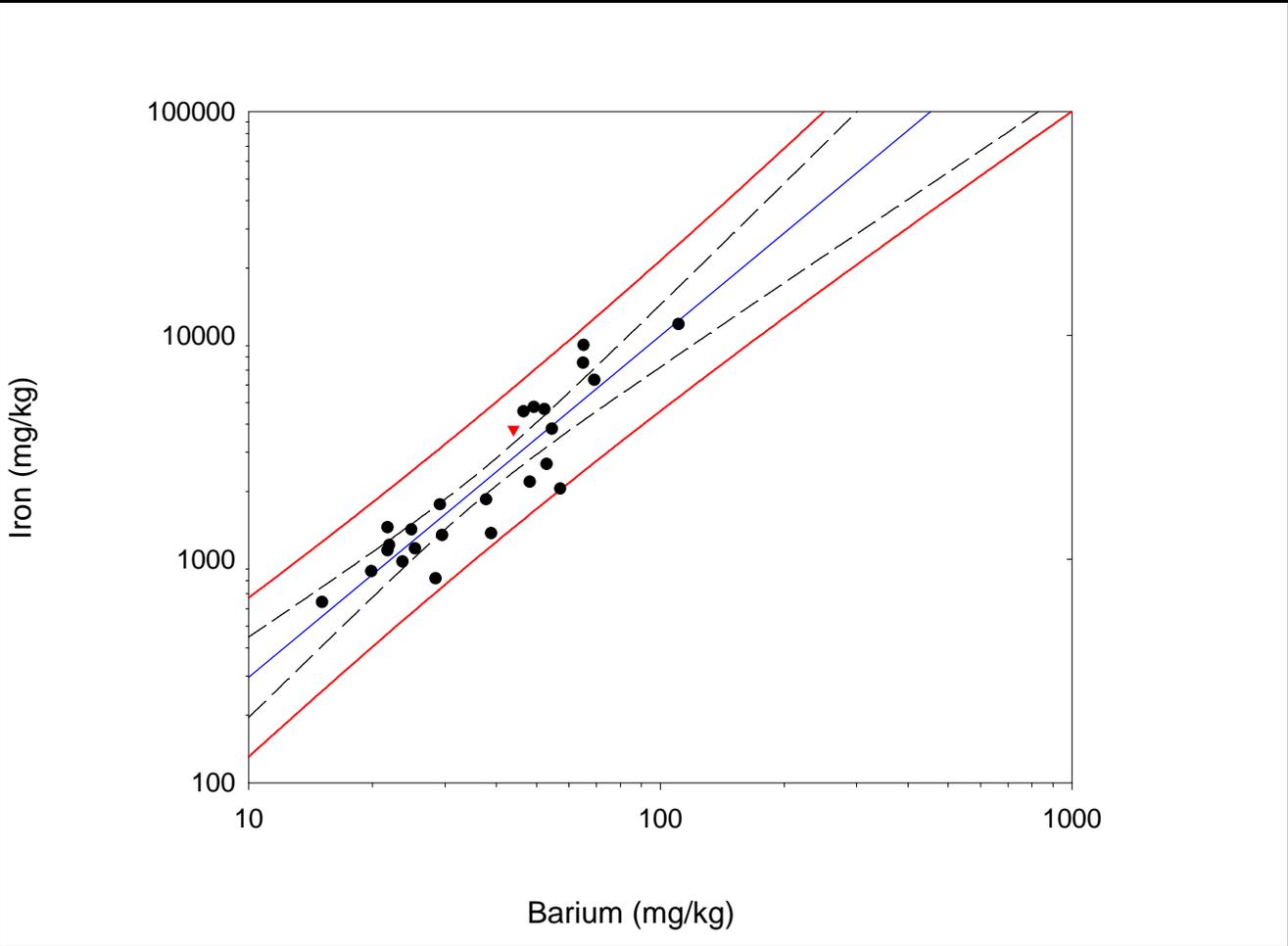
Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Copper vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals



**Barium in Soil Geochemical Regression Plot
Iron vs Barium (mg/kg)**

White Sands Missile Range, HELSTF, New Mexico

**Figure
F5-4**

Correlation Coefficient (r) = 0.911
 Regression Coefficient (r^2) = 0.830

Notes:

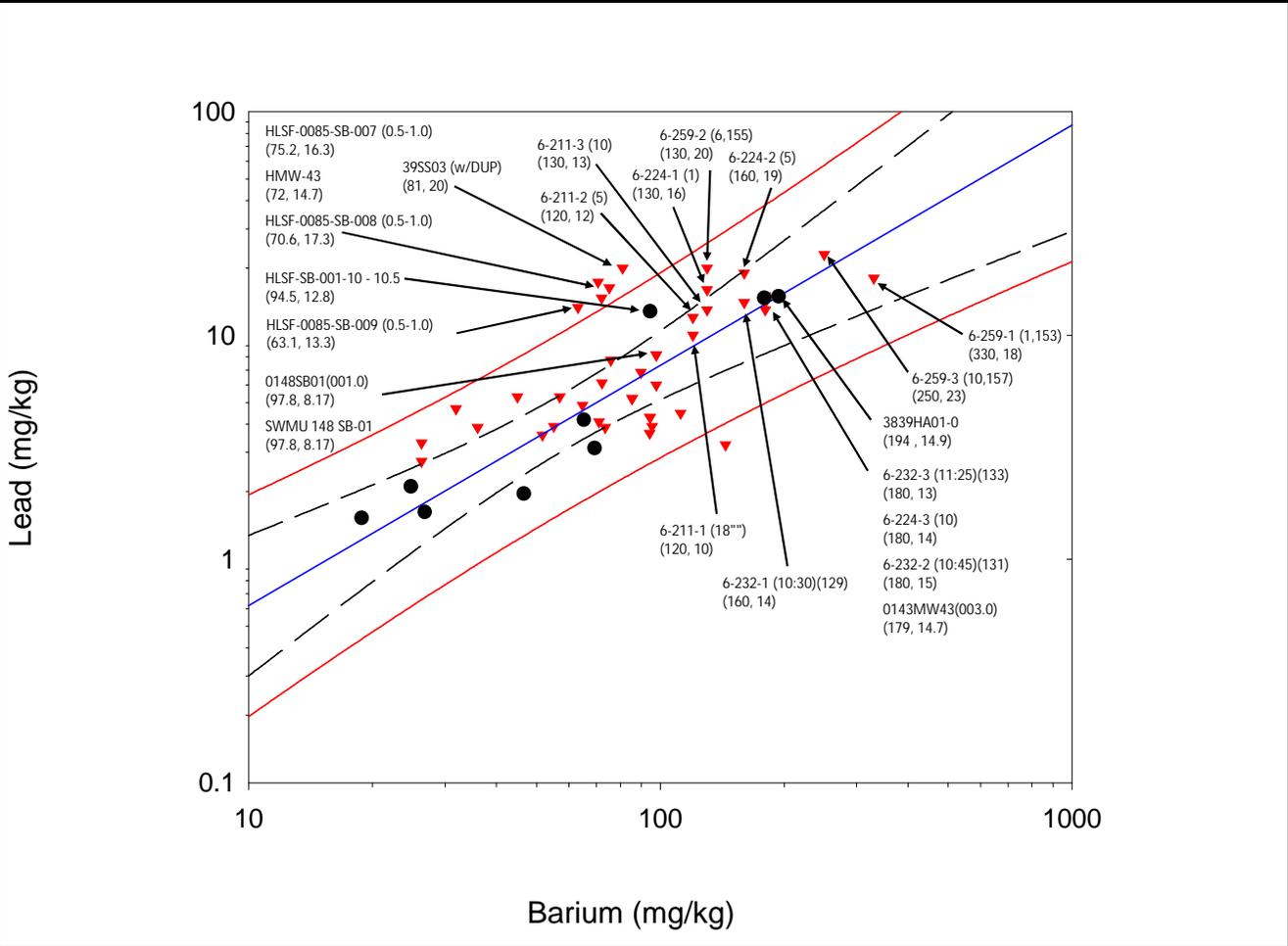
Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Iron vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals



**Barium in Soil Geochemical Regression Plot
Lead vs Barium (mg/kg)**

White Sands Missile Range, HELSTF, New Mexico

**Figure
F5-5**

Correlation Coefficient (r) = 0.914
 Regression Coefficient (r^2) = 0.835

Notes:

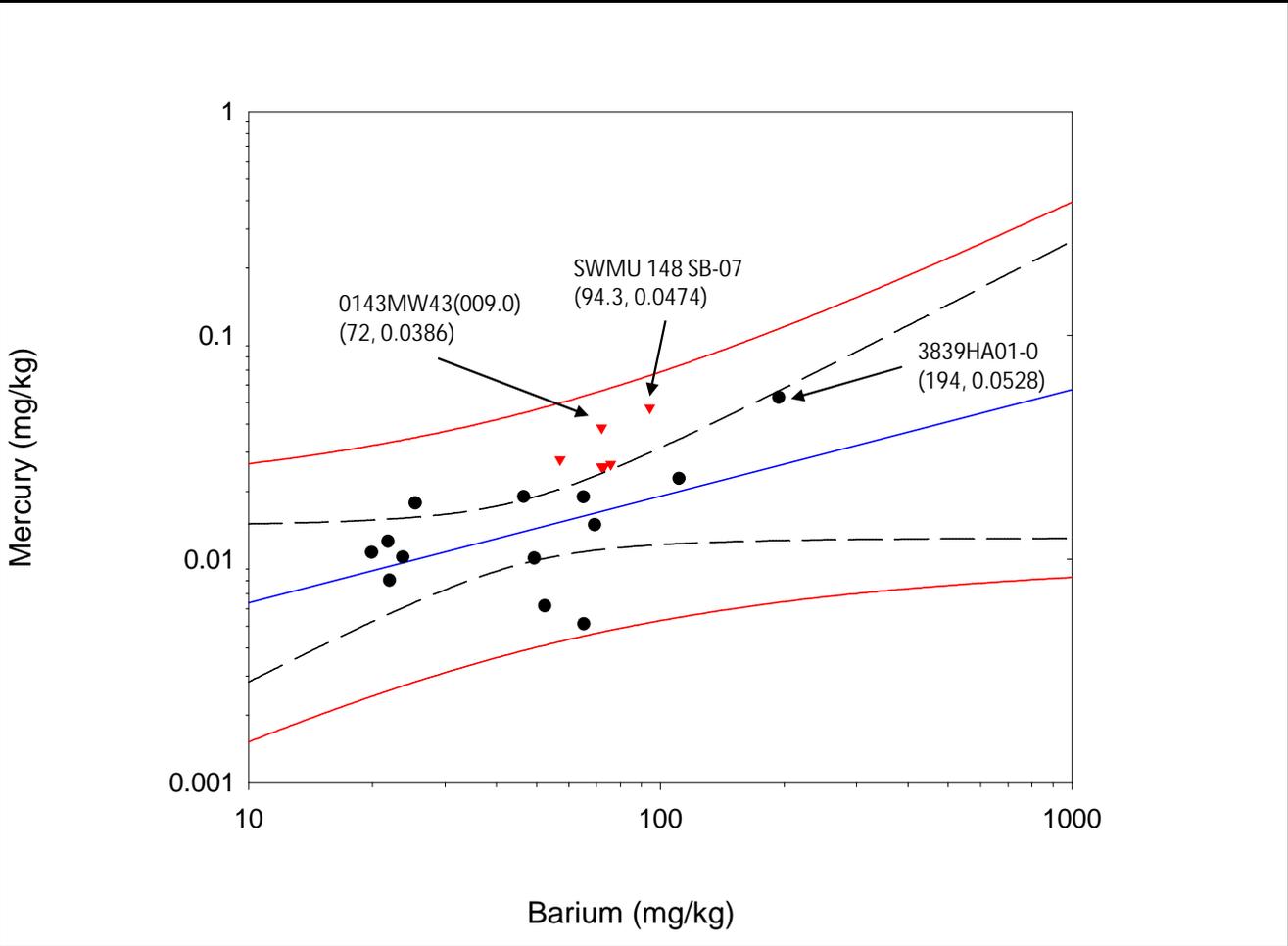
Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Lead vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals



Barium in Soil Geochemical Regression Plot
Mercury vs Barium (mg/kg)
 White Sands Missile Range, HELSTF, New Mexico

Figure F5-6

Correlation Coefficient (r) = 0.545
 Regression Coefficient (r^2) = 0.297

Notes:

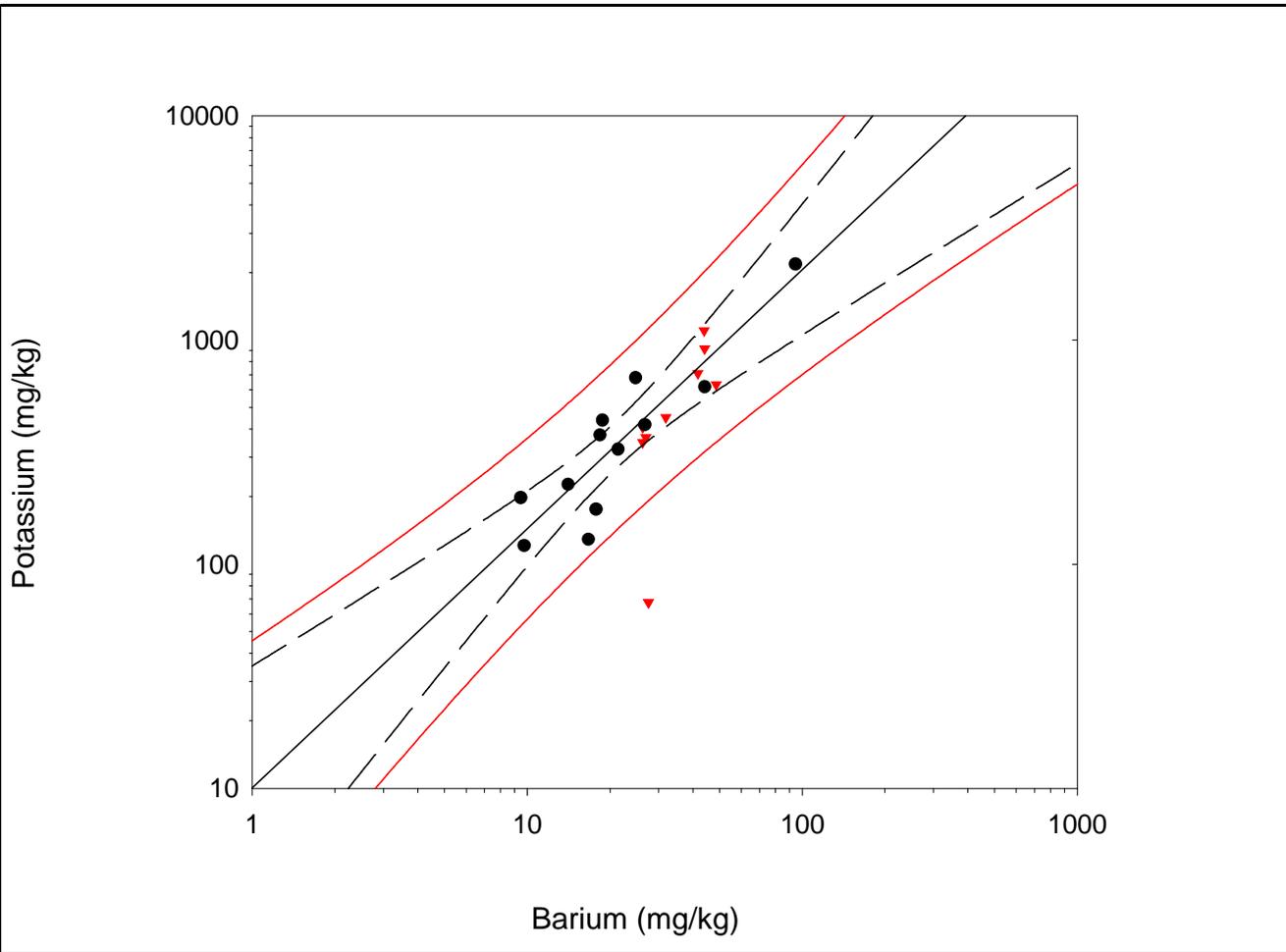
Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Mercury vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals



**Barium in Soil Geochemical Regression Plot
Potassium vs Barium (mg/kg)**
White Sands Missile Range, HELSTF, New Mexico

**Figure
F5-7**

Correlation Coefficient (r) = 0.896
 Regression Coefficient (r^2) = 0.803

Notes:

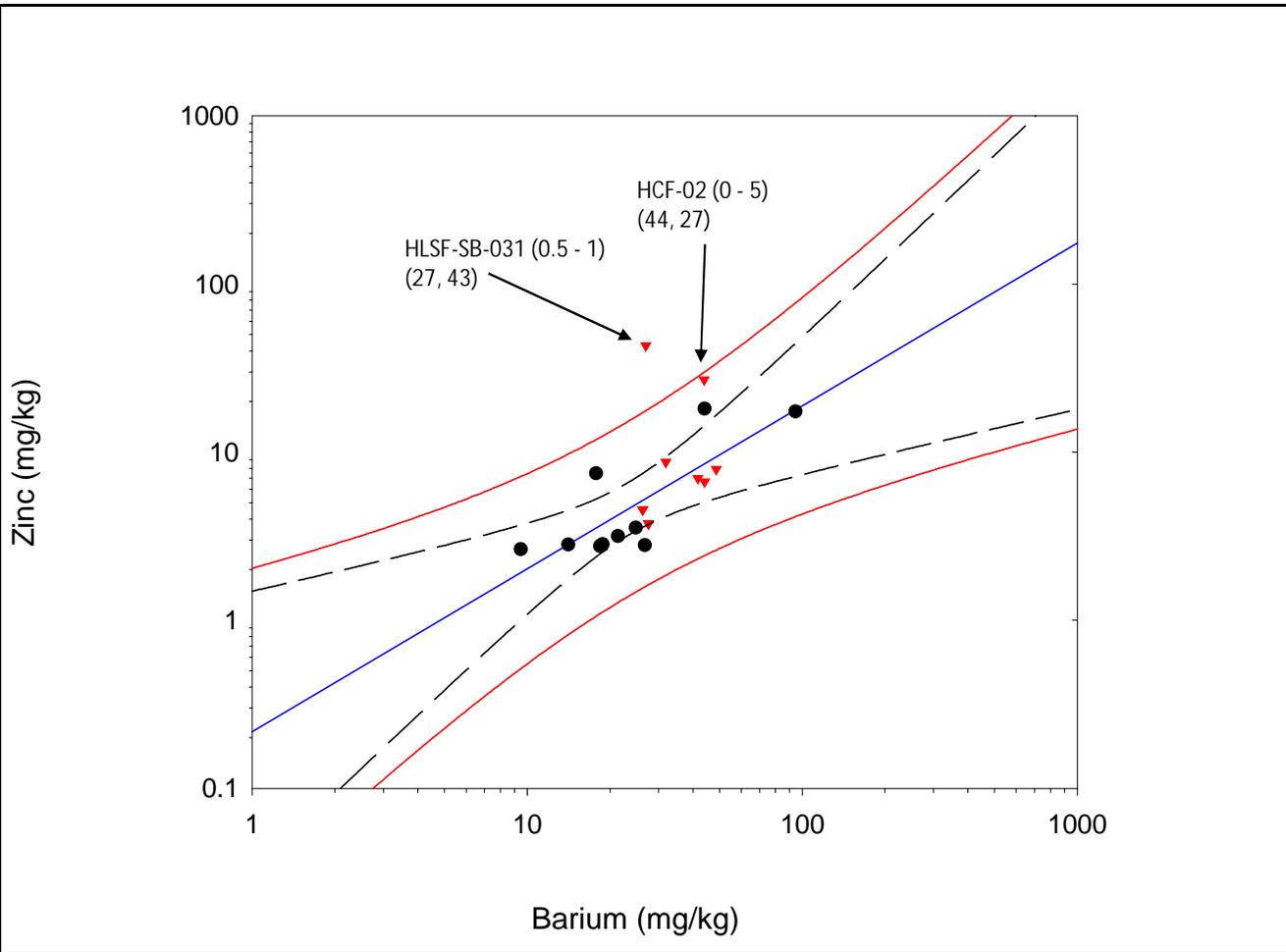
Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Potassium vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals



**Barium in Soil Geochemical Regression Plot
Zinc vs Barium (mg/kg)**

White Sands Missile Range, HELSTF, New Mexico

**Figure
F5-8**

Correlation Coefficient (r) = 0.797

Regression Coefficient (r^2) = 0.635

Notes:

Samples exceeding the UTL that have a corresponding barium results are annotated for reference.

Data include soil samples collected 0-10 feet below ground surface.

Regression is based on detected background values only.

Background samples that are also assigned to SWMUs are included in the regression only once and plotted as background.

- = Background sample
- ▼ = Site sample
- = Zinc vs Barium (mg/kg)
- = 95% confidence intervals
- = 95% prediction intervals